



State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
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May 3, 1994

Mr. George Morris, Forest Supervisor
U.S. Forest Service
Manti-LaSal National Forest
599 West Price River Road
Price, UT 84501

Re: Subsidence Calculations, Federal Lease Addition, Castle Valley Ridge Lease UTU-64263, Star Point Mine, Cyprus Plateau Mining Corporation, ACT/007/006, Folder #2, Carbon County, Utah

Dear Mr. Morris:

Enclosed please find a copy of the letter from the Bureau of Land Management with an evaluation of possible subsidence impacts incident to underground mining. This evaluation specifically addresses Forest Service concerns outlined in your letter dated January 20, 1994 and subsequent discussions at a meeting at the Forest Service offices with staff from the Manti-LaSal Forest Service, the Division, and Cyprus Plateau Mining Corporation held on February 2, 1994.

This review concurs with the Agapito report and determines that the potential for any surface expressions over time from the proposed mining plan is negligible. This should resolve any outstanding issues with the Castle Valley ridge Federal Lease Addition.

Please notify the Division if you concur, or have any further comments, with regard to this permitting action. If you have any questions, please call me. Thank you.

Sincerely,

Pamela Grubaugh-Littig
Permit Supervisor

Enclosure

cc/enc: Daron Haddock
Ben Grimes, Cyprus Plateau Mining Corporation
Rick Holbrook, OSM, Denver

Price

Moab District
P. O. Box 970
Moab, Utah 84532

3482
UTU-64263
(UT-066)

S.W. Felt

APR 25 1994

Mr. Lowell Braxton
Utah Coal Regulatory Program
State of Utah
Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Request for Review of Subsidence Calculations, Federal Lease Addition, Castle Valley Ridge Lease UTU-64263, Starpoint Mine, Cyprus Plateau Mining Corporation, ACT/007/006

Dear Mr. Braxton:

The Bureau of Land Management (BLM) received the subject request on March 4, 1994, and has reviewed the mining plan with respect to the requested information. The Manti-LaSal National Forest has concerns of the possible subsidence impacts incident to underground mining. Our comments follow:

The mining plan for the Castle Valley Ridge lease (UTU-64263) calls for a set of main entries to run east/west underneath the north side of Little Park Canyon, but not directly under the drainage. The main entries are planned to be a four-entry set on 100x80-foot entry and crosscut centers. Barrier pillars will be left on both sides of these main entries for protection from the adjacent planned longwall panels. These entries could be used for additional ventilation of the mine, if needed, by adding breakouts to the canyon. These main entries will be under 250 feet of overburden at the west end of the entries and under 800+ feet under the east end. These entries are planned using standard industry practices for pillar designs.

W. H. K. 4/27/94

Cyprus hired J. F. T. Agapito and Associates, a geotechnical consulting firm, to evaluate the subsidence potential for the Little Park area, given the planned mining scenario. This evaluation is found in Appendix 523a of the Starpoint Mining and Reclamation Plan (MRP). Pillar stability of the main entries under the Little Park area were calculated at a safety factor of 2.3. This calculation used an average pillar stress, for 800 feet of overburden and a tributary area load, as 1400 psi, and a coal strength of 3,200 psi. The tributary area load estimation is a standard estimation of the amount of stress through rock at a point of given depth.

Best North 4/28/94

To evaluate Cyprus's pillar design and Agapito's subsidence potential assessment, we have used another accepted method to substantiate their conclusions that these pillars will remain stable and

that no subsidence should take place in the Little Park drainage. From Rock Mechanics and the Design of Structures in Rock, by Obert and Duvall, a design equation for the average pillar stress is:

$$S_p = \frac{S_v}{1-R_a}$$

S_p = average pillar stress (lbs./sq. in.)
 S_v = average vertical stress (lbs./sq. in.)
 R_a = recovery rate (%)

An estimation of the vertical stress has been shown to approximate the gravitational force on the amount of rock above the opening. Hence:

$$S_v = \tau h + 144 \text{ sq. in./sq. ft.}$$

τ = density of the overburden (lbs./cu. ft.)
 h = height of overburden (ft.)

This assumption is accepted by industry and rock mechanic experts, though exact vertical stresses are very complex due to changes in geologic structures. For simplicity, the density of the overburden is 144 lbs./cu. ft., which is a reasonable average of the various rock (sandstones and shales) strata above. Hence, the vertical stress is nearly a direct relationship to the amount of overburden. The overburden of the Little Park drainage is 200 feet at the west end and 800 feet at the east end. Using a 40 percent recovery rate for the proposed room-and-pillar design, the stress on the pillar will range from 300 to 1,300 psi.

