



GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining

JOHN R. BAZA
Division Director

April 19, 2018

John Byars, General Manager
Canyon Fuel Company, LLC
397 South 800 West
Salina, Utah 84654

Subject: Conditional Approval of State Permit for Green's Hollow Lease Tract, Canyon Fuel Company, LLC, Sufco Mine, C/041/0002, Task #5445

Dear Mr. Byars:

The Division has found that Canyon Fuel Company, LLC has met all of the requirements for permitting the Green's Hollow Lease tract as part of the Sufco mine. Enclosed are two original renewed permanent program mining permits for the Sufco Mine with the State's Decision Document. The Green's Hollow lease tract is approved for mining according to the Sufco Mine permit and the revised Mining and Reclamation plan. Please read the permit to be sure you understand the requirements of the permit and conditions.

The conditions of the permit include:

- 1) Canyon Fuel Company, LLC must submit water quality data for the Sufco Mine in an electronic format through the Electronic Data Input web site, <http://linux1.ogm.utah.gov/cgi-bin/appx-ogm.cgi>.
- 2) Underground coal mining and reclamation activities in federal coal lease UTU-84102 (Green's Hollow) may not commence until a mining plan approval is authorized by the Secretary of the Interior.
- 3) To protect sage-grouse habitat, Canyon Fuel Company, LLC will locate new appurtenant surface facilities outside priority habitat management areas, unless no technically feasible alternative exists. If new appurtenant surface facilities cannot be located outside of priority habitat management areas, locate them within any existing disturbed areas, if possible. If location within an existing disturbed area is not possible, then construct new facilities to minimize disturbed areas while meeting mine safety standards and requirements in the established mine-plan approval process and locate the facilities in an area least harmful to greater sage-grouse habitat based on vegetation, topography, or other habitat features.

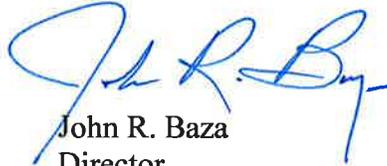


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As explained in the conditions, mining in the Green's Hollow Lease tract cannot begin until the mining plan is approved by the Secretary of the Interior. Please have both copies of the state permit signed by the company official with signatory authority and return one copy to the Division. At this time you should also submit clean copies of the application for incorporation into the approved MRP.

If you have any questions, please call Daron Haddock at (801) 538-5325.

Sincerely,



John R. Baza
Director

JRB/DRH/ss
Enclosures
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**UTAH DIVISION OF OIL, GAS AND MINING
STATE DECISION DOCUMENT
For
GREEN'S HOLLOW LEASE PERMIT**

Canyon Fuel Company, LLC
Sufco Mine
C/041/0002
Sevier County, Utah

April 19, 2018

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ADMINISTRATIVE OVERVIEW

Canyon Fuel Company, LLC
Sufco Mine
Green's Hollow Tract Revision
C/041/0002
Sevier County, Utah

April 19, 2018

Canyon Fuel Company, LLC made application to the Division of Oil, Gas and Mining for adding additional federal lease acreage to the existing SUFCO mine. This additional area is known as the Green's Hollow Lease Tract (UTU-84102) and comprises 6,175.39 acres, all of which will be mined using underground mining methods. The Green's Hollow Tract is contiguous to, and will be accessed through, the existing SUFCO mine. No new surface facilities or disturbance is planned for this lease.

BACKGROUND

The Sufco Mine, formerly known as the Convulsion Canyon Mine and operated by Southern Utah Fuel Company (Sufco), is located approximately 30 miles east of Salina, Utah, with the surface facilities and access portals on U. S. Forest Service land in East Spring Canyon, within Section 12, Township 22 South, Range 4 East, Salt Lake Baseline and Meridian. The mine commenced operations in 1941, mining federally owned coal. The original mine plan was submitted to the U. S. Geological Survey (USGS) and the Utah Division of Oil, Gas and Mining (DOGGM) in 1977. Additional information was submitted, and the mine plan was approved by DOGM pursuant to the Utah Mined Land Reclamation Act on September 14, 1977. The USGS approved the plan on February 3, 1978.

In October of 1979, Sufco submitted additional information to comply with the regulation of the newly implemented Surface Mining Control and Reclamation Act of 1977. A joint OSM/DOGGM review was conducted and the mine plan application was declared complete on July 18, 1983. A permanent program permit was issued to the Coastal States Energy Company on May 19, 1987, consisting of five federal leases and one fee lease for a total of 7,355 acres. The need for a waste rock disposal site was soon apparent. Coastal States applied for a disposal site located on a 40-acre tract of private land located approximately 6 miles west of the mine portals. This waste rock site was approved on August 26, 1988, bringing the revised permit area to a total of 7395 acres.

On July 3, 1989, application was made to add another federal lease known as the Quitchupah Lease to the permit area. Approval for the new lease was obtained and a revised permit was issued effective December 21, 1989. This new lease brought the total permit area to 17,301 acres.

On December 20, 1996 the permit was transferred to Canyon Fuel Company, LLC.

A lease modification to the Quitchupah lease (150 acres) was submitted in January 1999. This was approved as an incidental boundary change and added to the existing permit area on October 20, 1999.

Canyon Fuel Company, LLC acquired the Pines Tract lease through a lease by application (LBA) process. An EIS was completed for the Pines Tract lease on January 28, 1999 and the lease was issued to Canyon Fuel Company, LLC on September 1, 1999. The state issued a permit on June 22, 2000, and the mining plan approval was signed by the Secretary on July 25, 2000. The SITLA Muddy Tract was approved on January 20, 2006.

Lease modifications known as the west lease modifications, to add the following federal coal leases: SL-062583, U-47080, and U-63214 were submitted by Canyon Fuel Company, LLC in January 2011. The addition of these three lease modifications added 2,312.74 acres to the area authorized for mining bringing the total area authorized for mining to 27,605.17 acres. The West Coal Lease Modifications were approved on March 23, 2011.

At about the same time Sufco applied to reduce the permit area to just the disturbed and bonded area (a result of a legislative audit). This changed the permitted area to 720.483 acres. The permit was renewed on May 21, 2012 with the same permit and authorized mining area. On January 16, 2013, the Division approved the South Fork Quitchupah 2R2S amendment. While this action did not change the permit area, it did change the area authorized for mining primarily because of lease relinquishments that occurred at the time. The area authorized for mining totaled 23,820.58 acres. In 2016 Canyon Fuel Company relinquished the South Fork Lease which further reduced the area authorized for mining to 20,227.25 acres. In May of 2017, the proposed Quitchupah fan and shaft were dropped from the permit leaving a total of 691.728 acres of permit area. A renewed mine permit was issued on May 21, 2017.

Canyon Fuel Company is now expanding their area authorized for mining to include the Greens Hollow lease. This expansion will add 6175.39 acres of new lease. There are no planned disturbances associated with this lease, so the permit/disturbed area will not change. Canyon Fuel, LLC acquired the Greens Hollow lease through a lease by application (LBA) process starting on December 7, 2005. The lease was signed by the BLM State Director on March 14, 2017 (effective April 1, 2017) after a lengthy NEPA process spanning several years.

ANALYSIS

The Canyon Fuel proposal to permit the Green's Hollow lease was submitted on April 21, 2017. After an initial review, Canyon Fuel Company submitted additional information that satisfied the Division's completeness requirements. The application was determined to be administratively complete on May 11, 2017. An extensive technical review was initiated which also involved coordination with other state and federal agencies.

The Division has completed a thorough technical analysis of the proposed Mining and Reclamation Plan submitted by Canyon Fuel and has found that the applicant has met the requirements of the R645 coal mining regulations. Besides the NEPA that was completed during the leasing process, an EA is being prepared by the Office of Surface Mining with DOGM as a

cooperating agency for the mining plan decision document (MPDD).

Extraction of coal will primarily be by longwall mining methods with room and pillar development. The LBA as applied for is estimated to contain about 56.6 million tons of recoverable federal coal. The addition of this lease to the mine will extend the life of the SUFCO mine by approximately 9-10 years. It is estimated that production will range from 5.5 thru 6.3 million tons per year.

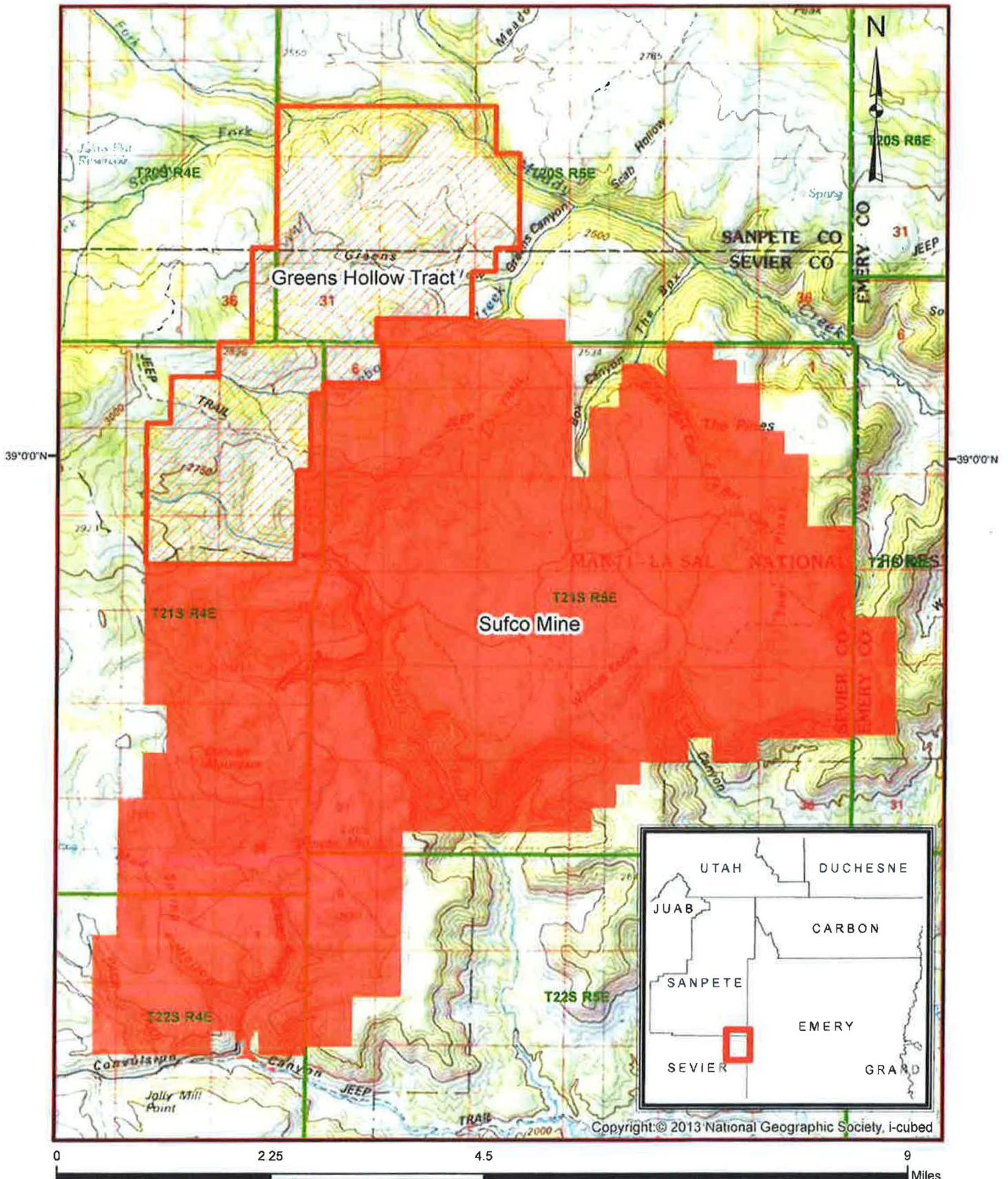
RECOMMENDATION

Approval for this permit renewal is recommended. This recommendation is based on the complete permit application package (PAP), the Technical Analysis (TA) conducted by the Division, the Cumulative Hydrologic Impact Assessment (CHIA) also prepared by the Division, and the administrative record. Canyon Fuel Company, LLC has demonstrated that mining of the Green's Hollow Lease Tract can be done in conformance with the Surface Mining Control and Reclamation Act and the corresponding Utah Act and performance standards. The 510 (C) report on the Applicant Violator System for this mine has an issue recommendation.

The public notice for this permit renewal was last published on June 6, 2017 in the Emery County Progress and in The Richfield Reaper and the Sanpete Messenger on June 8th, 2017. The public comment period ended on July 10, 2017 with no comments received.

It is recommended that approval be given for the addition of the Green's Hollow Tract to the SUFCO mine with conditions as outlined in Attachment A to the Permit.

State of Utah, Division of Oil, Gas and Mining Sufco Mine C/041/0002



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PERMITTING CHRONOLOGY

Canyon Fuel Company, LLC
Sufco Mine
Green's Hollow Tract Revision
C/041/0002
Sevier County, Utah

April 19, 2018

- April 21, 2017 Canyon Fuel Company, LLC submits application for permitting the Green's Hollow Lease Tract.
- May 11, 2017 Division notifies Canyon Fuel Company, LLC that the application is administratively complete.
- May 11, 2017 Division notifies Canyon Fuel Company, LLC other federal, state, and local governmental agencies and water users that the application is determined administratively complete.
- May 16, 23, 30,
and June 6, 2017 Canyon Fuel Company, LLC published notice in Emery County Progress for four consecutive weeks.
- May 18, 25, and
June 1, 8, 2017 Canyon Fuel Company, LLC published notice in The Richfield Reaper for four consecutive weeks.
- May 18, 25, and
June 1, 8, 2017 Canyon Fuel Company, LLC published notice in Sanpete Messenger for four consecutive weeks.
- July 10, 2017 End of public comment period. No comments received.
- October 4, 2017
January 22, 2018
April 4, 2018 Canyon Fuel Company, LLC submits revised information in response to deficiencies identified.
- April 19, 2018 Division conditionally approves the application for mining the Green's Hollow lease and forwards the Decision Document to OSM for Federal Mine Plan approval.

PERMIT FINDINGS

Canyon Fuel Company, LLC
Sufco Mine
Green's Hollow Lease Tract Addition
C/041/0002
Sevier County, Utah

April 19, 2018

1. The revised plan and the permit application are accurate and complete and all requirements of the Surface Mining Control and Reclamation Act, and the approved Utah State Program (the "Act") have been complied with (R645-300-133.100). See attached Technical Analysis dated April 18, 2018.
2. No additional surface reclamation is required since the additional lease area will be mined as an underground extension of the existing mine. There will be no new surface facilities (R645-300-133.710).
3. The assessment of the probable cumulative impacts of all anticipated coal mining and reclamation activities in the general area on the hydrologic balance has been conducted by the regulatory authority and no significant impacts or material damage findings were identified. The Mining and Reclamation Plan (MRP) proposed under the application has been designed to prevent damage to the hydrologic balance in the permit area and in associated off-site areas (R645-300-133.400 and UCA 40-10-11 {2}{c}) (See Cumulative Hydrologic Impact Analysis [CHIA], updated April 17, 2018).
4. The proposed lands to be included within the permit area are:
 - a. not included within an area designated unsuitable for underground coal mining operations (R645-300-133.220) ;
 - b. not within an area under study for designated lands unsuitable for underground coal mining operations (R645-300-133.210) ;
 - c. not on any lands subject to the prohibitions or limitations of 30 CFR 761.11 {a} (national parks, etc.), 761.11 {f} (public buildings, etc.) and 761.11 {g} (cemeteries);
 - d. not within 100 feet of the outside right-of-way of a public road (R645-300-133.220);
 - e. not within 300 feet of any occupied dwelling (R645-300-133-220).

5. The regulatory authority's issuance of a permit is in compliance with the National Historic Preservation Act and implementing regulations (36 CFR 800) (R645-300-133.600). The acreage proposed in this incidental boundary change is not planned for any surface disturbing activity.
6. The applicant has the legal right to enter and complete mining activities through a federal coal lease issued by the Bureau of Land Management (Lease UTU - 84102) (R645-300-133.300).
7. A 510(c) report has been run on the Applicant Violator System (AVS), which shows that: prior violations of applicable laws and regulations have been corrected; neither Canyon Fuel Company, LLC or any affiliated company, are delinquent in payment of fees for the Abandoned Mine Reclamation Fund; and the applicant does not control and has not controlled mining operations with a demonstrated pattern of willful violations of the Act of such nature, duration, and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (R645-300-133.730). (See attached evaluations dated April 17 and 24, 2018).
8. Underground mining operations to be performed under the permit will not be inconsistent with other operations anticipated to be performed in areas adjacent to the proposed permit area. There are no other permits adjacent to the SUFCO Mine.
9. The applicant has posted financial assurance for the SUFCO Mine Complex in the amount of \$4,680,000.00. (Bond #1093364 issued by Lexon Insurance Company and indemnified by Ironshore Indemnity Inc.). No additional surety will be required, since there is no additional surface disturbance proposed (R645-300-134).
10. No lands designated as prime farmlands or alluvial valley floors occur within the permit area or the Green's Hollow lease areas (R645-302-313.100) (R645-302-321.100).
11. The proposed postmining land-use of the permit area is the same as the pre-mining land use and has been approved by the regulatory authority. (See R645-301- 400)
12. The regulatory authority has made all specific approvals required by the Act, the Cooperative Agreement, and the Federal Lands Program.
13. The proposed operation will not affect the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats (R645-300-133.500).
14. All procedures for public participation required by the Act, and the approved Utah State Program have been complied with. This permitting action was published for four consecutive weeks with a 30-day public comment period. No comments were received. (R645-300-120).
15. No existing structures will be used in conjunction with mining of the underground lease addition other than those constructed in compliance with the performance standards of R645-301 and R645-302 (R645-300-133.720).

David R. Haddock

Permit Supervisor

Ken G...

Associate Director of Mining

John R. By...

Director

FEDERAL

**May 21, 2017
Revised April 17, 2018**

**PERMIT
C/041/0002**

**STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1594 West North Temple
Box 145801
Salt Lake City, Utah 84114-5801
(801) 538-5340**

This permit, C/041/0002, is issued for the State of Utah by the Utah Division of Oil, Gas and Mining (DOGM) to:

**Canyon Fuel Company, LLC
225 North 5th Street, Suite 900
Grand Junction, Colorado 85101
(970) 263-5130**

for the Sufco Mine (previously the Convulsion Canyon Mine.) Canyon Fuel Company, LLC is the lessee of federal, state and fee-owned property. A performance bond is filed with the DOGM in the amount of \$4,362,000.00 payable to the state of Utah, Division of Oil, Gas and Mining and the Office of Surface Mining Reclamation and Enforcement (OSMRE). DOGM must receive a copy of this permit signed and dated by the permittee.

Sec. 1 STATUTES AND REGULATIONS - This permit is issued pursuant to the Utah Coal Mining and Reclamation Act of 1979, Utah Code Annotated (UCA) 40-10-1 et seq, hereafter referred to as the Act.

Sec. 2 PERMIT AREA - The permittee is authorized to conduct surface disturbing activities only as described in the approved Mining and Reclamation Plan and within areas covered by the Performance Bond which are within the described permit area at the Sufco Mine situated in the state of Utah, Sevier and Emery Counties, and located as follows:

Mine Site Facility, Water Tank, South Portals, Spring Collection Field, Pump House, Pipeline, Leachfield (Approximately 64.403 acres)

Township 22 South, Range 4 East, SLBM

Section 12: A Portion of the following: E1/2NW1/4,
SW1/4NW1/4NE1/4, S1/2

Portals – 3 East, 4 East, Quitcupah and Link Canyon, Link Canyon Substation No.1 and No. 2 (Approximately 3.368 acres)

Township 21 South, Range 5 East, SLBM

- Section 26: A portion of the following: SE1/4SW1/4SW1/4NW1/4, E1/2NW1/4NW1/4SW1/4, SE1/4NE1/4SW1/4SW1/4
Section 29: A portion of the following: NW1/4NW1/4SW1/4SE1/4, NE1/4NW1/4SE1/4SW1/4, NE1/4NE1/4SE1/4SW1/4
Section 32: A portion of the following: NE1/4SW1/4SW1/4NE1/4

Waste Rock Disposal Site (Approximately 81.25 acres)

Township 22 South, Range 4 East, SLBM

- Section 18: S1/2NW1/4NE1/4, S1/2N1/2NW1/4NE1/4, S1/2S1/2NE1/4NW1/4NW1/4NE1/4, S1/2S1/2NW1/4NE1/4NW1/4NE1/4, W1/2SW1/4NE1/4NE1/4, W1/2E1/2SW1/4NE1/4NE1/4, S1/2SW1/4NW1/4NE1/4NE1/4, S1/2N1/2SW1/4NE1/4NE1/4, NW1/4SW1/4NE1/4, W1/2NE1/4SW1/4NE1/4, NW1/4SW1/4SW1/4NE1/4, N1/2NE1/4SW1/4SW1/4NE1/4, SW1/4NE1/4NE1/4SW1/4NE1/4, N1/2NE1/4NE1/4SW1/4NE1/4, N1/2NW1/4SE1/4SW1/4NE1/4, NE1/4NE1/4SE1/4NW1/4, SE1/4NW1/4NE1/4SE1/4NW1/4, S1/2NE1/4SE1/4NW1/4, S1/2SE1/4NW1/4SE1/4NW1/4, NE1/4SW1/4SE1/4NW1/4, N1/2SE1/4SE1/4NW1/4

North Water Mitigation Area (Approximately 542.260 acres)

Township 21 South, Range 5 East, SLBM

- Section 2: A portion of the following: SW1/4SW1/4SW1/4
Section 3: A portion of the following: S1/2SE1/4
Section 10: A portion of the following: NE1/4, N1/2NE1/4SE1/4,
Section 11: A portion of the following: W1/2NW1/4, W1/2SE1/4NW1/4, E1/2SW1/4, E1/2NW1/4SW1/4, S1/2SE1/4, NW1/4SE1/4, S1/2NE1/4SE1/4
Section 12: A portion of the following: W1/2SW1/4
Section 14: A portion of the following: W1/2NE1/4, NE1/4NW1/4

Sinkhole (Approximately 0.45 acres)

Township 22 South, Range 4 East, SLBM

- Section 2: A portion on the following: SW1/4NE1/4

Total approximately 691.73 acres

Sec. 3 AUTHORIZED MINING AREA - The permittee is authorized to conduct underground coal mining and reclamation activities only as described in the approved Mining and Reclamation Plan and on lands where the "Right-of-Entry" has been acquired. This area includes the area above underground works and areas subject to subsidence and is described as follows:

Federal Coal Lease U-28297 - (716.51 acres)

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

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

Sec. 33, NW1/4SW1/4

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

Sec. 5, W1/2W1/2

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

Sec. 8, W1/2NW1/4

Federal Coal Lease U-062453 – (480 acres)

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

Sec. 28, SW1/4SW1/4

Sec. 29, SE1/4SE1/4

Sec. 32, N1/2

Sec. 33, W1/2NW1/4

Federal Coal Lease U-0149084 - (240 acres)

T.22 S., R. 4 E., SLM, Utah

Sec. 12, NE1/4 and N1/2SE1/4

Federal Coal Lease SL-062583 - (3,079.83 acres)

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

Sec. 36, S1/2

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

Sec. 31, all

T.22 S., R. 4 E., SLM, Utah

Sec. 1, lots 1 to 4 S1/2N1/2, S1/2

Sec. 2, SE1/4, S1/2SW1/4

Sec. 3, SE1/4SE1/4

Sec. 10, E1/2NE1/4, NE1/4SE1/4

Sec. 11, N1/2, N1/2S1/2

Sec. 12, NW1/4

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

Sec. 6, all

Sec. 7, N1/2NE1/4, E1/2NW1/4

Federal Coal Lease U-47080 - (1,953.73 acres)

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

Sec. 25, all

Sec. 35, E1/2, E1/2SW1/4

Sec. 36, N1/2

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

Sec. 30, lots 2-4, W1/2SE1/4

T.22 S., R. 4 E., SLM, Utah

Sec. 2, lots 1-4, S1/2NE1/4, S1/2NW1/4, N1/2SW1/4

Sec. 3, NE1/4SE1/4

Federal Coal Lease U-63214 - (6.336.34 acres)

Tract 1:

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

Sec. 12, E1/2SE1/4

Sec. 13, E1/2NE1/4, S1/2

Sec. 14, E1/2SW1/4, SE1/4

Sec. 23, E1/2, E1/2W1/2

Sec. 24, all

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

Sec. 16, W1/2NW1/4, W1/2SW1/4, W1/2E1/2NW1/4, W1/2E1/2SW1/4

Secs. 17-19, all

Sec. 20, NE1/4, W1/2SE1/4, SW1/4, NW1/4

Sec. 21, W1/2NW1/4, W1/2E1/2NW1/4

Sec. 26, W1/2NW1/4SW1/4, SW1/4SW1/4

Sec. 27, NE1/4, SE1/4, S1/2SW1/4, S1/2N1/2SW1/4

Sec. 28, S1/2SE1/4, S1/2N1/2SE1/4, S1/2N1/2SW1/4, SE1/4SW1/4

Sec. 29, S1/2NE1/4SE1/4

Sec. 30, lot 1, N1/2NE1/4

Sec. 33, NE1/4, E1/2NW1/4, NE1/4SW1/4, N1/2SE1/4

Sec. 34, NW1/4NE1/4, NW1/4, NW1/4SW1/4

Tract 3:

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

Sec. 26, E1/2, E1/2SW1/4

Sec. 35, NW1/4, W1/2SW1/4

Federal Coal Lease UTU-76195 - (4,148.15 acres)

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

Sec. 2, lots 3, 4, S1/2SW1/4, SW1/4SE1/4

Sec. 10, NE1/4NE1/4

Sec. 11, NE1/4, SE1/4, NW1/4NW1/4, NE1/4NW1/4, SE1/4NW1/4,
N1/2SW1/4NW1/4, SW1/4SW1/4NW1/4, E1/2SW1/4, E1/2NW1/4SW1/4,
SE1/4SW1/4NW1/4

Sec. 12, S1/2SW1/4, NW1/4SW1/4

Sec. 13, NW1/4, S1/2

Sec. 14, NE1/4, E1/2NW1/4, E1/2E1/2SE1/4

Sec. 22, S1/2S1/2SE1/4

Sec. 23, SE1/4, E1/2SW1/4, S1/2SW1/4SW1/4, S1/2SE1/4NW1/4,
SE1/4NW1/4NE1/4, S1/2NE1/4NE1/4, NE1/4NE1/4NE1/4,
S1/2SW1/4NE1/4, NE1/4SW1/4NE1/4, SE1/4NE1/4

Sec. 24, all

Sec. 25, N1/2, N1/2S1/2

Sec. 26, N1/2, NE1/4SW1/4, E1/2NW1/4SW1/4, SE1/4

T.21 S., R. 6 E., SLM

Sec. 19, lots 3-4, E1/2SW1/4

Sec. 30, lots 1-3, E1/2NW1/4, NE1/4SW1/4

Federal Coal Lease UTU-84102 – (6,175.39 acres)

T.20 S., R. 4 E., SLM

Sec. 36, lot 4, E1/2NE1/4, NE1/4SE1/4

T.20 S., R. 5 E., SLM

Sec. 19, lots 5-8, E1/2SW1/4, SE1/4

Sec. 20, S1/2

Sec. 21, W1/2SW1/4

Sec. 28, W1/2

Sec. 29, all

Sec. 30, all

Sec. 31, all

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

Sec. 33, NW1/4NW1/4

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

Sec. 1, all

Sec. 2, SE1/4

Sec. 11, E1/2, E1/2W1/2

Sec. 12, NE1/4, W1/2, W1/2SE1/4

Sec. 13, W1/2NE1/4, NW1/4

Sec. 14, NE1/4, E1/2NW1/4

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

Sec. 6, all

BLM Right of Way UTU-91108 (70 acres)

T.21 S., R. 4 E. SLB&M

Sec. 1, E1/2SE1/4SE1/4, SE1/4NE1/4SE1/4
Sec. 12, E1/2E1/2NE1/4

State of Utah Coal Lease ML 49443-OBA - (2,294.19 acres)

T.21 S., R. 5 E., SLB&M

Sec. 4: Lots 1 - 4, S1/2S1/2
Sec. 5: Lots 1 - 4, S1/2S1/2
Sec. 7: Lots 1 - 4, NE1/4, SE1/4
Sec. 8: All
Sec. 9: All

Fee lands owned by Canyon Fuel Company, LLC as follows:

T.21 S., R. 5 E., SLB&M, Utah

Sec. 29, SW1/4, NW1/4, W1/2NE1/4, W1/2SE1/4
Sec. 30, S1/2NE1/4, E1/2SE1/4
containing 640.00 acres

T. 22 S., R. 4 E., SLB&M, Utah

Sec. 18, NE1/4, SE1/4NW1/4, NE1/4SE1/4
containing 240 acres

U. S. Forest Service special use permit areas

T. 22 S., R. 4 E., SLB&M, Utah

Sec. 12, S1/2
containing 28.5 acres

This legal description is for the authorized mining area of the Sufco Mine included in the mining and reclamation plan on file at the Division. The permittee is authorized to conduct coal mining and reclamation operations connected with underground mining on the foregoing described property subject to the conditions of the leases, the approved mining plan, including all conditions and all other applicable conditions, laws and regulations.

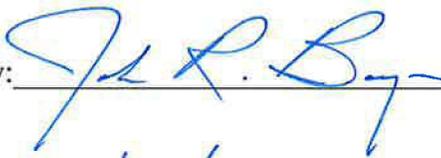
- Sec. 4** **COMPLIANCE** - The permittee will comply with the terms and conditions of the permit, all applicable performance standards and requirements of the State Program.
- Sec. 5** **PERMIT TERM** - This permit expires on May 21, 2022.
- Sec. 6** **ASSIGNMENT OF PERMIT RIGHTS** - The permit rights may not be transferred, assigned or sold without the approval of the Director, DOGM. Transfer, assignment or sale of permit rights must be done in accordance with applicable regulations, including but not limited to 30 CFR 740.13(e) and R645-303.

- Sec. 7** **RIGHT OF ENTRY** - The permittee shall allow the authorized representative of the DOGM, including but not limited to inspectors, and representatives of OSMRE, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:
- (a) have the rights of entry provided for in 30 CFR 840.12, R645-400-110, 30 CFR 842.13 and R645-400-220; and,
 - (b) be accompanied by private persons for the purpose of conducting an inspection in accordance with R645-400-100 and 30 CFR 842, when the inspection is in response to an alleged violation reported by the private person.
- Sec. 8** **SCOPE OF OPERATIONS** - The permittee shall conduct surface disturbing activities only on those lands specifically designated as within the permit area (in section 2 above) on the maps submitted in the mining and reclamation plan and permit application and approved for the term of the permit and which are subject to the performance bond. All coal mining and reclamation operations are to be conducted within the bounds of the authorized mining area.
- Sec. 9** **ENVIRONMENTAL IMPACTS** - The permittee shall minimize any adverse impact to the environment or public health and safety through but not limited to:
- (a) accelerated monitoring to determine the nature and extent of noncompliance and the results of the noncompliance;
 - (b) immediate implementation of measures necessary to comply; and
 - (c) warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.
- Sec. 10** **DISPOSAL OF POLLUTANTS** - The permittee shall dispose of solids, sludge, filter backwash or pollutants in the course of treatment or control of waters or emissions to the air in the manner required by the approved Utah State Program and the Federal Lands Program which prevents violation of any applicable state or federal law.
- Sec. 11** **CONDUCT OF OPERATIONS** - The permittee shall conduct its operations:
- (a) in accordance with the terms of the permit to prevent significant, imminent environmental harm to the health and safety of the public; and
 - (b) utilizing methods specified as conditions of the permit by DOGM in approving alternative methods of compliance with the performance standards of the Act, the approved Utah State Program and the Federal Lands Program.
- Sec. 12** **EXISTING STRUCTURES** - As applicable, the permittee will comply with R645-301 and R645-302 for compliance, modification, or abandonment of existing structures.

- Sec. 13 RECLAMATION FEE PAYMENT** - The operator shall pay all reclamation fees required by 30 CFR Part 870 for coal produced under the permit, for sale, transfer or use.
- Sec. 14 AUTHORIZED AGENT** - The permittee shall provide the names, addresses and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.
- Sec. 15 COMPLIANCE WITH OTHER LAWS** - The permittee shall comply with the provisions of the Water Pollution Control Act (33 USC 1151 et seq.) and the Clean Air Act (42 USC 7401 et seq), UCA 26-11-1 et seq, and UCA 26-13-1 et seq.
- Sec. 16 PERMIT RENEWAL** - Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit in accordance with the Act, the approved Utah State program and Federal lands program.
- Sec. 17 CULTURAL RESOURCES** - If during the course of mining operations, previously unidentified cultural resources are discovered, the permittee shall ensure that the site(s) is not disturbed and shall notify DOGM. DOGM, after coordination with OSMRE, shall inform the permittee of necessary actions required. The permittee shall implement the mitigation measures required by DOGM within the time frame specified by DOGM.
- Sec. 18 APPEALS** - The permittee shall have the right to appeal as provided for under R645-300.
- Sec. 19 SPECIAL CONDITIONS** - There are special conditions associated with this permitting action as described in Attachment A.

The above conditions (Secs. 1-19) are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the lease. The permittee shall require his agents, contractors and subcontractors involved in activities concerning this permit to include these conditions in the contracts between and among them. These conditions may be revised or amended, in writing, by the mutual consent of DOGM and the permittee at any time to adjust to changed conditions or to correct an oversight. DOGM may amend these conditions at any time without the consent of the permittee in order to make them consistent with any new federal or state statutes and any new regulations.

THE STATE OF UTAH

By: 

Date: 4/23/18

I certify that I have read, understand and accept the requirements of this permit and any special conditions attached.

Authorized Representative of the Permittee

Date: _____

ATTACHMENT A

- 1) Canyon Fuel Company, LLC must submit water quality data for the Sufco Mine in an electronic format through the Electronic Data Input web site, <http://linux1.ogm.utah.gov/cgi-bin/appx-ogm.cgi>.
- 2) Underground coal mining and reclamation activities in federal coal lease UTU-84102 (Green's Hollow) may not commence until a mining plan approval is authorized by the Secretary of the Interior.
- 3) To protect sage-grouse habitat, Canyon Fuel Company, LLC will locate new appurtenant surface facilities outside priority habitat management areas, unless no technically feasible alternative exists. If new appurtenant surface facilities cannot be located outside of priority habitat management areas, locate them within any existing disturbed areas, if possible. If location within an existing disturbed area is not possible, then construct new facilities to minimize disturbed areas while meeting mine safety standards and requirements in the established mine-plan approval process and locate the facilities in an area least harmful to greater sage-grouse habitat based on vegetation, topography, or other habitat features.



GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining
JOHN R. BAZA
Division Director

Technical Analysis and Findings
Utah Coal Regulatory Program

April 18, 2018

PID: C0410002
TaskID: 5445
Mine Name: SUFCO MINE
Title: GREENS HOLLOW LEASE

General Contents

Identification of Interest

Analysis:

The application meets the State of Utah R645 requirements for Identification of Interest.

On April 13, 2018, Canyon Fuel Company, LLC submitted to the Division Revisions to Update Ownership. The submittal included an Organizational Chart (Figure 1-1) which included all of the partnerships and companies within the organization. The submittal also included Appendix 1-1, Organizational Ownership, Officers and Director information. The submittal was forwarded to the Office of Surface on April 17, 2018 for entry into the Applicant/Violator System.

ssteab

Violation Information

Analysis:

The application meets the State of Utah R645 requirements for Violation Information.

An AVS Permit Evaluation Report was generated for the SUFCO Mine C/041/0002 on April 17, 2018. The report retrieved 12 violations. The violations are coded "conditional" indicating a settlement, payment plan, or pending challenge, linking entity is John Joseph Siegel Jr.

ssteab

Legal Description

Analysis:

The amendment meets the State of Utah R645 requirements for providing an accurate legal description of the area to be included in the permit. The legal description provided on pages 1-11 and 1-12 titled Federal Coal Lease UTU-84102 – (6,175.39 acres) matches the legal description found in Appendix 1 of the ROD (p. 22) and the UTU-84102 BLM Coal Lease. The properties listed in the lease match the properties listed on pages 1-11 and 1-12 of the MRP as well as the properties delineated on Plate 5-6 (Land Ownership, Lease, and Permit Area Map).

tmiller

Environmental Resource Information

Historic and Archeological Resource Information

Analysis:

The amendment meets the State of Utah R645-301-411 requirements for historic and archeological resource information. Plate 5-10C shows the lease boundary, boundaries of No Subsidence Mining, limits of potential subsidence, and the locations of cultural sites. The map titled "Cultural Resource Sites Greens Hollow EIS" in Appendix 4-2 shows the size and shape of cultural sites located in the Greens Hollow EIS analysis area. Included in the Chapter 4 narrative of the amendment is the monitoring plan as outlined in the MOA. The MOA in its entirety is also found in Chapter 4 of the amendment.

The monitoring plan is to be implemented for sites 42SV3224, 42SV2584, and 42SV2589. The first step of the plan is to create detailed baseline maps and photographic records of the three sites. These records, in the form of site forms, are found in Appendix 4-2 of the amendment. The next step of the monitoring plan is to monitor each of the three sites yearly while mining is occurring in the area of the site. Site 42SV3224 ended up being part of another lease and a visit to that site will be planned in 2018 or 2019, once it has been determined that subsidence has most likely ended in the area. The area around the remaining two sites, 42SV2584 and 42SV2589, is not scheduled to be mined until approximately 2025. When it has been determined that subsidence is concluded in that area, a site visit with mine personnel, DOGM representatives, and Manti-La Sal National Forest Heritage Program representatives will be scheduled to evaluate any potential effects from subsidence. If no effects are found, that will conclude the monitoring plan and further monitoring will not be required. If effects are found, further consultation with MLSNF, Utah SHPO, and interested Tribes will be conducted to resolve the effects.

triller

Climatological Resource Information

Analysis:

The application meets the State of Utah R645 requirements for Climatological Resource Information.

The Permittee provides a statement of the climatological factors in Chapter 4 and Volume 9 of the MRP

aumarva

Vegetation Resource Information

Analysis:

The amendment meets the State of Utah R645-301-321 requirements for vegetation resource information. Volume 1, Chapter 3, Section 3.2.1, pages 3-3 through 3-5 provide vegetation information. This amendment updates Ch.3 on page 3-5 to include a summary of vegetation in the Greens Hollow Tract. Detailed vegetation information is located in the EIS (Environmental Impact Statement) prepared by the BLM. Plate 3-1 is updated to include the vegetation within the Greens Hollow Lease.

Ireinhart

Fish and Wildlife Resource Information

Analysis:

The amendment meets the State of Utah R645-301-322 requirements for fish and wildlife resource information. Volume 1, Chapter 3, Section 3.2.2, pages 3-6 through 3-27 provide fish and wildlife information. Section 3.2.2.3 contains the Fish and Wildlife Service Review. Appendices are located in Volume 5 Appendix 3-1 includes a report of field investigations from 1983. Appendix 3-2 is an aquatic resource inventory of the permit area. Appendix 3-3 is a wildlife assessment of the permit and adjacent area. Appendix 3-4 discusses raptors and avifauna Appendix 3-5 discusses fauna of the permit and adjacent area. Appendix 3-7 discusses power lines Appendix 3-8 is a bat survey for the SUFCO Mine Appendix 3-9 discusses vegetation and wildlife of the Pines Tract Appendix 3-10 is a monitoring and mitigation plan for mining under the east fork of Box Canyon. Appendix 3-11 discusses wildlife in the Muddy Creek area. Appendix 3-12 is the Mexican Spotted Owl survey for the Muddy Tract Appendix 3-13 discusses vegetation and wildlife of the West Coal Lease Modifications Appendix 3-14 is the Monitoring and Mitigation plan for undermining the south fork of

Quitcupah 2R2S Block A and 3R2S Block B. This amendment adds Appendix 3-15 which is the Wildlife Technical Report for Greens Hollow Coal Lease Tract. Federal and State sensitive species within the Greens Hollow Tract were evaluated. As noted on pages 294 and 295 of the FSEIS, the BLM analyzed the impacts of underground coal mining on wildlife and plant species listed under the ESA. None of the potential impacts from the project would be contrary to any of the laws, regulations, and orders included in the ESA of 1973, as amended. A supplemental biological assessment was prepared for the proposed Greens Hollow tract (Cirrus 2014f). That assessment determined there would be no effect on federally-listed threatened and endangered species under the alternatives analyzed. Therefore, consultation with the U.S. Fish and Wildlife Service was not required. There are no known federally listed plant species in the project area. One sensitive plant species (Link Canyon columbine) occurs in the general analysis area but not in the permit area and would not be affected by project. As required by the Migratory Bird Treaty Act, the BLM analyzed the impacts of the project on migratory birds. None of the potential impacts of the project would be contrary to any of the laws, regulations, and orders included in the Migratory Bird Treaty Act of 1918. The level of detail of the information is sufficient to design the protection and enhancement plan under R645-301-333 should one be required. The amended permit area contains habitats of unusually high value for fish and wildlife. However, none of these areas should be adversely affected from underground coal mining. Any surface disturbing activities will be evaluated separately. Pursuant to the Executive Order Implementing the Utah Conservation Plan for Greater Sage-Grouse, consultation with Utah Division of Wildlife occurred on 11/22/2016. DWR did not request any additional mitigation or monitoring at this time. Based on the analysis conducted by the BLM and the Divisions evaluation of the IPac Trust Resource Report generated November 22, 2016 and again on May 18, 2017, Consultation Code: 06E23000-2017-E-00883, the Division determined that approval of this amendment would not affect a listed species or designated critical habitat and therefore did not initiate informal consultation with U.S. Fish and Wildlife Service. Potential water depletions from mining operations that may have an effect on endangered fish species identified in pertinent fish recovery programs of the USFWS have been evaluated by the Windy Gap Process as it applies to existing coal mines in the Upper Colorado River Basin on pages 3-40A-B. Total mining operations net water gain is 5365.2 ac-ft/yr.

Ireinhart

Soils Resource Information

Analysis:

Analysis: The R645-301-200 soils environmental regulations do not apply to this application, because it does not describe any surface disturbance. The application adds 6,696.41 acres in BLM Greens Hollow Lease UTU-84102 within T. 20 S., R. 4 E., Sec 36, 14, 23, 24; and T 20 S., R. 5 E. Sec. 19, 20, 21, 28, 29, 30, 31, 32, and Sec 33; and T 21 S, R 4 E Sec 1, 2, 11, 12, 13, and 1; and T 21 S, R 5 E Sec 6. The Greens Hollow lease surface is managed by Fishlake (79 acres) and Manti LaSal National Forests (the remainder). The application revises the total permitted disturbed area boundary (96.416 acres) and the currently disturbed acreage (48.825 acres, pg 1-15) due to the previously permitted waste rock expansion and sink hole disturbance. There is no revision to Chapter 2, Soils, other than a statement that the 2015 FEIS provides background information. A general Order III survey is included as Dwg 2-3, Soil Types SITLA Muddy & Greens Hollow Tract. The potential for a ventilation and escapeway shaft facility is anticipated in Section 5.2.6.1 with a statement that permitting of the potetial shaft will follow the acquisition of the Greens Hollow Lease. Confidential Appendix 4-5 Memorandum of Agreement between USFS and SHPO outline requirements of shaft development.

pburton

Land Use Resource Information

Analysis:

The amendment meets the State of Utah R645-301-411 requirements for land use information. Volume 1, Chapter 4, Section 4.10, pages 4-1 through 4-12A provide information on premining land use. This amendment adds land use information for the Greens Hollow Tract on page 4-7. The land is under USFS management and therefore is managed for multiple use. Recreational use is light and livestock grazing and wildlife are the primary uses. The narrative analyzes the landuse in conjunction with other environmental resources and provides analysis of the capability of the land before any coal mining and reclamation operations to support a variety of uses. Plates 4-1 and 4-1c are land use maps.

Ireinhart

Alluvial Valley Floors

Analysis:

The application meets the State of Utah R645 requirements for the Alluvial Valley Floor Determinations.

The Permittee provides sufficient information regarding the absence of alluvial valley floors in the Greens Hollow Lease Area in Chapter 9 of the MRP. The information provided in this section is part of the conceptual mine plan that assumed full extraction mining with maximum associated impacts as determined by the BLM's Final EIS.

The Canyons of Greens Hollow Tract contain a steep gradient and limited narrow deposits of unconsolidated alluvium. The canyon bottoms contain shallow alluvium, with much of the channel resting directly on bedrock. The unconsolidated sediments have not been mapped in detail but are depicted in the Geologic Fence Diagram in Appendix 6-4. Additional information is provided in Chapters 2, 3, 6, and 7, determining that alluvial valley floors are not present in this tract.

aurmarva

Geologic Resource Information

Analysis:

The application meets the State of Utah R645-301-600 requirements for Geologic Resource Information. Chapter 6 of the MRP has been updated to include the Greens Hollow Lease tract. A specific geologic report has been added to the MRP which discusses the geology of the tract (Appendix 6-4). This report entitled, "Geology Technical Report Greens Hollow Coal Lease Tract" was prepared by Paul B. Anderson and does contain a Stratigraphic column of the Green's Hollow lease and a map showing a fence diagram using borehole data from the Green's Hollow area. This report was only partially available and was missing most of the pages in the original submittal of the Greens Hollow application. Upon discussing this with the Operator, the missing pages were located and in the October 4, 2017 resubmittal the entire report has been provided and the missing information is now available.

Since this is an extension of an existing mine a lot of the geologic information carries over from the existing mine plan. The formations are essentially the same, although most of the Greens Hollow is a little deeper in the geologic column and is covered by the North Horn formation. The report prepared by Paul Anderson specifically for the Greens Hollow tract is found in Appendix 6-4. The Geology Technical Report (Appendix 6-4) contains a General Stratigraphic column (Figure 1) of the Greens Hollow Coal lease tract. It is accompanied by Plate 2 which is a Geologic Fence Diagram of the tract. These adequately describe the stratigraphy of the area. Plate 6-1 of the MRP is the Geology and drill hole location map and has been updated to include the Greens Hollow lease tract.

Lithologic drill logs are found in Appendix 6-1 which is marked confidential because of the proprietary information contained therein. The logs are done on drill holes that reflect the general geology of the area, and are specific to the Green's Hollow lease. The same is true for the chemical analyses that were done on the drill samples and which are also contained in Appendix 6-1. R645-301-624.300 et. seq. requires samples from test borings or drill cores to provide lithologic characteristics, including physical properties and thickness of each stratum that may be impacted, and location of groundwater where occurring. Chemical analyses for acid or toxic forming materials, including the total sulfur and pyritic sulfur of the coal seam and the strata immediately above and below the coal seam must be provided.

Drill hole logs have now been provided in Appendix 6-1 which characterized the formation and lithology of the Greens Hollow Lease area. The following drill holes were logged and the information is now provided; Well 04-29-3, Well 04-33-1, Well 06-30-1, Well 07-31-1, Well 15-13-1 and Well 16-1-1. The second number in the description corresponds to the section number where the well is located. Wells 04-29-3, 04-33-1, 06-30-1 are also located on Plate 6-1 for reference.

Chemical sampling has been provided for the strata above, through and below the coal seam. This included base to acid ratios and total sulfur and pyritic sulfur. The sulfur is relatively low with samples being generally less than 2%. The base to acid ratios are positive in all the samples provided. This is not surprising given the alkaline nature of most strata in Utah. No toxic or acid forming materials were identified that would present a problem within the Greens Hollow Coal lease.

dhaddock

Hydro Sampling and Analysis

Analysis:

The application meets the State of Utah R645 requirements for Sampling and Analysis.

The Permittee states on page 7-3 in Section 7.2.3 that all water samples collected for use in accordance with this MRP will comply with methods described in "Standard Methods for Examination of Water and Wastewater" of 40 CFR parts 136 and 434.

Hydro Baseline Information

Analysis:

The application meets the State of Utah R645 requirements for Baseline Information.

Ground Water Information

The application includes baseline hydrologic locations on Plate 7-3. To characterize the Greens Hollow Tract and adjacent areas, baseline monitoring was conducted to identify springs, wells, and streams in the area. The sampling frequency, sampling parameters, and UTM coordinate locations are listed in Table 1 of Appendix 7-28. The sampling analysis results for all the baseline sites is presented in Table 2A and 2B.

A spring and seep survey was performed by Cirrus Ecological Solutions for the Greens Hollow Tract in 2000-2004. A narrative describing the spring and seep survey can be found on 7-30. A summary for selected springs, including a discharge hydrograph, temperature, pH, specific conductance, and Palmer Hydrologic Drought Index, are presented in Attachment A. Water level hydrographs are shown for selected wells in Attachment C. As summarized on page 7-26, Petersen Hydrologic has traversed all major surface water drainages quarterly since 2000, in order to coincide with sampling requirements. Peterson Hydrologic observed the hydrologic conditions and spring discharge locations within and adjacent to the tract. In addition, baseline monitoring activities were conducted specifically for the Greens Hollow Tract from 2014-2017. It was during the course of these visits that surveyers identified a new spring, USP-2. The Permittee states no additional springs or seeps have been identified over the course of numerous field investigations between 2000 - 2017, and all springs identified during the 2000-2004 spring and seep survey have been "visited, monitored, and observed" during the second, third, and fourth quarters of 2015 through 2017. The narrative includes methodology and location specifics.

Overall, the current baseline monitoring includes 64 springs. Forty springs have been monitored as recently as 2014 or sooner. Twenty-two sites were last monitored in 2004. Two additional sites were monitored once in 2009. The 40 springs that were monitored most recently includes the most significant springs. All springs and seeps found in the Tract emit from the North Horn or Price River Formation. Though the hydrology of the region is climatology/recharge driven and significant time has passed since the last survey, the Permittee has accessed and traversed the area at least quarterly, and has provided a confirmation from the principal professional hydrologist in the region, that no new significant springs, other than USP-2, have been observed since the 2001 spring and seep survey.

Surface Water Information

The major surface water drainages in the Greens Hollow Tract include the Muddy Creek and Quitchupah Creek. The Muddy Creek Drainage includes the central and northern portions of the tract. This drainage includes the Cowboy Creek Drainage, the Greens Hollow Drainage, and the South Fork of Muddy Creek Drainage, as well as, a series of unnamed drainages that drain directly to Muddy Creek to the North.

The Cowboy Creek sub-drainage flows into the Castlegate Escarpment and across the Blackhawk Formation. This portion of the stream is monitored using M-STR04, with monitoring beginning in 2001. In the past five years of quarterly monitoring the stream has recorded flow only once, in July 2015. The Greens Hollow sub-drainage flows in the North Horn Formation in the northwestern most reaches of the drainage, then along the Castlegate Sandstone for 0.5 miles. This portion of the stream is monitored using M-STR06. Inflows to Greens Hollow Creek, according to the Cirrus 2001 survey and the quarterly monitoring in 2015-2016, is predominantly spring driven from M-SP04, M-SP05, and M-SP06. M-STR06 is used to monitor the composite stream flow. In the past 5 years of quarterly monitoring, M-STR06 has recorded flow only once, in June 2015. The stream is usually dry to the confluence with Cowboy Creek in Greens Canyon. An additional monitoring point, M-STR01, records flow downstream, after the confluence with Cowboy Creek but before the confluence with Muddy Creek. This will allow an estimate of Greens Hollow and Cowboy Creek contributions to Muddy Creek.

The adjacent drainage, Box Canyon Creek, should not experience influences from mining in the Greens Hollow Tract due to isolation from the Big Ridge uplands and Greens Canyon.

Muddy Creek is a major drainage with flows that vary climatically, with peaks in May or June from springtime snowmelt, and baselow conditions in the late fall and winter. Discharge typically ranges >100 cfs to <10 cfs. Flows can exceed 500 cfs during wet years. Releases from reservoirs in the headwaters can impact discharge rates. The Permittee discusses

the gain/loss study on Muddy Creek on page 52 and Figure 8 in Appendix 7-28. Station 1 is in the headwaters of Muddy Creek, just outside the Greens Hollow Tract, Station 2 is just within the eastern boundary of the Tract, and Station 3 is downstream, near monitoring location Pines 405. No appreciable or statistically significant change in discharge rates occurred between Station 1 and 2, which is the portion of the tract overlying Greens Hollow Tract. Between Station 2 and 3, no appreciable or statistically significant change. Overall, no loss or gain in flow in Muddy Creek has been noted. Due to the culinary importance of Muddy Creek, SUFCO will monitor several points downstream of Greens Hollow as well. These include Muddy ABF and Pines 406. Both of these points are upstream of Pines 406B and the USGS gaging station. The Muddy ABF monitoring can help assess any flow differential across the Joes Valley graben.

Quitcupah Creek Drainage is in the southern portions of the Greens Hollow Tract, with most of drainage within the North Fork of Quitcupah. Monitoring of the North Fork of Quitcupah occurs at SUFCO 007, and has been ongoing quarterly since 1979. Discharge at Sufco 007 is seasonally variable with peaks during spring snowmelt and baseflow in late fall. The North Fork of Quitcupah Creek flows across the Flagstaff Limestone, North Horn Formation, and Price River Formation within the Tract. Monitoring of the South Fork of Quitcupah Creek, which covers only a small southern portion of the Tract, is monitored at SUFCO 006, and has been monitored quarterly since 1979. The South Fork of Quitcupah Creek flows across the Castlegate Formation and Blackhawk Formation. Discharge at Sufco 006 is seasonally variable with peaks during spring snowmelt and baseflow in late fall. Typically, discharge rates in the South Fork is less than that flowing at the same time in the North Fork. Baseflow discharge rates in the South Fork can be zero. A diversion exists upstream of South Fork that may contribute to low or no flow. The diversion is used to divert water from the South Fork into the Skutumpah drainage. An additional USFS maintained diversion exists higher in the drainage.

Discharge hydrograph information associated with major streams in the Greens Hollow Tract is presented in Attachment B of Appendix 7-28. Water quality data is presented in Table 2A and 2B. Baseline monitoring of streams, including when they have been monitored and analyzed for water quality, is presented in Table 1. The baseline monitoring occurred beginning in 2001 by Cirrus Ecological Solutions.

An additional 15 surface water monitoring locations exist on tributaries throughout the Greens Hollow Tract. These sites were added in 2017. Baseline information on these sites was collected for high and low flow during 2017. The flow and water quality information is presented in Tables 2A and 2B. These sites include Cowboy Top, Cowboy Middle, Cowboy Bottom, SP60 Creek, CPC Upper, CPC Middle, CPC Lower, North Fork Upper, North Fork Middle, ULGF, URGH, GH at Road, Muddy Creek below Horse, Muddy Creek above Horse, and Horse Creek.

Stock water ponds within and adjacent (within an approximate 1 mile radius of the Lease boundary) have been monitored by the Permittee for 10 years, 2008-2017. The historic information, including select pictures, for these ponds (M-P-02 - 05, 07 - 10, and GH-P01 - P09) is provided in Appendix 7-27.

Geologic Information

The permittee discusses structural information for the Greens Hollow Tract in Appendix 7-28, on page 15.

The permittee states that no major faulting has been identified in the Greens Hollow Tract, though displacement faults, of three feet or less, have been encountered in the SUFCO mine. The application states that both minor faults and joints are likely to exist in the Greens Hollow Tract, especially in the Castlegate Sandstone. The faults in the SUFCO Mine area most commonly strike approximately N10 degrees to 15 degrees W and are inclined nearly vertical. Joints are both parallel and normal to the fault trend. Joints in the Castlegate are common. On page 60 of the PHC description, the Permittee states that groundwater inflows along fault zones that are intercepted by the mine workings in the Greens Hollow Tract may occur. However, the application states the due to the geologic similarity to the existing SUFCO mine, it is likely the Greens Hollow Tract will behave similarly. Therefore, it is likely any water that is encountered will be minimal and short-lived. Appendix 6-4 provides more detailed information on structural geology.

aumarva

Hydro Baseline Cumulative Impact Area

Analysis:

The amendment meets the State of Utah R645 requirements for Cumulative Hydrologic Impact Assessment (CHIA).

The Permittee provides sufficient hydrologic information to complete the CHIA.

aumarva

Probable Hydrologic Consequences Determination

Analysis:

The application meets the State of Utah R645 requirements for Probable Hydrologic Consequences Determination.

728.300: Hydrologic Balance

Continuously saturated groundwater systems generally do not exist in the geologic formations overlying or immediately below the coal seams to be mined in the Greens Hollow Lease area. The formations are largely heterogeneous in nature and groundwater is typically present in fracture systems or isolated strata i.e. sandstone paleochannels. Furthermore, waters in the Castlegate Sandstone and Star Point Sandstone, immediately above and below the coal strata, respectively, do not discharge within the Greens Hollow Tract. The R645 definition of "aquifer" means "a zone, stratum, or group of strata that can store and transmit water in sufficient quantities for a specific use." As no specific use for the waters above and below the coal strata could be identified within and adjacent to the Greens Hollow Tract, the Division does not qualify the Star Point and Castlegate as aquifers. In addition, the geology does not lend itself to communication between surface and subsurface water, the details of which are outlined below.

Formation specifics:

North Horn Formation consists of groundwater flow within shallow sandstone paleochannels. Due to the presence of low-permeability shales throughout the formation, groundwater flow is restricted to the sinuous nature of the sandstone paleochannels and does not flow widely throughout the formation with lateral and vertical flow largely constrained. Based on these characteristics, the North Horn formation does not meet the definition of "aquifer" per R645-100-200 rules.

Price River Formation consists of mudstone drapes separated by fluvial sandstones. Vertical flow of groundwater is restricted causing perched zones and springs to appear at higher topographic positions.

Castlegate Sandstone overlying the coal seam is a massive sandstone unit with groundwater flow occurring primarily through fractures, joint systems, and along bedding planes. However, the interbedded mudstone drapes limit groundwater flow in the formation. The typical direction is controlled by local stratigraphic dip, typically toward the north-northwest direction. The Castlegate Sandstone unit is discontinuous due to the presence of shale layers and permeable sandstone strata are not continuous over significant, long, regional-type flow systems. All water flow is typically local in nature with small to moderate quantities discharged. The only surface exposure of the Castlegate is along the rims of the North Fork of Quitcupah, South Fork of Quitcupah, Box Canyon, and Muddy Creek Canyon. No water rights exist on the Castlegate within the tract and no surface expression is observed. Therefore, the Castlegate Formation does not meet the R645-100-200 definition for "aquifer" as this unit does not transmit water in sufficient quantities for a specific use.

There is no surface expression for the Star Point Sandstone Formation within the Tract, therefore the water is not put to a specific use as required by R645-100-200 to qualify as an aquifer. Further, flow within the Star Point Sandstone occurs primarily through joints, fractures, and faults. The Permittee provides information on the bounding impermeable layer below the Blackhawk that separates the Star Point formation, as well as, isotopic evidence to show surface water and groundwater are not in communication. Therefore, the Star Point Formation does not meet the R645-100-200 definition for "aquifer" as this unit does not transmit water for a specific use within the areas expected to be impacted by mining.

Furthermore, there is limited potential for communication between these formations naturally. Active mining within the Greens Hollow Tract has potential to increase subsurface connectivity between formations, however, it is unlikely that this will substantially and permanently affect surface water resources. However, there is potential for groundwater discharging as springs to migrate from the original spring location where near-surface tension cracking is extensive. All of the Greens Hollow Tract has an overburden exceeding 800 feet. The Permittee outlines on pages 60-61 several reasons why groundwater systems in the near-surface Price River and North Horn Formations will be minimally impacted by mining operations and water resources are unlikely to migrate downward. To summarize, the presence of clays in the subsurface will likely impede the development of cracks due to the plasticity, or heal any cracks that do form by infilling or swelling.

In the Sufco Mine, Pines Tract, the surface formation is the Castlegate Sandstone. This formation is a brittle sandstone with dominant joints and fractures. The near-surface fracturing allows for substantial groundwater recharge (unlike the North Horn or Price River formations). When undermining occurred beneath springs discharging from near-surface

fractured sandstone perches, discharge ceased at locations where joints and/or fractures dilated in response to subsidence, compromising the clay-rich perching layers causing the groundwater to migrate deeper. Because not all undermined springs in the area were affected by subsidence, it is likely the spring loss was a localized, not regional effect. As compared to the Pines Tract, the hydrogeologic features in the Greens Hollow Tract are different. These differences include:

- The Greens Hollow Tract is overlain by the North Horn and Price River Formation for the majority of the surface.

In these formations, the groundwater flow is in interbedded sequences of sandstone and low-permeability shale that deform plastically, instead of brittlely like the Castlegate.

- Developing no-subsidence mining buffer zones underlying all perennial reaches above the Tract where the Castlegate Sandstone is exposed at the surface or is within 50-feet of the surface. This means no longwall mining and the accompanying subsidence is proposed in these areas: portions of lower Cowboy Creek, lower Greens Hollow, lower North Fork Quitcupah, and Muddy Creek.

The decrease in discharge from springs in the Pines Tract overlies the mined coal seam by only 100 feet. By contrast, springs discharging in the Greens Hollow Tract overlie the mined seam by several hundred feet, discharging from the North Horn and Price River Formations. It is not expected that this type of hydrologic impact occurs in the Greens Hollow Tract.

Similarly, additional concerns existed in the Pines and Quitcupah Tract regarding loss of water to stock water ponds. Due to the lack of baseline and ongoing drought conditions, no determination of impact was made. Impacts to stock water ponds in the Greens Hollow Tract are considered minimal due to the depth of overburden, however, a baseline monitoring and ongoing biannual monitoring plan throughout the life of the mine has been implemented.

Inside the mine, the Permittee uses evidence from previous SUFCO mining activity to predict water intercepted in the Greens Hollow Tract will likely be from the Blackhawk formation, perched groundwater systems in sandstone channels, in the mine roof. Actual flow rates and quantities of water to be encountered cannot be inferred until mining commences. It is expected, however, the mining will dewater these perched groundwater systems immediately above the mining. Furthermore, subsidence-related changes to the subsurface will occur in longwalled areas, altering pre-mining hydrogeology. Deformation of strata above longwall panel mined areas will be in line with what is expected in most coal mines, as outlined on Page 67-68 in Appendix 7-28. The Permittee uses the Mining Engineers Handbook to conclude that upwardly propagating fracturing will likely extend approximately 60 times the mining height, or 600 feet. The mining height in Greens Hollow is 10-15 feet. In the Greens Hollow Tract, all overburden in subsidence mining areas exceeds 800 feet. The overburden in non-subsidence mining areas exceeds 500 feet. Also, in Appendix 7-28, page 41, the Permittee states that discharge from an old sealed longwall gob area and other abandoned long wall areas consistently decrease with time especially from inactive-zone mine inflows. Reduced discharge is one indicator of poor hydrologic communication between systems overlying the mine and shallow groundwater. The Permittee provides the data to support this in Appendix 7-17, using the contents of Mayo and Associates literature. Overall, due to the amount of overburden, the poor hydrologic communication between the surface and groundwater, the plastic nature of the subsurface due to the presence of hydrophyllic clays, the lack of surface expression of the Star Point Sandstone and Blackhawk Formation within the Tract, the isolation of the coal seam from the Star Point Sandstone due to shaley lagoonal deposits, it is unlikely that shallow active hydrologic systems will be impacted by mining as several hundred feet is expected to exist between the surface and the top of the fractured zone.

728.320: Acid-forming and toxic-formation materials

Sufco Mine discharge waters have routinely been within permitted discharge limits. Though small quantities of sulfide minerals are known to exist, no significant acid-or-toxic forming materials are believed to be present in the Greens Hollow Tract. Rocks in the Wasatch Plateau typically act to neutralize any acid produced. Acid forming or toxic forming materials have seldom been of concern in past Sufco mining operations and it is believed little to no potential exists within the Greens Hollow Tract.

728.331: Sediment Yield

No new surface facilities are planned for the Greens Hollow Tract as mining will enter through existing channels. Therefore, any potential for additional sedimentation impact will come from subsidence-induced changes in the stream channels. All perennial streams within the Tract will be undermined using no-subsidence mining techniques, the potential for sedimentation impacts in these channels is negligible. Any subsidence-induced gradient changes in streams with longwall undermining may experience short-lived sediment yield increases due to gradient changes from differential subsidence.

728.332: Water Quality

The water quality information for the Greens Hollow Tract is presented in Appendix 7-28 with the water quality data

tabulated in Table 2A and 2B. No adverse impacts to water quality are expected. The Permittee has recommended a monitoring plan for Greens Hollow in Table 8 - 11 in Appendix 7-28, including parameters to be sampled, and site specific monitoring. According to the Monitoring Plan on Page 7-51 in the MRP, Table 7-2, all PHC recommended sites have been incorporated into the monitoring plan.

Probable hydrologic consequences from equipment and facilities is considered minimal because the Greens Hollow Tract will be accessed through the existing mains in Sufco Mine and no new surface facilities are to be developed.

728.333: Flooding or streamflow alteration

Due to the geologic similarity between Sufco Mine and the Greens Hollow Tract, flooding and streamflow alteration potential is not expected to increase above what is already observed at the Quitchupah Creek discharge.

728.334: Ground-water and surface-water availability; 728.350 State-appropriated water rights

It is likely that groundwaters in the inactive Blackhawk Formation will be encountered and dewatered during mining. Inflows will likely decrease over time as these groundwaters perched and not replenished. However, there are no known uses or state-appropriated water rights on these waters. The Permittee presents Plate 7-2 to show the state-appropriated water supply locations within and adjacent to the Greens Hollow Tract. Additional information on water rights is provided in Appendix 7-1. All state-appropriated water rights within the Greens Hollow Tract belong to the USFS.

Inactive zone groundwater intercepted within the mine will discharge into Quitchupah Creek at Sufco 047. As described previously, the deep, inactive zone groundwater has minimal hydrologic communication with active zone, shallow groundwater and surface water systems. Also, no surface expression of the Blackhawk Formation groundwaters exists within or adjacent to the Greens Hollow Tract. Consequently, the water intercepted within the mine and discharging into Quitchupah Creek is likely not resulting in diminution of surface water resources in the overlying drainage basin. Conversely, the mine water discharge is likely making previously inaccessible, ancient groundwater available for use to downstream users, by increasing natural flow.

aumarva

Hydro GroundWater Monitoring Plan

Analysis:

The application meets the State of Utah R645 requirements for hydrologic groundwater monitoring plan.

In 2001, a spring and seep survey and baseline monitoring program was performed, in conjunction with NEPA analysis, for the Greens Hollow Tract and adjacent areas by Cirrus Ecological Solutions, LLC. The Permittee describes the groundwater monitoring plan for baseline characterization in Appendix 7-28, page 3. The information collected included discharge rates, field water quality parameters, locations collected via handheld GPS, and baseline monitoring of selected sites for laboratory water quality parameters. The information gathered is tabulated in Table 1, including monitoring site geographic coordinates, elevations, associated geologic formations, monitoring periods, baseline monitoring parameters, and information on water usage. The monitoring locations are plotted on Figure 2 and included on Plate 7-3. Discharge and water-quality data for springs and seeps, including field and laboratory chemical and field parameters are presented in Table 2a. Discharge hydrographs for springs in the study area are shown in Attachment A. Geochemistry is summarized via stiff diagrams on Figure 6 and 7, compiled using the chemical composition listed in Table 5.

Groundwater was characterized, as applicable, for each of the geologic formations present at SUFCO mine. The North Horn Formation was monitored using 33 springs. The Price River Formation was monitored using 29 springs. In the Greens Hollow Tract, no springs discharge from the Castlegate Sandstone, Blackhawk Formation, or Star Point Sandstone. The Permittee monitored the Castlegate Sandstone using MW-15-5-2, however, the well has been consistently dry. In the past, several springs in the Pines Tract discharging from the Castlegate have experienced a diminution of flow, likely attributable to the Sufco Mining Operations in the area. Because of this history, the monitoring plan includes no-subsidence buffer zones in areas where the Castlegate Sandstone is known to occur within 50 feet or less of the surface. The Castlegate Sandstone is not considered to be a regional aquifer. The groundwater occurs within the Castlegate Sandstone occurs as isolated, perched zones, does not outcrop within the mining or adjacent areas, and is not transmitted nor stored within the Tract for a specific use. Consequently, the Castlegate Formation does not meet the R645-100-200 criteria for "aquifer." Therefore, the current monitoring plan for the Castlegate Formation will suffice.

