

DESCRIPTION OF MAP UNITS

BLYTHE 7.5-MINUTE QUADRANGLE, MONTANA

Qa1

FLOOD PLAIN AND CHANNEL ALLUVIUM (HOLOCENE)--Light-brown and gray gravel, sand, silt and clay deposited in flood plains and channels of active streams. Deposits are well to poorly stratified and moderately well sorted. Thickness not measured; estimated to be as much as 5 m (15 ft).

Q1s

LANDSLIDE DEPOSITS (HOLOCENE)--Slump and earth flow deposits that may be stable or unstable, and generally consist of chaotic mixtures of clay- to boulder-size clasts. Color, texture and lithology reflect that of parent rock. Thickness not measured; estimated to be generally less than 15 m (50 ft).

Qat

ALLUVIAL TERRACE DEPOSITS (HOLOCENE)--Light-brown to light-gray, moderately to well sorted sand and gravel from 24 to 30 m (80 to 100 ft) above Cora Creek. Thickness approximately 6 m (20 ft).

Qaf

ALLUVIAL FAN DEPOSITS (HOLOCENE)--Small fans developed where tributaries reach the flatter flood plain area of larger stream. Sediment is mostly fine-grained with some pebble- to cobble-sized subangular to subrounded clasts of locally derived rock. Thickness not measured; estimated to be approximately as much as 15 m (50 ft).

Qc1

COLLUVIUM AND SHEETWASH ALLUVIUM (HOLOCENE and PLEISTOCENE?)--

Moderately sorted sand, silt and clay and poorly sorted angular gravel deposited on slopes. Includes significant component of windblown silt and fine-grained sand. Color and texture reflect that of parent rock. Thickness not measured; estimated to be as much as 4.5 m (15 ft).

COLORADO GROUP

MARIAS RIVER SHALE

Kmc

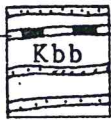
CONE MEMBER (UPPER CRETACEOUS, CENOMANIAN and TURONIAN)--Lower part dark-gray calcareous shale that contains a persistent bentonite bed, and upper part thin beds of platy, medium-gray- or grayish-orange-weathering petroliferous limestone that contains blue fish scales and pelecypod fragments. Top not exposed in map area. In adjacent areas thickness approximately 18 m (60 ft).

Kmfl

FLOWEREE MEMBER (UPPER CRETACEOUS, CENOMANIAN)--Dark-gray-weathering, fissile shale that contains light-yellowish-gray, low-swelling bentonite beds and several thin beds of siltstone and fine-grained sandstone, some of which are lenticular and wavy-bedded. Locally contains septarian concretions and limonitic dolostone concretions that weather to small chips. Thickness of member approximately 12 m (40 ft).

BLACKLEAF FORMATION

Arrow Creek  
Bed



BOOTLEGGER MEMBER (LOWER CRETACEOUS, ALBIAN)--Contains two to six relatively prominent sandstone beds about 3 to 12 m (10 to 40 ft) thick separated by 15 to 30 m (50 to 100 ft) of dark-gray shale that contains numerous bentonite beds. The fine- to medium-grained light-brown- to moderate-yellowish-brown- weathering sandstones are commonly flaser-bedded or ripple-laminated with abundant trace fossils on bedding surfaces. Trough and hummocky bedding also occur higher in the section, and fish scales and bones are common in the upper sandstones. Locally the tops of sandstone beds contain black chert pebbles. A well cemented chert-pebble conglomerate, or coarse-grained sandstone occurs at the top of the member. Sandstone beds persist over many square kilometers. The upper part of the Bootlegger contains the Arrow Creek Bed, predominantly porcellanite and bentonite, labeled on the map. Thickness of member approximately 60 m (200 ft).

Kbv

VAUGHN MEMBER (LOWER CRETACEOUS, ALBIAN)--Poorly exposed very bentonitic silty gray shale with thin bentonite beds. Thickness of member ranges from 0-12 m (40 ft).

Kbt

TAFT HILL MEMBER (LOWER CRETACEOUS, ALBIAN)--Medium-dark-gray- to medium-light-gray-weathering bentonitic silty shale with several thin, locally glauconitic sandstone beds. Thickness of member approximately 37 m (120 ft).

