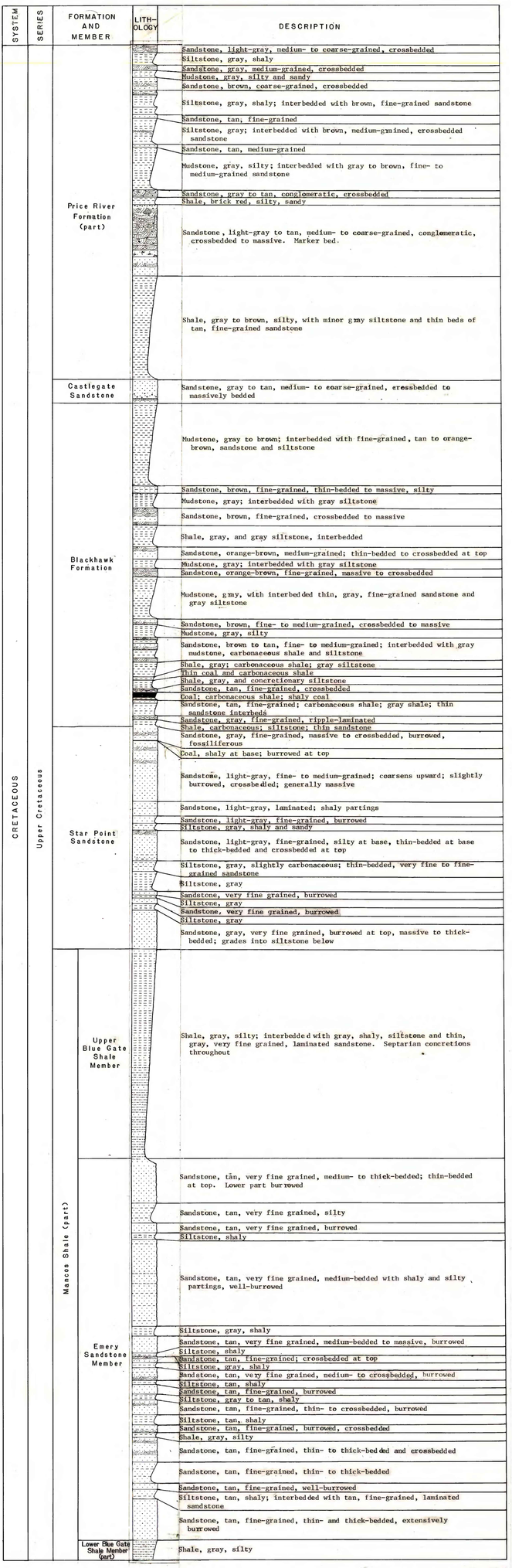
GENERALIZED COLUMNAR SECTION



Scale approximately 1" = 100'

INTRODUCTION

The Old Woman Plateau 7 1/2-minute quadrangle, in south-central Utah, was mapped by the U.S. Geological Survey as part of a project to classify and evaluate mineral lands in the public domain. The regional geology of the area was mapped previously and described by Spieker (1931). Bituminous coal, sand and gravel, and ground water are known resources of economic interest within the quadrangle; oil and gas may occur at depth. The quadrangle is located in the southern part of the Wasatch Plateau coal field and may also encompass the deeper parts of the Emery coal field.

ECONOMIC GEOLOGY

Coal beds of economic thickness are found within the Blackhawk Formation and in the Ferron Sandstone Member of the Mancos Shale, based on drill-hole and outcrop information. The Blackhawk Formation contains the most laterally persistent coals. Thick coal beds occur only in the lower 150 ft (45.7 m) of the Blackhawk, although thinner beds occur throughout the formation. The Knight coal zone (Sanchez and others, in press), formerly known as the Ivie bed of Spieker (1931) and named for an exposure at the Knight Mine, sec. 36, T. 23 S., R. 4 E., is the most persistent and economically important coal zone in the quadrangle. This zone lies 40-130 ft (12-40 m) above the Star Point Sandstone and usually (in the southern part of the quadrangle) overlies a 10-20-ft-thick (3.04-6.1-m) bleached white massive sandstone that can be traced laterally for several miles. The Knight coal zone ranges in thickness from less than 1 ft (0.3048 m) to as much as 13.7 ft (4.2 m).

Other thick coal beds are shown on sheet 2. The correlations and relationships of these beds are complicated by a series of intertongues of Star Point Sandstone and Blackhawk Formation. Individual beds range in thickness from 1 ft (0.3048 m) to 11.8 ft (3.6 m). The Acord Lakes coal zone (Sanchez and others, 1982) is the most important coal zone in the northernmost part of the quadrangle. A bed within this zone is currently being mined in Convulsion Canyon, sec. 12, T. 22 S., R. 4 E., in Acord Lakes quadrangle north of the mapped area.

Several coal beds were observed in the Ferron Sandstone Member of the Mancos Shale in geophysical logs of drill holes. These beds are probably not laterally persistent and would be found only at depths greater than 3,000 ft (914 m) under that part of the quadrangle overlain by Blackhawk Formation sediments. Ferron Sandstone Member coals do not crop out in this quadrangle. The thickest bed encountered was 6 ft (1.8 m) thick in Johnson Livestock No. 1, sec. 31, T. 23 S., R. 5 E., at a depth of 1,977 ft (602.6 m).

According to Spieker (1931, p. 74), Blackhawk coals have an average as-received analysis of 12,620 Btu/lb heating value, 6 percent moisture, 5.9 percent ash, 41.8 percent volatile matter, and 46.3 percent fixed carbon. Analyses of two samples from drill holes W-LCC-12a-OHP and W-LCC-13a-OHP are given in table 1.