The Blackhawk Formation, underlying the Castlegate, will be mined by Sufco as it contains the Upper Hiawatha coal seam. The Blackhawk Formation does not discharge within the Greens Hollow Tract area. Water encountered in the

mine, through working faces, or faults, fractures and roof bolts, will likely be from the Blackhawk Formation and/or the overlying Castlegate Formation. SUFCO Mine has four wells screened in the Blackhawk, and six springs, which can be used to characterize the water quality in the adjacent region, however, no additional were added within the Greens Hollow Tract.

The Star Point Sandstone is beneath the mineable coal seam. In the Greens Hollow Tract, the Star Point Sandstone does not discharge. Furthermore, the water is not put to a specific use and therefore does not qualify as an aquifer under R645-100-200. However, due to its proximity to mining and adjacent discharge areas, the Division has requested monitoring. The Permittee has proposed an in-mine well, to be screened in the Star Point Formation. The well will be drilled once Sufco has advanced close enough access to the Greens Hollow Tract. The estimated time for well completion will be Fall/Winter 2018. All information relevant to the new well, including drilling logs, will be provided to the Division. Once completed, water level monitoring will occur quarterly. The information will allow for further characterization of the Star Point Sandstone.

Overall, the springs and wells monitored in the Greens Hollow Tract for water quality and quantity provide sufficient information to characterize the groundwater resources within and adjacent to the tract.

aumarva

Hydro SurfaceWater Monitoring Plan

Analysis:

The application meets the State of Utah R645 requirements for Surface Water Monitoring Plan.

Surface water monitoring in the Greens Hollow Tract for baseline characterization includes 31 sites, located within the major drainages of the Greens Hollow Tract. Monitoring occurred in Cowboy Creek, Greens Hollow Creek, Muddy Creek, South Fork of Quitchupah Creek, and North Fork of Quitchupah Creek. The baseline monitoring information collected included discharge rates, field water quality parameters, locations collected via handheld GPS, and baseline monitoring of selected sites for laboratory water quality parameters. The information gathered is tabulated in Table 1, including monitoring site geographic coordinates, elevations, associated geologic formations, monitoring periods, baseline monitoring parameters, and information on water usage. The locations of monitoring locations are presented on Plate 7-3. Baseline information of water quality is available in Table 2A and 2B, Appendix 7-28. Surface water resources are described in detail beginning on page 46. Hydrographs and PHDI data for surface sites is provided in Attachment B of Appendix 7-28.

In 2015, Peterson Hydrologic performed a gain/loss study on Muddy Creek. The results of that study are described on page 50, tabulated in Table 7, and plotted on Figure 9 in Appendix 7-28. The results indicate that no appreciable flow loss had been noted, and water quality measurements do not indicate appreciable groundwater/surface water interaction.

Quitchupah Drainage is described beginning on page 53. In 2012, a gain/loss study was performed on South Fork of Quitchupah Creek. South Fork of Quitchupah extends mostly in the area adjacent to the Greens Hollow Tract. During this evaluation, discharge was low or non-existent, likely due to drought conditions.

Stock water ponds within and adjacent (within an approximate 1 mile radius of the Lease boundary) have been monitored by the Permittee for 10 years, 2008-2017. The historic information, including select pictures, for these ponds (M-P-02 - 05, 07 - 10, and GH-P01 - P09) is provided in Appendix 7-27.

Overall, the surface water monitored in the Greens Hollow Tract for water quality and quantity provide sufficient information to characterize the surface water resources within and adjacent to the tract.

aumarva

Maps Affected Area Boundary Maps

Analysis:

The amendment meets the State of Utah R645-301-323 requirements for maps and aerial photographs. This amendment updates Plate 3-1 (plant communities and reference areas), 3-2 (elk range), 3-3 (deer range and raptor nests) and 4-b1(land use) to include the Greens Hollow tract.

ireinhart

Maps Affected Area Boundary Maps

Analysis:

The amendment meets State of Utah R645 requirements for Affected Area Boundary Maps.

A previous deficiency outlined the need for the Permittee to amend all drawings and maps to show only approved Sufco leases and pending Green's Hollow lease boundaries. All maps now only include relevant Sufco leases and Green's Hollow lease boundaries, and therefore adequately address this requirement.

jeatchel

Maps Monitoring and Sampling Locations

Analysis:

The application meets the State of Utah R645 requirements for Maps Monitoring and Sampling Locations.

Maps of Historic Hydrologic Monitoring Stations, including all baseline monitoring locations for Sufco Mine, is presented on Plate 7-3. This plate includes the current operational monitoring locations as well.

aumarva

Maps Subsurface Water Resources

Analysis:

The application meets the State of Utah R645 requirements for Subsurface Water Resources Maps.

According to R645-301-722, Cross Sections and Maps, the Permittee must provide depictions of locations and extent of subsurface water, with aerial and vertical extent distribution of aquifers and and portrayal of seasonal difference of head in different aquifers on cross-sections and contour maps. However, the formations within the Greens Hollow Tract do not qualify a "aquifers" under R645-100-200 rules. The definition of aquifer means "a zone, stratum, or group of strata that can store and transmit water in sufficient quantities for a specific use." Details of formation characteristics that support these claims are provided in Appendix 7-27 in Section 3.1.1 Groundwater Aquifers and Springs, Appendix 7-28 of the MRP, and portions of Appendix 7-17 provides a summary of the groundwater systems.

Further, the Permittee states on page 29 of the PHC that continuously saturated groundwater systems generally do not exist in the geologic formations overlying or immediately below the coal seams to be mined in the Greens Hollow Lease area. The formations are largely heterogeneous in nature and groundwater is typically present in fracture systems or isolated strata i.e. sandstone paleochannels. Furthermore, waters in the Castlegate Sandstone and Star Point Sandstone, immediately above and below the coal strata, respectively, do not discharge within the Greens Hollow Tract. As described previously, the R645 definition of "aquifer" is that which is "sufficient quantities for a specific use." As no specific use for the waters above and below the coal strata could be identified within and adjacent to the Greens Hollow Tract, the Division does not request additional subsurface water resource maps.

The Permittee provides a generalized conceptual cross-section as Figure 38 in the Cirrus Surface and Groundwater Technical Report for the Greens Hollow Tract.

Formation specifics:

North Horn Formation consists of groundwater flow within shallow sandstone paleochannels. Due to the presence of low-permeability shales throughout the formation, groundwater flow is restricted to the sinuous nature of the sandstone paleochannels and does not widely flow throughout the formation. Based on these characteristics, the North Horn formation does not meet the definition of "aquifer" per R645-100-200 rules.

Price River Formation consists of mudstone drapes separated by fluvial sandstones. Vertical flow of groundwater is restricted causing perched zones and springs to appear at higher topographic positions. Due to the discontinuous and perched nature of groundwater in this formation, mapping is not feasible.

Castlegate Sandstone overlying the coal seam is a massive sandstone unit with groundwater flow occurring primarily through fractures, joint systems, and along bedding planes. However, the interbedded mudstone drapes limit

groundwater flow in the formation. The typical direction is controlled by local stratigraphic dip, typically toward the north-northwest direction. The Castlegate Sandstone unit is discontinuous due to the presence of shale layers and permeable sandstone strata are not continuous over significant, long, regional-type flow systems. All water flow is typically local in nature with small to moderate quantities discharged. The only surface exposure of the Castlegate is along the rims of the North Fork of Quitchupah, South Fork of Quitchupah, Box Canyon, and Muddy Creek Canyon. Due to the discontinuous nature of this formation, mapping is not feasible. Further, no water rights exist on the Castlegate within the tract and no surface expression is observed. Therefore, the Castlegate Formation does not meet the R645-100-200 definition for "aquifer" as this unit does not transmit water in sufficient quantities for a specific use.

There is no surface expression for the Star Point Sandstone formation within the Tract, therefore the water is not put to a specific use as required by R645-100-200 to qualify as an aquifer. Further, flow within the Star Point Sandstone occurs primarily through joints, fractures, and faults. The internal fifth-order bounding surface restricts horizontal and vertical flow. The Permittee provides information on the bounding impermeable layer below the Blackhawk that separates the Star Point formation, as well as, isotopic evidence to show surface water and groundwater are not in good communication. Therefore, the Star Point Formation does not meet the R645-100-200 definition for "aquifer" as this unit does not transmit water for a specific use within the areas expected to be impacted by mining.

aumarva

Maps Surface and Subsurface Ownership

Analysis:

The amendment meets State of Utah R645 requirements for Surface and Subsurface Ownership Maps.

A previous deficiency outlined the need for the Permittee to amend all plates to show only approved Sufco leases and pending Green's Hollow lease boundaries. All plates now only include relevant Sufco leases and Green's Hollow lease boundaries, and therefore adequately address this requirement.

jeatchel

Maps Surface Water Resource

Analysis:

The application meets the State of Utah R645 requirements for Surface Water Resource Maps.

The Permittee provides in Plate 7-2 and Plate 7-3 a location of all water resources and water monitoring locations, historic and operational, that are within and adjacent to the Greens Hollow Tract.

aumarva

Operation Plan

Mining Operations and Facilities

Analysis:

The amendment meets State of Utah R645 requirements for Mining Operations and Facilities.

A previous deficiency outlined the need for the Permittee to include a detailed description of proposed mining methods and procedures, including anticipated annual and total coal production within the Green's Hollow Lease. Amendments to section 5.2.3 describe the use of continuous miners and longwall mining techniques to recover coal within the Green's Hollow Lease. Anticipated annual coal production throughout the life of the Green's Hollow Lease is projected to be between 5.5 - 6.3 Million tons.

jeatchel

Air Pollution Control Plan

Analysis:

The amendment meets the State of Utah R645-301-420 requirements for Air Quality. The approved MRP references DAQ Permit Approval Order DAQE-AN0106650013-11 dated March 30, 2011 and DAQEEN0106590004-11. With the addition of the Greens Hollow Lease, Sufco will continue to be considered a "Minor Source" by the Utah Department of

Environmental Quality and the mining of the Greens Hollow Lease is not a significant acid rain source (FSEIS, 2015). The demand for coal from the Sufco mine is established, the addition of the coal in the Greens Hollow Lease extends the supply of coal for years. Coal production and therefore trucking is intended to remain within the limits of the existing Air Quality Approval Order (Review production quantities in Section 5.2.3). Should mining changes require a revision; the Air Quality Approval Order will be updated at that time.

ireinhart

Coal Recovery

Analysis:

The amendment meets State of Utah R645 requirements for Coal Recovery.

A previous deficiency outlined the need for the Permittee to include a narrative describing sequencing of operations, measures used to maximize use and conservation of coal resource, expected recovery, and R2P2 details for the Greens Hollow Lease. As outlined in section 5.2.3, anticipated annual coal production throughout the life of the Greens Hollow Lease is projected to be between 5.5 - 6.3 Million tons and will be extracted using a longwall, thus ensuring the maximum amount of coal will be extracted using best available technology. Section 5.1.2 and appendix 1-1 includes a discussion about the R2P2, although the details haven't yet been finalized but will be sent to the BLM once it is complete.

jeatchel

Subsidence Control Plan Renewable Resource

Analysis:

The amendment meets the State of Utah R645-301-332 requirements for describing impacts of subsidence to fish, wildlife, and vegetative resources. Volume 1, Chapter 3, Section 3.3.3 provides a description of the anticipated impacts of subsidence. Subsidence associated with the Greens Hollow Lease is consistent with information in the approved MRP. As noted on pages 3-43 and 3-45A, the permittee has implemented a program to monitor the effect of subsidence on the vegetative communities. The applicant uses color infrared photography (CIR) to document changes in vegetation. This CIR coverage began in 1987 and will be updated at least every 5 years. 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 in section 3.3.3.

ireinhart

Subsidence Control Plan Renewable Resource

Analysis:

The amendment meets State of Utah R645 requirements for Renewable Resource Subsidence Control Plan.

A previous deficiency outlined the need for the Permittee to clarify whether the stock troughs and man-made ponds within the permit area are state-appropriated water supplies. Narrative in section 5.2.5.1 states that according to water right records, no man-made ponds or troughs are assigned state appropriated water supplies.

jeatchel

Subsidence Control Plan Subsidence

Analysis:

The application meets the State of Utah R645-301-623.300 requirements for a subsidence Control plan.

Subsidence mining has the potential to be excluded from areas identified for protection such as stream segments where the overburden is insufficient in thickness or rock types to facilitate healing of surface tensile cracks. Mining may also be excluded along cliff escarpments where subsidence would impact cultural features or raptor habitat. Each exclusion will be evaluated on a case by case basis and permitted as required. Prior to mining the Greens Hollow Lease, the subsidence monitoring points will be located and the site surveyed for baseline information.

dhaddock

Subsidence Control Plan Subsidence

Analysis:

The amendment meets the State of Utah R645 requirements for Subsidence Control Plan.

R645-301-521, R645-301-525.420 - A previous deficiency stated that Permittee must provide a map that illustrates projected subsidence throughout the Greens Hollow Lease in addition to addressing subsidence control measures to prevent damage to sensitive areas such as archaeological sites or raptor nests.

Narrative in sections 5.2.5.1 and 5.2.5.2 state that a buffer zone will be designed and built into the mine plan to protect areas such as cultural resource sites and other areas designated as No Subsidence. Buffer zones consist of barrier pillars that are left in place a sufficient distance from sensitive surface resources meant to be protected.

Plates 5-10 and 5-10C illustrate the limits of expected subsidence that is anticipated within the Greens Hollow Lease. The potential subsidence limits disturb a wider surface area in areas where the overburden is thicker. A comparison between the potential subsidence limits on Plates 5-10 and 5-10C against the overburden isopach contours on Plate 5-11 confirms this relationship.

jeatchel

Subsidence Control Plan Performance STD

Analysis:

The amendment meets State of Utah R645 requirements for Subsidence Control Plan Performance STD.

R645-301-525.440 - Narrative in 5.2.5.1 clarifies that numerous control points have been established within the lease to assist in the subsidence surveys. The coordinates of the control points are provided in Table 5-2, and additional points will be added as necessary once existing points become influenced by subsidence. Additionally, supplemental subsidence monitoring locations have been added within the vicinity of the Greens Hollow lease, and those locations have been added to Plates 5-10 and 5-10C. More subsidence locations will be added within the Greens Hollow Lease as mining progresses to the North.

jeatchel

Subsidence Control Plan Notification

Analysis:

The amendment meets State of Utah R645 requirements for Subsidence Control Plan Notification.

A previous deficiency outlined the need for the Permittee to define a clear plan of specific areas to be protected from subsidence and a notification sent to the appropriate surface owners affected by said subsidence. Narrative in section 5.2.5.1 states that mining may be excluded along cliff escarpments where subsidence would impact cultural features or raptor habitat, but will be evaluated on a case by case basis and permitted as required. There is no private surface ownership as the surface rights for the entirety of the Greens Hollow tract is owned by the USFS.

jeatchel

Fish and Wildlife Protection and Enhancement Plan

Analysis:

The amendment meets the State of Utah R645-301-333 requirements to describe how using best technology currently available to minimize adverse impacts to fish and wildlife, including compliance with the Endangered Species Act. Volume 1, Chapter 3, Section 3.3.3 provides a plan to minimize disturbance and adverse impacts to fish and wildlife. Since this amendment does not include additional surface disturbance, the approved MRP is adequate. Appendix 3-15 contains a sound monitoring report conducted by Tetra Tech, Inc from 2008. The monitoring was conducted to collect baseline data in association with the potential development and operation of a ventilation shaft near Quitcupah Canyon. The data was collected around an existing ventilation fan and at selected sensitive resource location such as

Forest System Roads, and Greater Sage-grouse leks. The collected sound level data will be used to determine measures which could reduce sound related impacts associated with the operation of the proposed ventilation fan.

Ireinhart

Vegetation

Analysis:

The amendment meets the State of Utah R645-301-331 requirements for protection of vegetation. Volume 1, Chapter 3, Section 3.3.1 provides protection measures for vegetation. Potential impacts to vegetative, fish and wildlife resources and the associated mitigation plans are presented in Sections 3.30 and 3.40 of the approved MRP. Since this amendment is an expansion of underground mine workings with no additional surface disturbance, the existing protection measures are adequate. However, this amendment includes Appendix 3-15, a sound monitoring report in association with the potential development and operation of a vent shaft near Quitchupah Canyon. The collected sound level data will be used to determine measures which could reduce sound related impacts associated with the operation of the proposed ventilation fan. Additional monitoring information for the upper reaches of Quitchupah Creek is provided on page 3-34.

Ireinhart

Hydrologic Ground Water Monitoring

Analysis:

The application meets the State of Utah R645 requirements for hydrologic groundwater monitoring plan.

The Permittee includes a groundwater monitoring plan based upon the PHC determination and the analysis of baseline hydrologic and geologic information in the permit application. Groundwater Plan is outlined in Table 7-2, beginning on page 7-50. The locations are depicted on Plate 7-10. All PHC monitoring recommendations were incorporated into the monitoring program. The Permittee commits to monitoring 27 springs and 2 wells specifically associated with the Greens Hollow Tract. The North Horn Formation will be monitored using 22 springs and the Price River Formation will be monitored using 5 springs. The springs will be monitored quarterly, as access permits, for flow and field parameters: TDS, total iron, and total manganese. In the Greens Hollow Tract, no springs discharge from the Castlegate Sandstone, Blackhawk Formation, or Star Point Sandstone. The Permittee monitors the Castlegate Sandstone using MW-15-5-2, however, the well has been consistently dry. In the past, springs discharging from the Castlegate have experienced a diminution of flow, likely attributable to the Sufco Mining Operations in the Pines Tract area. Because of this history, the monitoring plan includes no-subsidence buffer zones in all perennial reaches where the Castlegate Sandstone is known to occur within 50 feet or less of the surface. The Castlegate Sandstone is not considered to be a regional aquifer. The groundwater occurring within the Castlegate Sandstone is isolated, perched, does not outcrop within the mining or adjacent areas, and is not transmitted nor stored, within the Tract for a specific use. Consequently, the the Castlegate Formation does not meet the R645-100-200 criteria for "aquifer." Therefore, the current monitoring plan for the Castlegate will suffice.

The Blackhawk Formation, underlying the Castlegate, will be mined by Sufco as it contains the Upper Hiawatha coal seam. The Blackhawk Formation does not discharge within the Greens Hollow Tract area. Water encountered in the mine, through working faces, or faults, fractures and roof bolts, will likely be from the Blackhawk Formation and/or the overlying Castlegate Formation. Within the groundwater monitoring plan for Sufco Mine, there are four wells screened in the Blackhawk, and six springs discharging from the Blackhawk. As no surface expression or specific use for the Blackhawk Formation groundwaters exist in the Greens Hollow Tract, this monitoring plan will suffice.

The Star Point Sandstone is beneath the mineable coal seam. In the Greens Hollow Tract, the Star Point Sandstone does not discharge. Furthermore, the water is not put to a specific use and therefore does not qualify as an aquifer under R645-100-200. However, due to its proximity to mining and adjacent discharge areas, the Division has requested monitoring. The Permittee has proposed an in-mine well, to be screened in the Star Point Formation. The well will be drilled once Sufco has advanced close enough access to the Greens Hollow Tract. The estimated time for well completion will be Fall/Winter 2018. All information relevant to the new well, including drilling logs, will be provided to the Division. Plate 7-3 and 7-10 will also be updated to reflect the well location. Once completed, water level monitoring will occur quarterly.

Furthermore, there is limited potential for communication between these formations naturally. Active mining within the Greens Hollow Tract has potential to increase subsurface connectivity between formations. There is potential for groundwater discharging as springs to migrate from the original spring location where near-surface tension cracking is

extensive. However, all of the Greens Hollow Tract has an overburden exceeding 800 feet. The Permittee uses the Mining Engineers Handbook to conclude that upwardly propagating fracturing will likely extend 60 times the mining height, or 600 feet. The Permittee outlines on pages 60-61 several reasons why groundwater systems in the near-surface Price River and North Horn Formations will be minimally impacted by mining operations and water resources are unlikely to migrate downward. The presence of clays in the subsurface will likely impede the development of cracks due to the plasticity, or heal any cracks that do form by infilling or swelling.

On page 7-65, the Permittee provides a commitment to notify the Division in the comments section of the quarterly water monitoring reports if any spring is believed to have moved locations.

Overall, the springs and wells to be monitored in the Greens Hollow Tract will be monitored for water quality and quantity, with quarterly reports sent to the Division. The groundwater monitoring plan is sufficient to determine the impacts of the operation upon the hydrologic balance.

During operation, the mine water management system is used to pump water to and from mining districts underground. The permittee commits, in the event water is encountered in-mine at a rate of 1 cfs, continuously flowing for 30 days, to collect a sample for lab analysis. The commitment is provided on page 7-12. The permittee writes "should water underground be encountered due to faulting that is flowing greater than 1 cfs, which continually flows for 30 days, a sample will be collected for lab analysis." The water must be flowing directly from the formation. Further, the sample will be analyzed according to Table 7-2, subcategory D9, which includes C14, C13, and Tritium analysis. The analysis for tritium will occur once during the 30 day sampling period. Flow measurements will be taken weekly until access is no longer available and/or flow stabilizes or stops. The Permittee includes a commitment to provide weekly flow data, as well as a map showing an approximate location (approximate means which panel and ballpark area within panel) of where the flows have been encountered. In the event this information is collected, the data monitoring information and map will be incorporated into Appendix 7-27.

aumarva

Hydro Surface Water Monitoring

Analysis:

The application meets the State of Utah R645 requirements for Surface Water Monitoring.

Operations in the Greens Hollow Tract have potential to impact surface water resources and therefore, a surface water monitoring plan will be implemented. Surface water monitoring plan is outlined in Table 7-2, beginning on page 7-50. The locations are depicted on Plate 7-10. All PHC monitoring recommendations were incorporated into the monitoring program. The surface locations are located within major drainages of the Greens Hollow Tract. Monitoring will occur at Cowboy Creek (M-STR04, discharge and field parameters), Greens Hollow Creek (M-STR06, discharge and field parameters), Muddy Creek (U-Mud, discharge and field parameters), Muddy Creek below the Tract (Pines 405, discharge and field parameters), South Form of Quitchupah Creek (Sufco 006, discharge, field and lab parameters), and North Fork of Quitchupah Creek (Sufco 007, discharge, field and lab parameters.) An additional 15 surface water monitoring locations exist throughout the tract to provide monitoring of tributaries and water above and below longwall panels. The total number of surface monitoring locations within and adjacent to the tract is 25 sites.

The major drainages includes a no-subsidence buffer zones in the perennial reaches above the Tract and where the Castlegate Sandstone is known to occur within 50 feet or less of the surface. The buffer zone provides extra protection for the surface water resources. The no subsidence zones are depicted on Appendix 7-27, Figure 4.4. Furthermore, there is limited potential for communication between these formations naturally. Active mining within the Greens Hollow Tract has potential to increase subsurface connectivity between formations, however, it is unlikely that substantial and permanent impacts will affect surface water resources. All of the Greens Hollow Tract has an overburden exceeding 800 feet. The presence of clays in the subsurface will likely impede the development of cracks due to the plasticity, or heal any cracks that do form by infilling or swelling.

The streams chosen to be monitored include no-subsidence mining zones and in areas where subsidence mining will occur. The locations are depicted on Table 7-10. A mine progress map, to be submitted to the Division quarterly-coinciding with water monitoring, is described on page 7-69. The maps will be submitted confidentially to the Division within 30 days following the end of the previous quarter.

The permittee will monitor all stock water ponds within and immediately adjacent (1-mile) to the Greens Hollow Tract be monitored. This will include a commitment from SUFCO to visit the ponds within the Greens Hollow Tract as soon as

they are accessible in the spring of each year (typically late April to early May), photographing the condition of each pond, observe the pond for evidence of cracking, estimate the depth and surface area of water contained in the pond, inspect the immediate drainage area for evidence of surface cracking, note general soil moisture conditions, and note the general condition of the pond. The information will be supplied in table format. Additional monitoring visits will be made in the Fall (late September to early October) of each year. This information will be submitted to the Division annually in the Annual Report or provided to the Division Hydrologist at any time upon written request (e-mail, etc.). This commitment is on page 7-24 of the MRP.

The monitoring plan for all surface sites includes a commitment to submit discharge and field parameter measurements to the Division, quarterly.

The surface water monitoring plan is sufficient to detect impacts to the hydrologic balance.

aumarva

Maps Affected Area

Analysis:

The amendment meets State of Utah R645 requirements for Affected Area Boundary Maps.

A previous deficiency outlined the need for the Permittee to amend all drawings and maps to show only approved Sufco leases and pending Green's Hollow lease boundaries. All maps now only include relevant Sufco leases and Green's Hollow lease boundaries, and therefore adequately address this requirement.

jeatchel

Maps Mine Workings

Analysis:

The application meets the State of Utah R645 requirements for Maps Mine Workings.

The Permittee provides a commitment to provide a longwall progress map to coincide with quarterly water monitoring data. The maps will be submitted confidentially to the Division within 30 days following the end of the previous quarter. The maps will have the most recent quarters longwall advancement highlighted, with monthly completion dates labeled and showing the current location of the longwall. The commitment is provided on page 7-85.

aumarva

Maps Monitoring and Sampling Locations

Analysis:

The application meets the State of Utah R645 requirements for Maps Monitoring and Sampling Locations.

The map of Operational Hydrologic Monitoring Stations, including only the current monitoring plan locations for Sufco Mine, is presented on Plate 7-10.

aumarva

Reclamation Plan

PostMining Land Use

Analysis:

The amendment meets the State of Utah R645-301-412 requirements for postmining land use. Volume 1, Chapter 4, Section 4.1.2 pages 4-16 through 4-16 provide the post-mining land use plan. The Greens Hollow mining area is managed by U.S. Forest Service under the multiple use under the Federal Land Policy and Management Act. Present management emphasizes livestock grazing, wildlife, timber and watershed development. 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 the MRP 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. Volume 1, Chapter 4, Section 4.1.3 pages 4-19 through 4-20 provide the postmining land use plan which is the

same as the premining land use.

Irinhart

WildLife Protection

Analysis:

The amendment meets the State of Utah R645-301-342 requirements for a fish and wildlife plan for the reclamation and postmining phase of operation. The amendment does not propose any additional surface disturbance and therefore the existing MRP adequately meets the requirements. Volume 1, Chapter 3, Section 3.4.2 provides a wildlife enhancement plan. Enhancement measures include range improvements within the lease area and reclamation seed mixes are designed to provide nutritional value and cover to wildlife. Table 3-1 (pg. 3-15) provides information on federally protected threatened, endangered, and listed species. Table 3-2 (pg 3-27/28) provides a list of Utah species that are protected. Table 3-3 (pg 3-29/30) provides a list of USDA-FS Region 4 Sensitive species. The proposed amendment will not affect the continued existence of endangered or threatened species or result in the destruction or adverse modification of their critical habitats, as determined under the Endangered Species Act.

Irinhart

Mine Openings

Analysis:

The application meets the State of Utah R645 301-631 requirements for managing mine openings and sealing exploration holes had boreholes.. Since this application is for an extension of an existing underground mine, there are no plans for additional or new portals in the Greens Hollow tract. Reclamation of exploration boreholes has been addressed. The plan for casing and sealing of wells is found in section 7.6.5 of the MRP. When no longer needed for monitoring or approved for transfer as a water well, each well will be sealed and backfilled by placing a concrete plug from TD to the surface.

dhaddock

Contemporaneous Reclamation General

Analysis:

The amendment meets the State of Utah R645-301-352 requirements for contemporaneous reclamation. Volume 1, Chapter 3, Section 3.5.2 page 3-52 provides the contemporaneous reclamation plan. The amendment does not contemplate any surface disturbance and therefore, the approved MRP meets the regulations.

Irinhart

Revegetation General Requirements

Analysis:

The amendment meets the State of Utah R645-301-341 requirements for a revegetation plan. Volume 1, Chapter 3, Section 3.40 provides the revegetation plan which covers all lands disturbed by coal mining and reclamation operations. Nothing has been added to the existing reclamation plan with this amendment since additional surface disturbance is not proposed at this time.

Irinhart

Revegetation Mulching and Other Soil Stabilization

Analysis:

The amendment meets the State of Utah R645-301-353 requirements for vegetative cover. Volume 1, Chapter 3, Section 3.5.3 page 3-53 through 3-58 provides general requirements for revegetation. The amendment does not contemplate any surface disturbance and therefore, the approved MRP meets the regulations.

Irinhart

Maps Affected Area Boundary

Analysis:

The amendment meets State of Utah R645 requirements for Affected Area Boundary Maps.

A previous deficiency outlined the need for the Permittee to amend all drawings and maps to show only approved Sufco leases and pending Green's Hollow lease boundaries. All maps now only include relevant Sufco leases and Green's Hollow lease boundaries, and therefore adequately address this requirement.

jeatchel

CHIA

CHIA

Analysis:

The application meets the State of Utah R645 requirements for the Cumulative Hydrologic Impact Assessment (CHIA).

aumarva

**QUITCHUPAH AND MUDDY CREEK
CUMULATIVE HYDROLOGIC
IMPACT ASSESSMENT
(CHIA)**

For

Canyon Fuel Company

SUFCO Mine
C/041/0002

In

Sevier County, Utah

April 17, 2018

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I. INTRODUCTION

The Quitchupah and Muddy Creek Cumulative Impact Area (CIA) are located in Sevier County, Utah, west of the town of Emery (Plate 1). There is currently one active mine in the Quitchupah/Muddy Creek CIA – Canyon Fuel Company’s SUFCO Mine. The SUFCO Mine presently encompasses three existing tracts of land: The Pines Tract, the Quitchupah Tract and the SITLA Muddy Tract. Expansion of the SUFCO Mine with the addition of the Greens Hollow Lease Area located north-west of the existing lease area has prompted this review and update of the Quitchupah/Muddy Creek Cumulative Hydrologic Impact Assessment (CHIA). The addition of Greens Hollow adds approximately 6,175.39 acres and will expand the total lease area to 26,402.64 acres.

The Division has the responsibility to assess the potential for mining impacts both inside and outside permit areas. The CHIA is a findings document prepared by the Division that assesses whether existing, proposed, and anticipated coal mining and reclamation operations have been designed to prevent material damage to the hydrologic balance outside the permit areas. The Division cannot issue a permit to a proposed coal mining operation if the probable, anticipated hydrologic impacts will create material damage to the hydrologic balance outside the permit area. The CHIA is not only a determination if coal mining operations are designed to prevent material damage beyond their respective permit boundaries when considered individually, but also if there will be material damage resulting from effects that may be acceptable when each operation is considered individually but are unacceptable when the cumulative impact is assessed.

The objective of a CHIA document is to:

1. Identify the Cumulative Impact Area (CIA) **(Part II)**
2. Describe baseline conditions in the CIA; identify hydrologic systems, resources and uses; and document baseline conditions of surface and ground water quality and quantity **(Part III)**
3. Identify hydrologic concerns **(Part IV)**
4. Identify relevant standards against which predicted impacts can be compared **(Part V)**
5. Estimate probable future impacts of mining activity with respect to the parameters identified in 4 **(Part VI)**
6. Assess probable material damage **(Part VII)**
7. Make a statement of findings **(Part VIII)**

This CHIA complies with the federal Surface Mining Control and Reclamation Act of 1977 (SMCRA) and subsequent federal regulatory programs under 30 CFR 784.14(f), and with Utah regulatory programs established under Utah Code Annotated 40-10-et seq. and the attendant State Program rules under R645-301-729.

II. CUMULATIVE IMPACT AREA (CIA)

Reviewing Permit Application Packages (PAPs) and Mining and Reclamation Plans (MRPs) alone are not sufficient to assess impacts to the geologic and hydrologic regimes. Specific knowledge of the geology and hydrology is crucial in assessing the dynamics and interactions of chemistry, surface- and ground-water movement, and surface disturbance and subsidence impact associated with the mine sites. The Division uses pertinent information from many sources, including federal and state agencies; geological and hydrological reports; textbooks and other publications; site visits; and a knowledge-base built on experience and training.

Plate 1 depicts the location of the Quitchupah/Muddy Creek drainage area relative to the southeast/central portion of the State of Utah. Plate 2 delineates the CIA for current and projected mining in the Quitchupah/Muddy Creek area. The CIA boundary encompasses approximately 95 square miles. It is bounded on the south by Quitchupah Creek and Convulsion Canyon, from a point where Quitchupah Creek crosses State Highway 10, northeast to a point east of Christensen Wash, along Christensen Wash to the ridge that lies east of Rock Wash

Canyon, then along the ridge to Muddy Creek. It proceeds northwest along the northeast side of Muddy Creek and along the South Fork of Muddy Creek. The CIA boundary then ranges south along the drainage divide separating Skutumpah Canyon drainage from the Quitchupah Canyon drainage from White Mountain south to the ridge dividing Collier Hollow and into Convulsion Canyon to join Quitchupah Creek.

Within the CIA, SUFCO Mine is the only SMCRA permitted coal mining operation. The SUFCO Mine operations generally comprises of five major tracts: the Quitchupah Tract, the Pines Tract, the SITLA Muddy Tract, the WLM tract, and the Greens Hollow Tract (Plate 2). The whole CIA area is truncated to the south and southeast by the steeply eroded Convulsion and East Spring Canyons. This upland plateau is dissected by a series of valleys predominantly trending northwest/southeast including Duncan Draw, Mud Spring Hollow and Pin/Broad Hollow. The surface topographic relief in the Greens Hollow Tract ranges from 7,400 feet in eastern portion of Muddy Canyon to 9,760 feet at the western edge of White Mountain. The physiographic setting of the Greens Hollow Tract is in the Wasatch Plateau, bounded to the north and northeast by the deep Muddy Creek and Cowboy Creek canyons, to the west by White Mountain, and to the south by the North Fork of Quitchupah Creek. The general slope of the land is reported to the south/southeast. Elevations in the CIA range from less than 5,000 feet in the lower reaches of Muddy Creek to approximately 9,760 feet on the western edge of the Quitchupah/Muddy Creek (Plate 2).

A small part of the northeast portion of the Pines Tract extends across the Muddy Creek drainage and outside the CIA. The coal seam ends in the escarpment south of the creek, so the CIA should include all impacts. The mine facilities are located within the Quitchupah Tract. Mining activities in the Pines and SITLA Muddy Tracts take place underground with no planned breakouts or surface disturbances.