Kbf

FLOOD MEMBER (LOWER CRETACEOUS, ALBIAN)--Black- to dark-gray-  
weathering fissile shale that contains pods and lenses of  
bioturbated sandstone at its base. Lacks the two prominent  
sandstone beds present in Great Falls area. Thickness of member  
approximately 30 m (100 ft).

base of Colorado Group

#### KOOTENAI FORMATION

Kk<sub>5</sub>

FIFTH MEMBER (informal map unit) (LOWER CRETACEOUS APTIAN AND  
ALBIAN?)--Dominantly moderate-red mudstone that contains lenses  
of sandstone and limestone. The uppermost part of the member  
consists of massive, color-banded, greenish-gray, grayish-red-  
purple, moderate-red and very dark-red mudstone with lenses of  
fine- to medium-grained trough-crossbedded, greenish-gray-  
weathering sandstone. Thickness of member approximately  
34 m (110 ft).

Kk<sub>4</sub>

FOURTH MEMBER (informal map unit) (LOWER CRETACEOUS, APTIAN)--  
Dusky-red or pale-reddish-brown fine- to medium-grained, thin-  
to medium-bedded micaceous, argillaceous, platy-bedded sandstone  
with abundant plant fragments and impressions, interbedded with  
very dark-red mudstone. Basal contact is transitional with  
Third member and contains interbedded medium-gray or dusky-red  
siltstone and mudstone. Lowest sandstone beds are light-brown-  
or moderate-yellowish-brown-weathering, becoming dusky-red or  
pale-reddish-brown higher in the section. Low amplitude ripple



marks, that are locally interference ripples, commonly occur on bedding surfaces. Thickness of member approximately 30 m (100 ft).

Kk<sub>3</sub>

THIRD MEMBER (informal map unit) (LOWER CRETACEOUS, APTIAN)--Well sorted resistant quartz arenite with interspersed limonite specks. Scour base locally with rip-up clasts and chert pebbles cuts into Second member. Up to 20% dark chert is present at base, but higher in section it disappears almost entirely. Primary sedimentary structures include planar, tabular cross-bedding with sets generally 20 to 40 cm thick and planar-bedded fine-grained sandstone and siltstone in 2- to 10-cm-thick beds separating sets. Sinuous and straight-crested wave and interference ripple marks occur on bedding surfaces. Interbedded sandstone, siltstone and shale occur in planar beds near the top of the member with abundant invertebrate trace fossils on bedding surfaces and within beds. Thickness of member approximately 12 m (40 ft).

Kk<sub>2</sub>

SECOND MEMBER (informal map unit) (LOWER CRETACEOUS, APTIAN)--Poorly resistant red mudstone that overlies the First member with a sharp contact. Mudstone contains dense medium-gray micrite and argillaceous, light-brownish-gray micrite concretions that laterally become lenticular, irregular beds. Thin, lenticular chert-rich quartz arenite beds occur locally. A bed of intraformational-micrite-clast conglomerate occurs near the top of the member. Thickness of member approximately 30 m (100 ft).

Kk

FIRST MEMBER (informal map unit) (LOWER CRETACEOUS, APTIAN?)--

Dominantly resistant festoon-crossbedded, moderately well sorted quartz arenite with 20-50% black, dark- and light-gray chert. Coarse-grained sandstone, chert-granule conglomerate or chert-pebble conglomerate occurs at scour base, typically with rip-up clasts of coal, plant fragments and impressions. Grain size fines upward with upper part of member generally fine- to medium-grained. Thickness of member approximately 25-37 m (80-120 ft).

Jm

MORRISON FORMATION (JURASSIC, KIMMERIDGIAN)--Light-greenish-gray mudstone and shale with interbedded lenses of medium-gray micrite and fine- to medium-grained calcareous thin-bedded, moderate-yellowish-brown-weathering sandstone with subbituminous coal bed at the top of formation. Thickness of formation approximately 30 m (100 ft).

Je

ELLIS GROUP

SWIFT FORMATION (JURASSIC, OXFORDIAN)--Grayish-orange-weathering, calcareous, glauconitic fine- to coarse-grained sandstone that contains interbeds of shale and chert pebble conglomerate. Thickness of formation approximately 24 m (80 ft).

PIPER FORMATION (JURASSIC, BATHONIAN)--Grayish-green shale, dusky-red and grayish-red gypsiferous shale and gray limestone beds. Thickness of formation approximately 6 m (20 ft).

