GEOLOGIC AND STRUCTURE CONTOUR MAP OF THE WHITEWATER 30' x 60' QUADRANGLE NORTHEASTERN MONTANA

by

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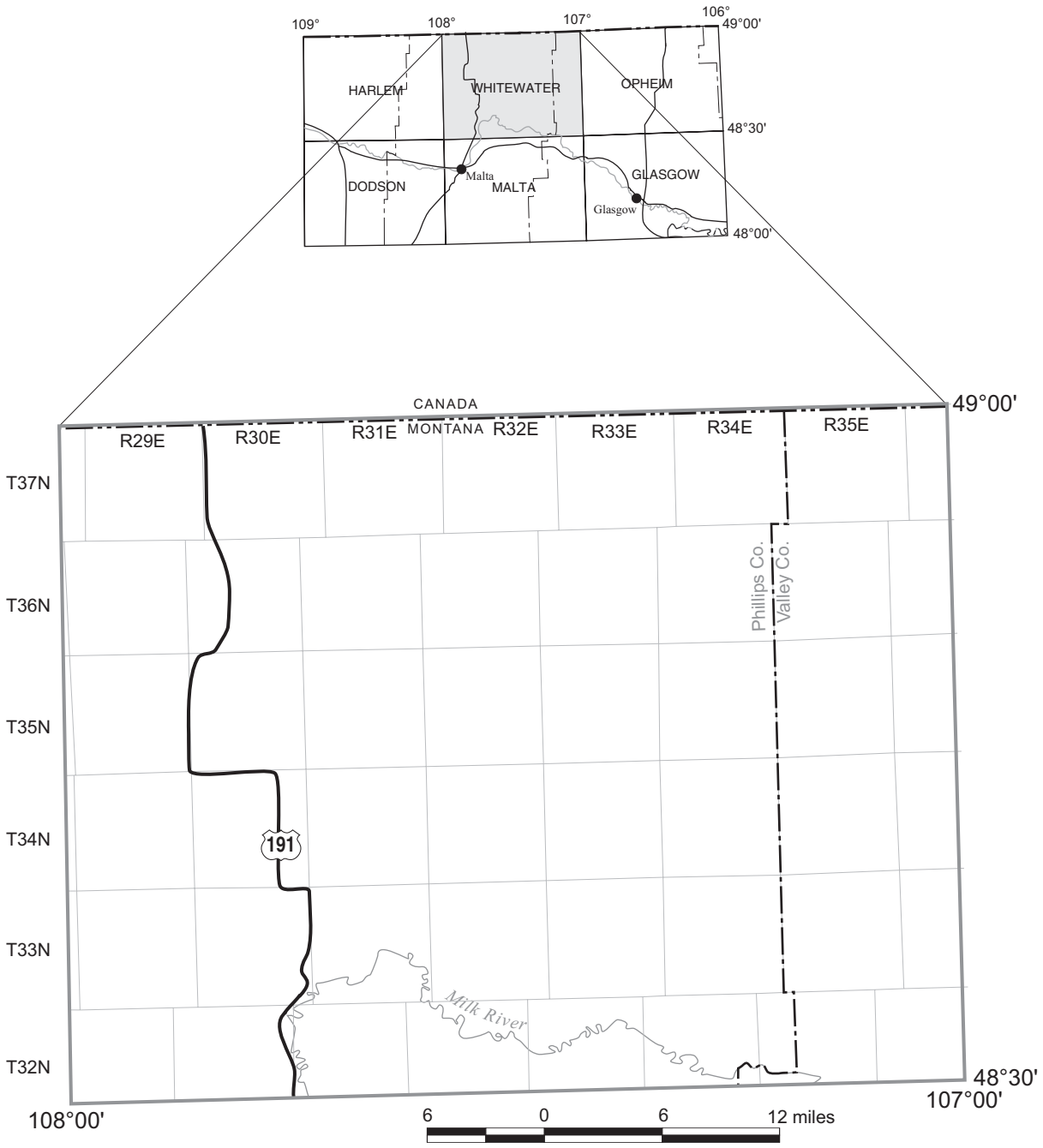
INTRODUCTION

The distribution of Quaternary alluvium (Qal) on this map was derived principally from interpretation of U.S. Geological Survey 7.5' topographic quadrangles. The maps by Colton and Patton (1987a, b) provided most of the information on the late Tertiary-early Quaternary deposits (Tsg). The few bedrock contacts depicted on those maps were incorporated into the present geologic map of the Whitewater 30'x 60' quadrangle and extended by maps showing the altitude of the top of the Judith River Formation and Claggett Shale. These latter maps were produced from data in Feltis and others (1981) and from water well logs and microfiche copies of petroleum well logs on file at Montana Bureau of Mines and Geology's Ground-Water Information Center.

Sandstone of the Judith River Formation generally overlies the Claggett Shale; in some areas, cemented gravel caps the Claggett Shale. Cemented gravels also locally cap the Bearpaw Shale. Along major drainages where glacial or postglacial erosion has cut through the more resistant beds into the shale, landslide deposits in the Claggett and Bearpaw shales are common. Some of the landslides extend for several miles along a stream and may extend back from the stream more than one-half mile.

