DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
BUREAU OF INDIAN AFFAIRS

COAL INVESTIGATIONS
MAP C-122-A

CORRELATION OF MAP UNITS

Qal	Holocene	QUATERNARY
Qo	Pleistocene	QUATERNARY
unconformity		
Tfu	Paleocene	TERTIARY
Ku	Upper Cretaceous	CRETACEOUS

DESCRIPTION OF MAP UNITS

Qal **Quaternary alluvium (Holocene)**—Postglacial fluvial deposits chiefly of stratified silt, sand, and gravel in flood plains, terraces, and channels of the Missouri River and major tributaries. Small deposits not shown

Qo **Quaternary outwash deposits (Pleistocene)**—Stratified glaciofluvial deposits chiefly of silt, sand, and gravel. Shown only along the Brockton-Froid fault zone

Tfu **Fort Union Formation (Paleocene)**—Chiefly interbedded gray to yellowish-gray and greenish-gray claystone, siltstone, sandstone, carbonaceous shale, and coal. Poorly exposed and generally buried under thin to thick glacial deposits (not shown) in northwestern part of map area, and locally by the Wiota Gravels (not shown). Area west of Poplar River was not studied in the course of these investigations

Ku **Undivided rocks (Late Cretaceous)**—Includes Hell Creek Formation, Fox Hills Sandstone, and upper part of Bearpaw Shale; chiefly somber gray claystone, siltstone, and shale as well as several thin to thick sequences of silty sandstone. Scattered thin and laterally discontinuous beds of coal in upper part

Coal bed—Shown on cross sections only. Solid where bed is greater than or equal to 2 feet thick; short-dashed where datum is above land surface, or where bed is less than 2 feet thick. Letters designate coal beds: A, AA, AB, AR (A Rider), B, BC, LS (Lower Smoke Creek), S (Smoke Creek), R (Reserve), LT (Lower Timber Coulee), T (Timber Coulee), UT (Upper Timber Coulee), D, DR (D Rider), LR (Local R). Thicknesses of coal beds not drawn to scale

Contact—Dashed where inferred; dotted where concealed. Contact between units Tfu and Ku is generally concealed by surficial deposits and therefore approximately located

Fault zone—Approximate location of Brockton-Froid fault zone from Colton and Bateman (1956) and Colton (1963). U, upthrown side; D, downthrown side; queries indicate that suggested displacement of strata along fault traces was not discerned in our investigations

Structure contours—Drawn on base of Fort Union Formation. Datum is mean sea level; contour interval is 50 feet

Drill hole locality—U.S. Geological Survey coal exploratory drill hole and identification number. Only selected drill holes along lines of cross sections are shown. On cross sections, shown solid where in line of section and shown dashed where projected to line of section

Fort Peck Indian Reservation boundary

INTRODUCTION

The Fort Peck Indian Reservation occupies about 3,000 square miles in parts of Daniels, Roosevelt, Sheridan, and Valley Counties, northeastern Montana (fig. 1). The reservation is located on the western flank of the Williston basin in the Missouri Plateau subdivision of the Northern Great Plains physiographic province (Fenneman, 1931).

Our study area encompasses an area of about 1,000 square miles in the eastern part of the reservation (fig. 2). A comprehensive investigation of the coal beds in the Fort Union Formation in this area was conducted during the summers of 1978 through 1980 by the USGS (U.S. Geological Survey). This map is one of a series of maps that resulted from that comprehensive investigation. These include a map showing the geology and structure (this report); a series of geophysical profiles showing the stratigraphy of the Paleocene Fort Union Formation (Hardie and Arndt, in press a); and a series of cross sections showing the stratigraphic framework of the coal beds in the Fort Union Formation (Hardie and Arndt, in press b).

Eighty-three test holes were drilled and logged by the USGS during this period (Hardie and Arndt, 1981; Arndt and others, 1982a, b). Geophysical logging by the USGS of more than 600 water wells and seismograph shot holes provided additional subsurface data.