The strength of the pillar to resist the vertical stresses can be estimated by compressive tests on core samples of the coal. The Wattis Seam has been tested at about 3,400 psi. If the vertical stress is greater than the strength of the pillar, failure will occur. Hence:

$$F = \frac{C_p}{S_p}$$

F = factor of safety
 C_p = strength of the coal pillar
 S_p = pillar stress

Factors of safety greater than 1 will reflect stability. We calculate a safety factor for the proposed pillars in the Little Park main entries from 2.5 to 10. This substantiates the Agapito report. From observations and experience in the coal fields of the region, main entries of old mines under shallow cover have held up over time. Without exception, the old mines in the Spring Canyon area west of Helper, Utah, have intact pillars just in by the portals.

The Agapito report examined case studies of areas around the country of sinkhole subsidence. In each case, sinkhole or plug-type subsidence only occurred in areas where the overburden was less than 150 feet. Documented instances of sinkhole subsidence in this region have only occurred in the Clear Creek/Pleasant Valley area where there was shallow cover, fracture and

shear zones from faulting, and inadequately sized pillars. None of these factors are planned or known to exist in the Little Park area. As to the possibility of pillar failure over time from water or air oxidation, we have determined that possibility to be negligible. The dip of the structure is to the south, draining any water inflow away from the entries. Also, standard mine closure requirements will seal off the entries from air exposure.

In summary, our review concurs with the Agapito report and determines that the potential for any surface expressions over time from the proposed mining plan is negligible. The mining plan, as proposed, meets the requirements of the Mineral Leasing Act of 1920, as amended, the regulations at 43 CFR 3480, the lease terms and conditions, and will achieve MER of the Federal coal. Our recommendation for approval of the mining plan for the Castle Valley Ridge lease addition remains as documented in our September 19, 1991, letter to the Office of Surface Mining.

If you have any questions or need further information, please contact Stephen Falk at 637-4584.

Sincerely,

/s/ Roger Zortman

District Manager

cc: UT-066, Price River Resource Area
UT-921, Utah State Office, Branch of Solid Minerals
Manti-LaSal National Forest, Price, Utah
Cyprus Plateau Mining Corporation
P. O. Drawer PMC
Price, Utah 84501

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State of Utah
DEPARTMENT OF NATURAL RESOURCES
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February 14, 1994

Mr. Bill Stringer
Bureau of Land Management
Moab District Office
82 Dogwood Avenue
Moab, Utah 84532

Re: Request for Review of Subsidence Calculations, Federal
Lease Addition, Castle Valley Ridge Lease UTU-64263,
Star Point Mine, Cyprus Plateau Mining Corporation,
ACT/007/006, Folder #2, Carbon County, Utah

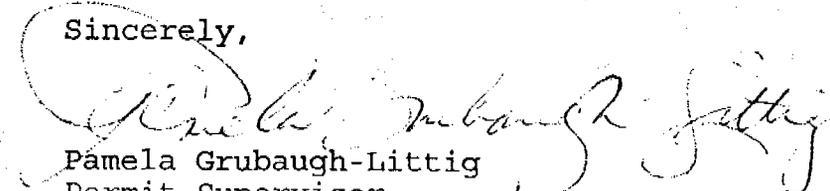
Dear Mr. Stringer:

Enclosed please find a letter to Mr. Lowell P. Braxton from Mr. George Morris, Forest Supervisor, Manti-LaSal, dated January 20, 1994, regarding Forest Service concerns related to the Castle Valley Ridge Lease Addition. A meeting was held on February 2, 1994 at the Forest Service offices with staff from Manti-LaSal Forest Service, the Division, and Cyprus Plateau Mining Corporation.

As a result of that meeting, the Forest Service requested a technical review of the subsidence calculations by the Bureau of Land Management, specifically page 2 of the January 20, 1994 letter, entitled "523. Mining Methods, Page 500-9 and 10 and 731.122. Protection of Surface Water Flow and Quantity, Page 700-90" (see attached).

This is a Division request for that review. If you have any questions, please call me or Jess Kelley.

Sincerely,


Pamela Grubaugh-Littig
Permit Supervisor

Enclosure

cc: Jess Kelley
Steve Falk, BLM, Price
Ben Grimes, Cyprus Plateau Mining Corporation



Pam - rough & file

United States
Department of
Agriculture

Forest
Service

Manti-La Sal
National Forest

599 West Price River Dr.
Price, Utah 84501

Reply to: 2820

Date: January 20, 1994

Lowell Braxton
State of Utah Department of Natural Resources
Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

RECEIVED

ACT/007/006 # 2 JAN 24 1994
DIVISION OF OIL, GAS & MINING
Copy PAM

RE: Addition of Federal Coal Lease UTU-64263, Star Point Mine, Cyprus-Plateau Mining Corporation, ACT/007/006, Carbon County, Utah

Dear Mr. Braxton:

We reviewed the updated information (10/13/93) on the proposed incidental boundary change (IBC) and addition of Federal Coal Lease UTU-64263 into the permit area included in your October 13, 1993 letter to George Morris, Forest Supervisor.

