

# TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

---

December 20, 2011

TO: Internal File

THRU: April Abate, Hydrologist and Team Lead *CA* 12-22-2011

FROM: James Owen, Engineer *JO*

RE: South Fork Quitchupah 2R2S, Canyon Fuel Company, LLC, Sufco Mine, C/041/0002, Task #3950

## SUMMARY:

On November 4, 2011, the Utah Division of Oil Gas & Mining received an application for an amendment to the Mining & Reclamation Plan (MRP) of Canyon Fuel Company's (CFC) Sufco Mine. The application seeks approval to modify the current monitoring and mitigation plan for undermining the South Fork of Quitchupah stream channel.

This memo addresses the application's compliance with the engineering (R645-301-500) section of the Utah Coal Mining Rules. The following deficiency was identified:

- **R645-301.525.500** On page 5-39E of the application, CFC 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.

TECHNICAL MEMO

---

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:**

With the proposed amendment, portions of the South Fork of Quitchupah will be undermined and subsided as longwall panel 2R2S is extracted. Plate 5-10Av10 (Potential Subsidence Limits Quitchupah Tract) was included with the submittal and details the panel location as well as expected subsidence limits. CFC states that a monitoring and mitigation plan that is more intensive than the general MRP area is being proposed for monitoring water flows, subsidence cracks and repair of the cracks in the portions of the South Fork of Quitchupah channel to be undermined.

Prior to the initiation of undermining and subsidence, CFC commits to conducting a pre-subsidence survey of the stream channel in the portion of South Fork of Quitchupah that flows over the 2R2S panel and associated gate roads. The survey will consist of a gain/loss survey of flow within the stream channel paying particular attention to surface flows and ground water discharge, soil conditions, and the general channel geomorphology of the area. A similar study was performed in the past but all stream measurements were not conducted on the same date. The second gain/loss survey will be completed on a single day at or near base flow conditions late in the summer or early fall of 2011. The mine commits to attempt, as part of this second survey, to occupy the same monitoring sites in the panel area as those chosen in the initial survey.

CFC states that subsidence monitoring plan for the South Fork of Quitchupah will include "frequent" inspection of the stream channel during and after active subsidence. While mining is occurring under the stream channel, and within the 15-degree angle-of-draw above the active longwall face, that area of the channel will be inspected **semi-weekly for subsidence cracks or other related features**. As the longwall face advances and the 15-degree angle-of-draw area follows, the portions of the channel that now lie outside the 15-degree angle-of-draw will be monitored for subsidence features **on a quarterly basis for two years** following the cessation of subsidence related effects, if any, due to mining.

The Division initiated an in-depth analysis of CFC past subsidence at the Sufco Mine. Based on past reported subsidence contours, CFC is mining at a critical width, which is the minimum width that needs to be mined before the maximum possible subsidence is observed at

**TECHNICAL MEMO**

---

the center of the subsidence trough, which has limits defined by the angle of draw boundaries. CFC is extracting in such a way that increases recovery and focuses subsidence down the center of the longwall panel. CFC has reported that subsidence they have encountered has been within 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 CFC has in its MRP (not included with the amendment). CFC does not expect subsidence related impacts to qualify to be considered material damage

On page 5-39D of the application, CFC states that 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. CFC commits to 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 diverting using native materials (or a designed flume or pipe if necessary to maintain the flow) until the crack is sealed.

If cracks are present in channel walls defined by soil, the soil cracks will 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. In the unlikely 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, arrangements will be made to get a contractor selected after consultation with the Forest Service to the site as soon as possible.

CFC states that 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.

On page 5-39E of the application, CFC states that if mitigation measures by Sufco personnel, and their consultants and contractors, are not successful in restoring flows after two

TECHNICAL MEMO

---

spring runoff periods, Sufco will initiate additional analysis and planning with the Forest Service.

After receiving the application, the Division received comments on the amendment from the US Forest Service (USFS). The comments were received jointly from the Fish Lake and Manti-Lasal National Forest Offices. USFS representatives commented that a "resolution of the potential issues and acceptable mitigation for loss of water in quantity and quality must be defined prior to their loss." The USFS suggested that changes to the contingency plans and a description of the level of water loss restoration should be identified.

- **R645-301.525.500** On page 5-39E of the application, CFC 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" mitigation plan in place.

CFC states that it may be required to remove loose rock from the channel floor, either where the channel flows across thin-bedded bedrock or where large rock have fallen into the channel and is impeding flows. This work may be completed using available pneumatic or hydraulic tools that do not require road or pad building disturbances. In the unlikely event that large boulders do need to be moved, pumps and tanks necessary to complete the work will be located in pre-disturbed areas, such as roads or turnouts, and hoses will be walked into the work area.

Sufco commits to conduct longwall mining operations in such a manner as to minimize surface disturbance while mining within the 15-degree angle-of-draw area that includes the South Fork stream channel. This will be accomplished by advancing the longwall on a schedule where mining will not be suspended for a period to exceed 48 hours.

A bi-weekly (once every two weeks) report on the impacts to stream flow and required mitigation, if any, will be submitted via e-mail to the Division and the USFS detailing the results of the inspections while mining is occurring under the stream channel. The reports will include, but not necessarily be limited to: a map illustrating the current *location* of the longwall face; descriptions and dates of *field* activities; noted changes in stream and local geomorphology; location, width, frequency of cracks; and a description of repairs, if any, conducted. If the prescribed inspections cannot be conducted, the reason for the missed inspection and a record of the attempt to conduct the inspection will be submitted to the Division and the forest in the report. The Division and the forest will be notified immediately after mining-induced cracks, if any, are found in the South Fork stream channel and the steps taken or planned to be taken as

mitigation. Thereafter, the Division and the forest will be advised of continuing mitigation efforts, if needed, in the report.

CFC states that short segments of Cowboy Creek could be subsided in the SITLA Muddy Tract. If this is anticipated to occur, CFC will submit a plan for mitigation to address, if it occurs, adverse impacts to Cowboy Creek. With the approval of the Division and concurrence of the Forest, Sufco will instigate a flow monitoring plan similar to the plan implemented prior to the undermining of the East Fork of Box Canyon. If mitigation of surface cracks is required, methods similar to those proposed and implemented in the East Fork of Box Canyon as described above could be used.

On page 5-40 of the application, CFC states that one area (5 North panels) of the mine experienced pillar failure when the area was flooded with water after mining of the panels had been completed. This particular area was mined using a double pass technique and the mining height was from 14 to 18 feet. The resulting pillars varied from 25 feet x 25 feet to 40 feet x 40 feet. The underlying floor was a weak mudstone that lost its cohesive strength when wet. When the 1 R5N and 2R5N panels were flooded the underlying mudstone became saturated and lost its cohesive strength. This allowed the pillars in the area with  $SF < 2.5$  to fail, because frictional confinement on the bottom of the pillar was lost. To prevent reoccurrence, the applicant commits to not flood areas of the mine that have small pillars and a weak mudstone floor in areas where subsidence is to be prevented.

CFC 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, CFC 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 not sufficient enough to meet the minimum requirements of this section of the Utah Coal Mining Rules.

### **RECOMMENDATIONS:**

Approval is not recommended at this time. Deficiencies must be addressed.