HISTORY OF MINING

The Convulsion Canyon Mine commenced operation in 1941, mining federal owned coal. There was no previous mining activity prior to the 1941 operation. From 1941 through 1974, coal was extracted using only conventional mining techniques. Between 1974 and 1978, both conventional and continuous mining methods were used. Then, until 1985, only continuous miners were used for coal extraction. Since 1985, SUFCO has utilized both continuous mining and longwall mining techniques.

Currently, the SUFCO lease area encompasses a total of 26,402.64 acres that includes 23,129.95 acres of Federal coal leases, 2,294.19 acres of State of Utah coal leases, 640 acres of fee coal leases, the 240-acre waste rock disposal site, 28.5 acres under U.S. Forest Service special use permit, and 70 acres of BLM R-O-W. The majority of mining has been and will continue to be full-extraction, longwall mining.

The mine is portaled in the Upper Hiawatha coal seam, occurring in the lower portion of the Blackhawk Formation. The Upper Hiawatha coal seam is the seam mined in the majority of the SUFCO mine. The Lower Hiawatha Coal Seam will only be mined in the western portion of the

Quitcupah lease where the seam is of mineable thickness. Anticipated annual production of coal from SUFCO Mine during the 2017-2021 years will range from 5.5 to 6.3 million tons. The projected life of the SUFCO Mine, with the Greens Hollow extension, is estimated to be until May 2030 and produce an estimated 59.7 million tons of mineable coal.

Most of the mine and coal processing facilities are located in the Quitcupah Creek drainage, in East Spring Canyon. The portal and facilities in East Spring Canyon receive coal from the face by underground conveyor and then the coal is transported by truck. A waste rock disposal site with sedimentation pond is located approximately 5.3 miles west of the mine facilities. Three sedimentation ponds are located in East Spring Canyon in the immediate vicinity of the surface facilities. A concrete sediment trap is located near the southern end of the mine yard which captures all disturbed area runoff from the mine yard area. The primary and overflow ponds are located directly below the mine facilities where disturbed area flow drops down a steep slope to get to the pond. The overflow pond is located 800 feet downstream of the primary sedimentation pond. A buried sewage septic system in lower East Spring Canyon treats all mine sewage. In September 2010, the Permittee submitted an amendment to reduce the permit area of the mine to only the disturbed portions. With the expansion of the Waste Rock Site, and SUFCO taking responsibility for the North Water Spring area, the permitted acres for the mine have increased. Currently, the permitted and bonded area comprises 691.728 acres. The disturbed area is 96.42 acres.

Table 1 presents the annual production in millions of tons of the SUFCO mine from 1983 to 2017. The production values were obtained from the Utah Geological Survey (Coal Production and Recoverable Reserves in Utah by Coal Mine 2001-2015) and Canyon Fuel Company. Currently, the SUFCO Mine is the highest producing coal mine in the State of Utah. The mine is estimating that their advancement of longwall panels into the Greens Hollow Tract area will occur in Fall 2017, extending the life of the mine through May 2030.

III. HYDROLOGIC SYSTEM and BASELINE CONDITIONS

Predominant features that exist in the CIA are sandstone cliffs, narrow steep canyons, valleys, highly exposed rock formations and an extensive fracture system. Drainage in the CIA is characterized by the two major drainage systems of Quitcupah and Muddy Creeks which are perennial streams with headwaters that originate at elevations of 7,500 to 9,000 feet.

The SUFCO mine area exists entirely within the Muddy River Basin. Big Ridge, in the southern portion of the Greens Hollow Tract, forms the drainage divide between Muddy Creek Watershed and Quitcupah Creek Watershed. The majority of the mine area drains south into Quitcupah Creek via the North Fork of Quitcupah Creek and ephemeral tributaries. The north and northeast portions of the mine area, including the majority of Pines Tract and Greens Hollow Tract, drain into Muddy Creek.

Surface-water resources in the CIA consist of streams and stock watering ponds. Stock water ponds capture water from adjacent springs or precipitation. Similarly, most streamflow is climatically driven, attributed to runoff from snowmelt or rain. Peak perennial monthly stream flows typically occur in May or June, likely as a result of snowmelt runoff. In the later summer and fall months, baseflow is driven by spring discharge. Ephemeral streamflow in the area is often of a short duration with high intensity because it largely results from precipitation events occurring in the summer months of July, August, and September.

Ground-water resources in the CIA consist of springs and mine-water discharge. Spring discharge from the shallow formations is largely climatically driven, with recharge at outcrops and surface exposure. Recharge to the deeper formation is through overlying strata. Groundwater resources have been analyzed for water quality and seasonal flow patterns. The information used to make findings on groundwater trends was compiled by Mayo and Associates and Petersen Hydrologic, Inc. for the SUFCO Mine. Data was collected at springs, wells, in-mine flows, and mine discharge sites. A previous water resource study was conducted by the U.S. Geologic Survey (Thiros and Cordy, 1991).

GEOLOGY

The geology of the CIA consists of stratigraphic units of rock ranging in age from Late Cretaceous to Tertiary (Eocene) as seen in Table 2 and Plate 3. The oldest exposed rocks include members of the Mancos Shale. The Mesaverde Group overlies the Mancos Shale and consists of the Star Point Sandstone, Blackhawk Formation, Castlegate Sandstone, and Price River Formation. Overlying the Mesaverde Group in the CIA is the North Horn Formation, a member of the Wasatch Group of Paleocene to Eocene age. Unconsolidated deposits formed by weathering and erosion exist as soils, terrace deposits and gravels along canyon streams, and pediments at the base of escarpments. The geology and the general hydrologic properties of each of these formations are described herein:

Geologic Units

North Horn Formation

The North Horn Formation is a variegated, slope-forming shale unit with minor sandstone, conglomerate and freshwater limestone. The North Horn Formation is of late Cretaceous – Early Tertiary age and outcrops in the west/northwest portion of the CIA and present at the surface on Duncan Mountain and throughout the Greens Hollow Tract. The reported thickness of the North Horn Formation in the general CIA area was reported to be approximately 1,490 feet. The shaley nature of the formation and its occurrence in high precipitation areas make landslides and mass movement common along outcrops. Groundwater movement through this unit is considered minimal due to the pervasiveness of the low-permeability of the shale horizons. Groundwater transport is primarily through fractured or weathered zones that may percolate to the underlying Price River Formation, but it is not considered appreciable.

Price River Formation

The upper member of the Price River Formation consists of interbedded sandstone, shale, siltstone with minor conglomerate. The formation was deposited in fluvial environments. The full formation thickness in the CIA is approximately 500 feet. The Price River Formation has been reported to have the capability of transmitting water but is limited by the lenticular geometry of the sandstone units, prohibiting water from traveling significant distances. Because this unit represents the land surface in the majority of the CIA, recharge to this unit from precipitation and snowmelt is heavily influenced by climatic conditions.

Castlegate Sandstone

The Castlegate Sandstone is a formation consisting of massively bedded coarse-grained sandstone that formed in a braided fluvial depositional system. The Castlegate has been described as a formation that is sufficiently permeable to transport appreciable groundwater but the discontinuity of interbedded lithologies of mudstone, shale, and sandstone limit its ability to transmit water over significant distances. Therefore long, regional flow systems do not generally develop in the Castlegate Sandstone (Petersen 2010). Low discharge rates from springs and lack of water in some drill-holes and wells are further evidence that an extensive groundwater system is not present in the Castlegate. Ground-water systems that feed Castlegate springs are localized, and recharged on the plateau or outcrops. Spring discharge hydrographs show flow is strongly dependent on precipitation and snowmelt. Flow is localized, occurring at joints/fractures and intergranular spaces in weathered rock. Near cliff faces and along stream bottoms, the Castlegate Sandstone becomes friable and more able to transmit groundwater due to dissolution of carbonate cement.

Blackhawk Formation

The upper Blackhawk Formation consists of fine- to medium- grained sandstones, interbedded with subordinate gray and black carbonaceous shale, with coal found mostly in the lower quarter of the formation. The Blackhawk formation deposition was part of a broad deltaic plain sequence with coal accumulating in coastal plain and shoreface environments. These sandstones are separated vertically and laterally by overbank and inter-deltaic deposits of shale and mudstone. Sandstone decreases towards the base of the Blackhawk and the sandstone units become even more separated and isolated. Swelling clays throughout the Blackhawk decrease the effectiveness of fractures as conduits for water. Because of the lateral and vertical discontinuity of the sandstone horizons, the potential for movement of groundwater is limited in the Blackhawk Formation.

Mining operations are restricted to the lower Blackhawk Formation, where the main coal seam is the Upper Hiawatha, averaging approximately 7 feet thick and is known to directly overlay the Star Point Sandstone. The Upper Hiawatha coal seam is the coal to be mined in the WLM and Greens Hollow area. The Lower Hiawatha Seam is thick enough and is separated from the Upper Hiawatha by sufficient interburden to allow it to be mined in the western portion of the Quitcupah tract. The Duncan Seam, above the Upper Hiawatha, is of minable thickness

over only 50 acres, so it is not economical to mine. Overburden thickness over the Upper Hiawatha ranges from approximately 600 feet to 2,500 feet and averages 800 feet. Large areas where coal seams have burned and fired the rock to resistant, reddish clinker are exposed in the canyon walls. The Blackhawk Formation is well exposed in the cliffs of Convulsion Canyon.

Star Point Sandstone

The Star Point sandstone is described as an interbedded sandstone, siltstone and shale deposited in a near shore beach environment. The thickness of the Star Point Sandstone averages about 280 feet and is found throughout the lease area. The lower portion of the formation inter-tongues with the underlying Masuk Member of the Mancos Shale. Groundwater flow in the Star Point Sandstone is primarily transported through joints and fractures.

Mancos Shale, Masuk Member

The Masuk Member of the Mancos Shale is described as a blue-gray fissile claystone or silty claystone that weathers to a light blue-gray to light tan. The unit forms steep, barren, easily erodible slopes. The Mancos shale is a deep marine shale unit considered to be a confining layer due to its poor water transmitting properties due to its high clay content.

Structure

There are no major disconformities. Dip is approximately 2° to the northwest due to the rise of the San Rafael Swell located to the southeast. North-south oriented faults are common in the Wasatch Plateau. At least 200 feet of offset on one of these faults formed the closed basin that holds Accord Lakes, located 6 miles southwest of the SUFCO Mine. Lisonbee Spring issues from this fault. Offsets on bounding faults of the Joes Valley graben lies only a few miles east of the SUFCO Mine and approach 1,000 feet.

Neither Spieker (1931), Doelling (1972), nor Thiros and Cordy (1991) mapped any faults within the CIA between the Accord Lakes fault and Joes Valley graben. A group of ten echelon normal faults have been mapped between East Spring Canyon and Duncan Mountain: vertical offsets are indicated on Plate H-II of Appendix 7-2 of the MRP as being greater than 2 feet. Another group of parallel faults, located north of Duncan Mountain, is shown between the South and North Forks of Quitchupah Creek on Plate 6-1: the basis for mapping these faults is unknown but is assumed to be photo geology. Two short faults mapped near the head of Box Canyon were encountered in the mine, but may not show at the surface. Strike of all these faults is approximately N 25° W to N 30° W. Major faulting has not been identified in the Greens Hollow area (Petersen, 2010).

Most faults within the SUFCO Mine have displacements of less than a foot, but a fault encountered near Duncan Draw had 16 feet of displacement (oral communication from Chris Kravits, mine geologist, reported by both Thiros and Cordy (1991), and Mayo and Assoc. (1997)).

Fractures measured in the SUFCO Mine strike generally N 26° W. Fractures observed in the Castlegate Sandstone, Blackhawk Formation, and Star Point Sandstone are oriented N 20° W to N 27° W, and strongly influence surface drainage development. Orientation of a secondary set of fractures, measured at a Castlegate Sandstone outcrop centered on N 65° E (Thiros and Cordy, 1991). Joints in the Castlegate Sandstone are common and can be traced up to approximately 1,000 feet in length.

CLIMATE

In the Quitchupah/Muddy Creek CIA, temperatures are elevation dependent and range from 32° to 90° F in the summer and -10° to 40° F in the winter. Prevailing winds are from the west and northwest. Annual precipitation ranges from 10 inches per year at lower elevations to more than 20 inches per year at higher elevations. Approximately half of the total annual precipitation falls during localized thunderstorm events from July through November (Thiros and Cordy, 1991).

The Palmer Hydrologic Drought Index (PHDI) indicates long-term climatic trends for the region. The PHDI is a monthly value generated by the National Climatic Data Center (NCDC) that indicates the severity of a wet or dry spell. The PHDI is computed from climatic and hydrologic parameters, such as temperature, precipitation, evapotranspiration, soil water recharge, soil water loss, and runoff. Because the PHDI takes into account parameters that affect the balance between moisture supply and moisture demand, it is useful for evaluating the long-term relationship between climate and groundwater recharge and discharge. The Quitchupah/Muddy Creek CIA straddles the boundary between PHDI Regions 4 and 7 and is near Region 5. Figure 1 shows the PHDI for 2000 through 2017. Overall, the area has been experiencing mild-moderate wet spells up to moderate-severe drought conditions since 2000.

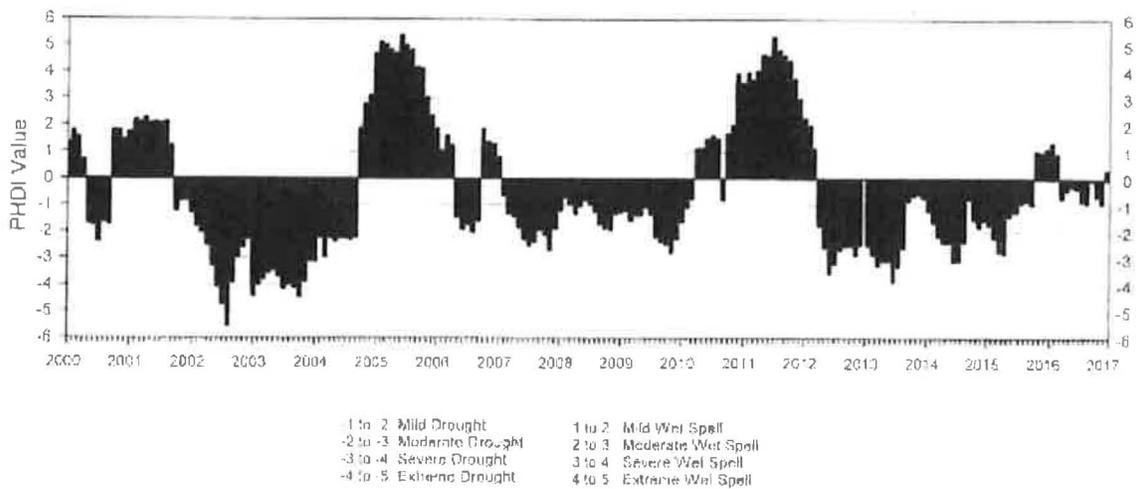


Figure 1 - PHDI, Division 4

REGIONAL AQUIFER

Regional aquifer is a phrase commonly used by mine operators in the Book Cliffs and Wasatch Plateau coal fields. In such usage, regional aquifer usually refers to any water found in the Star Point Sandstone and Blackhawk Formation irrespective of quality, quantity, use, storage, flow and transport, and discharge. In preparing this CHIA, the Division has adhered to the definition of aquifer as found in the Coal Mining Rules (R645-100-200), and the term regional aquifer has been deliberately used or avoided, as appropriate, throughout this CHIA. Although there are local perched and fracture-related aquifers in the Quitchupah/Muddy Creek CIA, the quality, quantity, use, storage, flow and transport, and discharge of groundwater do not indicate the presence of a regional aquifer or aquifer system. Continuously saturated groundwater systems generally do not exist in the geologic formations overlying or immediately below the coal seams to be mined. The formations are largely heterogeneous in nature and groundwater is typically present in fracture systems or isolated strata i.e. sandstone paleochannels. After evaluating the geologic and hydrologic evidence, the Division does not consider the saturated strata in the Starpoint, Blackhawk and associated formations in the CIA to be a regional aquifer.

Sedimentology and Transmissivity

In sedimentary rocks, there is a wide range of textures or fabrics that determine the hydraulic characteristics of the unfractured medium. These textures or fabrics are related to the mineralogy or composition of the sediments, the range of sizes of the sedimentary particles (sorting), the spatial distribution of different sediment-sizes (grading), the shape and spatial orientation or arrangement of the sediment particles after compaction (packing), cementation, and properties acquired or altered as and after the sediments were lithified. Lateral and vertical variations in these characteristics can create internal low-permeability zones or barriers resulting in formations with limited storage capacity or low hydraulic conductivity. Such vertical and lateral heterogeneities are common within the sandstone units of the CIA.

The hydrogeologic conditions within formations in the CIA are summarized below.

North Horn Formation consists of groundwater flow within shallow sandstone paleochannels, under perched conditions. Groundwater flow is largely constricted to these paleochannels due to the pervasiveness of low-permeability shales that limit vertical and horizontal movement of water. Recharge of the North Horn Formation occurs in the western adjacent reaches of the CIA in sandstones present at or near the surface. Groundwater flow in the unit increases locally due to bedrock fracturing. This unit has not been identified as a significant aquifer. Transmissivity for the North Horn Formation on average is 10 ft²/day.

Price River Formation consists of individual fluvial sandstones (paleochannels) capable of transmitting water. Due to the lenticular geometry of sandstone units and the presence of low-permeability shales throughout the formation, groundwater flow is restricted and does not typically transmit laterally and vertically in the formation. The restricted vertical flow creates perched zones and springs appear at higher topographic positions. Recharge is limited due to the

poor vertical groundwater transmitting properties of the overlying North Horn Formation. This unit has not been identified as a significant aquifer. The springs discharging from this formation are seasonal, climatically driven. Transmissivity averages for the Price River Formation averages 0.8 ft²/day.

Castlegate Sandstone overlying the Hiawatha seam is a massive sandstone unit with groundwater flow occurring primarily through fractures, joint systems, and along bedding planes. Recharge and storage in the Castlegate is most readily available at surface exposures. For instance, in the Pines area, recharge to springs in the Box Canyon tributaries is derived primarily from the area within 1,000 feet of canyon rims. These surface exposures create more storage and greater hydraulic conductivity from the widening and increased fracturing from canyon erosion. In areas where the Castlegate is overlain by other formations, the interbedded mudstone drapes limit recharge and groundwater flow in the formation. The Castlegate Sandstone unit is discontinuous due to the presence of shale layers, therefore permeable sandstone strata are not continuous over significant, long, regional-type flow systems. All water flow is typically local in nature with small to moderate quantities discharged. The formation is not considered to be a significant regional aquifer as the groundwater occurrence within the Castlegate Sandstone is limited to isolated perched zones contained in permeable sandstone lenses, within weathered bedrock, or fractures/joint systems. Transmissivity averages in the Castlegate Sandstone ranges from 0.003 to 0.02 ft²/day.

Blackhawk formation underlies the Castlegate Sandstone and is the unit which contains the mineable Hiawatha coal seam. Recharge to the Blackhawk appears to be downward percolation from the Castlegate Sandstone. The Blackhawk Formation contains layers of low-permeability rock units, such as shales and clays that may impede downward movement of groundwater. Therefore, some springs and seeps found in the CIA issue from the base of the Castlegate Sandstone due to the possible perched effect caused by the Blackhawk Formation. Groundwater flow within the Blackhawk typically occurs along fractures, and springs and seeps may appear at sandstone lens outcrop areas. Groundwater encountered in the underground workings is said to be primarily at working faces, associated with faults, fractures, and roof bolt holes. It has been noted that water inflow rates, initially less than 5 gpm, decrease as mining progresses. This indicates that mining is likely dewatering perched, isolated zones of limited areal extent. This unit has not been identified as a significant aquifer. Transmissivity averages in the Blackhawk Formation ranges from 2.0 to 100 ft²/day.

Flow within the Star Point Sandstone occurs primarily through joints, fractures, and faults. There exists a bounding impermeable layer below the Blackhawk that separates the Starpoint formation. Based on slug tests and determinations from core samples, hydraulic conductivity of the Star Point Sandstone is typically low. Transmissivity averages in the Starpoint ranges from 2.0 to 100 ft²/day. The movement of groundwater through unfractured Star Point Sandstone is slow and generally not considered to be an aquifer. However, hydraulic conductivity values within the Star Point Sandstone vary several orders-of-magnitude where fractured units exist, enabling local transmission of groundwater in sufficient quantities to sustain small springs or wells. The CIA is underlain by the largely massive, unfractured Star Point Sandstone.

*All transmissivity values are represent values taken from parts of the formation supplying water to a well, not the full saturated thickness of the unit. Overall, "aquifers" typically have hydraulic conductivities of 10^{-5} cm/sec or greater. The formations above the Star Point Sandstone have hydraulic conductivities that are generally as low as or lower than those in the Star Point Sandstone.

Swelling Clays

Groundwater is not readily recharged by groundwater contained within the overlying strata of the Castlegate, Price River, or North Horn formations. Strata with limited surface exposure in the Mesaverde Group receive limited recharge from overlying formations because they are interbedded with low-permeability claystones and siltstones. Large volumes of these rocks may be unsaturated or even dry. Generally, sandstone aquifers occur where there is sufficient intergranular porosity and permeability in lenticular fluvial-channel and tabular overbank deposits. However, in th CIA, the sandstones are laterally and vertically discontinuous, pinch-out over short distances, and individual sandstone units are poorly interconnected, becoming isolated by claystones and siltstones. It is however feasible for these sandstones, especially where fractured, to produce significant groundwater flows from local systems. For instance, in many of the areas of the CIA, the surface exposure of sandstone units and fractures provides a mechanism for groundwater to recharge the Castlegate Sandstone.

Movement of water is also impeded by the presence of swelling clays in the formation of the Wasatch Plateau. The interbedded claystones, siltstones, and sandstones of the Wasatch Plateau are rich in swelling clay minerals of the montmorillonite or smectite group. Swelling clays absorb water and expand to as much as 150 percent of their dry volume. These swelling clays reduce the hydraulic conductivity of the rock or soil that contains them and contributes to the rapid closing or healing of tension fractures that result from subsidence. Genwal Resources, Inc. examined six shale and siltstone samples from the Blackhawk Formation in the East Mountain region of the Wasatch Plateau, located approximately 25 miles northeast of the Quitcupah/Muddy Creek CIA. The samples were analyzed by X-ray diffraction and cross-polarized light microscopy. The samples contained 3 to 34 percent of smectitic clays, with an average of 24 percent. Siltstones and shales in the Castlegate (three samples) averaged 19 percent smectitic clay, and the Price River Formation (three samples) averaged 15 percent smectitic clay. Non-swelling clays, which also inhibit ground-water flow, constituted an additional 1 to 6 percent of the rock volume (Crandall Canyon Mine MRP, App. 7-41).

HYDROLOGY

As part of the SUFCO mining and reclamation plan (MRP), SUFCO has implemented a baseline and operational surface- and ground-water monitoring program for their permit and adjacent areas. Several studies have been conducted within the CIA in order to assess hydrologic conditions and potential effects due to coal mining in the area. These studies include Thiros and Cordy, 1991; Mayo and Associates, 1997; Mayo and Associates, 1999; Pines Tract Final Environmental Impact

Statement, 1999; Cirrus Ecological Solutions, 2004; Surface and Groundwater Technical Report Greens Hollow Coal Lease Tract, 2014; Petersen Hydrologic, 2005, 2010, and 2017. Information presented in these studies is used to describe baseline hydrologic conditions for the CIA.

Groundwater

Groundwater systems identified in the Quitchapah/Muddy Creek region are either of shallow, meteoric origin water, or deep, ancient origin water. The North Horn, Price River and Castlegate formations are shallow, subject to recharge from meteoric water. Once recharge enters the ground, the rate and direction of groundwater flow is governed mainly by geology. Lateral groundwater flow dominates in the gently dipping Tertiary and Cretaceous strata of the Wasatch Plateau, where layers of low-permeability rock that impede downward movement are common. Both lateral and vertical flow may be channeled through faults and fractures, but plastic or swelling clays that can seal faults and fractures impede movement. Ground-water movement is controlled mainly by fractures, dip of the beds (dip is approximately 1 - 2 degrees to the northwest) and the hydraulic conductivity of the strata.

Shallower groundwater systems in the CIA are more weathered and have hydraulic conductivities that are typically larger than deeper groundwater systems. Groundwater flow occurs in a stair-step pattern, moving laterally and downward as porosity and permeability allow. Where groundwater intersects the surface, groundwater discharges as a spring or seep, enters a stream as baseflow, or is transpired by vegetation. Some groundwater infiltrates deeper and enters slower flow-paths where it enters storage and becomes largely isolated from the surface. Deep groundwater systems in the CIA are largely in massive units, with water moving along joints and fractures in the bedrock. The lateral and vertical continuity in deep groundwater systems is greatly limited from interbedded low-permeability layers.

Numerous springs and seeps have been identified by the various studies conducted within the CIA. Fifty-three springs have been selected to be monitored as part of the SUFCO Mine groundwater monitoring program. The springs were selected as representative of the permit and surrounding area from baseline data and information provided in the PHC determinations of the SUFCO MRP (Appendices 7-17, 7-18, 7-19, 7-20, 7-24, 7-26, 7-28). The monitored springs are identified with their respective stratigraphic units on Table 3. The springs identified included both the shallow and deep groundwater systems. All springs were monitored for analytical geochemistry. Typically, shallow or meteoric groundwater systems have different chemical and isotopic signatures than deep or ancient groundwater systems. A generalized ground-water quality data summary of the CIA is presented in Table 5. More springs and seeps appear along northeastern escarpments, which is consistent with the concept of groundwater following the northwestern dip slope.

Average total dissolved solids (TDS) concentrations for springs in the CIA range from 140 to 749 mg/L. Average TDS concentration reported for mine water discharged at UPDES outfall 003 is approximately 777 mg/L. The higher TDS concentration for mine water is likely due to the longer residence time of water encountered in perched aquifers with minimal direct

communication with surface-water recharge zones. In contrast, TDS in springs of the Castlegate Sandstone, average under 200 mg/L. The waters are under saturated with respect to carbonate minerals, which along with the low TDS, indicates that recharge takes place where soil zone CO₂ is low. This is most likely the exposed, relatively barren Castlegate Sandstone surface of the Old Woman Plateau with extensive surface exposure and poor soil development. Ground water from springs that issue from the Blackhawk Formation are similar to those from the Castlegate. Most of these springs are in the upper Blackhawk. Ca⁺ and HCO₃⁻ are the dominant ions in both the Castlegate and Blackhawk. TDS levels in ground waters flowing from the overlying North Horn, Price River, and the Star Point Formations are higher, averaging greater than 550 mg/L. Dominant ions in these formations are Na⁺ and HCO₃⁻ in the North Horn, Na⁺, HCO₃⁻ and SO₄ in the Price River, and Ca⁺ and HCO₃⁻ in the Star Point. Calcite and clay minerals with exchangeable sodium (cation exchange processes) probably produce sodium enriched water (Thiros and Cordy, 1991). Overall, the waters are of mixed composition, no ions dominating consistently. There is some indication of seasonal variation in the North Horn, Price River, and Castlegate Formations.

Wells WRDS-B3, WRDS-B5, WRDS-B6, WRDS-B8, and WRDS-B9 monitor water quality at the waste rock disposal site (WRDS). They are completed in the upper Price River Formation. TDS concentrations are high, averages in the different wells ranging from 1,700 mg/L to 6,200 mg/L. TDS concentrations increase down gradient beneath the WRDS, a condition that predates construction of the site.

Only a small amount of water-quality data has been collected from the other wells around the SUFCO Mine because they are primarily intended for monitoring water levels.

Surface Water

Quitcupah and Muddy Creeks, both perennial streams, are the two major drainages in the CIA. East Spring, Greens, Box, and Wash Rock Canyons, and Wileys Fork are the source of small perennial, intermittent or ephemeral streams that feed Quitcupah and Muddy Creeks (Plate 4 and Table 4). The small draws that feed these canyon streams are numerous and some originate as springs, which continue to flow perennially, but most often filter into the surrounding channel deposits. Most springs on the CIA emit low volumes.

Muddy Creek is a major drainage with flows that vary climatically, with peaks in May or June from springtime snowmelt and baseflow conditions in the late fall and winter. Discharge typically ranges > 100 cfs to < 10 cfs. Flow can exceed 500 cfs during wet years. Releases from reservoirs in the headwaters can impact discharge rates. A gain/loss study on Muddy Creek was conducted. The study found no appreciable or statistically significant change in discharge rates.

Quitcupah Creek Drainage is in the southern portions of the Greens Hollow Tract. The majority of the tract is within the North Fork of Quitcupah Drainage. The North Fork of Quitcupah flows across the Flagstaff Limestone, North Horn and Price River. The South Fork of Quitcupah flows across the Castlegate and Blackhawk Formation. The discharge is seasonally variable with peaks during spring snowmelt and in late fall.

Snowmelt is the major source of water for the perennial streams of the Quitchupah and Muddy Creek. Intermittent and ephemeral tributaries are abundant, existing primarily at lower elevations where potential evapotranspiration exceeds precipitation. Intense summer thunderstorms may cause short-term flooding, but not large volumes of runoff.

All surface monitoring sites are listed in Table 7. In addition to Table 7, monitoring includes three UPDES sites and stock pond sites. Two UPDES sites, 001 and 002, are located in East Spring Canyon and a third, 003, is located in the North Fork of Quitchupah Creek. Stock pond monitoring is located within and adjacent to the Pines, Quitchupah, and Greens Hollow Tract.

The following streams within the SUFCO permit area are considered perennial:

North Fork of Quitchupah Creek as measured at SUFCO-007 and SUFCO-042;

South Fork of the North Fork of Quitchupah Creek as measured at SUFCO-006;

Quitchupah Creek as measured at SUFCO-041 and SUFCO 046;

Box Canyon as measured at stations SUFCO-090, Pines 403, and Pines 407;

East Fork of Box Canyon as measured between stations Pines 106 and 408;

Cowboy Creek as measured at station M-STR4; and

Muddy Creek as measured at stations Pines 405 and Pines 406.

Water use in the higher elevations of the Muddy Creek drainage basin is primarily for wildlife and stock watering purposes, although they tend to be low yielding springs and streams. The upper watershed provides most of the domestic water needs for the lower valley. The lower valley area also used water for agricultural. Minimum flows in the gauged streams and rivers in the basin occasionally reach zero. During warm snow melts and heavy rain storms, erosion causes streams to become loaded with sediments, especially in the lower reaches with sparse vegetation and hillside exposures of the Blackhawk Formation and Mancos Shale.

Storage reservoirs are common at higher elevations, however, there are no major reservoirs located within the CIA. Three reservoirs are located adjacent to the CHIA boundary: 1) Julius Flat Reservoir (approximately 725 acre-feet) located northwest of the CHIA, 2) Skutumpah Reservoir (less than 500 acre-feet) located west of the CHIA; and 3) Accord Lakes (less than 500 acre-feet) located southwest of the CHIA.

Soil cover varies with slope. However, soils are generally not cultivated due to their thin nature, shortage of irrigation water, and a short growing season. Residual and colluvial soils are present at the mine surface facilities in East Spring Canyon, including soil types O, W, T, and X. There are areas on top of Pines Tract that are bare or contain only a few sparse inches of soil,

exposing the surface and fracture pattern of the Castlegate Sandstone. Overall, soils in the CIA are generally shallow, consisting of sand and silty sand loams with high percolation rates, with shallow silty soils appear on the milder slopes and shallow sand-gravel alluvium in the channel bottoms.

Groundwater/Surface Water Communication

Mayo and Associates have proposed a hydraulic disconnect between in-mine waters and near-surface ground water based on data from isotopic evaluation. Dr. Allen Mayo is considered a leading authority on isotopic dating of water resources by mining operators, and has identified the ground-water regimes of several mines on the Wasatch Plateau. Studies conducted by his firm are specialized. Analysis of the groundwater by Mayo and Associates using tritium analysis and carbon dating reveals the mine waters to be very old (greater than 7,000 to 20,000 years) as compared to meteoric waters that replenish the near surface waters (Mayo and Associates, 1999, and FEIS, 1999). “The cause of this disconnect is attributed to shale and mudstones in the Blackhawk Formation that hinder the downward migration of water” (FEIS, 1999). Dr. Mayo has concluded, “ground-water should not be diverted from the Castlegate Sandstone into the Blackhawk Formation”.

Tritium analysis measures the amount of atmospheric tritium present in the groundwater, as a result of atomic weapons testing that occurred in the mid-20th century. Carbon-14 measurements estimate the number of years that have elapsed since the water was recharged. Used together, an estimate of origin (meteoric or ancient) can be learned. Compositions of spring and in-mine groundwater have different attributes. In-mine groundwater and springs emanating from faults have very low, near zero tritium concentrations and residence times of approximately 500 to 20,000 years. Meteoric springs have tritium concentrations ranging 5-15 TU.

Carbon¹⁴ and 3H analysis was conducted on spring samples in the CIA. Analysis of SUFCO 047, which discharges from the Starpoint Sandstone below the surface facilities in East Canyon indicated a Carbon¹⁴ result indicative of a 7,300 year residence time of the groundwater, and tritium of 0.1-0.2 TU. Spring 057A, discharging from the North Horn formation, yielded a high tritium result indicative of modern-aged groundwater. Isotopic analysis has been completed throughout the CIA, including sites in the Greens Hollow and Muddy Tract. Findings are summarized in the MRP (Appendix 7-28). The findings distinctively separate the isotopic concentrations of near-surface water (meteoric) and water encountered in-mine (ancient). The distinction supports the limitations of natural communication between surface and groundwater systems.

Mine Inflow

Mean residence time (“age”) of groundwater in the Pines, SITLA Muddy Tracts, WLM, and Greens Hollow have been determined using Carbon¹⁴ (radiocarbon dating) and tritium (³H). Most near-surface systems contain abundant tritium and anthropogenic radiocarbon and are recent or modern, the greatest mean residence time being 4,000 years according to radiocarbon

dating. Ground waters in the mine have a mean residence time of 7,000 to 20,000 years and contain little-to-no tritium. From these data, Mayo and Associates determined that the near-surface ground-water systems are disconnected from ground-water systems encountered in the mine, abundant shale and mudstone of the Blackhawk Formation hindering the downward migration of water.

