U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
MONTANA BUREAU OF MINES AND GEOLOGY

OPEN-FILE REPORT 88-626

Base from U. S. Geological Survey

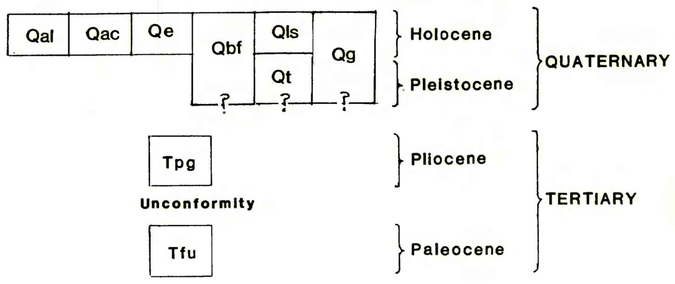
Geology mapped in 1980 and 1981

SCALE 1:24 000

1 ½ 0 1 MILE

1 .5 0 1 KILOMETER

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qal **Alluvium (Holocene)**--Light-brown and gray, well-stratified and well-sorted clay, silt, sand, and gravel. As much as 6 m (20 ft) thick under the flood plain of Redwater River to less than a few meters under flood plains of tributaries. Unit limited to areas characterized by meander or braided patterns on aerial photographs. Subject to occasional flooding

Qac **Alluvium and colluvium (Holocene)**--Light-brown and gray, poorly sorted and well-stratified clay, silt, sand, and gravel deposited by gravity and slope wash. Color and texture of colluvium reflect parent material upslope. May interfinger with alluvium; includes alluvial fans and much windblown clay, silt, and sand. Soil profiles range from well-developed to poorly developed. As much as 10 m (33 ft) thick, but generally less than 5 m (16 ft)

Qe **Eolium (Holocene)**--Light-brown to light-gray silt, sand, and granules. Present as sand dunes as much as 3 m (10 ft) thick on alluvial deposits near mouth of Cottonwood Creek. Unmapped thin blanket of eolium is on some upland benches

Qbf **Baked and fused bedrock (clinker) (Holocene to Pleistocene)**--Red to orange baked shale, sandstone, and siltstone of the Fort Union Formation that was heat-metamorphosed by combustion of lignite. Hard, dense, metamorphosed sediments are known as porcellanite; locally, sediments fused and melted to form black, vesicular, glassy, scoriaceous rock called buchite, which forms linings of chimneys and veins in porcellanite. As much as 12 m (39 ft) thick, but generally less than 5 m (16 ft)

Qls **Landslide deposit (Holocene)**--Slumps and earthflows. Size of material in the deposits ranges from clay and silt to boulder. As much as 12.2 m (40 ft) thick

Qt **Till (Pleistocene)**--Light-olive-brown to pale-yellow mixture of clay to boulder-sized materials. Estimated size distribution is: clay 15-20 percent, silt 25-30 percent, sand 35-40 percent, granules 15-20 percent, pebbles 5-10 percent, cobbles 1 percent, boulders 1 percent. Contains small clasts of coal and clinker. Probably was deposited in a glacial lake in as much as it contains lenses of varved clay as much as 4 m (13 ft) thick. Thickness as much as 15 m (49 ft), but generally less than 5 m (16 ft)

Qg **Sand and gravel, undivided (Holocene to Pleistocene)**--Light-brown to light-gray, well-stratified to poorly stratified, and well-sorted to poorly sorted sand and gravel. Unit generally limited to altitudes less than 762 m (2,500) ft. As much as 5 m (16 ft) thick, but generally less than 3 m (10 ft)

Tpg **Sand and gravel (Pliocene)**--Light-brown to light-gray, well-stratified and well-sorted sand and gravel. May contain some Pleistocene sand and gravel. Unit is generally limited to altitudes between 945 m (3,100 ft) and 762 m (2,500 ft). As much as 10 m (33 ft) thick, but generally less than 3 m (10 ft)

Tfu **Tongue River Member (Collier and Knechtel, 1939) of Fort Union Formation (Paleocene)**--Yellowish- or light-brown shale and sandstone containing numerous lignite beds. Estimated exposed thickness is more than 153 m (500 ft)

W **Water**

Contact--Dashed where approximately located

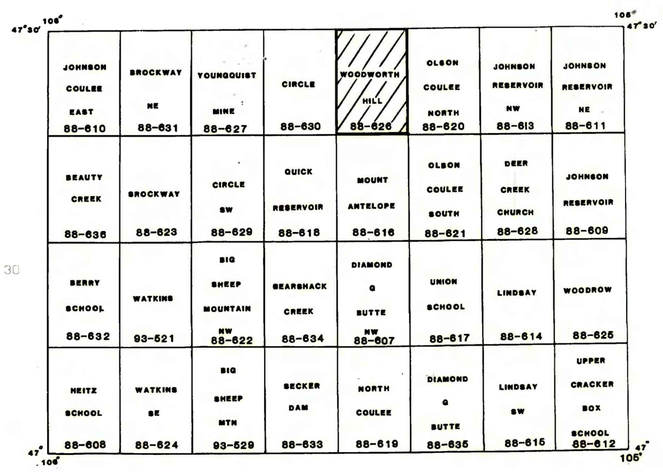
Abandoned coal mine

Gravel pit

Ice-marginal meltwater channel

REFERENCE

Collier, A.J., and Knechtel, M.N., 1939, The coal resources of McCone County, Montana: U.S. Geological Survey Bulletin 905, 80 p.



INDEX TO QUADRANGLES IN THE CIRCLE 30' x 60' QUADRANGLE. MAPPED QUADRANGLE SHOWN BY STRIPES; NUMBERS ARE OPEN-FILE NUMBERS

GEOLOGIC MAP OF THE WOODWORTH HILL QUADRANGLE, MCCONE AND DAWSON COUNTIES, MONTANA

By

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1994