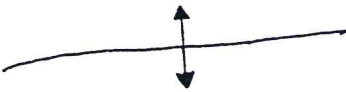
MAP SYMBOLS



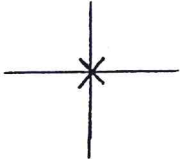
CONTACT--Dashed where approximately located.



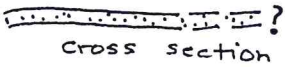
STRIKE AND DIP OF BEDDING--Showing direction, and amount of dip; interpreted from aerial photographs or map patterns where no dip amount shown.



ANTICLINE--Showing trace of crestline.



DEPRESSION--Center at X.



Cross section



Surface

SANDSTONE BED--Thickness approximate, not all sandstone beds shown on map. Dashed where approximately located. Queried at limit of mapping.



PORCELLANITE or PORCELLANITE and BENTONITE BED

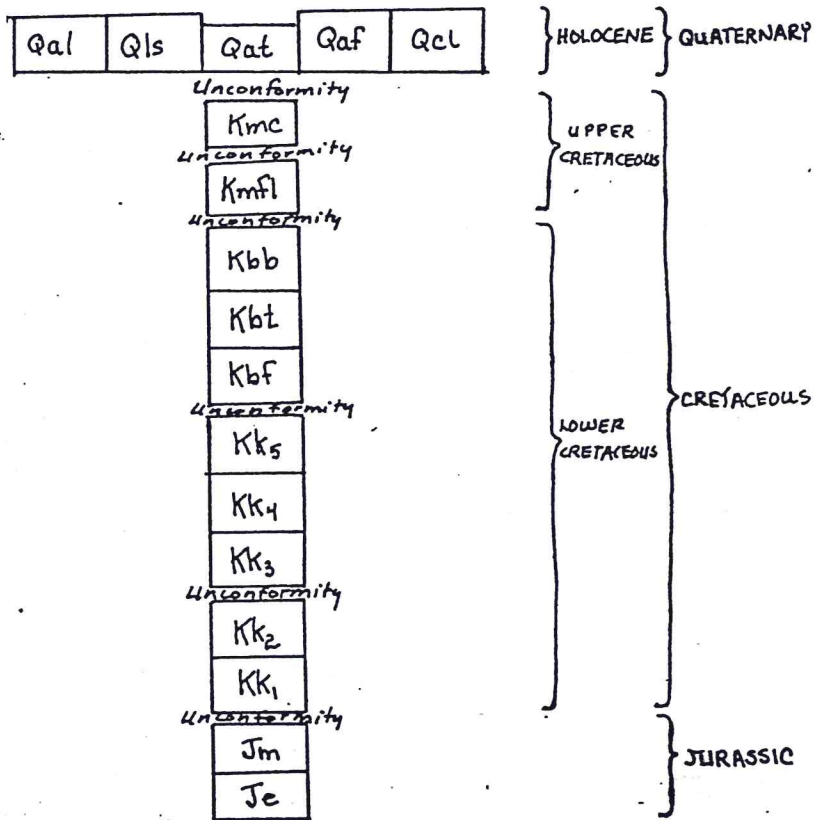
(CRETACEOUS, ALBIAN)--Arrow Creek Bed, labeled on map, occurs in the Bootlegger Member of the Blackleaf Formation.



WATER--Existing ponds and lakes adjacent to mappable alluvium.

CORRELATION OF MAP UNITS

BLYTHE 7.5-MINUTE QUADRANGLE





PREVIOUS GEOLOGIC MAPPING, BLYTHE 7.5-MINUTE QUADRANGLE

- Cannon, J. L., 1966, Outcrop examination of paleocurrent patterns of the Blackleaf Formation near Great Falls, Montana: Billings Geological Society, 17th Ann. Field Conference Guidebook, p. 71-111.
- Fischer, C. A., 1909a, Geology of the Great Falls coal field, Montana: U.S. Geological Survey Bull. 356.
- Fischer, C. A., 1909b, Geology and water resources of the Great Falls region, Montana: U.S. Geological Survey Water-Supply Paper 221.
- Weed, W. H., 1899, Fort Benton Folio, Montana: U.S. Geological Survey Folio 55.