Most water entering the mine comes through inflows from perched water in the mine roof and occasionally through mine floor seeps. As the mine-face progresses, it has been noted that in-flows decrease or cease once perched water drains. However, some leaks remain or become seeps and continue to contribute to the mine inflow. Underground mining activities in the Greens Hollow Tract area will likely intercept ancient or "in-active" groundwater systems from overlying sandstone channels and possibly intercepted fault/fracture zones. Mining activities will likely dewater these ancient perched systems as it has in other areas of the SUFCO mine. Using isotopic age dating, these systems have been demonstrated to be in poor natural hydrologic communication with the overlying active groundwater system. It is important to note that the subsurface environment will be altered by mining. Therefore, potential exists for communication pathways, between the near-surface and deep systems, that are not currently evident in the natural environment, to develop in the future when mining commences. However, using evidence from previously mined areas in the SUFCO mine, the depth of overburden, geologic structure, no-subsidence mining buffer zones, and the mineralogic composition of the overlying rock layers, this potential for surface water impacts in the Greens Hollow Tract are considered minimal.

Mine Discharge

Movement of water within the mine is managed by sumps, pumps and piping, free flow along the mine floor, and storage into gob areas for settlement. Water not used in the mine or lost to evaporation is discharged to the North Fork of Quitcupah Creek through UPDES permitted outfall 003. (Before September 1982, mine water was discharged into East Spring Canyon.) Daily average discharge rates for each month are reported to the Division and Utah Division of Water Quality (DWQ). Figure 2 shows the monthly average discharge of the SUFCO mine from 2002 through 2010. Average discharge in 1978 was about 200 gallons per minute (gpm). In September 1987, measurements above and below the discharge site revealed a mine discharge rate of 461 gpm. In 2017, the mine is reporting a discharge of approximately 3,200 gpm, or approximately 7.13 cubic feet per second (cfs). Mine discharge rates have increased along with production rates and to a lesser extent, the size of the mine (Table 4 and Figure 3). Discharge has increased the base flow to the North Fork of Quitcupah Creek. This increase is artificial and will cease with reclamation.

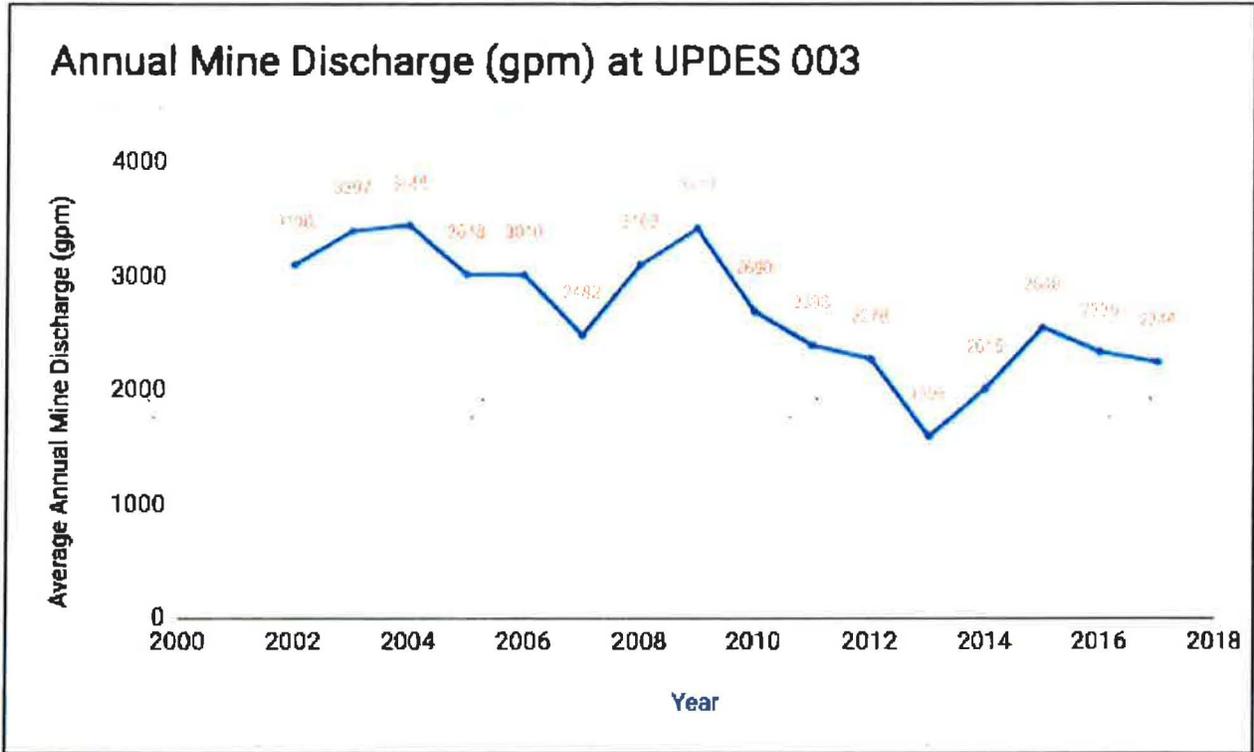


Figure 2 – SUFCO Mine Water Discharge History
 Discharge data from SUFCO DMRs

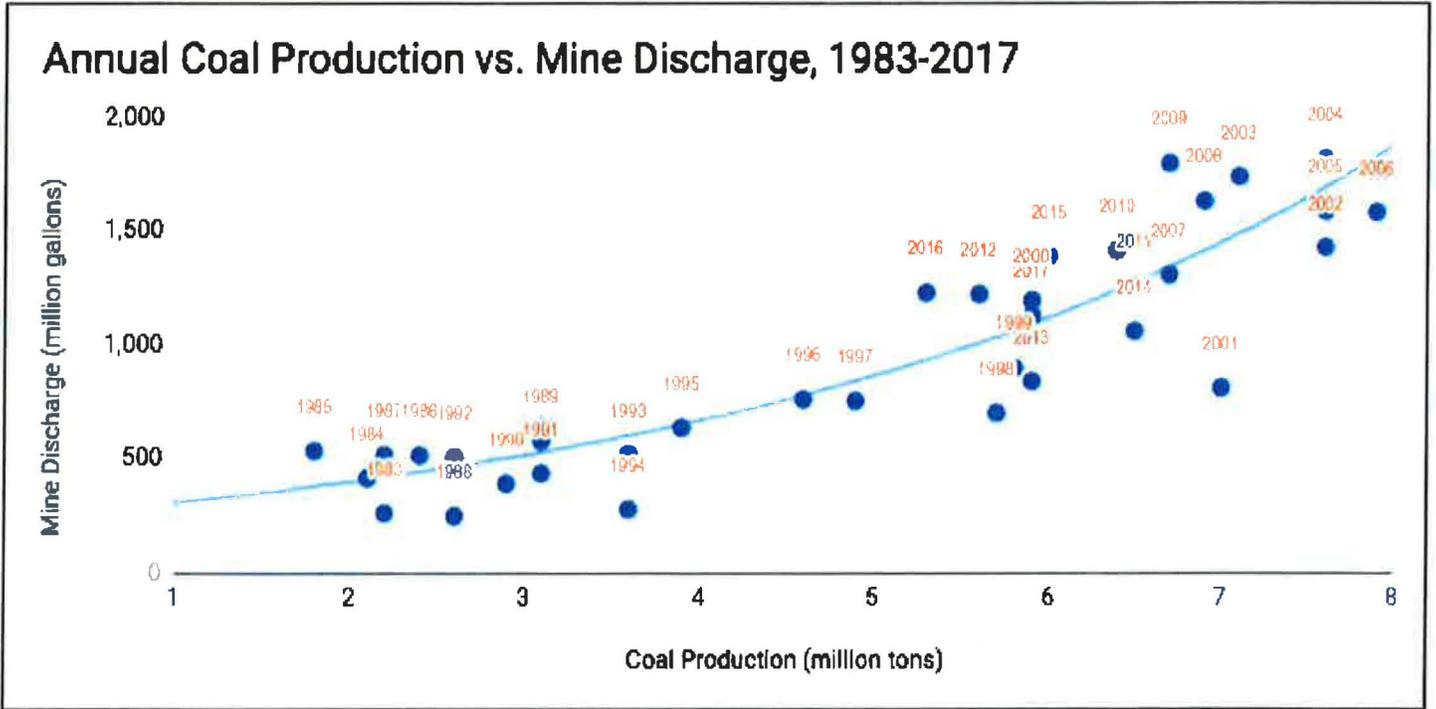


Figure 3 – SUFCO Mine Water Discharge vs Coal Production

WATERSHEDS

The subdrainage volumes for the Quitchupah Creek and Muddy Creek watersheds are listed on Table 6. Descriptions of the larger subdrainages are presented below.

Quitchupah Creek Drainage

1) East Spring Canyon

East Spring Canyon drainage consists of 5,316 acres. SUFCO's mine and surface facilities are located at the confluence of Mud Spring Hollow and East Spring Hollow. Approximately ½ mile below the facilities, East Spring Canyon connects with Convulsion Canyon. Convulsion Canyon runs southeast and connects with Water Hollow to form the main channel of Quitchupah Creek.

Construction of the mine facilities required extensive cut and fill operations. The average channel gradient of East Spring Canyon is 6.7 %, and 13 % through the facilities area, therefore the out slope of the mine pad is very steep. The sedimentation pond sits at the toe of the fill. All disturbed drainage is collected using berms, culverts, and ditches. Runoff from the disturbed area is first run to a sediment basin on the pad to allow sediment and coal fines to settle and to skim any trapped oils. Disturbed drainage overflowing the basin runs through a culvert to the containment sedimentation pond, and discharged in accordance with UPDES discharge permit requirements.

Undisturbed drainage is routed around the disturbed area using berms, ditches, and culverts. A 60-inch culvert transports streamflow from Mud Spring Hollow and East Spring Canyon downstream, under the mine pad.

2) North Fork of Quitchupah Creek

The North Fork of Quitchupah Creek drainage consists of 15,212 acres. The North Fork of Quitchupah Creek is a perennial stream that flows in a deep canyon, bisecting the Quitchupah Lease. Dry Fork enters Quitchupah Canyon from the northeast at the approximate midpoint of the canyon. The Main Fork of Quitchupah Creek enters the canyon from the upper reaches to the west. The Blackhawk Formation forms the steep canyon walls and the Castlegate Sandstone forms the canyon rim.

Thiros and Cordy (1991) conducted a seepage study that identified flow patterns in the North Fork of Quitchupah Creek canyon. During the study, upstream flow gained over a short distance in the Price River Formation. Through the Castlegate Sandstone, flow showed a gradual increase. The creek loses flow in the upper Blackhawk Formation and had minor gains in the lower part of the Blackhawk formation. Flow is substantially increased by the mine breakout discharge (UPDES 003). As flow continues downstream, the creek gains flow across the Star Point Sandstone and loses flow over the Mancos Shale. The continuous flows from the mine

discharge can be several times the normal flows during drier periods. The increased base flow can and likely has changed channel configuration. The baseline riparian information is not available to verify any changes, however potential changes include sediment and bank configuration, change (increase) in riparian zone, and more water for downstream users. Potential consequences when mining ceases include diminished channel flow and reversal of changes that have taken place.

3) Link Canyon

Link Canyon drainage is ephemeral and consists of 7,569 acres. SUFCO has constructed an electrical sub-station in the canyon to supply power for the Pines Tract operations. There are no discharges from the substation breakout and all runoff will be contained on site or treated by way of alternate sediment control measures, berms, and silt fences.

Link Canyon also contains the old Link Canyon Mine. Seepage issuing from the former mine portals has ceased upon SUFCO reopening the west portal as an emergency escape way, ventilation portal, and entry for electrical lines from the Link Canyon substation.

There are two springs in the upper end of the canyon, GW-21 and Pines 100 that are monitored by SUFCO and the Emery County Water Users. The spring flow is diverted into a trough for cattle, and then flows down the canyon. There is riparian vegetation for the first 100 yards of flow until it seeps into the channel.

Muddy Creek Drainage

8) Greens Canyon

Greens Canyon is a perennial drainage encompassing 5,878 acres. The drainage is split into the Greens Hollow and Cowboy Creek drainages north of the SITLA Muddy Tract and within the Greens Hollow Tract. Cowboy Creek is considered a perennial stream that drains the north side of Big Ridge.

Cowboy Creek flows over the Price River Formation at its headwaters and then cuts steeply into the Castlegate Sandstone and Blackhawk Formation before joining with Green Hollow. The creek flows across the northwest corner of the Pines tract. Maximum flow of Cowboy Creek was reported at 717 gpm during the spring of 2004 and baseflow during the fall ranges between 0 and 3 gpm. Average TDS concentration is reported at 364 mg/L.

Longwall mining is not anticipated beneath Cowboy Creek. The stipulations of the lease require a buffer zone of non-subsidence mining to occur under any perennial reaches of stream where the Castlegate Sandstone is < 50 feet from the surface. This includes Cowboy Creek. The creek will be undermined using non-subsidence extraction techniques such as room and pillar mining.

9) Box Canyon

The Box Canyon drainage encompasses 7,759 acres. The massive Castlegate Sandstone forms the consolidated rim of Box Canyon and Muddy Creek Canyon. The Blackhawk Formation is exposed in the bottom of the canyon below the boundary of the Quitchupah Lease. The surface rock forms near level outcrops that rim the area around to steep gorges of Box Canyon and Muddy Creek Canyon.

Ground-water chemistry analysis indicates spring recharge is likely primarily derived from flows in the Castlegate Sandstone. Therefore, spring recharge in the Box Canyon tributaries probably occurs within 1,000 feet of the canyon rims where the Castlegate Sandstone is exposed at the surface (FEIS, 1999, and Mayo and Associates, 1999).

The headwaters of the Main (west) Fork of Box Canyon are located in the Quitchupah Tract and the headwaters of the East Fork are located in the Pines Tract. Several springs are located in the forks of Box Canyon. More springs are located in the Main Fork of Box Canyon, which eventually flows into Muddy Creek. Most of the lower sections of Box Canyon Creek are perennial, but involve low baseflow volumes. The term "perennial functioning" has been used by the U.S. Forest Service to describe the upper reaches of the East Fork of Box Canyon where it is considered intermittent flow based on baseline monitoring of the PHC determination (Appendix 7-18 of the SUFCO MRP) and ongoing SUFCO water monitoring.

The perennial flows in the Main, West and East Forks of Box Canyon are allocated. Although the flows are generally low during the summer months, wildlife and cattle use the riparian and water resources. Water rights have also been issued on Muddy Creek, a receiving stream of Box Canyon. Vegetation communities are mapped on Plate 3-1 of the MRP. This map shows the riparian communities along both forks of Box Canyon Creek and Muddy Creek. In the West Fork of Box Canyon, seeps support some hanging garden communities of ferns, including one sensitive species, the Link Canyon Columbine. Muddy Creek and the lower portion of Box Canyon Creek support fish populations.

Longwall mining has been conducted in the Pines Tract Lease beneath portions of the East and West Forks of Box Canyon. Overburden above the stream channels ranges between 400 feet to a little over 900 feet. Areas where overburden is less than 400 feet were not mined by the permittee. The USDA Forest Service (USFS) initially stipulated in the Record of Decision (ROD) that areas under perennial streams would not be mined. However, due to constraints caused by a sandstone channel encountered during mining in the Pines Tract, SUFCO requested a permit to undermine perennial portions of the East Fork of Box Canyon. The permit was issued with concurrence of the Manti-La Sal Forest Service under the condition of implementing a monitoring and mitigation plan. The plan was implemented. Mitigation of surface water impacts were completed according to the North Water Spring Mitigation Plan outlined in Appendix 7-25 of the MRP. The plan is discussed in sections below in this CHIA.

10) Wileys Fork Canyon

Wileys Fork Canyon is an ephemeral drainage encompassing 1,625 acres located east of

the Pines Tract. Although part of the CIA, it has not been evaluated for hydrologic parameters. Coal mining in the Pines Tract shows the mine layout to end approximately ½ to one mile from the canyon. The mine workings are down-dip from the canyon. Hydrologic impacts to the canyon are unlikely.

11) Wash Rock Canyon

Wash Rock Canyon is an ephemeral drainage encompassing 1,390 acres and lies west and south of Wileys Canyon. Similar conditions exist as with Wileys Canyon, except the canyon is one to two miles away. No hydrologic impacts are expected to take place in the canyon because the SUFCO Mine does not extend into the canyons.

IV. IDENTIFY HYDROLOGIC CONCERNS

General hydrologic concerns include changes of flow rates and chemical composition that could physically affect the hydrologic balance. Changes to the existing hydrologic regime or balance need to be limited in order to prevent economic loss to existing agricultural and livestock enterprises, prevent significant alteration to the channel size or gradient, and maintain adequate capacity for existing fish and wildlife communities. The basis for the limiting value of a parameter may differ according to specific site conditions.

SUBSIDENCE

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

Mining at the SUFCO Mine has been by both room-and-pillar and longwall methods, and both will be used in future mining. Surface cracks are common above the mine, especially in shallow overburden areas. Subsidence is probable above longwall panels, above second mining of room-and-pillar areas, and in areas within the estimated angle-of-draw. The angle-of-draw for the SUFCO Mine is 15 degrees. This estimate is based on the experience of past mining operations at SUFCO and other coal mine operations in the Wasatch Plateau.

East Fork of Box Canyon

The pre-mining conditions of the East Fork of Box Canyon were documented on video. The public can access these files via the Division Public Information Center (PIC). Effects from undermining the stream channel were observed shortly after mining. Approximately 60 percent of the surface flow was lost during the summer of 2004 from the mining of the 3LPE panel. Currently, the U.S. Forest Service owns the water rights on the springs in the Pines Area. Subsidence caused extension fractures and buckling due to compression within sandstone layers, allowing the stream to flow in the subsurface for distances of up to 200 feet before reappearing at the top of a shale outcrop at the bottom of the stream channel. Platey surface fracturing of sandstone bedrock was observed within the stream channel approximately 200 feet outside the 15-degree angle-of-draw. Subsidence-induced fracturing lowered the water table, resulting in several monitored springs, located in the canyon above the stream, to no longer discharge. Most of the subsidence damage was located within the Blackhawk Formation above the 3LPE panel. Subsidence-related damage above the 4LPE panel, within the Castlegate sandstone, was less extensive. Repairs were made to the surface fractures within the stream channel using hand tools and bentonite pellets. Loose rock was pushed aside and bentonite was used to seal fractures and channelize the stream. The repairs were successful. Monitoring of the impacted areas will continue until Phase III bond release.

The Pines 104 and Joes Mill Pond springs were undermined during the winter of 2005-2006 as SUFCO extracted coal from the 5LPE panel. In the spring of 2006, it was discovered that surface discharge from these locations had ceased. Spring discharge to the land surface from three springs in North Water Canyon also ceased (Pines 105, Pines 311, and Pines 310). Due to the effects of subsidence from longwall mining beneath the East Fork of Box Canyon, SUFCO developed a mitigation plan to compensate for the water loss. The North Water Spring mitigation area has been designated as an affected disturbed area (and included within the permit area) within the lease boundary (refer to Plate 4 – Hydrology Map). Details of the North Water Spring Mitigation Plan are discussed in Appendix 7-25 of the MRP.

The mitigation plan was implemented in part to maintain water flow to two troughs on the canyon rim and in the Joe's Mill Pond area. SUFCO installed two additional trough locations, one to the east and one on the canyon rim above the pump in the East Fork of Box Canyon. SUFCO constructed a system of water transport from Spring M-SP89 to the existing pump and piping system in the East Fork of Box Canyon. This provides the necessary water for the troughs by diverting 10-15 gpm from M-SP89, which has an average flow of 20 gpm. The system includes a solar pump, solar panels, and a coupled/fused 2" HDPE pipe waterline to deliver water to the troughs. Sufco will maintain this system for the life of the mine. Three years prior to cessation of mining, the hydrologic condition of the North Water area will be evaluated and a report will be compiled. At this time, negotiations for the long term liability of the system will be discussed. Downstream water rights have not been impacted and land use has remained unchanged after undermining, therefore, the Division concluded that no material damage has occurred. Furthermore, the United State Forest Service (USFS) requested additional mitigation activities for habitat improvement at another site. In an agreement between SUFCO and the USFS, SUFCO developed three projects in the Muddy Creek Watershed, including the

development of three additional water sources, and improvement of associated riparian vegetation. The projects, completed by end of 2017, have enhanced the conditions for wildlife, plant, and livestock communities in the Forest.

Cowboy Creek, Greens Hollow, Muddy Creek

Longwall mining is not anticipated beneath Cowboy Creek, Greens Hollow, and Muddy Creek. The stipulations of the Greens Hollow Tract lease require a buffer zone of non-subsidence mining to occur under any perennial reaches of stream where the Castlegate Sandstone is < 50 feet from the surface. This includes Cowboy Creek, Greens Hollow, and Muddy Creek. These reaches will be undermined using non-subsidence extraction techniques such as room and pillar mining. The potential for subsidence-related impacts is therefore low.

Stock Water Ponds

The Forest Service and cattlemen use and maintain several stock watering ponds located on Forest Service Land within the undisturbed area of the SUFCO permit area. The water rights to the stock watering ponds are owned by the Forest Service and used by cattlemen with leases to run cattle on the Forest Service land. Claims have been made by the Forest Service and cattlemen that surface cracking due to mining related subsidence within the Quitchupah and Pines Tracts have had impacts on some ponds. The Division investigated this issue in 2004 and 2005. Due to the lack of baseline data on the ponds and prevailing drought conditions in 1999 through 2004, it was not conclusive to the Division that the ponds had been adversely impacted. In order to mitigate the potential damage to the ponds, SUFCO has taken action by monitoring pond conditions, applying bentonitic clay seals to the pond floors, and hauling water in for livestock.

The lack of baseline to appropriately assess stock water pond impacts in the Pines and Quitchupah Tract prompted the development of a monitoring plan for future development. A monitoring plan, including the establishment of a baseline of stock water pond conditions, has been implemented for the Greens Hollow Tract. The monitoring will include twice yearly (spring and fall) collection at all ponds within and immediately adjacent to the tract. The information to be collected includes photographing each pond, observe the pond for evidence of cracking, estimate the depth and surface area of water contained in the pond, inspect the immediate drainage area for evidence of cracking, note general soil moisture conditions, note the general condition of the pond, determine the functionality of the pond, and determine the water holding capacity of each pond. The collection of this data will allow for thorough investigations of all claims citing impacts to stock water ponds.

GROUNDWATER

The greatest mining-related potential for impacting ground-water resources in the CIA comes from dewatering and subsidence. After conducting spring and seep surveys and baseline studies prior to mine permitting, representative springs and seeps are chosen for a mine's monitoring plan to aid in the determination of mining-related impacts to the hydrologic balance

and water rights.

Fifty-one springs and seeps are being monitored within and adjacent to the SUFCO Mine permit area. With the exception of several springs within the East Fork of Box Canyon, monitoring of springs for the SUFCO Mine has not identified any mining-related impacts and future diversion of spring flow is considered to be an overall low risk.

Water users have expressed concerns that water intercepted underground may be discharged into a watershed other than the one where the groundwater was originally destined. In particular, water users are concerned that water discharged by the mine into the North Fork of Quitcupah Creek originated from perched aquifers within the Muddy Creek watershed. According to the Utah Coal Mining and Reclamation Act and rules, a mine may divert water underground and discharge to the surface if material damage to the hydrologic balance outside of a permit area is prevented and disturbance to the hydrologic balance within the permit area is minimized (R645-301-731.214.1). Furthermore, any state-appropriated water affected by contamination, diminution, or interruption resulting from underground mining must be replaced (R645-301-731.530).

The Division evaluates a mine's Probable Hydrologic Consequences Determination (PHC) and updates the CHIA prior to permitting, and reviews water monitoring data during mining and following reclamation to determine if adverse hydrologic impacts, as defined by the rules, can be demonstrated. Underground mining may result in some diversions of intercepted ground water into drainages that are not topographically within (above) the area where the water was encountered. The SUFCO PHC has demonstrated that water that is projected to be intercepted is mostly ancient and therefore, hydrologically isolated from springs, seeps, and streams. Furthermore, groundwater quality is unlikely to be impacted by mining due to the depth of overburden and lack of groundwater communication. If it is subsequently demonstrated that the mining has caused or will cause a diminution, contamination, or interruption of an appropriated water right or a material impact to the hydrologic balance either within or outside of the permit area, the permittee will be required by the Division to address means of minimizing the impact and replacing any appropriated water rights.

It is not known how much water will be generated from the mine workings once mining stops. The current mine plan shows that the mine will be sealed. Ground water should back up behind the seals and fill the voids remaining from the collapsed mine. The mine is not expected to discharge after the life of the mine.

Dewatering

Using isotopic analysis, Mayo and Associates (1999) have identified that the waters from the mine workings are older than waters from springs located in the North Horn, Price River, and Castlegate Sandstone. They concluded that water in the Blackhawk Formation is disconnected from that of the overlying formations. However, substantial fracturing is taking place due to subsidence, with fractures generally extending 60 times the mining thickness. The mining thickness in the SUFCO mine area ranges from 9 to 15 feet. Surface vertical displacement above

longwall mining caused by subsidence is approximately 5 to 6 feet. Rock fracturing can propagate long distances vertically and laterally, affecting aquifers and surface-water sources. In areas where overburden is greater than 800 feet, as in the Greens Hollow Tract, impacts to groundwater-driven springs are considered minimal.

On-going water monitoring will provide the information necessary to assess potential changes in the hydrologic balance within the cumulative impact area and potential material damage to the hydrologic balance outside the permit area.

SURFACE WATER

Increased discharge, especially runoff from disturbed areas, could alter flow volumes, water quality, and runoff and flood patterns in creeks. Mining in the SUFCO lease area will increase surface water discharge in North Fork of Quitcupah Creek due to mine discharge. When mining ceases, this mine discharge will no longer artificially increase streamflow volumes. Mining is not expected to permanently increase discharge of surface or groundwater beyond current levels. Creeks and drainage areas discussed are shown on Plate 4, Hydrology Map.

The SUFCO Mine uses the best technology currently available to prevent additional contributions of sediment to streamflow. SUFCO utilizes various sediment control techniques, including disturbed and undisturbed area diversion channels, sedimentation ponds, containment berms, silt fences, and road diversions and culverts. All sediment control measures have been designed to meet the applicable effluent limitations, and minimize erosion to the extent possible.

Subsidence could affect the character of drainages by altering the natural slope of the channel. However, large-scale impacts are unlikely because of the thick overburden (typically projected to be from 600 to 2,500 feet thick between the mine operations and the surface drainages). With the exception of the East Fork of Box Canyon, full extraction mining is not planned under any perennial reaches of streams within the CIA.

The potential for cracks to divert water underground may be limited by the self-healing characteristics of the formations, which consist of interbedded claystone, siltstone, and sandstone that are rich in montmorillonite clays. Fractures at the surface are prone to heal due to the expanding or swelling nature of these clays. However, the time for fractures to heal may vary widely. Material from the Blackhawk Formation was examined by X-ray diffraction and found to contain up to 58 percent montmorillonite clays (Crandall Canyon Mine MRP, App. 7-41). These clays absorb water and their volume can expand as much as 50 percent even when they are associated with other soil and rock materials.

Thirty-eight stream sites are being monitored within and adjacent to the SUFCO Mine permit area. With the exception of a temporary increase of flow and increase of TDS concentrations for the East Fork of Box Canyon Creek, monitoring of streams for the SUFCO Mine has not identified any mining-related impacts and future diversion of stream flow is considered to be an overall low risk.

V. IDENTIFY RELEVANT STANDARDS

RELEVANT STANDARDS

The CHIA is based on the best currently available data and is a prediction of mining related impacts to the hydrologic balance outside of the specific permitted coal mine areas. To verify that conditions remain within acceptable limits, the mine operator is required to monitor water quality and quantity as part of the permit requirements. The plans for monitoring are set forth in the Mining and Reclamation Plans (MRP) for the SUFCO Mine and have been determined adequate by the Division to meet regulatory requirements. If monitoring results show significant departures from the values established in the MRP and in this CHIA, or exceed UPDES discharge requirements, immediate remedial actions are provided for by SMCRA.

Water quality standards for surface waters in the State of Utah are found in R317-2, Utah Administrative Code (UAC). The standards are intended to protect the waters against controllable pollution. Waters, and the applicable standards, are grouped into classes based on beneficial use designations. The Utah Division of Water Quality of the Department of Environmental Quality has classified surface waters in the CIA as:

- | | | | |
|---|----|---|--|
| M | 2B | - | protected for recreational uses except swimming, |
| M | 3C | - | protected for nongame fish and aquatic life, and |
| M | 4 | - | protected for agricultural uses. |

Flow: There is no standard for flow neither in the SUFCO Mine permit nor in Utah water quality standards. At the SUFCO mine, UPDES discharge is recorded twice monthly. A flow limitation for the SUFCO Mine UPDES permit is not anticipated. Indirect standards for flow include potential changes to stream morphology, vertebrate and invertebrate populations, and water chemistry.

Oil and Grease: There is no State water quality standard for oil and grease. The UPDES permit limit for the SUFCO Mine is a daily maximum of 10 mg/L; It is required to collect one sample a month, either grab or composite, and perform weekly visual monitoring. A 10 mg/L oil and grease limit does not protect fish and benthic organisms from soluble oils, such as those used in longwall hydraulic systems. The UDWR recommends soluble oils be limited to 1 mg/L (Darrell H. Nish, Acting Director UDWR, letter dated April 17, 1989 to Dianne R. Nielsen, Director UDOGM).

Total Dissolved Solids (TDS) concentrations: Total dissolved solids is commonly used to indicate general water quality with respect to inorganic constituents. There is no state water quality standard for TDS for Classes 1, 2, and 3, but 1,200 mg/l is the limit for agricultural use (Class 4). The SUFCO Mine UPDES permit limits instantaneous TDS concentration to 1,200 mg/L, determined by two grab samples a month. The total amount of dissolved solids discharged from all SUFCO Mine operations is limited to 5 tons per day, determined by the twice monthly measurements of flow and TDS.

pH: Allowable pH ranges are 6.5 to 9.0 under the SUFCO Mine UPDES permit and State water quality standards for all Classes.

Total Suspended Solids (TSS) and Settleable Solids: There is no State water quality standard for suspended solids. Turbidity is limited to an increase of 10 NTU for Class 2A, 2B, 3A, and 3B waters and to 15 NTU for Class 3C and 3D waters. The SUFCO Mine UPDES permit allows a daily maximum 70 mg/L TSS, and 30-day average maximum of 25 mg/L. TSS is determined using two grab samples per month. Under the SUFCO Mine UPDES permit, all samples collected during storm water discharge events are to be analyzed for settleable solids. Samples collected from discharge, overflow, or bypass, during precipitation events not to exceed 10-year 24-hour storm, may comply with a settleable solid standard of 0.5 mL/L daily maximum instead, however TSS must still be determined. If precipitation event does exceed 10-year 24-hour storm, neither standard applies.

Iron and Manganese: The SUFCO Mine UPDES permit allows a daily maximum 1.0 mg/L total iron, assuming total and dissolved iron concentrations are nearly equivalent. Grab samples are taken twice monthly. The Division of Water Quality approves up to 2 mg/L total iron to be discharged under certain circumstances, including maintenance of dissolved iron concentrations at or below 1 mg/L. State water quality standards allow a maximum of 1,000 g/L dissolved iron in Class 3A, 3B, 3C, and 3D waters. No standard exists for Class 1, 2, and 4 waters.

Monitoring of total manganese is required by SMCRA and the Utah Coal Mining rules. No UPDES or water quality standard exists for total or dissolved manganese.

Macroinvertebrates: Macroinvertebrates serve as water quality indicators and can be used to evaluate the suitability of stream to support fish and other aquatic life. Baseline studies of macroinvertebrates provide standards to evaluate conditions in Box Canyon and Muddy Creek. Price and Plantz (1987) summarized macroinvertebrate data. Currently, no plans exist to monitor macroinvertebrate populations in the streams of the CIA.

Utah water quality standards exist for numerous additional parameters. At this time, no evidence exists that other parameters have reasonable potential to impact waters in the CIA. However, the parameters that have a reasonable possibility of affecting the hydrologic system are included in the routine water quality monitoring programs conducted quarterly by the mine operator. The review of monitoring results will aid in identifying concerns or impacts and if necessary, the Division will require revisions of mine operations to mitigate any issues.

Sediment is a common constituent of ephemeral stream flow in the western United States. The quantity of sediment in the flows affects stream-channel stability and use of water. Excessive sediment deposition is detrimental to existing aquatic and wildlife communities. Large concentrations of sediment in streamflow may preclude use of water for irrigation as fine sediment tends to reduce infiltration rates in irrigated fields. Also, excess sediment reduces

storage capacity at water facilities and damages pumping equipment. Mean sediment load is the indicator parameter for evaluating the sediment hazard on stream-channel stability and irrigation. Sediment load measurement error is, at a minimum, the same as the flow measurement error because sediment load is directly dependent on flow and in practice cannot be measured more accurately than the flow.

The concentration of dissolved solids is commonly used to indicate general water quality with respect to inorganic constituents. The quality of water from underground sources reflects the chemical composition of the rocks it passes through. That quality may be degraded by intrusion of poorer quality water from wells or mines, by leakage from adjoining formations, or by recharge through disturbed materials. Ground water discharging from seeps and springs is used by wildlife and livestock. The State standard for TDS for irrigation of crops and stock watering (Class 4) is 1,200 mg/L.

The Utah Department of Environmental Quality, Division of Water Quality can authorize a coal mine to discharge into surface waters under the Utah Pollutant Discharge Elimination System (UPDES). At the time this CHIA was prepared, the SUFCO Mine had applied for three UPDES permits, one to discharge from the planned sediment pond, a second to discharge from the treatment facility to East Spring Hollow, and a third to discharge from the mine to North Fork of Quitcupah Creek. No discharge emits from the Waste Rock Disposal Site sedimentation ponds as these sites have been designed for total containment.

The SUFCO Mine UPDES permit contains site-specific limitations on TDS, total suspended solids, total settleable solids (for discharges resulting from precipitation events), total iron, oil and grease, and pH. No limit exists for flow, but monthly measurements are required. Additionally, discharge must not include sanitary water, coal process water, or more than a trace amount of visible sheen, floating solids, or foam.

