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TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

November 13, 2012

TO: Internal File

THRU: April Abate, Hydrologist / Lead *QGA*
12.12.12

FROM: James Owen, Engineer *JO*

RE: South Fork Quitchupah 2R2S, Canyon Fuel Company, LLC, Sufco Mine,
C/041/0002, Task ID #4200

SUMMARY:

On October 17, 2012, the Utah Division of Oil Gas & Mining received an application for an amendment to the Mining & Reclamation Plan (MRP) of Canyon Fuel Company's (SUFCO) Sufco Mine. The application seeks approval to modify the current monitoring and mitigation plan for undermining the South Fork of Quitchupah 2R2S Block "A" portion of the stream channel.

This memo addresses the application's compliance with the engineering (R645-301-500) section of the Utah Coal Mining Rules.

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TECHNICAL ANALYSIS:

OPERATION PLAN

SUBSIDENCE CONTROL PLAN

Regulatory Reference: 30 CFR 784.20, 817.121, 817.122; R645-301-521, -301-525, -301-724.

Analysis:

During the previous review of this amendment (Task #3950) , the following deficiency was identified:

- *R645-301.525.500 On page 5-39E of the application, SUFCO states that if mitigation measures by Sufco personnel, and their consultants and contractors, are not successful in restoring flows after two spring runoff periods, Sufco will initiate additional analysis and planning with the Forest Service. In accordance with the Utah Coal Mining Rules as well as the requests from the US Forest Service, the applicant must include with this application a definite contingency plan for the event that mitigation measures are not successful. The Division and USFS seek to avoid a situation where the currently planned mitigation measures are unsuccessful and there is no "backup" plan in place.*

This deficiency was addressed in the new Mining and Mitigation Pal for Undermining the South Fork Quitcupah 2R2S Block A that was included with the application as Appendix 3-14.

The application states that implementation of the mitigation plan detailed in Appendix 3-14 will quickly identify surface disturbance or impacts from subsidence fractures intercepting spring and stream flows. The monitoring and mitigation plan will provide sufficient data for a determination to be made of the degree of impacts of mining. Information and data will be collected before the area is mined, throughout the mining period, and after mining is past. Monitoring and data collection will continue until the mine, Division and Forest agree that mining impacts, if any, have occurred, have been mitigated, and no further impacts are anticipated.

Sufco commits to conduct pre- and post-mining surveys of the undermining the South Fork of Quitcupah 2R2S Block "A" stream channel over panel 2R2S. The mine will conduct a post-mining survey during 2015. This post-mining survey will apply the same procedures as the survey conducted in 2012.

While mining under the channel, Sufco commits to promptly identify subsidence-induced fractures, dewatering, diminution of water quality, and movement of the stream channel. Semi-weekly visual inspections will be conducted for fractures, stream channel and flow observations while mining within the angle-of-draw of the stream channel.

Sufco will conduct uninterrupted longwall mining progression, except for normally scheduled maintenance, while under the 15-degree angle-of-draw of the stream channel as well as provide a bi-weekly (once every two weeks) report to DOGM to report any changes in surface expression, dates, any fracturing of surface (location, width, spacing, etc.), any repairs, and location of longwall.

If Sufco staff cannot gain access to the site, due to weather conditions, etc., attempts will be documented. Sufco commits to mitigate subsidence cracks and fractures identified within the stream channel. Mitigation of cracks that interrupt or divert flows from the stream channel will be sealed immediately with an appropriate impermeable grout or, in some cases, native materials. Sufco will attempt to seal cracks with the least intrusive methods (typically hand placement of grout or native materials) first. The sealing material may be placed by pouring it directly into the crack or, if cracks occur in an actively flowing portion of the stream, the stream may be temporarily diverted using native materials (or a designed flume if necessary to maintain the flow) until the crack is sealed. If cracks are present in channel walls defined by soil, the soil cracks may be hand filled using a native soil-bentonite mix. The sealing of the channel floor and walls will be accomplished with hand tools such as shovel, picks, trowels, etc.

As a backup plan, in the event that cracks too large to be sealed through the efforts of one or two persons in one day do occur and it appears there is a danger of water being diverted from the channel for an extended period of time, the stream will be temporarily diverted using native materials and a pipe to carry the flow over the crack to maintain the channel flow. Arrangements will be made to get a contractor to the site as soon as possible to repair the crack after consultation with the Forest Service.

There may be sections of the stream channel that may require more intensive mitigation efforts to restore surface flows in the creek. These efforts could include the drilling of closely spaced shallow boreholes in and adjacent to the stream channel and the injection of an acceptable impermeable grout into the alluvium or bedrock. The work will be accomplished either using hand tools or low impact equipment to minimize surface disturbance. Existing roads and turnouts will be used as staging areas to locate larger equipment and supplies. Any hoses or lines will be transported from the staging areas to the nearby worksites either by hand, the use of pack animals, or by helicopter. This work will be done with a contractor selected after consultation with the Forest Service.

The Division initiated an in-depth analysis of Sufco past subsidence at the Sufco Mine. Based on past reported subsidence contours, Sufco is mining at a critical width, which is the minimum width that needs to be mined before the maximum possible subsidence is observed at the center of the subsidence trough, which has limits defined by the angle of draw boundaries. Sufco is extracting in such a way that increases recovery and focuses subsidence down the center of the longwall panel. Sufco has reported that subsidence they have encountered has been within

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the outer portions of the head and tail gates. Therefore, records show they are keeping subsidence within their expected angle of draw.

The angle of draw is determined by mining method, seam thickness, seam depth (depth of cover), dip of seam, nature of overburden (geology), natural faults & fractures, in situ stresses, etc. State Coal Mining Rules 525.541 and 525.542 allow for an operator to vary from the standard 30 degree assumption based on geo-technical analysis, which Sufco has in its MRP (not included with the amendment). Sufco does not expect subsidence related impacts to qualify to be considered material damage

Sufco commits to comply with all provisions of the approved subsidence control plan and will plan mining operations so that no material damage occurs as a result of subsidence in the lease area. However, should material damage occur, Sufco will correct any material damage resulting from subsidence caused to surface lands to the extent technologically and economically feasible by restoring the land to a condition capable

Findings:

Contents and information provided are sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

RECOMMENDATIONS:

Approval is recommended.