The Knight mine, in sec. 34, T. 23 S., R. 4 E., is the only active mine in the quadrangle. This mine was reactivated in 1977 but has been temporarily shut down (1980). Several other small mines were operated earlier in this century and are shown on the map.

Coal beds in the Blackhawk Formation and Ferron Sandstone Member of the Blackhawk are minable only by underground mining methods because of the large amounts of overburden. AAA Engineering (1979) shows, in a general way, the amount of overburden on the Knight zone, which they refer to as the Hiawatha bed. Easy access to the coal is limited to the area around Interstate Highway 70 along the southern part of the map.

Surficial deposits, such as alluvium, have provided sand, gravel, and boulders for road and mine construction. Ubiquitous basalt boulders, found in extensive pediment deposits in the Johns Peak quadrangle to the south (Blanchard, 1980), could also be crushed to provide gravel.

Several springs have been developed for use by stock and wildlife. Ground water derived from sandstones in the Blackhawk Formation, Star Point Sandstone, and Emery Sandstone Member of the Mancos Shale, could be used for stock and wildlife and possibly for coal mining.

STRATIGRAPHY

According to Spieker (1949), there are five members of the Mancos Shale in the Wasatch Plateau. They are, in ascending order, the Tununk Shale, Ferron Sandstone, Blue Gate Shale, Emery Sandstone, and Masuk Shale. According to Peterson and Ryder (1975, p. 171), each is a distinct mappable entity (fig. 1) that probably should be considered a separate formation. However, there are problems with the nomenclature and correlations. The Ferron and the Emery Sandstone Members were named for exposures along the east side of the Wasatch Plateau and the shale members were named for exposures near the Henry Mountains, 30 mi (48.2 km) southeast of the Wasatch Plateau.

The Tununk Shale and the Ferron Sandstone Members in the Henry Mountains are probably equivalent to the same units in the Wasatch Plateau (Peterson and Ryder, 1975, p. 181). In the Henry Mountains region, the Ferron Sandstone is separated from the Blue Gate by an unconformity that represents as many as six faunal zones. In the Wasatch Plateau, however, Cobban (1976) suggested that, at most, only two faunal zones may be missing.

The Blue Gate Shale Member was named for an exposure on Blue Gate Plateau. According to Peterson and Ryder (1975, p. 183), the Blue Gate Shale Member is represented in the Wasatch Plateau by the Blue Gate Shale, Emery Sandstone, and "Masuk" Shale Members (quotation marks denote doubtful terminology usage) (fig. 1). They recommended that the Blue Gate Shale Member in the Wasatch Plateau be called the lower part of the Blue Gate Shale Member of the Mancos Shale and that the "Masuk" Shale Member be called the upper part of the Blue Gate Shale Member of the Mancos Shale. The "Emery" Sandstone Member in the Henry Mountains, lying directly on top of the Blue Gate Shale Member, is not correlative with the type Emery in the Wasatch Plateau but is correlative with the Star Point Sandstone and part of the Blackhawk Formation. The Masuk Member of the Mancos Shale, in the Henry Mountains, is correlative with part of the Blackhawk Formation and not with the "Masuk" Shale Member in the Wasatch Plateau. Figure 1 shows this relationship.

According to Peterson and Ryder (1975, p. 184), there are two reasons for this miscorrelation. The first reason is that the units were correlated on the basis of similar thickness. However, it has been demonstrated (Spieker, 1949) that most of the Upper Cretaceous units thicken considerably to the west, thus invalidating any correlation based strictly on similar thicknesses. The second reason is that the Masuk Member in the Henry Mountains was thought to be marine and thereby similar to the marine "Masuk" in the Wasatch Plateau. The Masuk Member in the Henry Mountains is now believed to be continental in origin (Petersen and Ryder, 1975) and is correlated with part of the Blackhawk Formation.

The map units of the Mancos Shale used in this report (in ascending order, Tununk Shale, Ferron Sandstone, lower part of the Blue Gate Shale, Emery Sandstone, and upper part of the Blue Gate Shale Members) follow the recommendations for the Wasatch Plateau of Peterson and Ryder (1975, p. 184).

The Star Point Sandstone and the Blackhawk Formation were observed to intertongue along the outcrop in T. 23 S., R. 4 E., and T. 23 S., R. 5 E. In addition, the intertonguing relationship was observed in drill-hole geophysical logs. Owing to the complexity of intertonguing, coal correlations are more complex than originally displayed by Spieker (1931). The intertonguing is similar to that of Flores and others (1980), Hayes and Sanchez (1979), and Sanchez and Hayes (1979) for an area to the northeast of this quadrangle.

STRUCTURE

The Paradise Valley-Joes Valley fault system crosses the southeastern corner of the map. This zone of normal faulting trends north-northeast throughout most of the length of the Wasatch Plateau. The fault system effectively separates the Emery coal field on the east from the Wasatch Plateau coal field on the west. The Acord Lakes fault crosses the northwest corner of the quadrangle near the head of Spring Canyon and is subparallel to the Paradise Valley-Joes Valley fault system.

There are a few other minor faults but, in general, the rocks in the quadrangle are unfaulted and dip gently to the west. Few prospective coal mining areas would be affected by faulting.

SUBSURFACE INFORMATION

Three oil-and-gas test holes have been drilled and abandoned in this quadrangle. All three holes bottomed in the Cedar Mountain Formation. The Ferron Sandstone Member of the Mancos Shale, Dakota Sandstone, and Cedar Mountain Formation are good potential sources of oil and gas. The available data for these drill holes are shown on table 2.

A total of nine coal test holes have been drilled by the U.S. Geological Survey (Blanchard and others, 1977; Blanchard, 1978; and Blanchard and Lee, 1978). These holes are illustrated on sheet 2, showing thickness of coal, depth, important stratigraphic horizons, and correlations.

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1983