MATERIAL DAMAGE

Material damage to the hydrologic balance manifests as an economic loss to the current and/or potential future water users, a quantified reduction of the capability of an area to support fish and wildlife communities, or another adverse change to the hydrologic balance outside the permit area. The basis for determining material damage may differ within the CIA according to site specific conditions. Surface-water and ground-water concerns have been identified for CHIA evaluation.

Parameters for surface-water quantity and quality

The potential material-damage concerns include changes to surface flow rates and chemical composition that would physically affect off-permit stream channel systems as they presently function, aquatic and wildlife communities, and agricultural and livestock production. Water monitoring is intended to identify changes in the present discharge regime that may indicate economic loss to existing agricultural and livestock enterprises; a significant alteration to the channel size, or gradient; and a loss of capacity to support existing fish and wildlife

communities. In order to assess the potential for material-damage to these elements of the hydrologic system, the following indicator parameters were selected for monitoring at each evaluation site: low-flow discharge rate, TDS, and sediment load.

Several stock water monitoring ponds are located in the permit area. Surface cracking due to mining induced subsidence has affected a few of the ponds on the Quitchupah and Pines Tracts. SUFCO has tried to mitigate the fracturing by applying bentonite into the cracks and hauling water to livestock. SUFCO has committed to visiting the ponds to photograph them to establish any evidence of cracking, marking their depth, and noting general soil moisture conditions and pond condition. Due to the impacts observed in the Pines and Quitchupah Tracts, the surface water monitoring plan for the Greens Hollow Tract requires similar monitoring of all ponds within and immediately adjacent to the tract. The twice yearly monitoring of all stock water ponds will occur during wet (Spring) and dry (Fall) seasons. The information to be collected includes photographing each pond, observe the pond for evidence of cracking, estimate the depth and surface area of water contained in the pond, inspect the immediate drainage area for evidence of cracking, note general soil moisture conditions, note the general condition of the pond, determine the functionality of the pond, and determine the water holding capacity of each pond.

SUFCO has established a monitoring plan to collect water quality data for 41 surface water sites in the CIA. The monitoring plan meets the requirements of the state and federal regulations, and guidelines established by the Division. Flow monitoring data for the stream monitoring sites is presented in Table 7.

Low-Flow Discharge Rate

Measurements provided by mine operators include flow and long-term trends. In the Wasatch Plateau, Waddell and others (1981) correlated records of three years of low-flow volumes (September) at stream sites, with records from long-term monitoring sites. This relationship developed an estimate for future low-flow volumes at these stream sites, within a standard deviation of approximately 20%. Using ten or fifteen years of records reduced the standard deviation to 16-17 %, and 15 %, respectively. Therefore, a 15-20% change in low-flow rates would likely go undetected. However, if projected and observed values of low-flow rates differ by greater than 20%, an evaluation of material damage may be needed. The Palmer Hydrological Drought Index (PHDI) should be used to determine climatological influences on low-flow rates.

Monitoring of low-flow discharge rates will also provide a means to evaluate effects of mine discharge on the receiving streams. SUFCO Mine discharge will be monitored at UPDES discharge points at the sediment pond and the direct discharge from the mine. The potential for material damage by mine discharge water on the North Fork of Quitchupah is tied to the effects of increased flow on the receiving streams.

Total Dissolved Solids (TDS)

The concentration of dissolved solids is commonly used to indicate general water quality with respect to inorganic constituents. Ground water discharging from seeps and springs is used by wildlife and livestock. Because wildlife and livestock use is the designated post-mining land use, established dissolved solids tolerance levels for wildlife and livestock have been adopted as the thresholds beyond which material damage may occur. The state standard for TDS for irrigation of crops and stock watering (Class 4) is 1,200 mg/L. If TDS concentrations persistently exceed 1,200 mg/L it will be an indication that an evaluation for material damage is needed. Historically, single samples from outfalls UPDES 003 (North Fork of Quitchupah Creek) and UPDES 001 (East Fork of Quitchupah Creek) have exceeded the 1,200 mg/L TDS threshold.

Sediment Load

TSS is the indicator parameter initially chosen for evaluating the sediment hazard to stream-channel stability and irrigation. Threshold values have initially been set as the greater of 1 standard error above the baseline mean TSS value or 120 % of the baseline mean TSS value (by analogy with the low-flow discharge rate measurement accuracy and assuming that the error in TSS will contribute equally to the error in flow when determining mean sediment load). If TSS concentrations persistently exceed these threshold values it will be an indication that evaluation for material damage from sediment load in the streams might be needed.

Parameters for groundwater quantity and quality

The potential material-damage concerns on groundwater sources include changes in the quantity and chemical composition of water to magnitudes that will:

- not cause economic loss to existing or potential agricultural and livestock enterprises;
- will not degrade domestic supplies;
- would not cause structural damage to water resources;
- will not cause impacts to the hydrologic balance

SUFCO has established a monitoring plan to collect water quality data for 53 ground water sites in the CIA. The monitoring plan meets the requirements of the state and federal regulations, and guidelines established by the Division. Flow monitoring data for the spring monitoring sites is presented in Table 3.

Seasonal flow from springs

Maintain potentiometric heads that sustain average spring discharge rates, on a seasonal basis, equal or greater than 80 % of the mean seasonal baseline discharge, in other words baseline minus 20 % probable measurement error. The 20 % measurement error is based on analogy with the accuracy of measuring low-flow surface discharge rates. A 20 % decrease in flows, determined on a seasonal basis, will indicate that decreased flows are probably persisting

and that an evaluation for material damage is needed.

TDS Concentration

The concentration of total dissolved solids is commonly used to indicate general water quality with respect to inorganic constituents. The quality of water from underground sources reflects the chemical composition of the rocks the water passes through. Ground-water quality may be degraded by intrusion of poorer quality water from wells or mines, by leakage from adjoining formations, or by recharge through disturbed materials. Wildlife and livestock use ground water discharging from seeps and springs, and those are the designated post-mining uses most likely to be impacted. There are no state-established groundwater quality standards for TDS. The state standard for TDS for irrigation of crops and stock watering (Class 4) is 1,200 mg/L. If TDS concentrations persistently exceed 1,200 mg/L, it will be an indication that evaluation for material damage is needed.

VI. ESTIMATE PROBABLE FUTURE IMPACTS OF MINING ACTIVITY

GROUNDWATER

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

Dewatering

Underground mining removes the support to overlying rock causing caving and fracturing of the overburden. In most mining areas it is unlikely that fractures will reach shallower perched groundwater because of the thickness of the overburden. However, in areas where fracturing is extensive, subsidence induced caving and fracturing can create conduits that allow groundwater to flow deeper into the subsurface or into the mine. In areas where the surface geology is thick North Horn or Price River Formation, subsidence induced dewatering is less likely. Dewatering caused by fracturing may decrease storage and ground-water flow to streams and springs (Figure 4). Water quality downstream from the mines could improve because water being discharged from coal mines in the Wasatch Plateau is often of better quality than natural spring flow or base flow.

Total ground-water storage above the Upper Hiawatha seam has not been calculated; however, the rate of current discharge with respect to the area mined indicates an extensive storage capacity. The SUFCO Mine is currently discharging approximately 3-4 million gallons per day. An average inflow calculation would not justify real hydrologic functions; however it could correlate the rate of discharge to area mined. The rate of discharge with coal production is shown on Table 4 and in Figure 3, which could provide a useable ratio; however, panel orientation and size variation within the mine may yield discrepancies. It is likely that

groundwater in the inactive Blackhawk Formation will be encountered and dewatered during mining. However, one important observed characteristic of groundwater that discharges to the mine workings from the Blackhawk formation is that there is no indication of seasonal variation, which may indicate that the source of the water is not dependent on climate. This provides a line of evidence that the groundwater in the Blackhawk formation is hydrologically isolated from modern-aged groundwater from the active system aquifer found in the upper strata.

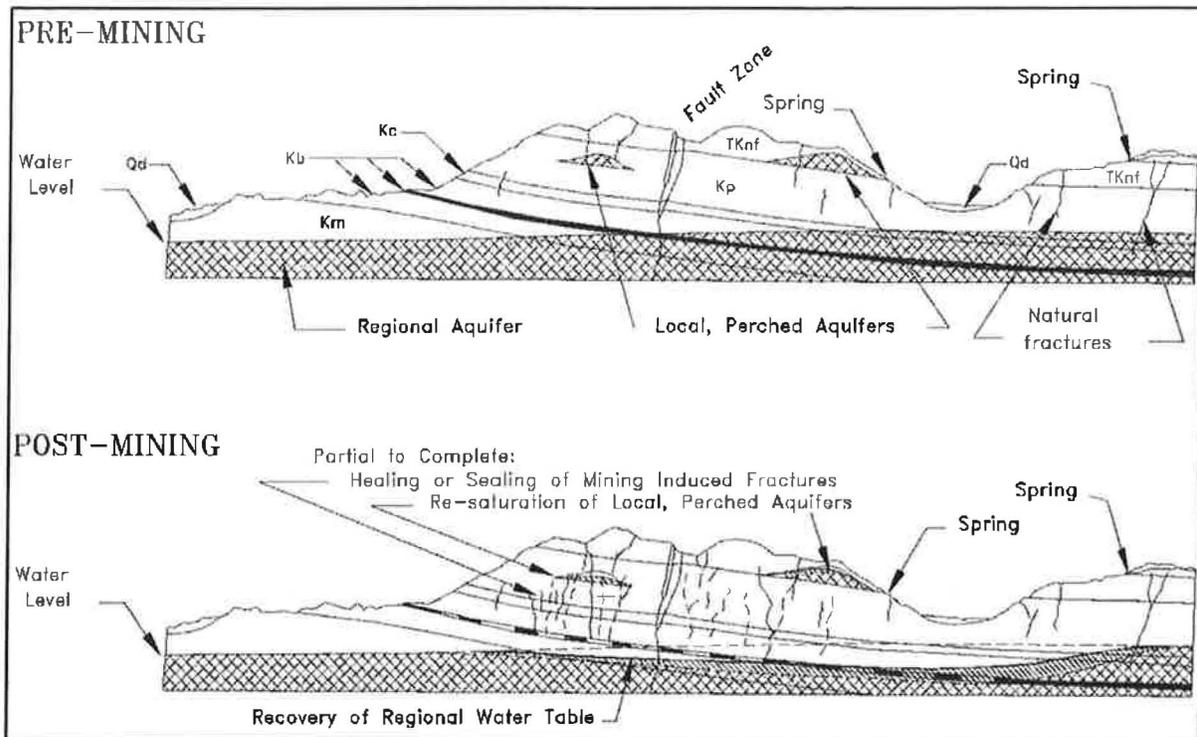
If impacts to springs and streams are identified, groundwater dewatering versus groundwater recharge will require further study.

Subsidence

Subsidence impacts are largely related to extension and expansion of existing fracture systems and upward propagation of new fractures. Inasmuch as vertical and lateral migration of water appears to be partially controlled by fracture conduits, readjustment or realignment in the conduit system will inevitably produce changes in the configuration of groundwater flow. Potential changes include decreased flow through existing fractures that close, increased flow rates along existing fractures that open further, and the diverting of groundwater flow along new fractures or within newly accessible permeable lithologies. Subsurface flow diversion may cause the depletion of water in locally saturated perched zones and loss of flow to springs that are undermined. Increased flow rates along fractures could potentially improve water quality by reducing groundwater residence time.

Subsidence surveys have been conducted at SUFCO Mine on an annual basis since 1988 using ground surveying supplemented with photogrammetric methods if needed. Annual subsidence reports are provided to the Division. Annual reports for 1988 through 2017 indicate extensive subsidence over the current SUFCO Mine permit area. The relatively moderate thickness of the overburden and the fracture system are major contributors to the amount of subsidence.

Mining in the Greens Hollow Tract is currently planned for the upper Hiawatha coal seam only, and overburden thickness will range 1000 to 2500 feet. The perennial reaches of Cowboy Creek, Greens Hollow, and Muddy Creek will be undermined using no-subsidence techniques. The potential for subsidence related impacts to water quantity in the Greens Hollow Tract are considered minimal.



SURFACE WATER

Changes in flow volume and in water quality have the greatest potential for impacting surface-water resources in the CIA. The monitoring plan should help identify variations in flow caused by mining. Monitoring is a benefit to both the public and the operator because it can identify and separate natural and anthropogenic variations to the environment or ecosystem. A good monitoring plan can provide the necessary data to establish mitigation or show the variations are following a natural sequence. The SUFCO surface water monitoring plan includes sufficient baseline information at high flow and low flow to detect changes to quality or quantity. Operational surface monitoring sites are sampled three times per year. Data is submitted to the Division's electronic database by the end of the quarter following the sampling. Surface-water monitoring will continue through the operational and reclamation phases until bond release.

Water Quality

The quality of the local surface waters can be affected by two basic processes. First, the runoff from the disturbed lands and waste piles could increase sediment concentrations and alter the distribution and concentration of dissolved solids in the receiving streams. This potential has been minimized using sufficient sediment controls. Also, the extent of surface disturbance is limited to the facilities in East Spring Canyon and the Waste Rock Site. The second potential cause of surface-water quality changes is related to the location and chemistry of ground-water

discharges, both from the mines and from springs and baseflow.

Water Quantity

Water not used in the SUFCO Mine or lost to evaporation is discharged to the North Fork of Quitchupah Creek through UPDES 003. Discharge rates have increased over the life of the mine, likely attributed to the increasing size of the mine. Ongoing monitoring will indicate total groundwater discharge due to mining.

Upon termination of mining operations, discharge of ground water from the SUFCO Mine will be discontinued and the mine will begin to flood. There will be a reduction in flow in the North Fork of Quitchupah Creek because of the loss of the mine discharge. The decrease in flow has potential to impact water users downstream who have relied on the artificially increased flows. The time required for mine flooding will depend not only on the rate of water inflow but also on the amount of caving and the void space remaining after caving. Complete flooding of the mine may never occur because flow out of the mine through the roof, floor, and ribs and into the surrounding rock will increase as flooding increases the hydraulic head within the abandoned workings. It is unlikely mine water will naturally discharge after the in-mine water management system ceases operation.

Stock pond monitoring will be completed for ponds within or adjacent to the Greens Hollow Tract and within the Pines/Quitichupah Tract. The development of baseline condition records will aid in the determination of potential mine-induced impacts in the event of public complaints. At this time, due to the extensive overburden, impacts to ponds are not anticipated.

ALLUVIAL VALLEY FLOORS

The Office of Surface Mining requires the following criteria to be evaluated in order to determine the presence or absence of alluvial valley floors in the western United States:

1. located in topographic valleys having an associated stream channel
2. underlain by unconsolidated deposits whose surface usually has the landform appearance of flood plains or terraces, and
3. have an agricultural importance derived from the availability of surface or groundwater.

The ultimate goal is to prevent surface disturbance to areas that have agricultural importance or to determine that regional water availability is not affected.

A negative Alluvial Valley Floors (AVF) determination has been made based on the studies conducted by Canyon Fuels Company, LLC for the approved SUFCO MRP. These studies have not confirmed the existence of unconsolidated stream laid deposits holding streams and sufficient water to support agricultural activities within the mine plan area.

VII. ASSESS PROBABLE MATERIAL DAMAGE

The probable hydrologic impacts are summarized below under the headings entitled Next Five Year Permit Term and Future Mining.

FIVE YEAR PERMIT TERM - SUFCO MINE

Planned operational monitoring will document any measurable changes in the surface- and ground-water systems. Surface disturbances and UPDES permitted discharges are not expected to degrade surface- or ground-water quality. There is no AVF to be impacted. Sediment control measures should continue to effectively prevent diminution of water quality in the receiving drainages.

Dewatering rates will likely increase due to more mine area being exposed. Previous dewatering trends have continued to increase as new mining areas have developed. Overburden thickness is 600 to 2,500 feet, and averages 800 feet in the CIA. However, surface manifestations of subsidence are still present where overburden is thin and the Castlegate Sandstone is close to the surface. Subsurface propagation of fractures may produce changes in flow that could affect local ground water systems and associated springs. Future monitoring will provide data applicable to documenting changes in the groundwater system.

Surface disturbance and the discharge of SUFCO Mine water have not significantly degraded water quality in East Spring Canyon. Sediment control measures such as those intended for use at the SUFCO Mine have served to reduce contaminants and stabilize water quality at acceptable discharge levels. The increase in discharge to the North Fork of Quitchupah increases water availability for downstream users, however, there is potential for long-term impacts to channel morphology and riparian vegetation. At the time when mining ceases, the sudden decrease in flow to baseline conditions may disrupt users downstream.

Mining in the Quitchupah Tract is ongoing and mining will begin in the Greens Hollow Tract beginning in Fall 2018. There will be no new surface disturbance for mining in either tract. A monitoring plan and mitigation for the North Water Spring impacts in East Fork of Box Canyon Creek is ongoing. The SUFCO Mine has been diligent at following their monitoring plan to date and have applied reasonable and effective mitigation efforts when needed. Stream channel repairs have returned surface flows, dry springs have likely diverted to other areas within the drainage, a water delivery system has brought water to the area of the Pines 310 and 311 seeps, and three additional water sources have been developed (along with the establishment of riparian vegetation). Monitoring of these mitigation efforts will continue through life of mining.

FUTURE MINING

Underground mining may result in some diversions of intercepted ground water into drainages that are not topographically within (above) the area where the water was encountered. If it is demonstrated that mining has caused or will cause a diminution, contamination, or

interruption of an appropriated water right or a material impact either within or outside of the permit area, the permittee will be required by the Division to address means of minimizing the impact and replacing any appropriated water rights. Evaluation of PHCs and the preparation of this CHIA do not indicate that there is any evidence that such impacts will result from the proposed mining in the Quitchupah/Muddy Creek CIA, and as a consequence, there is no reason to require operators to propose alternatives for disposing of the displaced water or other possible actions as part of the PAP.

Increased rates of dewatering may, in the future, result in depletion of groundwater storage. Depletion of storage may terminate certain spring flows and base flow recharge to streams. Upon cessation of mining, mine water discharge should cease, according to the current mine plan. As the mine workings flood, it is anticipated that ground water systems will return to pre-mining conditions. Drainage from future surface disturbance will be managed through appropriate sediment controls.

At the termination of mining, downstream potential AVFs will experience decreased flow. The duration and extent of this impact cannot be accurately assessed at this time. However, flow rates may be partially to fully restored when the groundwater system is reestablished by flooding of the abandoned mines.

The operational designs for the SUFCO Mine are determined, based on the information submitted in the mine plans and referenced literature, to be consistent with preventing damage to the hydrologic balance outside the mine plan areas.

Subsidence impacts to the Castlegate Sandstone has occurred in the Pines Tract during longwall mining activities in 2005/2006 causing springs that originate from the Castlegate Sandstone to dry up due to propagating fractures penetrating perching layers. The impacts from subsidence appears to have taken effect in areas where the Castlegate Sandstone is either exposed at the surface, or only a thin veneer of overlying Price River Formation rests on the Castlegate Sandstone. In the area of the WLM, precautions have been taken to avoid areas where similar conditions exist. For example Broad Hollow Spring, a developed spring fed by groundwater originating in the Castlegate Sandstone. The Castlegate is exposed at the surface in this area with no significant overburden cover. As a result, SUFCO plans to alter their mining plan to avoid longwall mining beneath the area where Broad Hollow Spring is located. Similarly, in the Greens Hollow Area, the lease stipulations require SUFCO to avoid longwall mining beneath the perennial reaches of Muddy Creek, Cowboy Creek, and Greens Hollow.

VIII. STATEMENT OF FINDINGS

Based on the information presented in this CHIA, the Utah Division of Oil, Gas and Mining finds that the proposed coal mining and reclamation operations of the SUFCO Mine including the Greens Hollow Tract have been designed to prevent material damage to the hydrologic balance outside the permit areas.

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VIII. TABLES

Table 1	
Annual Production in thousand short tons	
SUFCO Mine	
Year	Production
2001	7,001
2002	7,600
2003	7,126
2004	7,568
2005	7,567
2006	7,908
2007	6,712
2008	6,946
2009	6,748
2010	6,600
2011	6,498
2012	5,650
2013	5,960
2014	6,539
2015	5,996
2016	5,375
2017	5,947
Estimated Recoverable Reserves Under Lease (2017)	59.7 million

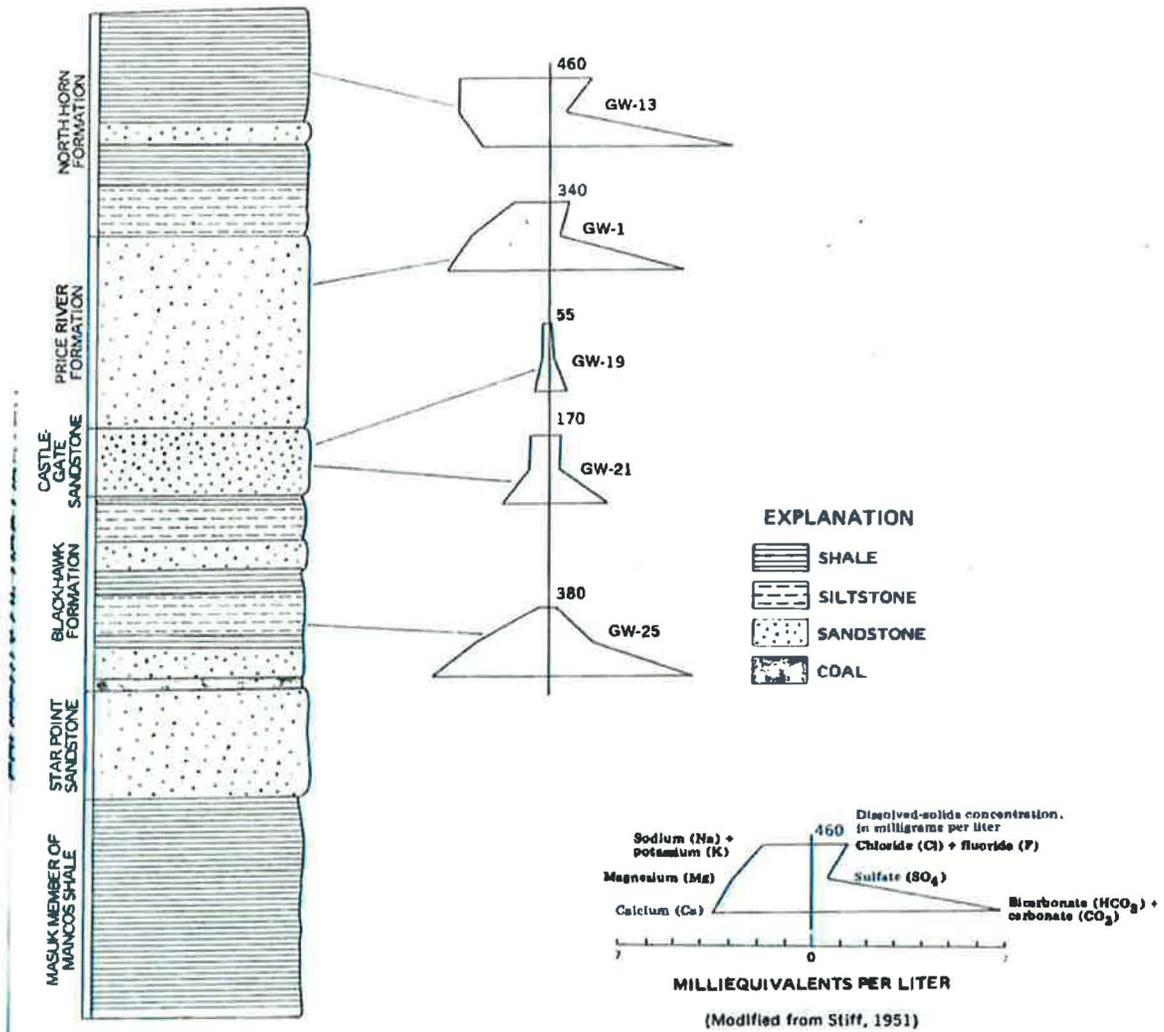


TABLE 2 - Generalized stratigraphic column for the study area and representative water-quality diagrams for selected units.

(Adopted from Thiros and Cordy, 1991)

Table 3
Spring Information – SUFCO Groundwater Monitoring Plan

Formation	Spring Name		Flow (gpm)			Monitoring Period	Notes
	SUFCO	USGS1	Average	Max	Min		
North Horn Formation	GW-13	GW-13	0.6	1.8	0.002	19861; 1989-19952; 1995-20176	
	Sufco 057A	GW-5	0.26	3.37	0	19781; 1987-19952; 1988-20176	Duncan Draw spring
	M-SP08		0.05	1.19	0	1980-20176	
	M-SP53		0.08	0.27	0.05	2006-20166	
	M-SP04		1.41	3.23	0.75	2001-2004, 2015-20177	
	M-SP05		0.14	0.26	0.08	2001-2004, 2015-20177	
	M-SP06		1.55	2.3	1.47	2001-2004, 2015-20177	
	M-SP09		0.3	1	0.25	2001-2004, 2011, 2015-20177	
	M-SP11		1.09	6.275	0	2001-2004, 2015-20177	
	M-SP12		0.65	0.94	0.26	2001-2004, 2015-20177	
	M-SP15		0.71	4.82	0.27	2001-2004, 2015-20177	
	M-SP19		2.35	3.13	1.98	2001-2004, 2015-20177	
	M-SP20		2.13	8.62	0.71	2001-2004, 2015-20177	
	M-SP40		0.24	0.86	0.18	2001-2004, 2015-20177	
	M-SP41		0.56	2.25	0.4	2001-2004, 2015-20177	
	M-SP44		2.35	13.03	0.2	2001-2004, 2015-20177	
	M-SP45		1.43	2.23	0.67	2001-2004, 2015-20177	
	M-SP60		0.56	0.89	0.6	2002-2004, 2014-20177	
	M-SP100		0.84	1.08	0.77	2002-2004, 2015-20177	
	M-SP103		1.07	1.51	0.84	2003-2004, 2015-20177	
M-SP104		0.27	0.38	0.12	2003-2004, 2015-20177		
M-SP105		0.66	0.95	0.62	2003-2004, 2015-20177		
M-SP106		0.51	1.1	0.48	2003-2004, 2015-20177		
Price River Formation	M-SP01	GW-1	0.44	1.6	0.11	1976, 1979, 1985, 19871; 2006-200176	Rough Brothers spring
	M-SP02	GW-2	1.72	13.4	0	1976, 19871; 2006-200176	Estimated maximum flow
	M-SP18		0.25	0.77	0	2006-20176	
	M-SP39		1.04	2.71	0.22	2006-20176	
	Mud Spring		0	0	0	2007-20105, 2010-20176	
	M-SP87		1.55	3.08	2.19	2002-2004, 2009, 2014-20177	
	USP-2		0.38	0.43	0.35	2009, 20177	
	94-113 Seep		0	0	0	2012-20176	
	GW-8		1.32	1.98	0.61	2011-20176	
	GW-9		1.46	7.4	0.4	2011-20176	
Castlegate Sandstone	Sufco 089		10.9	17.05	5	1989-19952; 1997-20176	Pool with stage gage
	GW-20	GW-20	0.26	13.04	0	19861; 1998-20176	
	GW-21	GW-21	0.34	2.29	0	1979-19871; 1985-20176	Link Canyon spring
	Pines 100		0.23	0.96	0	1997-19993; 2000-20176	
	Pines 105		2.02	10	0	1997-19993; 2000-20176	
	Pines 218		0.01	0.1	0	1997-19994; 2000-20176	
	Pines 310		0.73	5.38	0	2006-20176	
	Pines 311		0.08	1.26	0	2006-20176	
	Wedge Spring		4	5.7	1	2012-20176	
Amanda Spring		0.67	2.94	0	2012-20176		
Blackhawk Formation	Sufco 001	GW-12	1.31	7.32	0.16	1980, 1986, 19871; 1983-19952; 1982-20176	
	Pines 206	GW-14	1.83	3.87	0.75	19861; 1997-19993; 1999-20176	
	Pines 209	GW-15	7.24	14.6	3.78	19861; 19973; 2000-20176	
	Pines 212		4.29	8.7	2.24	1997-19994; 2000-20176	
	Pines 214		0.76	3.21	0.01	1997-19984; 2000-20176	Impacted by subsidence
	Pines 303		1.3	0.88	0	1997-19994; 2000-20176	
Star Point Sandstone	Broad Hollow Spring		0.24	2.09	0	2007-20105, 2010-20176	
	Sufco 047A		144.83	4488	0.04	1983-19952; 1982-20176	Pump House spring

Sources for monitoring periods: 1 = Thiros and Cordy, 1991; 2 = Mayo and Associates, 1997 (MRP Appendix 7-17);

3 = Mayo and Associates, 1999 (MRP Appendix 7-17, Addition);

4 = Mayo and Associates, 1999 (MRP Appendix 7-18);

5 = Cirrus, 2004 and Petersen Hydrologic, 2005, 2010 (MRP Appendix 7-20 and 7-24); and

6 = SUFCO water monitoring program (DOGMA database).

7 = Cirrus, 2014 and Petersen Hydrologic 2017 (MRP Appendix 7-27 and 7-28)

**Table 4
Annual Coal Production and Mine Water Discharge -- SUFCO Mine**

Year	Annual Coal Production (million tons)	Annual Discharge (millions of gallons)	Discharge per Coal Production (gallons/ton)	Notes
2017	5.9	1,128	191	
2016	5.3	1,227	231	
2015	6	1,388	231	
2014	6.5	1,059	163	
2013	5.9	838	142	
2012	5.6	1,221	218	
2011	6.5	1,258	193	
2010	6.4	1,414	256	
2009	6.7	1,797	268	
2008	6.9	1,630	236	
2007	6.7	1,305	195	
2006	7.9	1,582	200	
2005	7.6	1,586	208	
2004	7.6	1,816	239	
2003	7.1	1,738	244	
2002	7.6	1,427	188	
2001	7	810	116	
2000	5.9	1,193	202	
1999	5.8	897	156	
1998	5.7	699	122	
1997	4.9	753	152	
1996	4.6	760	164	
1995	3.9	636	163	
1994	3.6	276	77	March 1994 to March 1995 - substantial flow diverted to the 3rdWest area.
1993	3.6	518	146	
1992	2.6	505	196	
1991	3.1	434	141	
1990	2.9	389	135	
1989	3.1	576	188	
1988	2.6	247	94	
1987	2.2	515	231	November 1987 to August 1989 - flow underestimated because of a change
1986	2.4	513	217	
1985	1.8	533	299	
1984	2.1	412	192	
1983	2.2	259	116	

Discharge data from SUFCO DMRs

**Table 5
Summary of Ground-Water Quality Data
SUFCO Mine**

Formation	Tract	# of sites	# of samples	TDSmg/L	Ca+2mg/L	Mg+mg/L	Na++ K+mg/L	HCO3-mg/L	SO42-mg/L	Cl-mg/L	* Total Anions	* Total Cations
North Horn	Greens Hollow	19	276	463	77	29.5	88	470	20	34	9.08	10.1
	West Lease	1	20	322	92	14	12	326	11	14	5.97	6.26
	Quitcupah	NA	3	722	79	24	193	431	89	107	11.9	14.3
	Pines	0	0	-	-	-	-	-	-	-	-	-
	Muddy	5	25	483	58	36	92	491	24	39	9.65	9.86
Price River	Greens Hollow	2	21	790	90	50	94	399	229	60	13	12.7
	West Lease	7	19	749	116	35	99	359	230	56	12.2	13
	Quitcupah	0	0	-	-	-	-	-	-	-	-	-
	Pines	0	0	-	-	-	-	-	-	-	-	-
	Muddy	5	25	545	77	38	68	425	82	64	10.5	9.93
Castlegate	Greens Hollow	1	0	-	-	-	-	-	-	-	-	-
	West Lease	2	44	264	48	15	27	208	12	17	4.14	4.8
	Quitcupah	NA	8	140	23	6	21	94	15	8	2.08	2.55
	Pines	7	19	163	21	5	9	85	13	9	1.92	1.85
	Muddy	0	0	-	-	-	-	-	-	-	-	-
Blackhawk	Greens Hollow	0	0	-	-	-	-	-	-	-	-	-
	West Lease	0	0	-	-	-	-	-	-	-	-	-
	Quitcupah	NA	17	422	80	41	41	339	90	16	7.88	9.15
	Pines	9	24	305	56	29	24	273	82	14	6.57	6.22
	Muddy	0	0	-	-	-	-	-	-	-	-	-
Star Point	Greens Hollow	1	NA	-	-	-	-	-	-	-	-	-
	West Lease	1	50+	479	89	40	27	392	86	18	8.72	8.91
	Quitcupah	2	78	593	100	48	68	406	123	38	10.3	11.9
	Pines	0	0	-	-	-	-	-	-	-	-	-
	Muddy	0	0	-	-	-	-	-	-	-	-	-

* Total anions and total cations might not balance closely because this table is based on average values.
 - = No data available or not applicable

