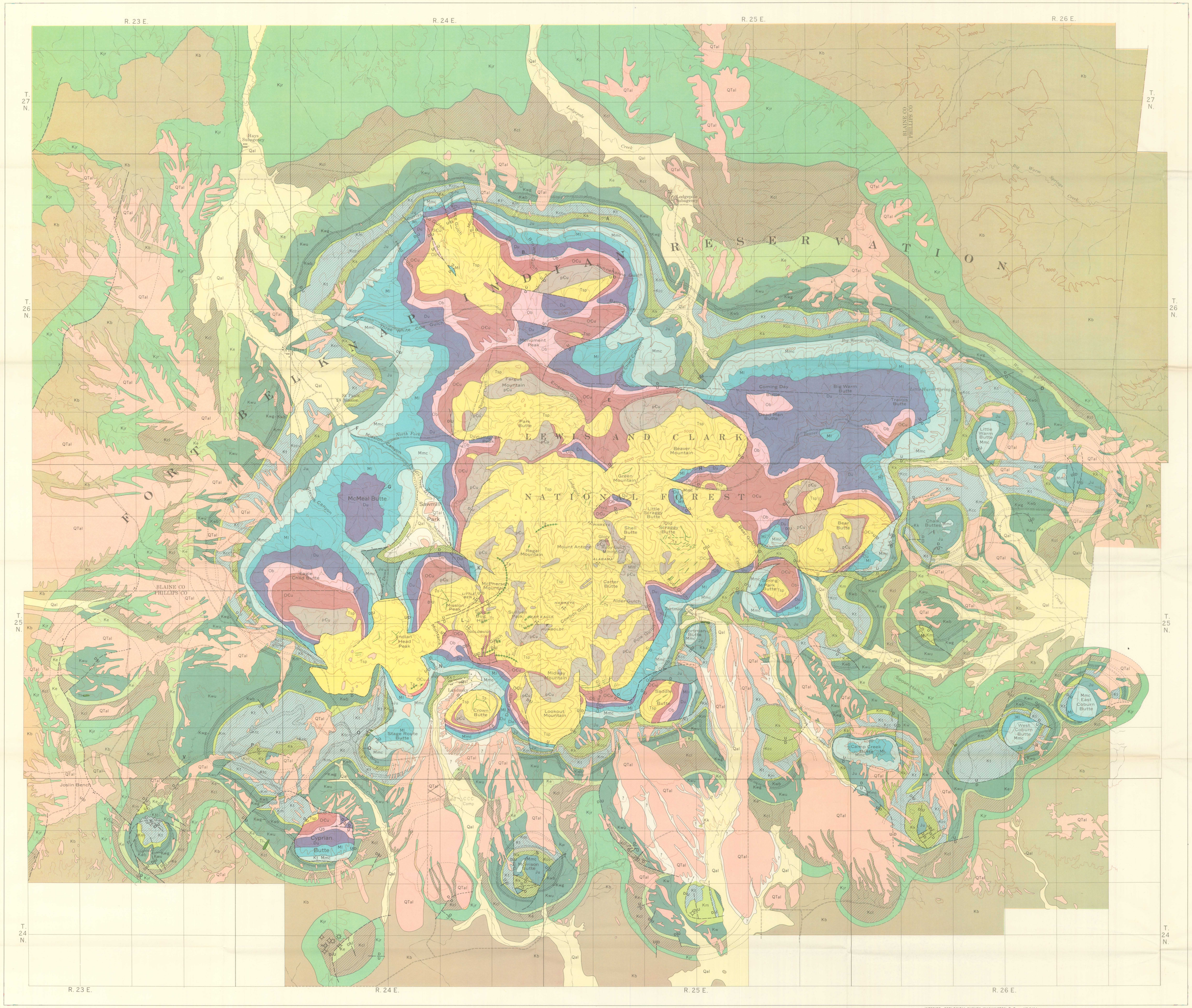


Base from plats of the Bureau of Land Management. Topographic contours for areas within the Fort Belknap Indian Reservation are copied from plats of the Bureau of Land Management. Those for areas outside Reservation were drawn photogrammetrically in 1938 by E. A. Schuster of the Geological Survey

TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1959

GEOLOGIC MAP OF LITTLE ROCKY MOUNTAINS AND ENCIRCLING FOOTHILLS, MONTANA

Scale 1:48 000

1 0 1 2 3 4 Miles

Contour interval 200 feet
Datum is mean sea level

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C. MR 7424

Geology mapped by Maxwell M. Knechtel, 1936–39, assisted by S. R. Brockunier, 1936, and by S. W. Hobbs, 1937 and 1938

EXPLANATION

QUATERNARY

Qal — **Younger alluvium**
Glacial deposits not shown

QTal — **Older alluvium of gravel benches**

TERTIARY(?) AND QUATERNARY

TERTIARY

Tl — **Lamprophyre dike or small boss**

Tta — **Trachyte porphyry dike**

Ta — **Aegirine trachyte porphyry dike**

Ts — **Syenite porphyry or quartz monzonite porphyry dike**

Tsp — **Syenite porphyry**

CRETACEOUS

Kb — **Bearpaw shale**
Dark-gray marine shale, weathering light gray; a few beds of bentonite and of sandstone, and many thin beds and lenses of cherty material and calcareous concretions

Kjr — **Judith River formation**
Interbedded light-gray to buff soft fine-grained sandstone, shale, and gray impure clay. A few thin coal beds in upper part

Kcl — **Claggett shale**
Dark-gray shale and siltstone, weathering to brownish gray, a few beds of bentonite and beds containing large boulderlike septarian concretions

