GEOLOGIC MAP OF THE

CONRAD 30' x 60' QUADRANGLE

NORTH-CENTRAL MONTANA

by

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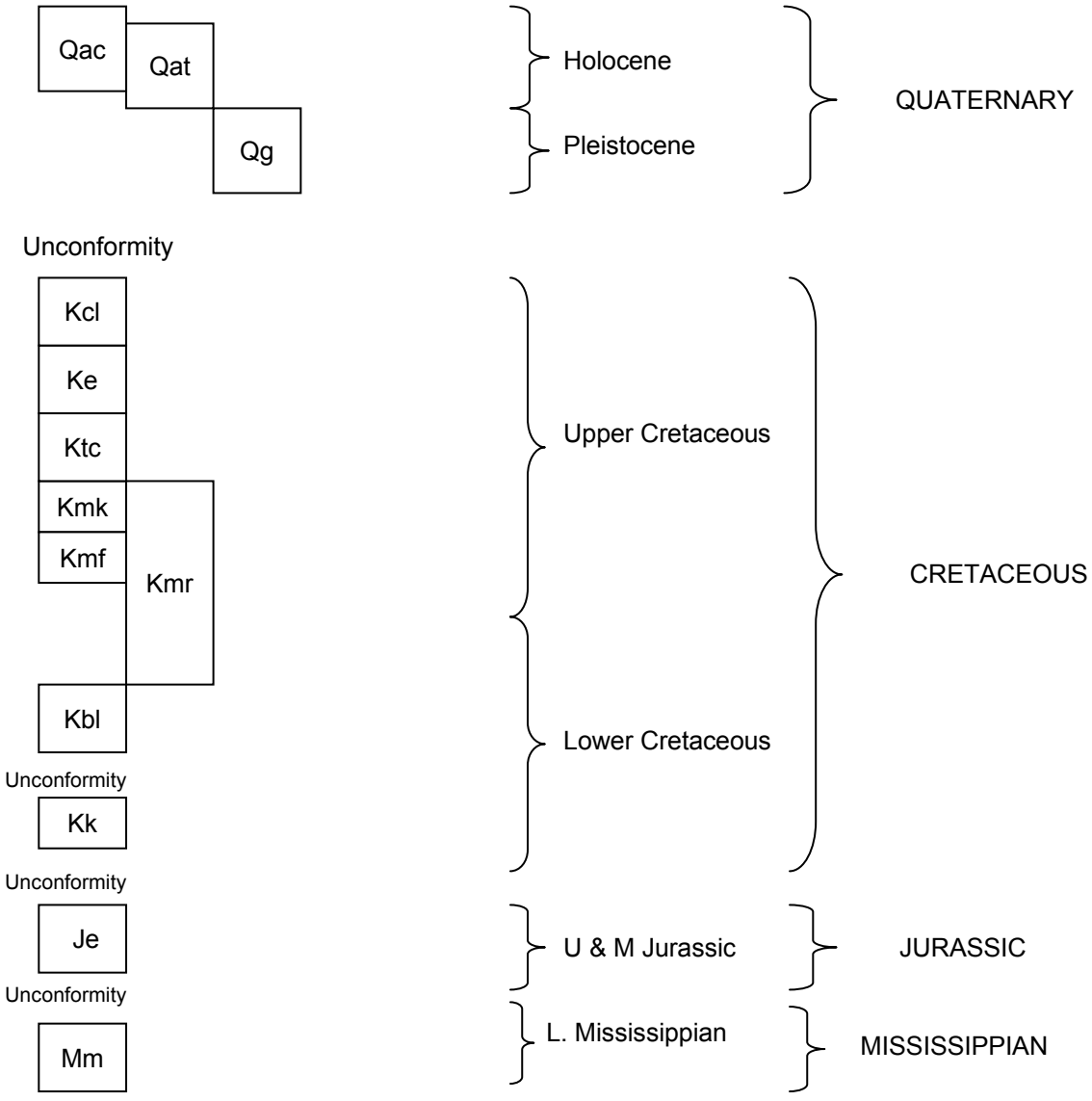
INTRODUCTION AND DISCUSSION

The Conrad 30' X 60' Quadrangle lies within the area that was covered by Pleistocene continental glaciers. Thus, glacial deposits cover much of the bedrock in the area. Glacial deposits are depicted by a stippled pattern, and buried bedrock units are identified by letter symbols in parentheses (see map Symbols explanation). The bedrock geology depicted here is based on limited exposures and on oil and gas drill-hole data. Because of the lack of sufficient data, buried contacts beneath glacial deposits are approximate and appear rather stylized.