Table 6
Subdrainages of the Quitchupah/Muddy Creek CIA

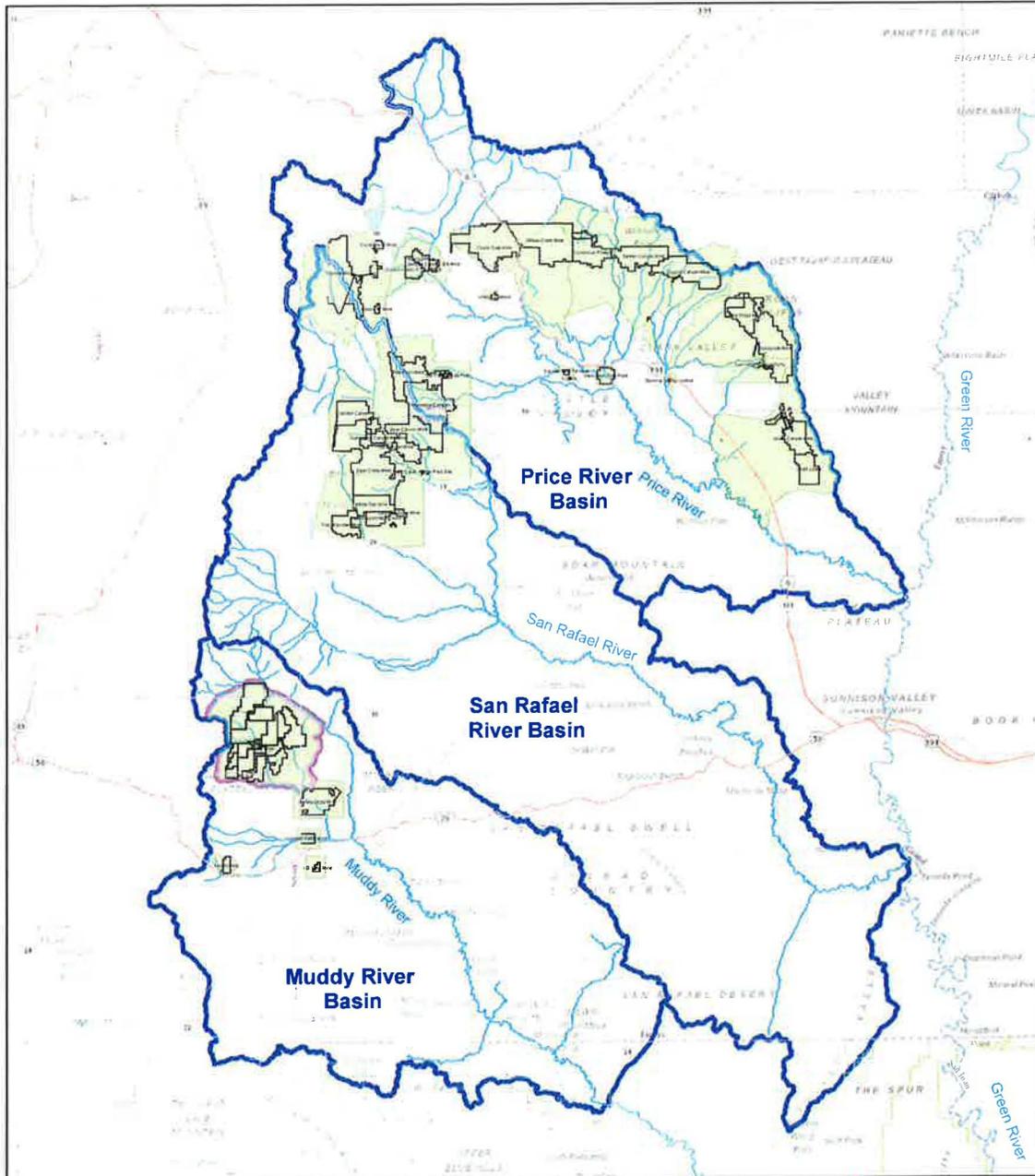
Number	Drainage	Square Meters	Acres	Square Miles
QUITCHUPAH CREEK WATERSHEDS				
1	East Spring Canyon	21,545,987	5,324	8.32
2	N. Fork Quitchupah	61,770,925	15,264	23.85
3	Link Canyon	30,921,703	7,641	11.94
4	Christiansen Wash	13,269,195	3,279	5.12
5	Quitcupah Creek Un-named Tributary	6,186,105	1,529	2.39
6	Quitcupah Creek Un-named Tributary	7,671,504	1,896	2.96
7	Quitcupah Creek Un-named Tributary	2,380,927	588	0.92
	TOTAL Quitcupah Creek Watershed	143,746,946	35,521	55.5
MUDDY CREEK WATERSHEDS				
8	Greens Canyon	23,540,156	5,817	9.09
9	Box Canyon	31,514,000	7,787	12.17
10	Wileys Fork	6,624,784	1,637	2.56
11	Wash Rock Canyon	5,663,696	1,400	2.19
12	Muddy Creek Un-named Tributary	15,818,553	3,909	6.11
13	Muddy Creek Un-named Tributary	8,760,269	2,165	3.38
14	Muddy Creek Un-named Tributary	1,691,910	418	0.65
15	Muddy Creek Un-named Tributary	5,362,570	1,325	2.07
16	Muddy Creek Un-named Tributary	2,135,364	528	0.82
	TOTAL Muddy Creek Watershed	101,111,302	24,986	39.04
	TOTAL CIA from Watersheds	244,858,248	60,504	94.54

Table 7
Stream Monitoring Locations
SUFCO Surface-Water Monitoring Program

SUFQO IDENTIFICATION		Elevation	UTM Coordinates		Flows in GPM			Monitoring Period	1 - SUFQO Mine monitoring data: 2 - Mayo and Associates 1993, 1995, and 1996 sampling reported in Mayo and Associates, 1997a 3 - SUFQO MRP 4 - UDOGM Database 5 - Petersen Hydrologic, 2005
			X - Coordinate	Y - Coordinate	Maximum	Minimum	No. of samples		
6	Upper South Fork Quitchupah	8560	463680	4312890	933.5	0.31	82	6/21/83 - present	1, 2, 2003
006D	Upper South Fork Quitchupah						16		
7	Upper North Fork Quitchupah	8240	464750	4315090	5772	44.9	83	6/21/83 - present	1, 2, 2003
41	Lower Quitchupah without mine water	8400	466100	4305400	3,110	0.2	87	4/20/83 - present	1, 2, 2003
42	Lower Quitchupah with mine water	6350	469180	4305420	9,371	1.6	86	4/20/83 - present	1, 2, 2003
46	Middle Quitchupah above portal	7240	463620	4306430	358	0	63	6/22/83 - present	1, 2, 2003
047A	Lower East Spring Canyon	7160	464030	4306450	4,488	0.1	80	10/5/75 - present	3, 4
90	Box Canyon Creek at lease boundary	8320	469470	4316620	62.8	0	63	7/27/88 - present	1, 2, 2003
Pines 106	Upper East Fork Box Canyon	8200	471550	4316990	4	0.1	51	8/23/2000 - present	3, 4
Pines 303	Muddy Creek-Last Water Creek	7140	472140	4319900	33.7	0	51	1/6/2000 - present	3, 4
Pines 403	Lower Box Canyon Creek	7270	471500	4320000	248	26.6	51	1/6/2000 - present	3, 4
Pines 405	Muddy Creek-Box Canyon Confluence	7290	471480	4320110	7,854	14.1	52	8/21/2000 - present	3, 4
Pines 406b	Lower Muddy Creek	6870	474500	4318210	68,866	76	53	1/6/2000 - present	3, 4
Pines 407	Box Canyon Creek	7845	470430	4318320	162	38.4	68	1/6/2000 - present	3, 4
Pines 408	East Fork of Box Canyon Creek	7685	470530	4318330	38.4	0.1	65	1/6/2000 - present	3, 4
USFS 109	Upper Main Fork of Box Canyon Creek	8280	469680	4315590	0.2	0	52	8/12/1999 - present	3, 4
Link 001	Link Canyon Drainage	7780			0.2	0	42	08/06/2003 - present	4
Link 002	Link Canyon Drainage	7300			0	0	42	08/06/2003 - present	4
FP-1	East Fork of the Main Fork of Box Canyon Creek	8290 to 8360	470010	4315570	0.34	0	16	10/6/2000 - present	3, 4
FP-2	East Fork of the East Fork of Box Canyon Creek	8200 to 8260	471810	4316910	2	0	15	10/9/2000 - present	3, 4
M-STR01	Greens Canyon Lower	7452	469241	4320776	460	0	19	2001-2004, 2017 - present	
M-STR04	Cowboy Creek	8164	NA	NA	717	0	33	2001 - present	3, 4, 2005
M-STR08	Top Greens Canyon	8170	467424	4319677	27.4	0	26	2001 - present	3
U-Mud	Confluence North & South Fork Muddy	7840	464799	4322438	43,960	4,057	12	2014 - present	3
Cowboy Top	Top of Cowboy Creek	9175	463410	4318133	1.74	0	3	2017 - present	3, 4
Cowboy Middle	Mid-segment of Cowboy Creek	8570	463984	4315266	12.1	2.23	3	2017 - present	3
Cowboy Bottom	Bottom of Cowboy Creek	8245	466562	4318577	1.41	0.51	3	2017 - present	3
SP60 Creek	Creek adjacent to Monitoring Point SP60	8620	462942	4316040	37.5	10.7	3	2017 - present	3
CPC Upper	Top of Tributary to North Fork Quitchupah	9010	463527	4316891	0.103	0	3	2017 - present	3
CPC Middle	Mid-segment of Tributary to North Fork Quitchupah	8500	463940	4315936	0.62	0	3	2017 - present	3
CPC Lower	Just above North Fork Confluence	8350	463976	4315264	3.6	3.95	3	2017 - present	3
North Fork Upper	Top of North Fork Quitchupah at lease edge	8990	462185	4316005	11.5	0.4	3	2017 - present	3
North Fork Middle	Mid segment of No Fork Quitchupah just above CPC confluence	8390	463973	4315256	10.3	0.4	3	2017 - present	3
ULGH	Upper Left Fork Greens Hollow Creek	8715	464277	4319327	12.6	0.8	3	2017 - present	3
URGH	Upper Right Fork Greens Hollow Creek	8660	464322	4319370	1.01	0	3	2017 - present	3
GH at Road	Greens Hollow Creek at Road Crossing	8380	463619	4319986	2.94	1.18	3	2017 - present	3
Muddy Creek below Horse	Muddy Creek below Confluence with Horse Creek	7510	467926	4322052	9620	4809	3	2017 - present	3
Muddy Creek above Horse	Muddy Creek above Confluence with Horse Creek	7500	467896	4322036	9030	3777	3	2017 - present	3
Horse Creek	Horse Creek at Confluence with Muddy Creek	7510	467938	4322054	4937	585	3	2017 - present	3

ABBREVIATIONS

AVF	Alluvial Valley Floor
BLM	Bureau of Land Management
BTCA	Best Technology Currently Available
CIA	Cumulative Impact Area
CHIA	Cumulative Hydrologic Impact Area
DWQ	Utah Division of Water Quality
DWR	Utah Division of Wildlife Resources
FEIS	Final Environmental Impact Statement
mg/L	milligrams per liter
MRP	Mining and Reclamation Plan
MSHA	Mine Safety and Health Administration
NTU	Nephelometric Turbidity Units
PAP	Permit Application Package
PHC	Probable Hydrologic Consequences
PHDI	Palmer Hydrologic Drought Index
ROD	Record of Decision
SITLA	Utah School and Institutional Trust Lands Administration
SMCRA	Surface Mining Control and Reclamation Act of 1977
SUFCO	Southern Utah Fuel Company
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UDOGM	Utah Division of Oil, Gas and Mining
UDWR	Utah Division of Water Resources
UDWQ	Utah Division of Water Quality
UPDES	Utah Pollution Discharge Elimination System
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WRDS	Waste Rock Disposal Site



Cumulative Impact Area Quitchupah - Muddy Creek

Plate 1

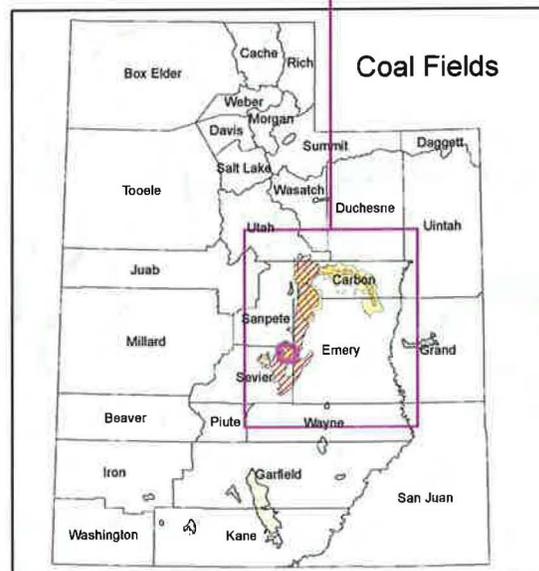
Location Map

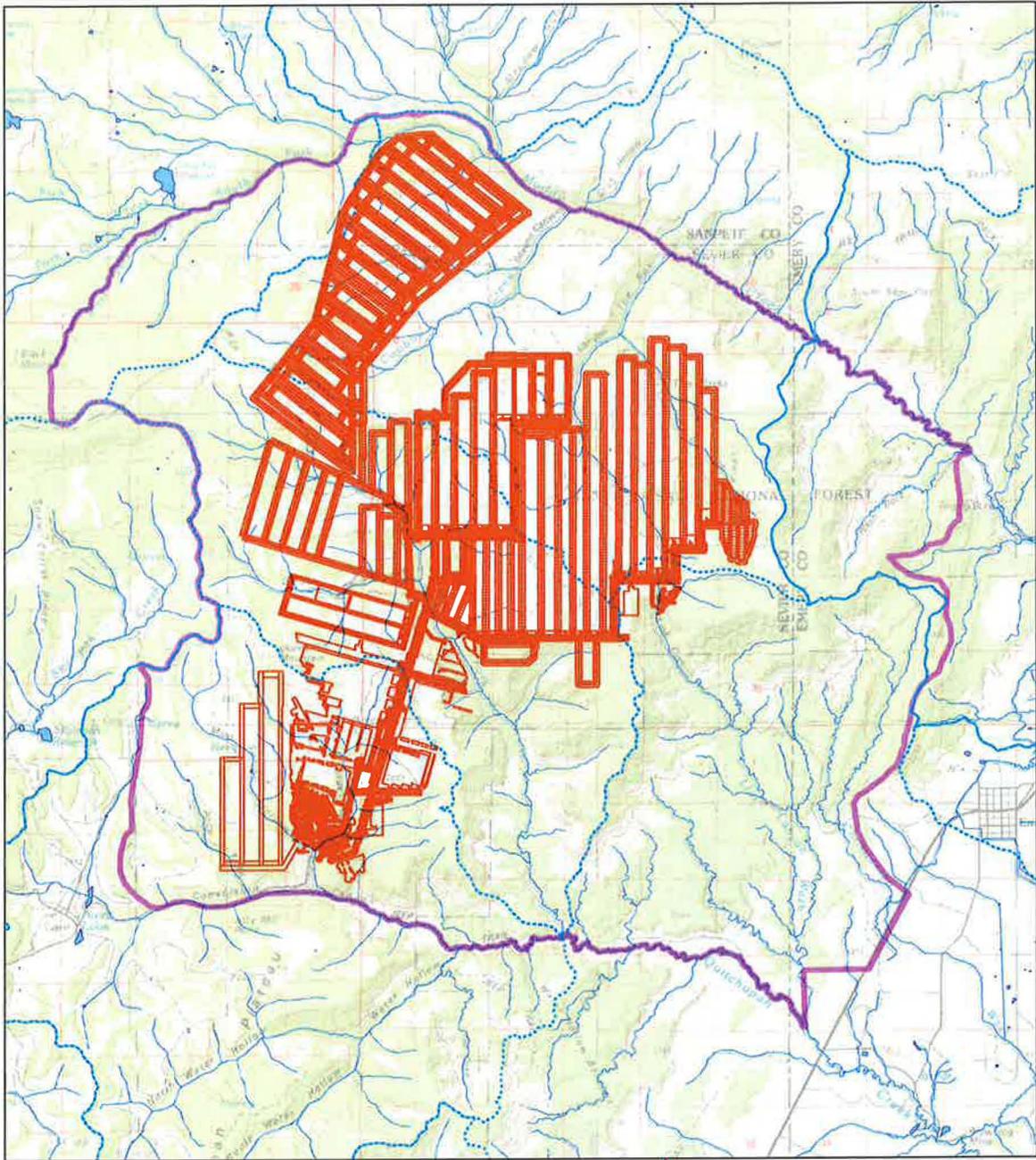
April 2018

- | | |
|-----------------|--------------------------|
| Drainage | Utah Major Rivers |
| Lease Area | Major_River_Basin |
| CIA Areas | Quitchupah - Muddy Creek |
| CoalBeds | County Boundaries |
| Book Cliffs | |
| Wasatch Plateau | |



0 2.5 5 10 15 20 Miles





Cumulative Impact Area Quitichupah - Muddy Creek

Plate 2

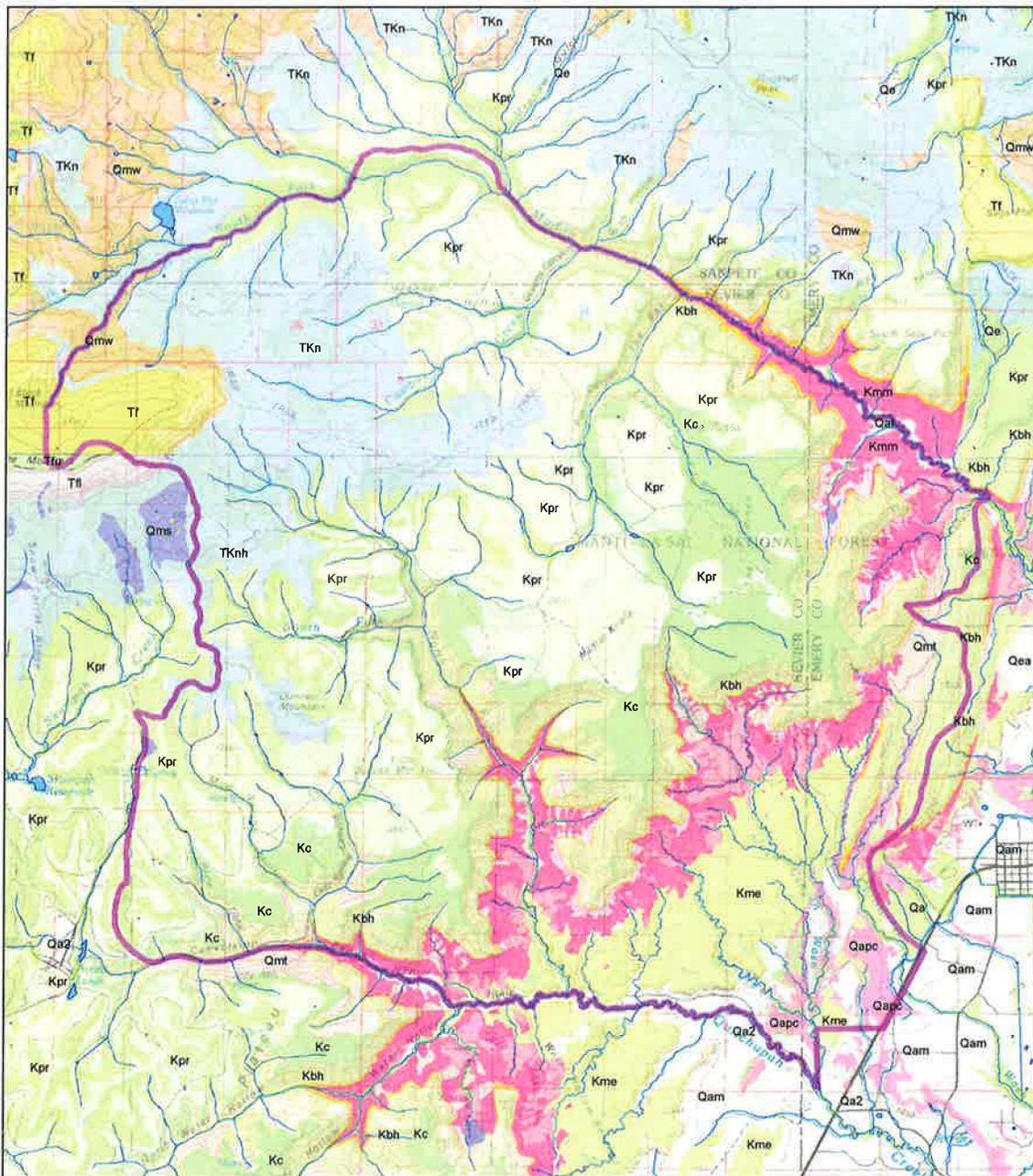
Workings Map

April 2018

-  Drainage
-  Watersheds_Area
-  Waterbody
-  CIA Areas
-  Mine Workings



CIA Areas



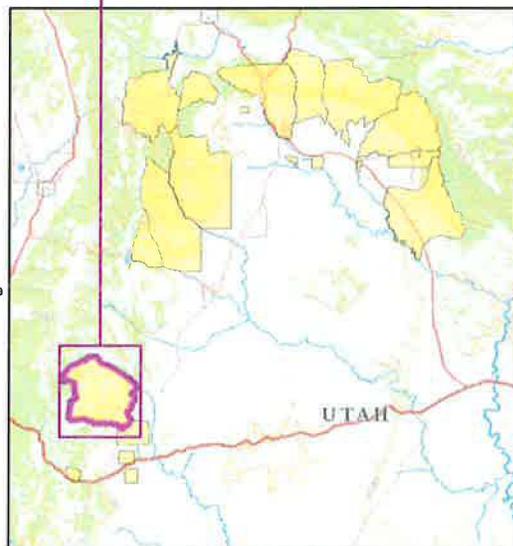
Cumulative Impact Area Quitchupah - Muddy Creek

Plate 3

Geology Map

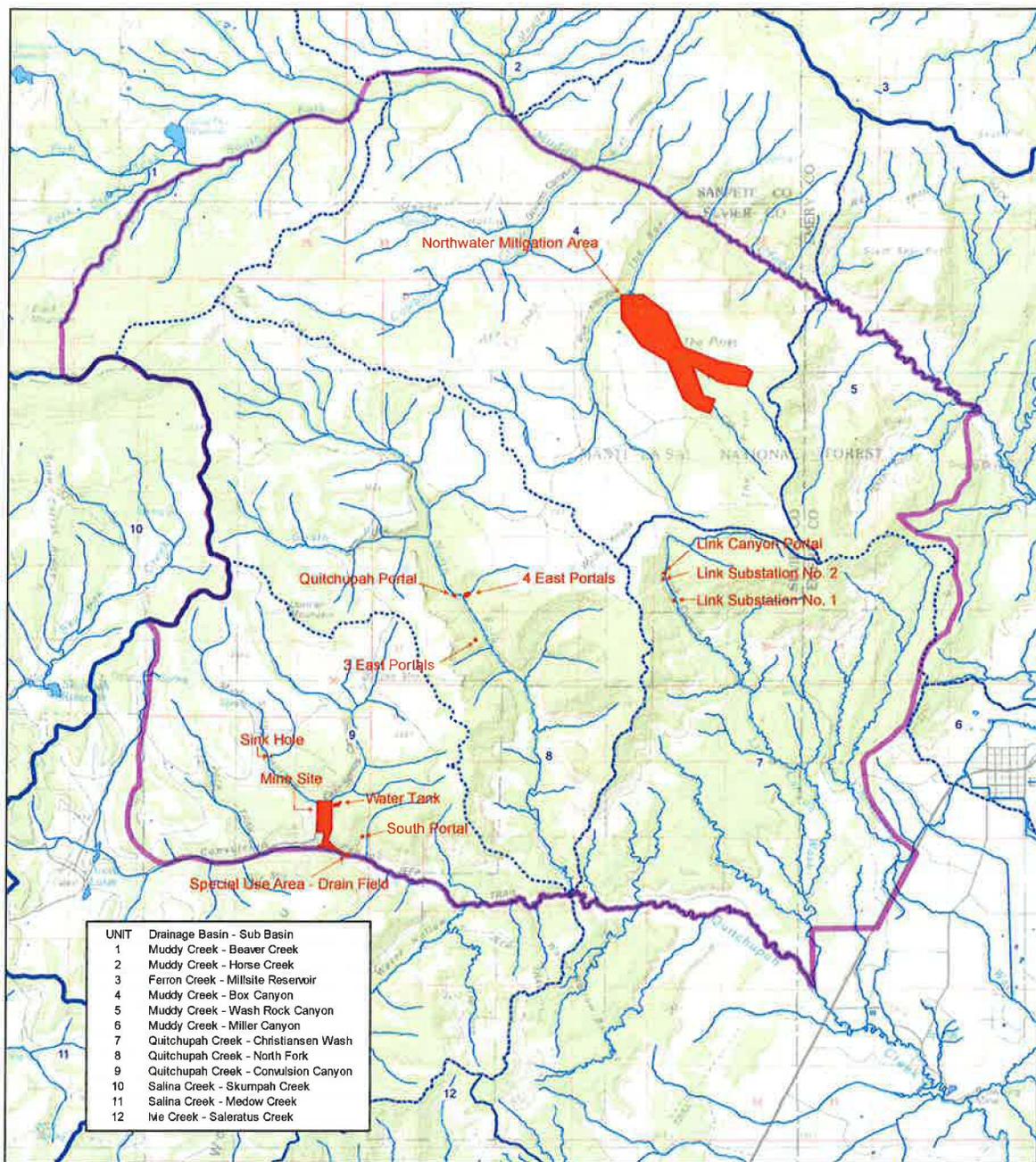
April 2018

- Drainage
 - Waterbody
 - Quitchupah - Muddy Creek
- Geology**
- Kbh - Blackhawk Fm
 - Kc - Castlegate Sandstone
 - Kmbu - Upper Mancos Shale
 - Kme - Emery Sandstone Mancos Shale
 - Kmm - Masuk Member Mancos Shale
 - Kpr - Price River Formation
 - Ksp - Star Point Sandstone
 - Qa - Unconsolidated Deposit
 - QMS - Mass-movement landslides
 - Qmt - Mass-movement talus
 - Qmw - Mass-wasting deposits
 - TKnh - North Horn
 - Tfl - Lower Flagstaff Formation



CIA Areas





Cumulative Impact Area Quitcupah - Muddy Creek

Plate 4

Hydrology Map

April 2018

- Drainage
- Waterbody
- CIA Areas
- Hydrologic Surface Divide (drainage basin)
- Hydrologic Surface Divide (sub-basin)
- Bonded Area



CIA Areas



GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining

JOHN R. BAZA
Division Director

May 11, 2017

John Byars, General Manager
Canyon Fuel Company, LLC
597 South SR24
Salina, Utah 84654

Subject: Determination of Administrative Completeness for Greens Hollow Lease Tract Addition, Canyon Fuel Company, LLC, Task ID #5445, C/041/0002

Dear Mr. Byars:

The Division has completed a review of the information you submitted on April 21, 2017. This application is considered to be administratively complete. A copy of our review worksheet is enclosed for your information and records.

A technical review of your plan has been initiated. Technical deficiencies will be forwarded to you as reviews are completed. The Division will also coordinate with other agencies and incorporate their comments into our review process. Issues raised will need to be resolved prior to permit issuance.

At this time you should publish a Notice of Complete Application for adding the Greens Hollow Lease Tract to the Sufco Mine. Per the requirements of R645-300-121, the Notice of Complete Application must be published in a local newspaper in the locality of the proposed mining for four consecutive weeks. In this instance, that would include Sevier, Sanpete and Emery County. Copies of the publication affidavits should be sent to the Division as soon as they are available. You should also insure that a copy of the application is on file at the Sevier, Sanpete and Emery County Courthouses. The Division will complete a technical analysis, which must find that your application is technically complete. We anticipate additional information may be necessary to make your application technically complete and look forward to working with you throughout the process.

Please call if you have any questions. Thank you for your help in the permitting process.

Sincerely,

Daron R. Haddock
Permit Supervisor

DRH/sqs
O:\041002.SUF\WG5445 GREENS HOLLOW\ADMINCOMPLETE.DOC



**ADMINISTRATIVE COMPLETENESS REVIEW WORKSHEET
(R645-100)**

DATE: 04/28/2017

REVIEWER(S): Suzanne Steab, Priscilla Burton, Justin Eatchel, Daron Haddock, Lisa Reinhart

APPLICANT: Canyon Fuel Company, LLC

MINE NAME: Sufco Mine **FILE NO.:** Task ID #5445

"Administratively Complete Application" means an application for permit approval or approval for coal exploration, where required, which the Division determines to contain information addressing each application requirement of the State Program and to contain all information necessary to initiate processing and public review.

Directions: The categories listed below correspond to the minimum requirements for information necessary to initiate processing and public review. If a category is checked the Applicant has met the Completeness requirement for that category. If a category is not checked, the Completeness requirements have not been met. If a category is Not Applicable, enter NA in check box. The comments column will identify the deficiency and what is necessary to correct it.

			Comments
301-112	Identification of Interests	<u>X</u>	
100	Applicant's Business Structure	<u>X</u>	
210	Applicant's Name/Address/Phone	<u>X</u>	
220	Resident Agent's Name/Address/Phone	<u>X</u>	
230	Name/Address/Phone of AML Fees Payer	<u>X</u>	
300	Corporate Structure & Ownership	<u>X</u>	
400	Identify Other Mining Operations in US	<u>X</u>	
500	Surface & Mineral Ownership	<u>X</u>	
600	Ownership Contiguous to Permit	<u>X</u>	
700	MSHA Numbers	<u>X</u>	
800	Interest in Contiguous Lands	<u>X</u>	

301-113	Violation Information	<u>X</u>	
100	AVS Violation Evaluation	<u>X</u>	An AVS Evaluation was completed on May 4 th , 2017. No outstanding violations were identified.
200	Suspension or Revocation Information	<u>X</u>	
300	List of Violations - 3 Previous Years	<u>X</u>	Located in General Chapter 1

301-114	Right of Entry	<u>X</u>	
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301-115	Status of Unsuitability Claims	<u>NA</u>	
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301-116	Permit Term	<u>NA</u>	
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301-117	Insurance	<u>X</u>	The applicant has current certificate of insurance on file. Publication following administrative completeness.
	Proof of Publication	<u>NA</u>	
	Facilities and Structures Used in Common	<u>NA</u>	

301-118	Filing Fee	<u>NA</u>	
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301-123	Notarized Signature of Responsible Official	<u>X</u>	
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301-130	<p>Information Collection: <u>X</u> Technical Data Accompanied by Names of Persons or Organizations that Collected and Analyzed the Data - Dates of Collections - and Analysis of the Data and Description of the Methodology Used to Collect and Analyze Data</p>	<p>Appendix 3-4 Raptor and General Avifauna Studies (Confidential) 2013. Tetra Tech. Appendix 3-15 Wildlife Technical Report (Confidential) 2014. Cirrus Ecological Solutions, LC. Appendices 4-2 Muddy Creek Technical report: Heritage Resources (Confidential) 2004. Cirrus Ecological Solutions, LC. Appendix 4-5 Cultural Resource Memorandum of Agreement Manti La Sal National Forest and SHPO (Confidential). 2001 Appendix 4-6, Cultural Resource Documentation (Confidential). Appendix 6-4 Geology Technical Report Greens Hollow Tract. 2014. Paul B. Anderson, PG and Cirrus Ecological Solutions, LC. Appendix 7-27 Surface and Ground Water Report prepared for BLM & USFS. 2014. Cirrus Ecological Solutions, LC and Norwest Applied Hydrology 2015. Final Supplemental Environmental Impact Statement, Chapter 4, pages 149 - 150, and selected water data and grazing allotment map.</p>
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301-200	<p>Soils <u>X</u></p>	<p>The application relinquishes acreage in federal coal lease U-63214 and UTU-76195 and in State lease ML 49,443-OBA. The application adds 6,696.41 acres in BLM Greens Hollow Lease UTU-84102 within T. 20 S., R. 4 E., Sec 36, 14, 23, 24; and T 20 S., R. 5 E. Sec. 19, 20, 21, 28, 29, 30, 31, 32, and Sec 33; and T 21 S, R 4 E Sec 1, 2, 11, 12, 13, and 1; and T 21 S, R 5 E Sec 6. The Greens Hollow lease surface is managed by Fishlake (79 acres) and Manti LaSal National Forests (the remainder). The application does not describe any surface disturbance. The application revises the total permitted disturbed area boundary (96.416 acres) and the currently disturbed acreage (48.825 acres, pg 1-15). There is no revision to Chapter 2, Soils, other than a disclaimer that the 2015 FEIS is provided as background. The potential for a ventilation and escapeway shaft facility is anticipated in Section 5.2.6.1 with a statement that permitting of the potetial shaft will follow the acquisition of the Greens Hollow Lease. Confidential Appendix 4-5 Memorandum of Agreement between USFS and SHPO outline requirements of shaft development.</p>
211	<p>Description of Pre-mining Soil Resources <u>NA</u></p>	<p>No surface disturbance described. A very general Order III survey is included as Dwg 2-3.</p>

221	Prime Farmland Investigation	<u>NA</u>	
222	Soil Survey	<u>NA</u>	
224	Substitute Topsoil Info (When Proposed)	<u>NA</u>	
230	Operation Plan Topsoil Handling/Removal/Storage	<u>NA</u>	
240	Reclamation Plan Soil Redistribution/Stabilization	<u>NA</u>	

301-300	Biology	<u>X</u>	
320	Vegetation Information	<u>X</u>	Ch. 3 has been updated to include vegetation in the Greens Hollow tract on page 3-5 and in the EIS.
322	Fish and Wildlife Information	<u>X</u>	Section 3.3.3.3 appendix 3-4, and appendix 3-15 include Raptor survey information. Table 3-1 has been updated to include listed species. TES were analyzed in the FSEIS, appendix 3-15.
323	Maps/Photos Vegetation-Fish-Wildlife Areas	<u>X</u>	Plate 3-1 (plant communities and reference), 3-2 (elk range), and 3-3 (Deer range and raptor nests) have been updated to include the Greens Hollow tract.
330	Operation Plan Vegetation-Fish-Wildlife Protection	<u>X</u>	Potential impact to vegetative, fish and wildlife resources and the associated mitigation plan are presented in Sections 3.30 and 3.40 of the approved MRP. In addition, Appendix 3-15 contains a sound monitoring report. Additional monitoring information for the upper reaches of Quitchupah Creek are provided on page 3-46.
341	Reclamation Plan for Revegetation	<u>X</u>	Nothing has been added to the existing reclamation plan. Assuming the Greens Hollow tract has no additional surface disturbance, this is okay. The reclamation plan used to restore the vegetative, fish and wildlife resources to a condition suitable for the postmining land use is presented in Section 3.40.

342	Fish & Wildlife Plan for Reclamation Phase	<u>X</u>	Nothing has been added to the existing reclamation plan. Assuming the Greens Hollow tract has no additional surface disturbance, this is okay. The reclamation plan used to restore the vegetative, fish and wildlife resources to a condition suitable for the postmining land use is presented in Section 3.40.
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301-400	Land Use and Air Quality	<u>X</u>	Appendix 4-46 is a map showing Greens Hollow range allotments for livestock use. The amendment provides information regarding the DAQ Air Quality Permit but it is not updated with the Greens Hollow Lease.
411	Pre-Mining Land Use Information (Includes Cultural Resources)	<u>X</u>	A description of the land use of the Greens Hollow tract is provided on pages 4-7. Land use is consistent with adjacent permitted tracts. The Paiute Indian Tribe, Navajo Nation and Ute Indian Tribe were consulted, no sacred sites were identified in the course of the tribal consultation (FESEIS). Pg. 4-14 contains a description of the cultural resources. Appendix 4-2 Appendix 4-5 contains the cultural resource MOA. The MLS NF and USHPO agreed that the undertaking may have an adverse effect on several archaeological sites eligible for listing. Therefore, several stipulations are required. There is no additional evidence of consultation with DEQ AQ regarding air quality.
412	Post-Mining Land Use Information	<u>X</u>	There are no changes to section 4.1.3.1 on page 4-19. PMLU is consistent with premining land use.

