

INTRODUCTION

Four quadrangles—from west to east, Pleasantdale, Scaper Reservoir, The Gap SW, and Saddle Horse Butte (formerly Kicken Creek)—have been mapped by the U.S. Geological Survey as part of a project to classify and evaluate Federal lands withdrawn for coal along the eastern edge of the Powder River Basin in Campbell County, Wyo. For convenience, the area is referred to here as the Caballo Creek area. The text, tables 1-4, and figure 1 apply to the entire Caballo Creek area and are identical for all four maps.

Rocks exposed in the Caballo Creek area are the Fort Union Formation of Paleocene age and the Wasatch Formation of Eocene age. Quaternary deposits are terrace gravel of Pleistocene(?) age, and alluvium, landslide, and lag deposits of Holocene age.

FORT UNION FORMATION

About 400 feet (122 m) of the Fort Union Formation is exposed in the escarpment and the surrounding lowlands in the Saddle Horse Butte quadrangle. The escarpment is capped by rock baked and fused by the burning of the Wyodak coal and a badlands topography has developed on the underlying nonresistant Fort Union Formation. The total thickness of the formation is about 2,100 feet (640 m) in the Saddle Horse Butte quadrangle, but the thickness increases westward to about 2,700 feet (823 m) in the Pleasantdale quadrangle. Greater thickening of the Fort Union Formation occurs farther west toward the basin center where the formation reaches a maximum thickness of 5,215 feet (1,590 m) (Curry, 1971, p. 32-36).

Exposed rocks of the lack lithologically distinct units and, consequently, the formation was not subdivided. The only bed sufficiently distinct and continuous to serve as a marker is the Wyodak coal bed, the top of which is the top of the formation. Exposed rocks below this coal bed are characterized by their light color, fine-grain size, and poor consolidation; but thin, discontinuous, dark, well-indurated interbeds and coarse carbonaceous shales. The light-colored rocks, which range from the base of the formation to the top of the fine-grained sandstone, are soft and poorly exposed. The dark, well-indurated beds consist of siltstone, fine- to medium-grained sandstone, and zones of discontinuous ironstone concretions. The concretions weather reddish brown and contain fractures commonly filled with yellow calcite. The numerous oily or carbonaceous zones are generally thin and occur as sections of trace, but they are marked and mapped in the subsurface of the Wyodak coal bed. This subzone reaches a thickness of about 45 feet (13.7 m). The principal lithology is dark-gray lithologically distinct, but several coal beds commonly occur in the subzone.

The lack of lithologically distinct marker beds or stratigraphic intervals makes correlation difficult. The identification of the light-colored rocks in most exposures, together with the presence of numerous facies changes, present great difficulty in attempting to correlate the light-colored rocks over any distance. Similar problems occur in correlating the thinner, oily, carbonaceous shale beds although the Wyodak coal subzone can be traced throughout its outcrop area in the Saddle Horse Butte quadrangle with some certainty. The well-indurated siltstone and sandstone beds are marked by their color and texture, but they are subject to variations in the degree of induration of a particular bed. Furthermore, several such beds, each varying in degree of induration along the outcrop, may occur within a single stratigraphic interval.

Early workers in the Powder River Basin (Dobbin and Barnett, 1928), whose work preceded acceptance of the Paleocene Series by the U.S. Geological Survey, assigned the Fort Union Formation to the Eocene. Since 1936, the formation has been considered to be Paleocene in age in this area (Olive, 1957, p. 10). Recent work by R. H. Tschudy (written commun., 1973) demonstrates that on the basis of palynology the Wyodak coal bed is of Paleocene age. Tschudy's palynological study also indicates that several hundred feet of rock above the Wyodak, but below the Felix coal bed (fig. 1), may be of Paleocene age. Additional work will be necessary to properly select the Eocene-Eocene boundary in this area (R. H. Tschudy, written commun., 1973).

WASATCH FORMATION

The Wasatch Formation was originally recognized in the Powder River Basin by Wegmann (1917) and the name was extended into the map area by Dobbin and Barnett (1928, p. 11).

The Wasatch Formation in the Caballo Creek area reaches a maximum thickness of about 1,800 feet (549 m) in the Pleasantdale quadrangle. The formation varies substantially in thickness, mainly as a result of Quaternary and, possibly, late Tertiary erosion, but subsurface data also show substantial thinning eastward during deposition of both the Wasatch and Fort Union Formations. This thinning indicates that the basin center was west of the Caballo Creek area and that sediment accumulation decreased toward the eastern edge of the basin.

Rocks of the Wasatch Formation are shades of gray, yellow, and brown and it is primarily this characteristic which distinguishes the Wasatch from the underlying, lighter colored Fort Union Formation. Wasatch rocks consist mostly of yellow to yellow-orange siltstone and sandstone, gray shale, brown carbonaceous shale, and three major coal zones (fig. 1).

Coarse-grained friable sandstone, containing pebbles of granite, chert, and quartzite as large as several centimeters in diameter, occurs in the Wasatch Formation. Sandstone that contains pebbles can be found within 40 feet (12.2 m) of the base of the U-1, R-70, W, and U-2, and U-3, and U-4, and U-5, and U-6, and U-7, and U-8, and U-9, and U-10, and U-11, and U-12, and U-13, and U-14, and U-15, and U-16, and U-17, and U-18, and U-19, and U-20, and U-21, and U-22, and U-23, and U-24, and U-25, and U-26, and U-27, and U-28, and U-29, and U-30, and U-31, and U-32, and U-33, and U-34, and U-35, and U-36, and U-37, and U-38, and U-39, and U-40, and U-41, and U-42, and U-43, and U-44, and U-45, and U-46, and U-47, and U-48, and U-49, and U-50, and U-51, and U-52, and U-53, and U-54, and U-55, and U-56, and U-57, and U-58, and U-59, and U-60, and U-61, and U-62, and U-63, and U-64, and U-65, and U-66, and U-67, and U-68, and U-69, and U-70, and U-71, and U-72, and U-73, and U-74, and U-75, and U-76, and U-77, and U-78, and U-79, and U-80, and U-81, and U-82, and U-83, and U-84, and U-85, and U-86, and U-87, and U-88, and U-89, and U-90, and U-91, and 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