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United States Department of the Interior



BUREAU OF LAND MANAGEMENT

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Price, Utah 84501

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U-017354
(UT-070)

Pamela Grubaugh-Littig
Permit Supervisor
State of Utah
Division of Oil, Gas and Mining
1594 West North Temple Street, Suite 1210
Salt Lake City, Utah 84114-5801

FEB 28 2000
Copy to: Mike
ACT/007/000001

Re: Mine Plan Amendment, Federal Coal Lease Modification Addition, U-017354, Lodestar Energy, Inc., White Oak Mine, ACT/015/025

hearing

Dear Ms. Grubaugh-Littig:

We have received the subject mine plan amendment and have reviewed the resource recovery and protection plan (R2P2) portion of the plan for compliance with the Mineral Leasing Laws and regulations. In addition, we have evaluated the pillar stability contained in the mining plan as to the possibility of subsidence on this tract that was leased under the analysis that there would be no subsidence as per the joint Bureau of Land Management and Manti-LaSal National Forest decision document for leasing. Our comments follow:

Lodestar's predecessor, White Oak Mining and Construction Company, applied for and received a lease modification of 160 acres to existing Federal lease U-017354 effective December 11, 1997.

After acquiring the property from White Oak, Lodestar has applied for a mine plan amendment to extend mine workings at the White Oak Mine south into this lease modification area. Though Lodestar's mining plan differs somewhat to what White Oak planned when they applied for this lease modification, we believe that the assumption that no surface subsidence from mining would occur in this area is still valid under Lodestar's mining plan.

Lodestar plans to extend mine workings into this 160-acre area directly south of existing mine workings at the White Oak Mine #2. This mine is driving rooms south in two zones, both in fault grabens. Lodestar is using standard room-and-pillar mining with continuous miners to mine coal. The proposed mine plan calls for standard entry dimensions to access the coal blocks which are either 80x80-foot pillars or larger. Upon reaching the southern limits of the lease modification area, Lodestar plans to retreat mine by developing side rooms and limit the amount of pillar recovery to a 50x50-foot pillar. This results in recovery rates of 50 percent, but leaves sufficient pillar to support the overburden. Also, if coal thicknesses are sufficiently thick (about 15 feet or greater), Lodestar would second mine the bottom coal in the rooms and still leave the pillars intact. This R2P2 amendment to the approved plan for the existing mine and parent lease is sufficient to meet the requirements of the Mineral Leasing Act of 1920, as amended. The following is our pillar stability analysis.

We have used an excepted methodology to substantiate that these pillars will remain stable and that no subsidence should take place under the lease modification area as analyzed in the leasing environmental document. 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:

$$S_v = T h \div 144 \text{ sq. in./sq. ft.}$$

T = 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 complex due to changes in geologic structures. However, the range of values for vertical stress measurements varies only slightly in magnitude and will not affect the overall stress calculations. For simplicity, the density of the overburden is about 160 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 in the area of question ranges from 300 feet in the far south to 900 feet in the north. Using a 50 percent recovery rate for the proposed entry and pillar design (50x50-foot pillars on 70-foot crosscut and entry centers), the stress on the pillars (S_p) will range from about 667 to 2000 lbs./sq. in.

The strength of the pillar to resist the vertical stresses can be estimated by compressive tests on the core samples of the coal. The O'Conner Seam has been tested at about 3,500 lbs./sq. in. If the vertical stress on the pillar 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 pillar

S_p = vertical pillar stress

Factors of safety greater than 1 will reflect stability. We calculate a safety factor for the proposed mine plan to range from 1.75 to 5.25. This substantiates the assertions of Lodestar that the pillars will remain intact and no subsidence will occur.

In summary, Lodestar's mining plan for the 160-acre lease modification will not affect the surface through subsidence as the pillars will remain stable. The mining plan amendment to add the 160-acre lease modification area to the existing White Oak Mine Permit 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 maximum economic recovery of the Federal coal. We recommend the R2P2 amendment be approved and the permit issued.

If you have any questions or need further information, please contact Stephen Falk of my staff at (435) 636-3600.

Sincerely,



For: Richard L. Manus
Field Manager

cc: UT-935, Utah State Office
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