301-500	Engineering	<u>X</u>	Chapter 5 narrative includes additional information regarding conceptual mine plans based off of full extraction mining. Narrative regarding sections 522, 523, and 525 regarding the Green's Hollow lease has been added.
510 520	General Description of Operation Plan (Maps, Locations, Cross-Sections, Narrative, Descriptions & Calculations)	<u>X</u>	520 A description of the sequencing of operations within the Greens Hollow Lease over the next five years is included.
522	Coal Recovery Description	<u>X</u>	Maximum utilization and conservation of coal within Greens Hollow Lease addressed in appendix 1-1 as well as 5.2.3.

523	Mining Methods	<u>X</u>	Coal recovery details anticipating annual and total production of coal by tonnage for the next five years is included.
524	Blasting and Explosives Plan	<u>X</u>	No blasting over five pounds is expected at the surface. No changes were made the MRP chapter 5.
525	Subsidence Control Plan	<u>X</u>	Plate 10-A and 10-C potential subsidence plate was updated to include the proposed lease. Narrative was added to the MRP Chapter 5 Section 5.2.5.1. Narrative specific to subsidence controls related to the Green's hollow lease was added on page 5-45.
526	Mine Facilities Description (Narrative, Plans, Maps) Including Existing Structures & Support Facilities	<u>X</u>	Narrative was added to Chapter 5 Section 5.2.6.1 regarding the Green's Hollow Lease.
527	Transportation Facilities (Including Plans & Maps)	<u>X</u>	No surface operations are considered at the time of this review; therefore no roads are proposed within the Green's Hollow lease.
528	Coal Mine Waste Plans (Description & Designs)	<u>X</u>	Plate 5-11 was update to show the overburden isopach within the proposed lease.
529	Management of Mine Openings (Design)	<u>X</u>	No surface operations are considered at the time of this review; therefore no mine seals are proposed within the Green's Hollow lease
531	General Plans for Structures	<u>X</u>	No surface operations are considered at the time of this review; therefore no sediment control measures are proposed within the Green's Hollow lease.
532	Sediment Control	<u>X</u>	No surface operations are considered at the time of this review; therefore no sediment control measures are proposed within the Green's Hollow lease.
533	Impoundments	<u>X</u>	No surface operations are considered at the time of this review; therefore no sediment control measures are proposed within the Green's Hollow lease.

301-534	Roads (Plans, Drawings, Designs, & Specifications)	<u>X</u>	No surface operations are considered at the time of this review; therefore no roads are proposed within the Green's Hollow lease
535	Spoil	<u>X</u>	No surface operations are considered at the time of this review; therefore no spoil plans are proposed within the Green's Hollow lease.
536	Coal Mine Waste	<u>X</u>	536 A detail of the Refuse pile associated with the Sufco mine remains unchanged in Volume 3 of the MRP.

537	Regraded Slopes	<u>X</u>	No mining or reclamation activities are conducted in the permit area that require approval for regarding steep slopes.
540 541-542	Reclamation Narrative, Maps and Plans	<u>X</u>	No changes were made to the reclamation plan of the Sufco mine within the proposed amendment.
551	Casing and Sealing Underground Openings	X	No changes were made to the reclamation plan of the Sufco mine within the proposed amendment due to no proposed mine openings at this time.
553	Backfilling and Grading Description	<u>X</u>	No changes were made to the reclamation plan of the Sufco mine within the proposed amendment due to no proposed surface support facilities at this time.

301-600	Geology	<u>X</u>	Chapter 6 of the MRP has been updated to include the Greens Hollow Lease tract. A specific geologic report has been added to the MRP to discuss the geology of the tract (Appendix 6-4)
621	Description of Geology (Permit & Adjacent Area)	<u>X</u>	The geology of the Greens Hollow Lease tract has been described. Since this is an extension of an existing mine a lot of the geologic information carries over from the existing mine plan. The formations are essentially the same, although most of the Greens Hollow is a little deeper in the geologic column and is covered by the North Horn formation. A report has been prepared by Paul Anderson specifically for the Greens Hollow tract and is found in Appendix 6-4.
622	Geologic Cross-Sections, Maps, and Plans	<u>X</u>	The Geology Technical Report (Appendix 6-4) contains a General Stratigraphic column (Figure 1) of the Greens Hollow Coal lease tract. It is accompanied by Plated 2 which is a Geologic Fence Diagram of the tract. These adequately describe the stratigraphy of the area. Plate 6-1 of the MRP is the Geology and drill hole location map and has been updated to include the Greens Hollow lease tract.
630	Plans for Casing and Sealing Holes	<u>X</u>	The plan for casing and sealing of wells is found in section 7.6.5 of the MRP. When no longer needed for monitoring or approved for transfer as a sater well, each well will be sealed and backfilled by placing a concrete plug from TD to the surface.

301-700	Hydrology	<u>X</u>	
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721	Description of Hydrologic Resources (Permit and Adjacent Area)	<u>X</u>	Surface and groundwater information is included. A loss/gain study for various streams in the area of the lease have been performed. Stock watering ponds have been identified and monitored. Water rights information is included in appendix 7-1.
722	Cross-Sections and Maps Subsurface Water - Surface Water - Monitoring Stations - Wells	<u>X</u>	Plates 7-2 and 7-3 have been updated.
723	Sampling and Analysis	<u>x</u>	Sampling has occurred as part of the baseline monitoring by the mine and as part of the EIS preparation.
724	Baseline Information Ground Water - Surface Water - Geology - Climatological & Supplemental; If Needed	<u>X</u>	Groundwater information is presented in 7.2.4.1 of the MRP. Pages 7-16 and 7-20 are specific groundwater information for the Greens Hollow lease.
728	PHC Determination	<u>X</u>	A PHC report has been provided for the addition of the Greens Hollow Lease.
730	General Operation Plan Minimize Disturbance to Hydrologic Balance & Compliance with Clean Water Act	<u>X</u>	Sections of Chapter 7 discuss possible subsidence impacts to water resources.
731	Ground and Surface Water Protection	<u>X</u>	Table 7-2, the water monitoring table, has been revised to include monitoring locations within the Greens Hollow lease.
732	Sediment Control Measures	<u>NA</u>	There is no proposed surface disturbance associated with the Greens Hollow Lease.

301-740	Plans and Designs Operation and Reclamation Plan Sediment Control Measures	<u>NA</u>	
	Siltation Structures	<u>NA</u>	
	Sediment Ponds	<u>NA</u>	
	Other Treatment Facilities	<u>NA</u>	
	Diversions	<u>NA</u>	
	Road Drainage	<u>NA</u>	
	Impoundments	<u>NA</u>	

	Discharge Structures	<u>NA</u>	
	Disposal of Excess Spoil	<u>NA</u>	
	Coal Mine Waste	<u>X</u>	
	Disposal of Non-Coal Mine Waste	<u>NA</u>	
	Casing and Sealing of Wells	<u>X</u>	

301-800	Bonding and Insurance	<u>X</u>	Chapter 8 edits were included within the application
820	Applicant Have Adequate Bond at Permit Issuance	<u>X</u>	Plate 5-2C detailing surface portals was updated to show the proposed lease.
830	Bond Estimate and Calculations Provided	<u>X</u>	Appendix 5-9 in Volume 6 contains the detail reclamation cost estimate. The bond remains unchanged at this point due to no surface disturbances currently planned within the Green's Hollow lease.
890	Certificate of Insurance Provided	<u>X</u>	Narrative was added to Section 8.60 of Chapter 8 detailing the base assumptions of no surface support facilities at the time of this review. The terms and conditions of the liability insurance for the Sufco Mine remain unchanged.

302-200	Special Categories of Mining	<u>NA</u>	
210	Experimental Practices Mining	<u>NA</u>	
220	Mountaintop Removal Mining	<u>NA</u>	
230	Steep Slope Mining	<u>NA</u>	
240	Auger Mining	<u>NA</u>	
250	In Situ Processing Activities	<u>NA</u>	

302-260	Coal Processing Plants (Not Located Within Permit Area of Mine)	<u>NA</u>	
270	Variances From Approximate Original Contour Restoration Requirements	<u>NA</u>	
280	Variances for Delay in Contemporaneous Reclamation Requirement in Combined Surface and Underground Coal Mining Activities	<u>NA</u>	
290	Small Operator Assistance Program (SOAP)	<u>NA</u>	

302-300	Special Areas of Mining	<u>NA</u>	
301	Prime Farmland	<u>NA</u>	
302	Alluvial Valley Floors	<u>NA</u>	

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AFFIDAVIT OF PUBLICATION

STATE OF UTAH)

ss.

County of Emery,)

I, Jenni Fasselin, on oath, say that I am the Publisher of the Emery County Progress, a weekly newspaper of general circulation, published at Castle Dale, State of Utah and County aforesaid, and that a certain notice, a true copy of which is hereto attached, was published in the full issue of such newspaper for 4 (Four) consecutive issues, and on the Utah legals.com webwsite; the first publication was on the 16th day of May, 2017, and that the last publication of such notice was in the issue of such newspaper dated the 6th day of June, 2017.

Jenni Fasselin

Jenni Fasselin – Publisher

Subscribed and sworn to before me this 6th day of June 2017.

Linda Thayne

Notary Public My commission expires January 10, 2019 Residing at Price, Utah

Publication fee, \$ 384.00



LEGAL NOTICE

Canyon Fuel Company LLC, 225 North 5th Street, 9th Floor, Grand Junction, CO 81501 has filed an application for the addition of the Greens Hollow Lease under the laws of the State of Utah and the U.S. Office of Surface Mining.

Approval of this application will allow coal mining operations at the Sulco Mine to continue within the additional lands of the Greens Hollow Lease. The lands on which mining is to continue are located in Sevier and Sanpete Counties and include parts of the Fishlake National Forest and Marti-LaSal National Forest. The mine portals are located 30 miles east of Salina, Utah, within Section 12, NW1/4, Township 22 S., Range 4 E. The approximately leasehold involves all or part of the following Sections which have been assigned to Canyon Fuel Company, LLC.

Federal Coal Lease UTU-84102 - (6,175.39 acres) - Effective April 1, 2017

- T. 20 S., R. 4 E., SLM
 - Sec. 36, lot 4, E1/2NE1/4, NE1/4SE1/4
- T. 20 S., R. 5 E., SLM
 - Sec. 19, lots 5-8, E1/2SW1/4, SE1/4
 - Sec. 20, S1/2
 - Sec. 21, W1/2SW1/4
 - Sec. 28, W1/2
 - Sec. 29, all
 - Sec. 30, all
 - Sec. 31, all
 - Sec. 32, N1/2, N1/2S1/2
 - Sec. 33, NW1/4NW1/4
- T. 21 S., R. 4 E., SLM
 - Sec. 1, all
 - Sec. 2, SE1/4
 - Sec. 11, E1/2, E1/2W1/2
 - Sec. 12, NE1/4, W1/2, W1/2SE1/4
 - Sec. 13, W1/2NE1/4, NW1/4
 - Sec. 14, NE1/4, E1/2NW1/4
- T. 21 S., R. 5 E., SLM
 - Sec. 6, all

After filing, copies of the permit application will be available for inspection at the: Utah Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah; Sanpete County Offices, 160 North Main, Suite 204, Marti, Utah, Emery County Courthouse, Castle Dale, Utah and Sevier County Offices, 250 North Main Street, Richfield, Utah.

Written comments or requests for an informal conference regarding this application may be addressed within 30 days of the last publication date of this notice, to the Utah Division of Oil, Gas and Mining, Box 145801, Salt Lake City, Utah 84114-5801.

Published in the Emery County Progress May 16, 23, 30 and June 6, 2017.

AFFIDAVIT OF PUBLICATION

County of Sevier, State of Utah, ss.

I, SHALON PETERSEN, being first duly sworn, depose and say I am the Legal Secretary of THE RICHFIELD REAPER, a weekly paper having a bona fide circulation of more than 200 subscribers in the State of Utah, published every Wednesday at Richfield, Sevier County, Utah, and that said notice was published on Utahlegals.com, a website established by the Utah Press Association through the collective efforts of Utah's newspapers, on the same day as the first newspaper publication and the notice remained on Utahlegals.com until the last day of publication.

That the notice GREENS HOLLOW LEASE a copy of which is attached hereto, was published in said paper for 4 consecutive issues, the first publication having been made in the issue of the 18 day of MAY 2017, and the last publication in the issue of the 8 day of JUNE 2017 that the said notice was published in the regular and entire issue of every number of said paper during the period of times and publication, and that the same was published in the newspaper proper and not in a supplement.

Shalon Petersen

Subscribed and sworn to before me this 8 day of JUNE, 2017

Sheena Thompson

Notary Public



PUBLIC NOTICE
LEGAL NOTICE
Canyon Fuel Company LLC, 225 North 5th Street, 9th Floor, Grand Junction, CO 81501, has filed an application for the addition of the Greens Hollow Lease under the laws of the State of Utah and the U.S. Office of Surface Mining.

Approval of this application will allow coal mining operations at the Sufco Mine to continue within the additional lands of the Greens Hollow Lease. The lands on which mining is to continue are located in Sevier and Sanpete Counties and include parts of the Fishlake National Forest and Manti-LaSal National Forest. The mine portals are located 30 miles east of Salina, Utah, within Section 12, NW1/4, Township 22 S., Range 4 E. The approximately leasehold involves all or part of the following Sections which have been assigned to Canyon Fuel Company, LLC.

Federal Coal Lease UTU-84102 - (6,175.39 acres) - Effective April 1, 2017

- T. 20 S., R. 4 E., SLM Sec. 36, lot 4, E1/2NE1/4, NE1/4SE1/4
- T. 20 S., R. 5 E., SLM Sec. 19, lots 5-8, E1/2SW1/4, SE1/4
- Sec. 20, S1/2
- Sec. 21, W1/2SW1/4
- Sec. 28, W1/2
- Sec. 29, all
- Sec. 30, all
- Sec. 31, all
- Sec. 32, N1/2, N1/2S1/2
- Sec. 33, NW1/4NW1/4
- T. 21 S., R. 4 E., SLM Sec. 1, all
- Sec. 2, SE1/4
- Sec. 11, E1/2, E1/2W1/2

Sec. 12, NE1/4, W1/2, W1/2SE1/4

Sec. 13, W1/2NE1/4, NW1/4

Sec. 14, NE1/4, E1/2NW1/4

• T. 21 S., R. 5 E., SLM Sec. 6, all

After filing, copies of the permit application will be available for inspection at the: Utah Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah; Sanpete County Offices, 160 North Main, Suite 204, Manti, Utah; Emery County Courthouse, Castle Dale, Utah; and Sevier County Offices, 250 North Main Street, Richfield, Utah.

Written comments or requests for an informal conference regarding this application may be addressed within 30 days of the last publication date of this notice, to the Utah Division of Oil, Gas and Mining, Box 145801, Salt Lake City, Utah 84114-5801.

Published in The Richfield Reaper May 18, 25, June 1 and 8, 2017. UPAXLP

AFFIDAVIT OF PUBLICATION

COUNTY OF SANPETE }
STATE OF UTAH } ss:

R **SEP 18 2017**
BY: _____

I, Karen Christensen, employee of Sanpete News Company, Inc., publisher of the Sanpete Messenger, a newspaper of general circulation published weekly at Manti, Sanpete County, Utah, do solemnly swear that the

Legal Notice: Canyon Fuel Company – Greens Hollow Lease

As per clipping attached, was published once a week for four successive week(s) in the regular and entire issue of said newspaper and not in a supplement thereof, commencing with the issue dated May 18, 2017 and ending with the issue dated June 8, 2017.

Karen J Christensen

Subscribed and sworn to before me this 9th day of June 2017

Green Howe
Notary Public signature

Notary public residing at Manti, Utah

[SEAL] My Commission will expire 5-6-2021

LEGAL NOTICES

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Publish Sanpete Messenger May 18, 25, June 1, 8, 2017.



GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining

JOHN R. BAZA
Division Director

April 19, 2018

To: Internal File

From: Daron R. Haddock, Coal Program Manager 

Subject: 510 (c) Recommendation for Canyon Fuel Company, LLC, Sufco Mine, C/041/0002, Task ID #5445

As of writing of this memo, there are no NOV's or CO's which are not corrected or in the process of being corrected for the Sufco Mine. There are no finalized civil penalties, which are outstanding and overdue in the name of Canyon Fuel Company, LLC. Canyon Fuel Company, LLC does not have a demonstrated pattern of willful violations, nor have they been subject to any bond forfeitures for any operation in the state of Utah.

Attached is a recommendation from the OSM Applicant Violator System for the Sufco Mine that states there are no outstanding violations.

O:\041002.SUF\PERMIT\2018 GH\510c.doc



Permit Evaluation

Permit Number C0410002 SEQ:6
 Permittee Name 142816 Canyon Fuel Company LLC
 Date Of Narrative 4/17/2018 11:58:02 AM
 Requestor susanne.steab

CAUTION: The Applicant/Violator System (AVS) is an informational database. Permit eligibility determinations are made by the regulatory authority with jurisdiction over the permit application not by the AVS. Results which display outstanding violations may not include critical information about settlements or other conditions that affect permit eligibility. Consult the AVS Office at 800-643-9748 for verification of information prior to making decisions on these results.

12 Violations Found.

1: Revoked Permit	<u>11</u>	IL	Permit:11	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
2: Revoked Permit	<u>128</u>	IL	Permit:128	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
3: Revoked Permit	<u>167</u>	IL	Permit:167	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
4: Revoked Permit	<u>172</u>	IL	Permit:172	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
5: Revoked Permit	<u>192</u>	IL	Permit:192	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
6: Revoked Permit	<u>228</u>	IL	Permit:228	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
7: Revoked Permit	<u>252</u>	IL	Permit:252	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
8: Revoked Permit	<u>267</u>	IL	Permit:267	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
9: Revoked Permit	<u>8</u>	IL	Permit:8	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
10: Bond Forfeiture	<u>8970262</u>	KY	Permit:8970262	Conditional	8/13/1993
Violator 1:	107269 Malachi Coal Company Incorporated				
11: Bond Forfeiture	<u>8970302</u>	KY	Permit:8970302	Conditional	1/8/2001
Violator 1:	101447 Flaget Fuels Inc				
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Violator 1:	101447 Flaget Fuels Inc				

Evaluation OFT

Entities: 14

- 249039 Halas Energy LLC - ()
- 101448 John Joseph Siegel Jr - (Manager)
- 101448 John Joseph Siegel Jr - (Member)
- 249034 Cedars Energy LLC - (Subsidiary Company)
- 101448 John Joseph Siegel Jr - (Manager)
- 260539 Bowie Holdings LLC - (Subsidiary Company)
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- 260572 Corey Prologo - (Director)
- 260572 Corey Prologo - (President)

Narrative

4/17/2018 - All violations are coded "conditional," indicating a settlement, payment plan, or pending challenge. Linking entity is John Joseph Siegel Jr. Please use the contact information below to confirm the conditional status of the violations. DB

Illinois: Jim Schafer -- 217.785.5191 -- james.schafer@illinois.gov
 Kentucky: Kay Thompson -- 502.782.6787 -- kay.thompson@ky.gov
 Pam Spaulding -- 502.782.6779 -- Pam.spaulding@ky.gov



U.S. Department of the Interior Office of Surface Mining Reclamation and
Enforcement Applicant/Violator System

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Evaluation on Application Number: C0410002 SEQ:7
9 Violations

[Print Report](#)

Application Evaluation

Application Number C0410002 SEQ:7
 Applicant Name 142816 Canyon Fuel Company LLC
 Date of Request 4/24/2018 4:39:31 PM
 Requestor suzanne.steab

CAUTION: The Applicant/Violator System (AVS) is an informational database. Permit eligibility determinations are made by the regulatory authority with jurisdiction over the permit application not by the AVS. Results which display outstanding violations may not include critical information about settlements or other conditions that affect permit eligibility. Consult the AVS Office at 800-643-9748 for verification of information prior to making decisions on these results.

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--- - (Chief Executive Officer)
--- - (Director)
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---260860 Mark Joseph Irwin - (Director)
---260861 Jose Maria Larocca - (Director)
---260862 Sipko Nanne Schat - (Director)
---260863 Andrew Vickerman - (Director)
---260864 Mariano Marcondes Ferraz - (Director)
---260865 Trafigura Group PTE. LTD. - (Subsidiary Company)
----- - (Director)
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----- - (Secretary)
-----260870 Pierre Andre Jacques Lorinet - (Director)
-----260871 Trafigura Holdings PTE. LTD - (Subsidiary Company)
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-----260872 Matthus Pieter Spaans - (Director)
-----260873 Chin Hwee Tan - (Director)
-----260874 Martin Urdapilleta - (Director)
-----260875 Antonio Gerald Vieira Araujo - (Director)
-----260876 Trafigura Holdings Limited - (Subsidiary Company)
-----260860 Mark Joseph Irwin - (Director)
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-----260878 Maryanne Inguanez - (Director)
-----260879 Robbert Alexander Maas - (Director)
-----260880 Galena Private Equity Investment LLC - (Subsidiary Company)
-----254576 Jesus Fernandez Lopez - (Director)
----- - (Director)
-----260859 Michael Stuart Wainwright - (Director)
-----260881 Gerard Sean Lynch - (Secretary)
-----260882 Galena Private Equity Resources Fund LP - (Subsidiary Company)
-----260900 Galena Private Equity Resources Investment LP - (Subsidiary Company)
-----260901 Galena Investments Limited - (Subsidiary Company)
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- 260879 Robbert Alexander Maas - (Director)
- 260899 Galena Private Equity Resources Co-Investment LP - (Subsidiary Company)
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- 260913 Christopher Cox - (Director)
- 260883 Galena Bulgaria Eood - ()
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--260886 Ileana Bolcato - (Director)
--260887 Fabrizio Riccardi - (Director)
--260888 Andrea Bonomi - (Director)
--260889 Francesco Cignolo - (Director)
--260890 Marius Van Heesch - (Director)
260891 University Of Texas System (UTIMCO) (Fund) - ()
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---260892 T Britton Harris IV - (Chief Executive Officer)
---260892 T Britton Harris IV - (Corporate Officer)
---260892 T Britton Harris IV - (President)
---260893 Jeffery D Hildebrand - (Chairman of the Board)
---260894 Ray Rothrock - (Chairman of the Board)
---260895 Robert Gauntt - (Director)
---260896 Janet Handley - (Director)
---260897 Ray Nixon - (Director)
---260898 James C Weaver - (Director)
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- 260908 J Kyle Bass - (Director)
- 260909 Phil Adams - (Director)
- 260910 Robert Steven Hicks - (Director)
- 260904 Galena Private Equity Resources Limited - ()
- 260881 Gerard Sean Lynch - (Director)
- 260882 Galena Private Equity Resources Fund LP - (Subsidiary Company)
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--260906 Sarah Ann Kelly - (Director)
--260907 Duncan Neil Letchford - (Director)
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-----260879 Robbert Alexander Maas - (Director)
--260917 Charles Heilbronn - (Director)
--260917 Charles Heilbronn - (President)
--260917 Charles Heilbronn - (Shareholder)
--260918 Ed Zysik - (Vice President)

Narrative

Request Narrative



United States
Department of
Agriculture

Forest
Service

Manti-La Sal N.F. Supervisor's Office
599 West Price River Drive
Price, UT 84501
435-637-2817
Fax: 435-637-4940

Fishlake N.F. Supervisor's Office
115 E. 900 N.
Richfield, UT 84701
435-896-1600
Fax: 435-896 9347

File Code: 2820
Date: April 9, 2018

Daron Haddock
Coal Program Manager
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

Dear Mr. Haddock,

The Manti-La Sal and Fishlake National Forests (FS) have completed review of the mine plan Modification, Task #5445 for permit C/041/0002 for Bowie Resources, LLC's Sufco Mine. The modification addresses mining the Greens Hollow Federal Coal Lease, UTU-084102. The FS is responding as the federal land management agency (FLMA) according to 30 CFR 994.30, Article VI (C)(2).

The FS consented to the Bureau of Land Management (BLM) leasing these lands in October 2015. The BLM issued the lease on April 1, 2017.

FS review has shown that the proposed mine plan modification is consistent with special coal lease stipulations for use and protection of non-mineral resources on NFS lands within the lease.

With respect to the post-mining land use, according to the Manti-La Sal Forest Plan (1986) and the Fishlake Forest Plan, the surface lands are managed principally for timber, rangeland and riparian area management. Any surface disturbance and subsequent reclamation must be designed to support these post-mining land uses.

With respect to protection of non-mineral resources, the FS finds the proposed resource monitoring plan adequate. According to lease stipulation 19, the Lessee is responsible to replace any surface or developed groundwater resources identified for protection that may be lost or adversely affected by mining operations. This is to maintain existing riparian habitat, fishery habitat, livestock and wildlife use or other land uses. All water resources identified for monitoring by the FS are subject to this stipulation.

The lands in the permit modification/revision area contain 3,847 acres of priority sage grouse habitat as shown on the map in Attachment A. The FS September 2015 Greater Sage-grouse Record of Decision for Idaho and Southwest Montana, Nevada and Utah, amended FS land management plans for sage-grouse management, including the Manti-La Sal Forest Plan. The amendment includes the following standard for leased coal mines (GRSG-M-CML-ST-093):

"In priority habitat management areas and sagebrush focal areas do not authorize new appurtenant surface facilities related to existing underground mines unless no technically feasible



alternative exists. If new appurtenant surface facilities associated with existing mine leases cannot be located outside of priority habitat management areas and sagebrush focal areas, locate them within any existing disturbed areas, if possible. If location within an existing disturbed area is not possible, then construct new facilities to minimize disturbed areas while meeting mine safety standards and requirements as identified by the Mine Safety and Health Administration mine-plan approval process and locate the facilities in an area least harmful to greater sage-grouse habitat based on vegetation, topography, or other habitat features..”

To implement this standard, the FS requires that the following condition be included in the permit modification/revision approval: To protect sage-grouse habitat, locate new appurtenant surface facilities outside priority habitat management areas, unless no technically feasible alternative exists. If new appurtenant surface facilities cannot be located outside of priority habitat management areas, locate them within any existing disturbed areas, if possible. If location within an existing disturbed area is not possible, then construct new facilities to minimize disturbed areas while meeting mine safety standards and requirements in the established mine-plan approval process and locate the facilities in an area least harmful to greater sage-grouse habitat based on vegetation, topography, or other habitat features.

If you have any questions or concerns, please contact Jeff Salow at 435-636-3596 or jsalow@fs.fed.us.

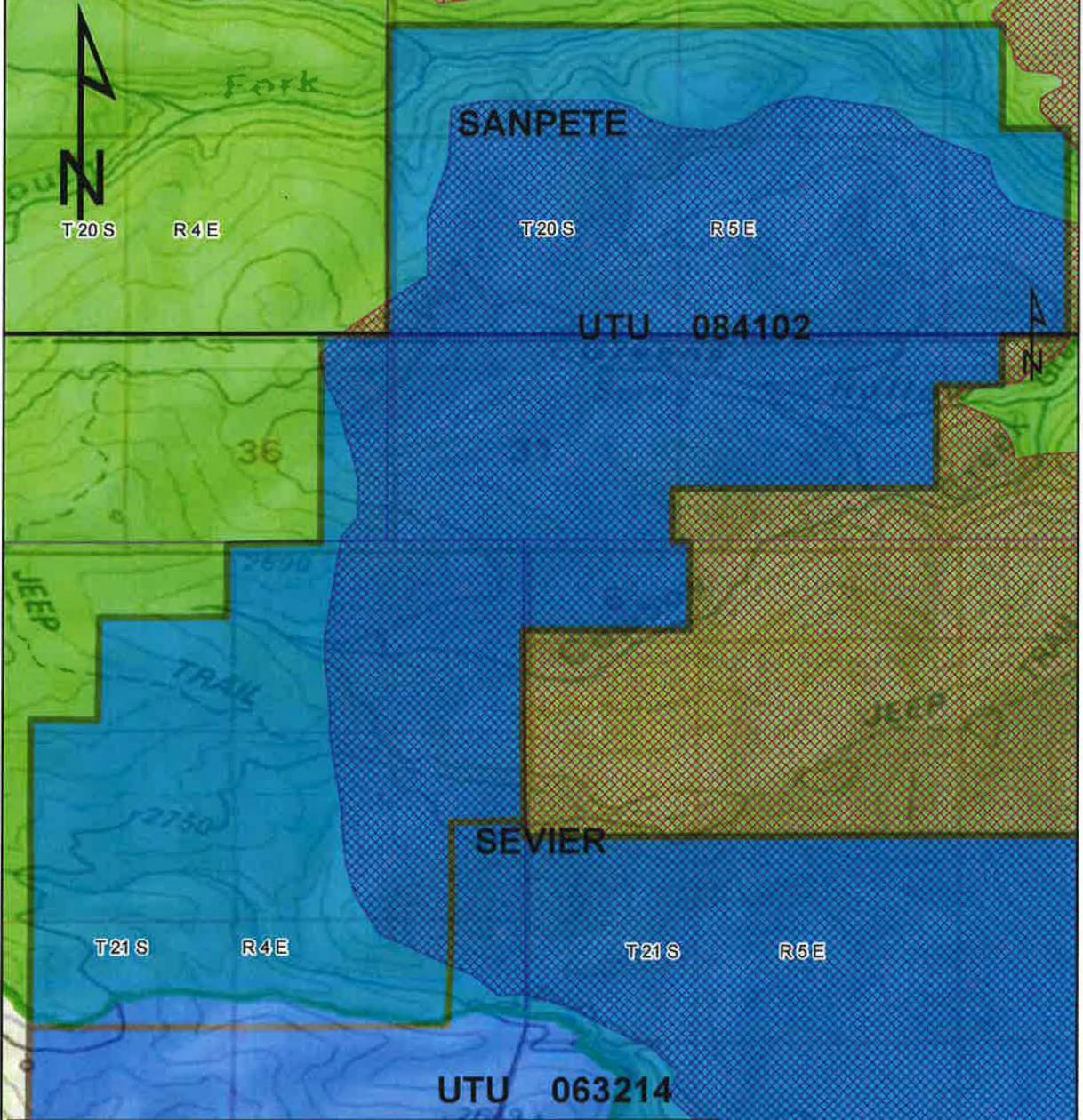
Sincerely,


BRIAN M. PENTECOST
Forest Supervisor
Manti-La Sal National Forest


MEL BOLLING
Forest Supervisor
Fishlake National Forest

cc: Nicole Caveny, OSMRE; Becky Hammond, FS – Intermountain Regional Office

The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at a certain scale, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created, may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification.



**Greens Hollow Coal Lease:
Utah Greater Sage Grouse General and Priority Habitat**

Coal_Leases

- Coal_Leases
- UT priority
- Manti-La Sal NF

0 0.2250.45 0.9 1.35 1.8 Miles





State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Office of the Governor
PUBLIC LANDS POLICY COORDINATING OFFICE

KATHLEEN CLARKE
Director

December 22, 2016

Sent via electronic mail: johnbaza@utah.gov

John Baza
Director
Division of Oil Gas and Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, UT 84114-5801

Subject: SUFCO Mine – Greens Hollow Amendment
C/041/0002, Task 5259

Dear Mr. Baza:

The Public Lands Policy Coordinating Office received the attached technical comments from the Utah Division of Wildlife Resources (UDWR) in regard to the Greens Hollow lease within the Parker Mountain-Emery Sage-grouse Management Area (SGMA), which DOGM requested consultation with UDWR in relation to the sage-grouse.

Thank you for the opportunity to review and provide comments on the proposed action to help mitigate impacts to greater sage-grouse habitat. Please call if you have any questions to discuss your concerns.

Sincerely,



Kathleen Clarke
Director

cc: Lisa Reinhart, Environmental Scientist
Sent via electronic mail: lreinhart@utah.gov
Dana Dean, Associate Director
Sent via electronic mail: danadean@utah.gov

Technical Comments

The Greens Hollow lease contains both winter habitat and opportunity habitat for the greater sage-grouse. Habitat for greater sage-grouse is defined in the *Conservation Plan for Greater Sage-grouse in Utah* (Plan) as:

“the aggregation of seasonal habitats used by sage-grouse at some point during the yearly life-cycle of the birds. Habitat includes the geographical extent of leks, nesting, brood-rearing, late-brood rearing, transitional and winter areas.”

Opportunity areas are defined in the Plan as:

“those portions of a SGMA that currently do not contribute to the life cycle of sage-grouse but are areas where restoration or rehabilitation efforts can provide additional habitat when linked to existing sage-grouse populations.”

As UDWR understands, the permit amendment would only be to expand underground coal mining, which includes the potential for ventilation shafts. In Section 5.5 of the Plan, extractive mineral development is addressed to discuss surface disturbing activities required for mining, such as surface vents, which are considered essential for human safety and must be permitted.

In order to limit impacts from surface development such as vents, a management protocol for development within an SGMA is outlined in Section 6.0. Overall, surface disturbance should be avoided to the greatest degree possible. Management protocol for winter habitat (Section 6.5.1.3) describes avoidance if possible, followed by minimization by locating development in the least important habitats or by taking advantage of topographic screening. If minimization is insufficient, then mitigation is required, calculated at a 4:1 ratio.

Activities should be avoided from November 15 - March 15 to reduce disturbances to wintering sage-grouse. Opportunity areas (Section 6.5.3) may be employed to meet restoration or rehabilitation goals, or as mitigation for disturbance within habitat. Opportunity areas may also be employed as the site for disturbances which are diverted from sage-grouse habitat.

UDWR appreciates the opportunity to characterize the values of the sage-grouse habitats influenced by this proposal. Following the issuance of the permit, please consult with Makeda Hanson (435-630-0805) at UDWR's Price office, for further evaluation and guidance on site-specific developments.