The Book Cliffs Coal Field, Utah and Colorado[1]

John O. Maberry
U.S. Geological Survey, Denver Colorado

Abstract

The Book Cliffs coal field consists of about 1,000 square miles in east-central Utah and west-central Colorado, extending about 170 miles from the Wasatch Plateau near Helper, Utah, to Grand Mesa near Palisade, Colo. Coal-bearing rocks of the Mesaverde Group crop out along the S-shaped escarpment of the Cliffs, high above an extensive flatland formed on Mancos Shale. Most of the commercially important coal beds are in the Blackhawk Formation and rocks stratigraphically equivalent to it, where high-volatile bituminous coking and noncoking coals occur in beds as much as 22 feet thick. Steam coal also was mined locally from the Castlegate Sandstone, which overlies the Blackhawk, and coal from the Neslen Formation (above the Castlegate) was mined near Thompson, Utah. Coal is also mined near Palisade, Colo., from beds above the Rollins Sandstone Member, which there forms the base of the Mesaverde Group although it is stratigraphically much higher than the Blackhawk.

The coal measures of the Book Cliffs consist of cyclic deposits that were laid down during Late Cretaceous (Campanian) time as the sea withdrew eastward. The coal-bearing rocks, therefore, rise stratigraphically, and become younger from west to east. The cycles typically are composed of, in ascending order, black marine mudstone, marine siltstone and sandstone, and coal-bearing continental rocks. The economically important coal beds in the western part of the field commonly rest on or a few feet above thick beach sandstones. Claystone, mudstone, and thin discontinuous sandstone beds overlie the coal in each cycle.

Underground mining is done both by room-and-pillar and by longwall mining methods. Access to the coal is provided by driving slopes down the dip of the coal, either from the outcrop or from level haulageways along the strike. Coal under as much as 2,700 feet of overburden was taken from two mines in the field. Unmined coal in parts of the field is under as much as 5,000 feet of overburden, and much coal may not be recoverable by any presently known mining methods. No strip mining is done in the field, and probably none ever will be done, because of extreme overburden thicknesses. The weight of overlying sediments is one factor that contributes to the occurrence of coal mine bumps in many of the mines. Bumps, which are sudden, catastrophic releases of stress in the coal, are hazards to life and property and often influence the economic feasibility of mining.

Original reserves of the Book Cliffs coal field were estimated by the U.S. Geological Survey, partly on the basis of reconnaissance mapping, to be about 8,700 million tons. This estimated tonnage consisted of coal within 2 miles of the outcrops and under less than 3,000 feet of overburden. Detailed exploration probably will significantly increase these resource figures.

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COAL DEPOSITS OF THE SAN JUAN BASIN

E.C. BEAUMONT
Consulting Geologist
Albuquerque, New Mexico

Coal occurs in some degree through nearly the entire range of Cretaceous strata in the San Juan Basin. Economically significant deposits in the southern part of the Basin are present in the Gallup Sandstone, the Dilco and Gibson Coal Members of the Crevasse Canyon Formation, and in the Cleary Coal Member of the Menefee Formation. All of these units belong to the Mesaverde Group. In the central and northern parts of the Basin, minable and potentially minable coal occurs in the Lower and Upper Coal Members of the Menefee Formation (Mesaverde Group) and in the younger Fruitland Formation. Coal in the Dakota Sandstone may have an economic potential in the Cortez area of southwestern Colorado.

The coal is the result of accumulation of vegetal debris principally within the shore-marginal paludal environmental band. Deposition in this zone was more or less constantly shifting as the sea either invaded the land area southwestward or withdrew to the northeast. The orientation of the strand line, averaging about N 55° W, is thought to have influenced the axial alinement of individual coal lenses. Zones and individual beds deposited under transgressive conditions become younger to the southwest, and conversely regressively deposited coal beds and zones are younger to the northeast. Particularly thick accumulations of coal are likely to occur in: (1) areas of relative shoreline stability which are likely to be associated with major reversals in the direction of shoreline movement and (2) in conjunction with minor reversals in shoreline movement during major phases.