DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Preliminary geologic map of the Gillette 1° x 2° quadrangle
northeastern Wyoming and western South Dakota

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DESCRIPTION OF MAP UNITS

[The Miocene-Pliocene boundary is used in the European sense, as applied to marine rocks (Berggren and Van Couvering, 1974), the separation being at about 5 m.y. (million years).]

Qa  ALLUVIAL DEPOSITS (HOLOCENE AND PLEISTOCENE)--Unconsolidated and poorly consolidated clay, silt, sand, and gravel, mainly in flood plains and lowest terraces

Qt  UPPER TERRACE DEPOSITS (HOLOCENE AND PLEISTOCENE)--Silt, sand, and gravel

Ql  LANDSLIDE DEPOSITS (HOLOCENE AND PLEISTOCENE)--Unsorted rock debris, ranging from clay to boulder size, emplaced by mass movement

Tt  TERRACE DEPOSITS (TERTIARY)--Silt, sand, and gravel

Tmu  UPPER MIocene ROCKS--Tuff, poorly sorted conglomerate, sandstone, and siltstone, white to tan, soft; some pumicite beds. Thickness less than 16.5 m (55 ft)

Twr  WHITE RIVER FORMATION (OLIGOCENE)--White to pale-pink blocky tuffaceous claystone and tan siltstone, and lenses of arkosic conglomerate. Thickness generally less than 60 m (200 ft)

Tmo  MIOCENE AND OLIGOCENE ROCKS--Similar to upper Miocene rocks (Tmu) and White River Formation (Twr)

Ti  INTRUSIVE ROCKS (EOCENE--38.8-55 m.y.)--Monzonite and syenite porphyry, latite, trachyte, phonolite, bostonite, nepheline syenite, latite lamprophyre, and pseudoleucite and phonolite porphyry. K/Ar age determinations: 40.5±1.6 m.y., phonolite porphyry from Devils Tower, (Bassett, 1961); 48.9±1.6 m.y. and 38.8±2.1 m.y., porphyritic syenite (2 samples) from Bear Lodge pluton; 54.3±2.2 m.y., porphyritic monzonite from Black Buttes stock, sec. 23, T. 50 N., R. 62 W.; 49.6±1.7 m.y., porphyritic phonolite from Missouri Buttes pluton, T. 54 N., R. 66 W. (the last 4 ages from McDowell, 1971, p. 14-15)

TW  WASATCH FORMATION (EOCENE)--Buff arkosic sandstone, lenticular conglomerate bodies, drab siltstone, carbonaceous shale, and many coal beds; upper part contains variegated claystone in southwestern corner of map area. Thickness 0-915 m (0-3,000 ft); the upper 305 m (1,000 ft) only in the northwestern corner of the map area

FORT UNION FORMATION (PALEOCENE) --

Tftr  Tongue River Member--Light-colored massive sandstone and gray shale; numerous coal beds. Thickness 150-240 m (490-790 ft)

Tfl  Lebo Member--Fine-grained drab to gray sandstone, finely conglomeratic in part, interbedded with drab siltstone, claystone, shale, and thin coal beds. Thickness 0-760 m (0-2,490 ft)
Tft
Tongue River and Lebo Members--Not mapped separately in central Campbell County

Tft
Tullock Member--Has a light-colored appearance and contains massive sandstones, whereas the Lebo Member is drab colored and contains more shale and claystone. Thickness 0-460 m (0-1,510 ft)

Kl
LANCE FORMATION (UPPER CRETAUCEOUS)--Somber shale and drab massive lenticular concretionary sandstone. Thickness 610-760 m (2,000-2,490 ft)

Kfh
FOX HILLS SANDSTONE (UPPER CRETAUCEOUS)--White to light-gray sandstone and gray sandy shale, both containing marine fossils. Thickness 45-60 m (150-190 ft)

Kp
PIERRE SHALE (UPPER CRETAUCEOUS)--Dark-gray to black concretionary marine shale. In Black Hills area, Kara and Monument Hill Bentonitic Members in upper part, Groat Sandstone Bed of Gammon Ferruginous Member in lower middle part, Pedro Bentonite Bed of Mitten Member as base. Thickness 510-625 m (1,675-2,050 ft)

Kn
NIOBRAARA FORMATION (UPPER CRETAUCEOUS)--Light-gray to yellow marl and gray to yellow limy speckled shale. Thickness 40-60 m (125-197 ft)

Kcl
CARLILE SHALE (UPPER CRETAUCEOUS)--Dark-gray to black soft sandy shale. Sage Breaks Member at top; Turner Sandy Member in middle. Thickness 135-230 m (443-755 ft)