GEOLOGIC SETTING

Coal-bearing strata in the Fort Peck Indian Reservation include the Upper Cretaceous Hell Creek Formation and the Paleocene Fort Union Formation. Only coal beds in the Fort Union Formation have economic potential because of their lateral persistence and thickness. For these reasons, this series of maps focuses on the Fort Union strata.

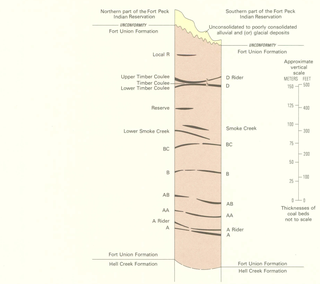
The contact between the Hell Creek Formation and the overlying Fort Union Formation is gradational and arbitrarily placed on the lowest mappable coal bed. The base of the Fort Union is marked by a persistent coal bed or family of beds, above which thick extensive coal beds are common (Jensen and Varnes, 1964). Although lithologically similar, the somber-colored beds typical of the Hell Creek contrast the bright-yellowish-brown strata of the Fort Union. In the study area, the gradational contact between the two formations is arbitrarily placed at the base of the stratigraphically lowest mappable coal bed following the precedent set by Colton and Bateman (1956).

The Fort Union Formation is as much as 1,300 feet thick in the northeastern part of the reservation, where it consists mainly of interbedded claystone, siltstone, sandstone, and coal beds as much as 13 feet thick. Much of the coal-bearing sequence is mantled by thick to thin glaciofluvial deposits, making it necessary to rely heavily on geophysical subsurface data as opposed to outcrop data.

COAL BEDS

Fifteen coal beds having thicknesses greater than 2 feet were identified in the study area. Those with the greatest thickness and lateral persistence occupy the upper part of the coal-bearing section. The thickest beds are the Upper Timber Coulee, Timber Coulee, and D coal beds. These beds individually measure more than 10 feet thick along the eastern part of the study area where they are exposed along the banks of drainages.

Apparent coal rank is lignite A according to a previous report by Hardie and Arndt (1981).



Generalized columnar section showing coal beds of economic importance in eastern part of Fort Peck Indian Reservation, Montana.

Figure 1.—Index map of Montana showing location of Fort Peck Indian Reservation.

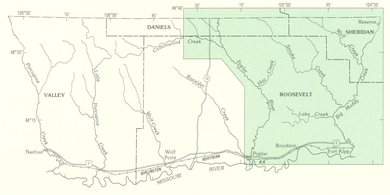
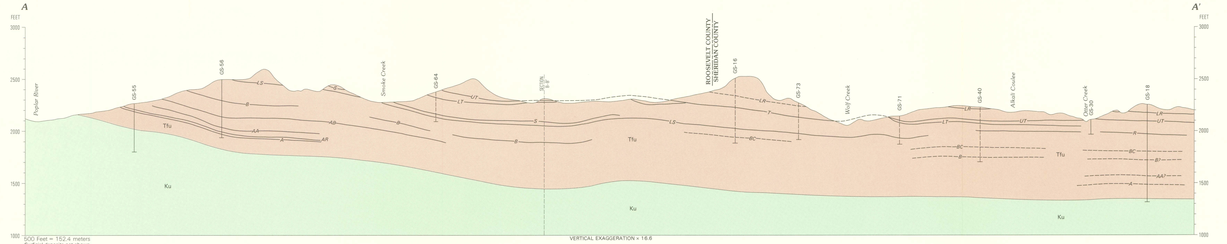
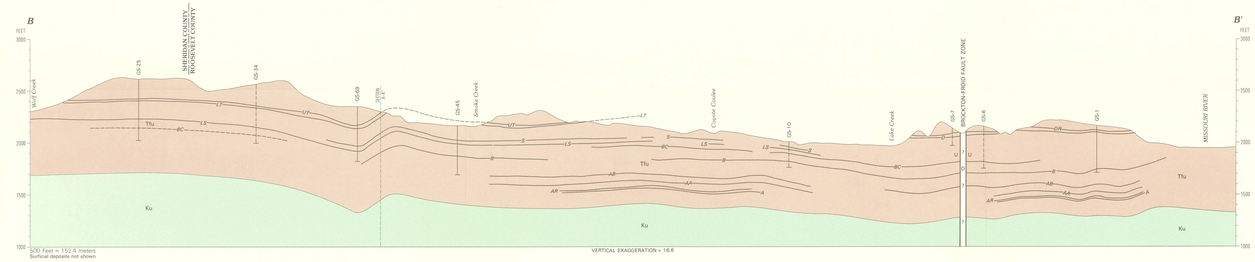