The map has a bedrock emphasis although bedrock is largely masked by unmapped glacial till. Glacial deposits are mapped in only limited areas and are not differentiated. Structure contours on the tops of the Judith River Formation and Clagget Shale are based on evaluation of well logs. Tertiary and Pleistocene sand and gravel (commonly overlain by till) also mask the bedrock. Most contacts, even where shown as a solid line, should be considered as concealed or approximate.

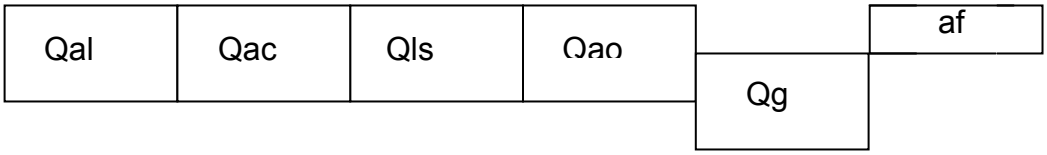


Colton and Patton, 1987a, b (whole quadrangle)

Figure 1. Location map for Whitewater 30'x60' quadrangle showing areas covered by older geologic maps within the quadrangle (see Sources of Previous Geologic Mapping), and location of adjacent geologic maps published by MBMG.

Correlation Chart of Map Units
Whitewater 30’ x 60’ Quadrangle

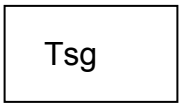
Quaternary



Unconformity

Tertiary

Unconformity



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Upper Cretaceous

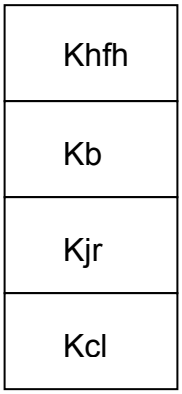

Figure 2. Correlation chart of map units

MAP UNITS

QUATERNARY

Qal	Alluvial deposits (Holocene) –- Deposits of gravel, sand, silt or clay in modern channels and flood plains
Qac	Alluvium-colluvium (Quaternary) –- Includes deposits in alluvial fans and on alluvial terraces, and may include glacial outwash
Qls	Landslide deposits (Quaternary)
Qao	Older alluvium, pre-Illinoian (Pleistocene) –- Possibly the equivalent of the Kintyre Formation of Jensen and Varnes (1964) and Colton and others (1989) in the Glasgow 30' x 60' quadrangle
Qg	Glacial deposits, undivided (Pleistocene)
af	Artificial fill – large remnant pile of rock quarried from Snake Butte to use as rip-rap for Fort Peck Dam

TERTIARY

Tsg	Sand and gravel deposits (Miocene-Pliocene) –- may include extensive sand and gravel deposits of Pleistocene age

UPPER CRETACEOUS

Khfh	Hell Creek and Fox Hills Formations, undivided –- Units uncertainly correlated northward into Canada; 20-30 meters (60-100 feet) thick
Kb	Bearpaw Shale — 330 meters (1100 feet) thick
Kjr	Judith River Formation –- 80-140 meters (250-450 feet) thick; thins to the east
Kcl	Claggett Shale –-120 meters (400 feet) thick

GEOLOGIC SYMBOLS

Contact: dotted where concealed

Significant break in slope between two levels of Qal

REFERENCES

Sources of Geologic Map Data in the Quadrangle

Colton, R.B., and Patton, T.W., 1987a, Surficial geology of the 72 quadrangles comprising the Whitewater 30' x 60' quadrangle, Montana [unpublished]: U.S. Geological Survey and Montana Bureau of Mines and Geology, scale 1:24,000.

Colton, R.B., and Patton, T.W., 1987b, Buried and abandoned drainage in the Whitewater 30' x 60' quadrangle, Montana [unpublished]: U.S. Geological Survey and Montana Bureau of Mines and Geology, scale 1:100,000.

Additional Sources

Colton, R.B., Whitaker, S.T., and Ehler, W.C., 1989, Geologic map of the Glasgow 30' x 60' quadrangle, Valley and McCone Counties, Montana: U.S. Geological Survey, Open-File Map 89-171, scale 1:100,000.

Feltis, R.D., Lewis, B.D., Frasure, R.L., Rioux, R.P., Jauhola, C.A., and Hotchkiss, W.R., 1981, Selected geologic data from the Northern Great Plains area of Montana: U.S. Geological Survey Water Resources Investigations, Open-File Report 81-415, 63 p.

Jensen, F.S., and Varnes, H.D., 1964, Geologic map of the Fort Peck area, Garfield, McCone, and Valley Counties, Montana: U.S. Geological Survey Professional Paper 414-F, p. 1-49, plate 1, scale 1:48,000.

Whitaker, S.H., 1967, Geology and groundwater resources of the Wood Mountain area (72-G), Saskatchewan Research Council, Geology Division, Map No. 5, scale 1:250,000.