This letter contains comments on the addition of Federal Coal Lease UTU-64263. We have already consented to the IBC, therefore, comments below pertain to the addition of lands not already included in the IBC area.

Subsidence Monitoring Plan, Map 521.121q1

Additional monuments are needed north of the IBC area north and south of Little Park Creek to adequately measure the amount and extent of subsidence in the lease. Subsidence monitoring must be adequate to determine when subsidence in the tract is substantially complete. A determination that subsidence is substantially complete is necessary to qualify for lease relinquishment once mining is complete. In order to make such a determination, monuments would be needed along the center of the last panel to be mined, as well as at the center of the major blocks of panels.

Subsidence monuments are needed in the Little Park drainage area to measure the subsidence and angle-of-draw along the canyon slope and the Castle Valley Ridge Trail. Cyprus has proposed to locate monuments along the bottom of the drainage to demonstrate that subsidence of the channel does not occur. At least two lines of additional monuments perpendicular to the drainage would be needed to determine the extent of subsidence, the angle-of-draw, and how close subsidence progresses down the canyon slope toward the drainage.

Continuous monitoring and reporting of the angle-of-draw is critical to the protection of the stream channels. Adjustments to the subsidence protection plan would be required accordingly.

411.130. Existing Land Uses and Land-Use Classification

Little Park Trail Protection

On Page 400-3 it is proposed that measures for the protection of trail users include scheduling the mining in the winter season, or short-term closure of the trail during mining. After review, we have determined that closure of the trail would not be acceptable except in an emergency, due to the investments in trail improvement and growing interest in it's use.

It would be best to mine the first and possibly second panel north of Little Park Creek during the late fall and winter so that the majority of subsidence occurs over the winter season when the trail is not in use. We, however, recognize that there are many unpredictable variables that would influence the exact time of mining.

If the panels beneath the trail are mined such that cracks and rock topples from outcrops above the trail could occur during the recreation season, measures must be taken to protect potential trail users. An analysis of the potential for hazardous conditions to be created must be conducted and appropriate measures to protect trail users proposed to the surface management agency. The analysis would include a determination of the potential for cracks to occur and the potential size and rate of their development. It would also include a determination of the potential for rocks to be dislodged and the potential for them to reach the trail, considering the slope, size of rocks, distance to the trail, and available tree cover. If the analysis shows a significant potential for rocks to reach the trail, protection measures would be required prior to mining.

Measures for protection of trail users would include intensive monitoring of the cracks, rock outcrops and effectiveness of any protection devices during the period of high risk.

523. Mining Methods, Page 500-9 and 10 and 731.122. Protection of Surface Water Flow and Quantity, Page 700-90

The mine plan and subsidence protection proposal for the Little Park Canyon area was significantly changed in the updated materials. It is now proposed that an east-west trending main entry be driven parallel to and under the drainage. It is stated that the main was designed using the tributary load method to provide a safety factor of 2.04 for protection of the drainage from subsidence. Our concern is that the main entries remain stable through time following abandonment of the mine. One of the factors not considered in the engineering design is the potential for pillars to oxidize due to exposure to air or water, become weakened, and collapse over time causing uneven subsidence of the drainage.

This information needs to be reviewed by UDOGM and BLM mining engineers to determine if the mains are properly designed to prevent subsidence considering potential of oxidation of the pillars over time. Empirical data should be used as evidence that the main will remain stable.

731.200. Water MonitoringGround and Surface Water Monitoring Schedule Table 211.211a

Monitoring of stream points needs to include October flow measurements, as long as weather permits. October flows are used as an indicator month to determine if flows are intermittent or perennial.

Hydrology, Page 700-82f

It is stated at the bottom of this page that it is common practice for CPMC to drill ahead of mining as known faults and fractures are approached using a small diameter horizontal drill rig to track geology and water occurrences. CPMC must commit to halting the advance of workings in the event that water under pressure is encountered along faults and to consult with UDOGM and the Forest Service in regard to continued mining into the fault area.

If you have any questions, contact us at the Forest Supervisor's Office in Price, Utah.

Sincerely,



for
GEORGE A. MORRIS
Forest Supervisor

cc:

D-3
C.Reed
Ben Grimes, CPMC
Roger Zortman, BLM Moab District