Figure 2.—Index map of Fort Peck Indian Reservation showing map area of this report (shaded)





REFERENCES CITED

Arndt, H. H., Hardie, J. K., and Kehn, T. M., 1982a, Results of exploratory drilling for lignite in 1979, Fort Peck Indian Reservation, Daniels, Roosevelt, and Sheridan Counties, Montana: U.S. Geological Survey Open-File Report 82-480, 152 p.

_____1982b, Results of exploratory drilling for lignite in 1980, Fort Peck Indian Reservation, Daniels, Roosevelt, and Sheridan Counties, Montana: U.S. Geological Survey Open-File Report 82-538, 107 p.

Colton, R. B., 1963, Geologic map of the Brockton quadrangle, Roosevelt and Richland Counties, Montana: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-362, scale 1:62,500.

Colton, R. B., and Bateman, A. F., Jr., 1956, Geologic and structure contour map of the Fort Peck Indian Reservation and vicinity, Montana: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-225, scale 1:125,000.

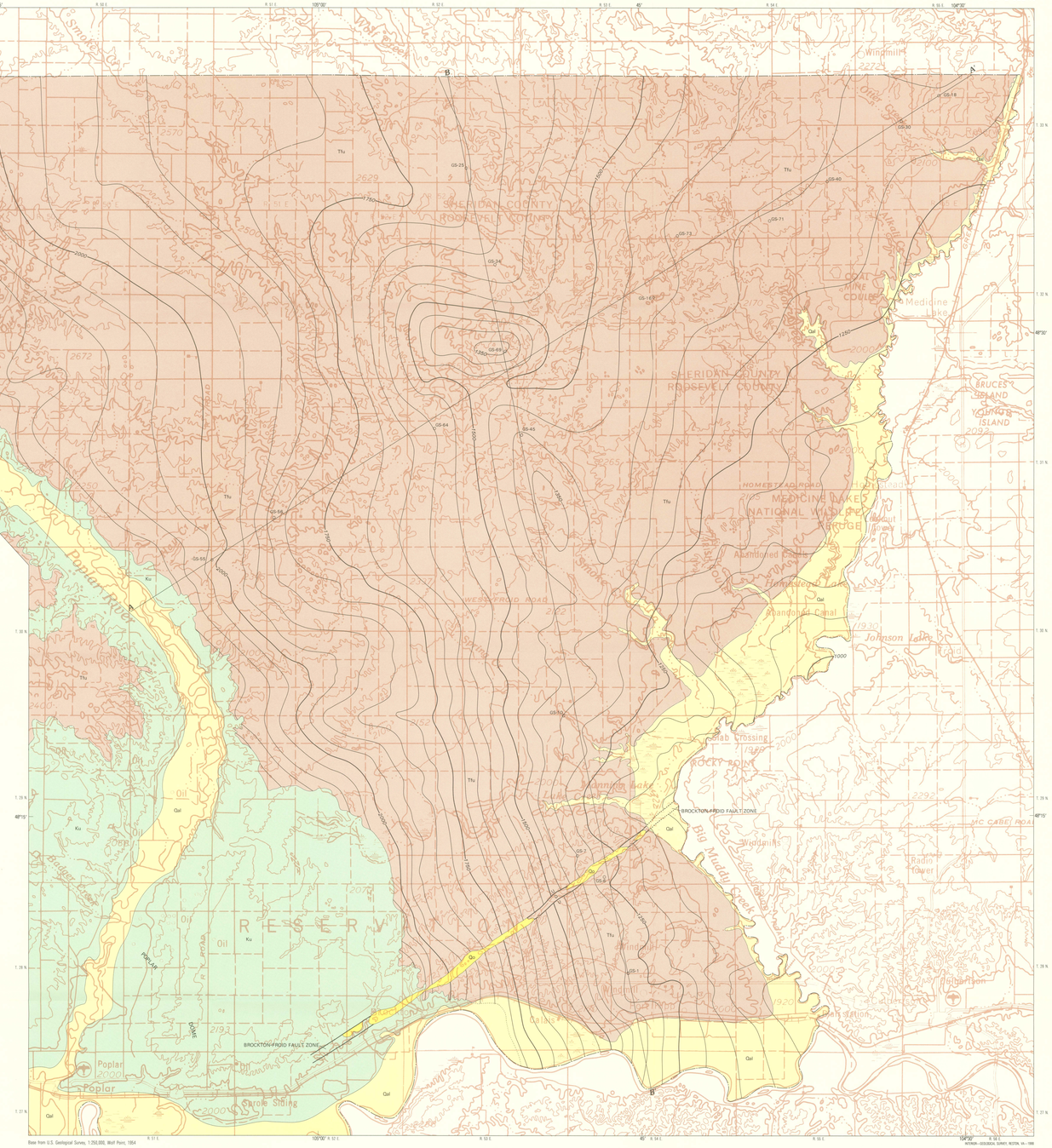
Fenneman, N. M., 1931, Physiography of the western United States: New York, McGraw-Hill, Inc., 534 p.