The northeast-trending Great Falls Tectonic Zone is a broad zone that passes beneath most of the area of this quadrangle (Lopez, 1995; O'Neill and Lopez, 1985). Its effect on bedrock geology in this area could not be determined because of the limited bedrock exposure and because detailed subsurface mapping is beyond the scope of this report. In the areas covered by glacial deposits, the bedrock structure must be much more complicated than shown on this map, as is the case in the nearby Sweet Grass Hills (Lopez, 1995). Limited available gravity and aeromagnetic data, as well as unpublished proprietary data, show the structure in the area is dominated by northeast-striking basement faults that are part of the Great Falls Tectonic Zone and that are known to affect the Paleozoic and Mesozoic rocks in the area (Lopez, 1995; O'Neill and Lopez, 1985).

This map is based on, and supersedes an earlier compilation of the geology of the Conrad Quadrangle, published as Open-File Report MBMG-313 (Lopez, 1994)

CORRELATION OF UNITS
CONRAD 30'X 60' QUADRANGLE



DESCRIPTION OF UNITS
CONRAD 30' X 60' QUADRANGLE

Qac **Alluvium and colluvium, undivided (Holocene)** –
Alluvial deposits in active streams and rivers, consisting mainly of locally-derived sand and gravel and reworked material from glacial till. Coarser material, up to boulder size, can be present close to mountainous areas. Locally includes colluvium, glacial outwash, and glacial lake deposits.

Qat **Alluvial terrace deposits, undivided (Holocene ?) –** Alluvium composed mainly of gravel and sand underlying terraces at varying levels above present-day river elevations. Gravel is rounded, ranges in size from cobbles to pebbles, and is 10 to 20 ft thick.

Qg **Glacial deposits, undivided (Pleistocene) –** Unsorted deposits of clay- to boulder-size material. Clast composition is exotic with respect to local bedrock; predominant lithologies are pink granite, quartz-biotite schist, granite gneiss, and quartzite. Rare cobbles and boulders of ultramafic rocks have been observed. Areas underlain by these deposits display characteristic hummocky topography. Roger Colton (written communication, 1994), on unpublished mapping of Quaternary deposits, divided these deposits in greater detail, but this detailed mapping is not included here because of the bedrock emphasis of this map.

Kcl **Claggett Shale (Upper Cretaceous)** – Brownish gray, silty and sandy shale with thin interbeds of argillaceous and calcareous sandstone. Brown septarian concretions and *Inoceramus* prisms are common. The lower part contains beds of bentonite. The Claggett is typically very poorly exposed. Cobban (1955) reported a thickness of 420 ft at Goosebill Butte, 30 miles south of Chester.

Ke **Eagle Sandstone (Upper Cretaceous)** – Upper part is generally poorly exposed and is characterized by thin sandstone beds interbedded with brown and olive mudstones and less-abundant bentonite, bentonitic mudstone, carbonaceous shale, and coal. Fossilized plant debris is common in this part of the section. The lower part is light brown to buff weathering, thick bedded to massive sandstone that forms rounded rims and bluffs. Sandstones are fine grained, light gray to light brownish gray, limonite speckled, and well indurated to friable. Ripples, low-angle cross-bedding, and burrowing are common. This lower part of the section is commonly referred to as the Virgelle Member. The Eagle Sandstone is about 350 ft in total thickness in the area.

Ktc **Telegraph Creek Formation (Upper Cretaceous) –** Interbedded medium-brownish gray sandy shale and brown, fine-grained, thin-bedded, argillaceous sandstone. Proportion of sandstone relative to shale increases upward in stratigraphic section. Total thickness in the area is about 150 ft.

Kmr **Marias River Formation, undivided (Upper Cretacous) –** used only on cross section.

Kmk **Kevin Member, Marias River Formation (Upper Cretaceous)** – Medium-dark-gray to brownish gray, calcareous, fissile shale. In the subsurface the informal name, First White Specks, is commonly applied because of the characteristic white specks (calcite) visible on shale partings. Thin, light-gray bentonite beds, gray limestone septarian concretions, and *Inoceramus* prisms are common in this member. At the type section on the Kevin-Sunburst Dome, the Kevin is 620 ft thick (Cobban and others, 1976).

Kmf **Ferdig Member, Marias River Formation (Upper Cretaceous)** – Dark-gray, fissile shale, with scattered laminae and very thin beds of sandstone and siltstone in the lower part. Reddish brown, gray, and brownish gray septarian concretions usually less than 1 ft in diameter are common. At the type section on the Kevin-Sunburst Dome the Ferdig is 224 ft thick (Cobban and others, 1976).

Kbl **Blackleaf Formation (Lower and Upper Cretaceous) –** used only on cross section.

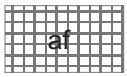
Kk **Kootenai Formation (Lower Cretacous) –** used only on cross section.

Je **Ellis Group (Upper and Middle Jurassic) –** used only on cross section.

Mm **Madison Group (Upper Mississippian) –** used only on cross section.