Ke — **Eagle sandstone, undivided**
Upper member: chiefly gray shale with many thin beds of siltstone, sandy shale, and friable sandstone that weathers reddish tan; Virgelle sandstone member: yellow to buff sandstone, gray siltstone, and gray shale

Kwu, Kwg, Kwb, Kw — **Warm Creek shale**
Warm Creek shale, undivided, Kw. Upper member, Kwu: mainly bluish-gray shale containing many large calcareous concretions, especially in lower half. Middle calcareous member, Kwg (Greenhorn limestone equivalent): includes a basal unit, the Mosby sandstone unit, which consists of slabby to platy sandstone containing bentonite beds of fossiliferous limestone, and an overlying unit, which is largely calcareous shale that weathers light gray. Lower shale member, Kwb: chiefly dark-gray to brownish-gray shale with a little sandstone and many limestone concretions; weathers light gray and lower part of member contains many nodules of heavy black slightly manganiferous siderite

Km — **Mowry shale**
Shale, mostly papery to slaty, medium- to dark-gray; weathers bright silvery gray; a thin bed of bentonite in uppermost part

Ktc, Kt — **Thermopolis shale**
Chiefly dark-bluish-gray shale containing numerous small ferruginous concretions. Near middle, in southwestern part of area mapped, is Cyprian sandstone member, Kt; made up chiefly of sandstone, coarse grained, massively bedded, containing chalcedonic pebbles of various colors, shapes, and sizes

Kcc — **First Cat Creek sand of drillers**
Upper member: dark-gray shale, siltstone, and argillaceous sandstone. Lower member: mostly sandstone, somewhat arkosic, coarse grained, massively bedded

Kk — **Kootenai formation**
Variegated argillaceous member: clay, mottled maroon and gray, with a few thin beds and lenses of sandstone, friable, light-gray. Lower unit, or Third Cat Creek sand of drillers: largely sandstone, rather friable, light gray, with a hard coarse-grained arkosic sandstone layer at the top, and a layer of dense light-gray limestone at the base

JURASSIC

Ju — **Upper Jurassic rocks, undifferentiated**
Comprises three formations, uppermost of which is the Morrison formation: largely light-gray sandstone and friable glauconitic sandstone, with a rocky layer at the top. Swift formation (Ellis group) is mostly light- to dark-gray shale, weathering pale gray, with some thin limestone and numerous large brown calcareous concretions; layers of glauconitic sandstone, sandy sandstone, dark shale, and impure limestone in upper part. Rierdon formation (Ellis group) is mostly light- to dark-gray marly limestone weathering pale gray, with some shale

MISSISSIPPIAN

Mmc — **Mission Canyon limestone**
Limestone, mostly coarse grained and massively bedded, locally crossbedded, with nodules and lenses of cherty material; numerous solution cavities in upper part

Ml — **Lodgepole limestone**
Limestone, richly fossiliferous, thin bedded, with some massive ledges, many small lenses of chert, and thin partings of shale; mostly dark to light gray, but two zones in upper half are predominantly red, at base is thin black conodont-bearing shale of Little Chief Canyon member

CARBONIFEROUS

DEVONIAN AND MISSISSIPPIAN

Du — **Devonian and Mississippian rocks, undifferentiated**
Includes three formations. Uppermost (poorly exposed) is Three Forks shale(?) (Devonian and Mississippian) consisting of calcareous clay and siltstone, light gray to light green, resting on Jefferson limestone (Devonian). The Jefferson limestone consists of an upper member (limestone and dolomite, light gray to buff, partly sandy, massively bedded but slightly where greatly altered, and with a few thin beds of sandstone and shale near base) and a lower member (a lower member: chiefly limestone, finely crystalline, dark gray and brownish gray, weathering light gray to whitish. Lowermost is Maywood formation (Devonian), consisting of shale, siltstone, limestone, and dolomite; upper two-fifths largely bright red; lower three-fifths mainly light gray, light green, yellow, and brown; lower 5 ft is pinkish dolomite, silty, platy

DEVONIAN AND MISSISSIPPIAN

Ob — **Bighorn dolomite**
Lower half: dolomitic limestone, massive, dapple gray with bluish cast in some exposures; weathered surfaces commonly pitted. Upper half: dolomite, thinly bedded, hard, gray to white

PRECAMBRIAN CAMBRIAN AND ORDOVICIAN

ORDOVICIAN(?)

pCu — **Flathead sandstone and Emerson formation, undifferentiated**
The Emerson formation (Cambrian and Early Ordovician(?)) is chiefly gray to greenish-gray shale with interbedded beds, increasing in number upward, of shale, limestone, dolomite, and siltstone intraformational conglomerate. The lower formation, the Flathead sandstone (Cambrian), is mainly sandstone, light gray, green and tan, with some interbedded fine-grained conglomerate

PRECAMBRIAN

pCu — **Pre-Belt metamorphic rocks, undifferentiated**
Metasedimentary rocks, chiefly biotite schist and gneiss; metavolcanic rocks, chiefly hornblende gneiss and amphibolite; and younger pre-Belt(?) ferromagnesian rocks forming a few dikes and sills

? — **No exposure**

Contact
Dashed where approximately located, dotted where concealed

Normal fault, approximately located
U, upthrown side; D, downthrown side, dotted where concealed

Thrust fault, approximately located
T, upper plate, dotted where concealed

Probable fault

Shaft

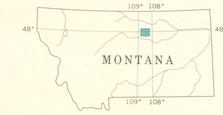
Mine

Spring

Dry hole

Gas well

Locality referred to in text



INDEX MAP SHOWING AREA MAPPED