Kg
GREENHORN LIMESTONE (UPPER CRETAUCEOUS)--Light-gray limestone, marl, and limy sandstone interbedded with gray limy concretionary shale. Thickness 20-110 m (66-361 ft)

Kb
BELLE FOURCHE SHALE (UPPER CRETAUCEOUS)--Dark-gray to black soft bentonitic concretionary shale. Thickness 215-245 m (705-804 ft)

Km
MOWRY SHALE (LOWER CRETAUCEOUS)--Black, hard, siliceous; weathers silvery gray; abundant fish scales; many bentonite beds. Clay Spur Bentonite Bed at top. Thickness 60-75 m (197-246 ft)

Knc
NEWCASTLE SANDSTONE (LOWER CRETAUCEOUS)--Gray sandstone, sandy shale, and siltstone; some bentonite and coal. Thickness 0-30 m (0-100 ft)

Ksc
SKULL CREEK SHALE (LOWER CRETAUCEOUS)--Black, soft, fissile. Thickness 60-75 m (197-246 ft)

KJim
INYAN KARA GROUP (LOWER CRETAUCEOUS) AND MORRISON FORMATION (UPPER JURASSIC)

Inyan Kara Group (Lower Cretaceous)
Fall River Sandstone--Brown sandstone, siltstone, and shale. Thickness 30-45 m (100-148 ft)

Lakota Formation--Intertonguing variegated claystones and sandstones, and, in northeastern area, gray conglomeratic sandstone underlain by nonconglomeratic sandstone, mudstone, and coal. Thickness 20-70 m (66-230 ft)

Morrison Formation (Upper Jurassic)--Dully variegated siliceous claystone containing nodular limestone and gray silty sandstone lenses. Thickness 0-60 m (0-197 ft)
SUNDANCE AND GYPSUM SPRING FORMATIONS

Sundance Formation (Upper and Middle Jurassic)--Greenish-gray glauconitic sandstone and shale underlain by red and gray nonglauconitic sandstone and shale. Thickness 60-130 m (197-427 ft)

Gypsum Spring Formation (Middle Jurassic)--Massive white gypsum; locally at top 0-24 m (0-80 ft) of red and green claystone. Thickness 0-40 m (0-130 ft)

SPEARFISH FORMATION (TRIASSIC)--Red shale, red siltstone, and white gypsum beds. Thickness 60-275 m (197-902 ft)

MINNEKAHTA LIMESTONE AND OPECHE SHALE (LOWER PERMIAN)

Minnekahta Limestone--Gray, slabby, hard. Thickness 8-14 m (25-46 ft)

Opeche Shale--Red, sandy, soft. Thickness 8-37 m (26-120 ft)

MINNELUSA FORMATION (LOWER PERMIAN AND PENNSYLVANIAN)--Light-gray and red sandstone, solution breccia that merges with anhydrite in subsurface, thin limestones, and red and black shale. Thickness 175-274 m (575-900 ft)

PAHASAPA AND ENGLEWOOD LIMESTONES (LOWER MISSISSIPPIAN)

Pahasapa Limestone--Gray, massive, cavernous, dolomitic. Thickness 155-365 m (508-1,198 ft)

Englewood Limestone--Pink, thin-bedded, dolomitic in part. Thickness 15 m (50 ft)

ORDOVICIAN AND CAMBRIAN ROCKS--Chiefly includes the following units:

Whitewood Dolomite (Upper Ordovician) and Winnipeg Formation (Middle Ordovician)--Gray to tan dolomite underlain by green shale and siltstone. Thickness 0-90 m (0-300 ft)

Deadwood Formation (Lower Ordovician and Upper Cambrian)--Brown sandstone, greenish-gray shale, and gray limestone. Thickness 90 to more than 270 m (300 to more than 885 ft)

PRECAMBRIAN X ROCKS--Mostly granite, light-gray to tan; includes lesser amounts of metasedimentary rocks in the Bear Lodge Mountains. Age determinations indicate a minimum age of 2,600 m.y. (M. H. Staatz, written commun., 1977)

PRECAMBRIAN W ROCKS--Mica schist, dark-gray, intruded by lesser amounts of granite and amphibolite; confined to Negro Hill area along the east boundary of the quadrangle. Age not precisely known

CONTACT--Dashed where projected

FAULT--Dotted where concealed. Bar and ball on downthrown side

1/ The contact between the Fort Union Formation and the Wasatch Formation is being reviewed and is subject to change.
REFERENCES


INDEX TO SOURCES OF GEOLOGIC DATA

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[Brackets indicate published names of topographic quadrangles as of date of this compilation.]