Map Symbols

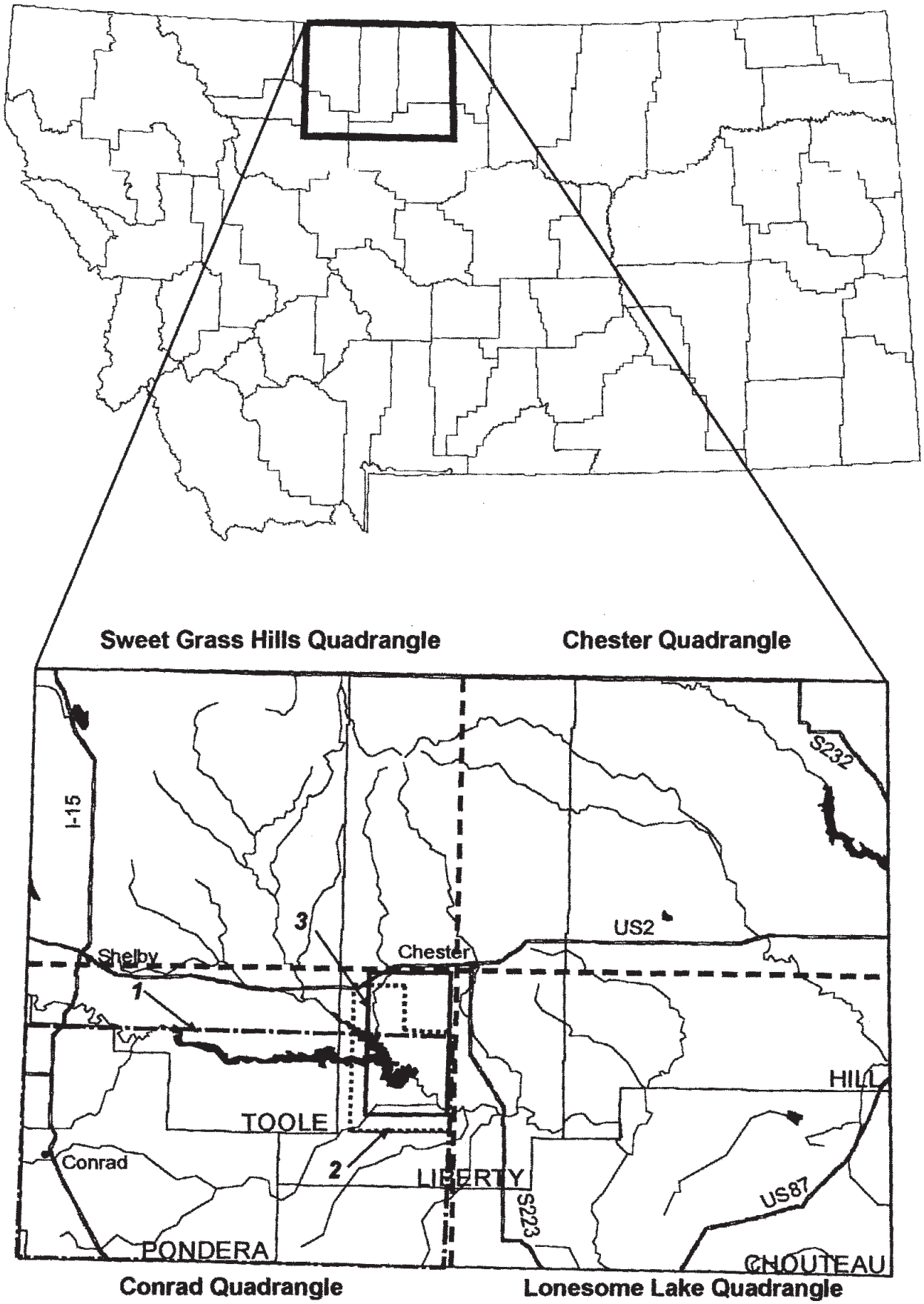
Contact, dotted where concealed.



Artificial fill (earth-fill dams)

(Kjr)

Unit symbol in parentheses denotes that the unit is concealed by glacial deposits.



Index map and sources of geologic mapping for the Conrad 30'X 60' quadrangle.

REFERENCES CITED

(Numbers at end of citations correspond to numbered areas on Index Map)

Cobban, W. A., 1955, Cretaceous rocks of northwestern Montana, *in* P. J. Lewis, (ed.), Sweetgrass Arch-Disturbed Belt, Montana: Sixth annual field conference guidebook, Billings Geological Society, p. 107-119.

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Dobbin, C. E., and Erdmann, C. E., 1930, Great Falls-Conrad region: U. S. Geological Survey press release map, scale 1:250,000. ***(map 1)***

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Lopez, D. A., 1994, Preliminary geologic map of the Conrad 30' X 60' quadrangle, Montana Bureau of Mines and Geology Open-File report MBMG-313, scale 1:100,000.

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Smith, J. F., Jr., Witkind, I. J., and Trimble, D. E., 1959, Geology of the lower Marias River area, Chouteau, Hill, and Liberty counties, Montana: U. S. Geological Survey Bulletin 1071-E, p. 121-155, Plate 10, scale 1:62,500. ***(map 3)***