Hardie, J. K., and Arndt, H. H., 1981, Results of exploratory drilling for lignite in 1978, Fort Peck Indian Reservation, Roosevelt County, Montana: U.S. Geological Survey Open-File Report 81-786, 66 p.

_____in press a, Stratigraphy of the Fort Union Formation in the eastern part of the Fort Peck Indian Reservation, Daniels, Roosevelt, and Sheridan Counties, Montana: U.S. Geological Survey Coal Investigations Map C-122-B.

_____in press b, Stratigraphic framework of coal beds in the Fort Union Formation, eastern part of the Fort Peck Indian Reservation, Daniels, Roosevelt, and Sheridan Counties, Montana: U.S. Geological Survey Coal Investigations Map C-122-C.

Jensen, F. S., and Varnes, H. D., 1964, Geology of the Fort Peck area, Garfield, McCone, and Valley Counties Montana, *in* Shorter contributions to general geology, 1961: U.S. Geological Survey Professional Paper 414-F, 49 p.



Base from U.S. Geological Survey, 1:250,000, Wolf Point, 1954

SCALE 1:100 000
5 0 5 MILES
5 0 5 10 KILOMETERS
CONTOUR INTERVAL 100 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology by H. H. Arndt and J. K. Hardie, 1978–82. Geology in western part of map area modified from Colton and Bateman (1956)
Manuscript approved for publication, September 23, 1986

MONTANA—GEOLOGICAL SURVEY, W2726, sh.—1988

GEOLOGY, STRUCTURE, AND COAL BEDS OF THE FORT UNION FORMATION IN THE EASTERN PART OF THE FORT PECK INDIAN RESERVATION, DANIELS, ROOSEVELT, AND SHERIDAN COUNTIES, MONTANA

By
John K. Hardie and Harold H. Arndt
1988

Any use of trade names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Geological Survey

For sale by U.S. Geological Survey Map Distribution, Box 25286, Federal Center, Denver, CO 80225