

Base from U.S. Geological Survey, 1965

Geology mapped in 1976. Faults from M. R. Mudge, unpub. mapping

SCALE 1:24,000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET.

QUADRANGLE LOCATION

MONTANA

CILLY CREEK, MONT.
N4745-W11345/75

1965

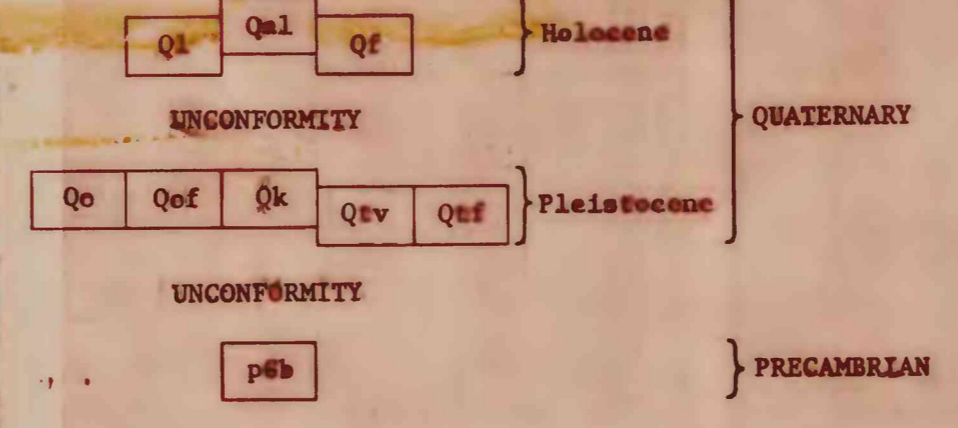
AMS 3219 IV SE. SERIES 1984

Introduction

U.S. Geological Survey personnel, in conjunction with Mark Weber, Geologic Consultant to Missoula and Powell Counties, are studying the water and earth resources of an area that extends from the Big Fork quadrangle on the north to the Avon quadrangle on the south (see index map). This map is a product of that study, and is intended for use by environmental and land-use planners. Maps of quadrangles, or parts of quadrangles, south of Highway 200, have been prepared by Weber.

The distribution of the alluvium was plotted in the office from aerial photographs. All other geologic units were mapped in the field.

CORRELATION OF MAP UNITS



Surficial deposits

Surficial deposits in the northern part of the Big Fork-Avon area were formed primarily during the latter stages of the latest ice age--the Pinedale Glaciation of the Pleistocene. Glacial deposits mantle the lower flanks of the mountains and form the valley floors; they have been dissected somewhat by streams, but most still appear such as when they were formed. In some localities, deposits of more than one ice advance may have been included in one of the other category.

DESCRIPTION OF MAP UNITS

Qal ALLUVIUM (HOLOCENE)--Stream-deposited, unconsolidated silt, sand, and gravel. Forms the floor of Swan River. Locally includes small deposits of colluvium and other mass-wasting debris. Light brown to brown; clasts range in shape from subangular to well rounded; most are rounded. In general, about 72 percent of unit is composed of clasts that range in size from about 5 mm to about 76 mm (1/4-3 in.) in diameter; about 26 percent consists of a fine to coarse sand with included small pebbles as much as 5 mm; and the remaining 2 percent is silt. Green, gray, and purple argillite, tan dolomite, and bluish-gray limestone clasts dominate. Overlies and normally masks sand and gravel deposited by meltwaters of wasting glaciers.

Ql LANDSLIDE (HOLOCENE)--Small, elongate, hummocky mass of partly consolidated, unsorted debris ranging in size from silt to boulders. Formed when a mass of till slumped valleyward.

Qf ALLUVIAL FAN (HOLOCENE)--Broad, fan-shaped, moderately sloping, even-surfaced deposit of poorly sorted debris at mouth of mountain valley. Consists of angular to subangular fragments of argillite, siltite, sandstone, and dolomite derived from bedrock exposed in mountains to the east.

MELTWATERS OF PINEDALE GLACIATION (PLEISTOCENE)

Qo Outwash--Includes two kinds of deposits. The first, represented by narrow, sinuous, interrelated outwash channels along the west side of Swan Valley, consists of light-brown to brown, unconsolidated to partly consolidated, till-sorted silt, sand, and gravel. Clasts range in shape from angular to rounded; most are subrounded. Sizes range from about 0.5 to 20 cm (1/4-8 in.); most are about 5 cm (2 in.) in diameter. Clasts of green, gray, and purple argillite dominate; tan quartzite and sandstone clasts are minor constituents. These channels were formed by meltwater which flowed in and around isolated blocks of a wasting glacier. The second kind of deposit fills outwash channels (along South Fork Lost Creek and Goat Creek) formed by meltwater which flowed westward from valleys in the Swan Range. Deposits are brown to dark brown, unconsolidated, and moderately well sorted. Clasts range in shape from angular to well rounded; most are subangular. Sizes range from about 0.5 to 20 cm (1/4-8 in.); most are about 6 cm (2 1/2 in.) in diameter. Clasts of green, gray, and purple argillite dominate.

Qof Outwash fan--Broad, fan-shaped deposit of light-gray to gray, unconsolidated, moderately well sorted silt, sand, gravel, and cobbles at mouth of outwash channel. Clasts range in shape from subrounded to well rounded; most are rounded. In general, about 85 percent of unit is composed of clasts that range in size from about 5 mm to about 76 mm (1/4-3 in.) in diameter; about 13 percent consists of a fine to coarse sand with included small pebbles as much as 5 mm; and the remaining 2 percent is silt. Green, gray, and purple argillite, and bluish-gray limestone clasts dominate deposit.

Qk Kame--Low, conical to ellipsoidal hillock with gently inclined flanks; composed of moderately to poorly sorted silt, sand, and gravel. Clasts range in shape from angular to well rounded; most are subrounded. In general, about 67 percent of unit is composed of clasts that range in size from about 5 mm to about 76 mm (1/4-3 in.) in diameter; about 26 percent consists of a fine to coarse sand with included small pebbles as much as 5 mm; and the remaining 7 percent is silt. Clasts of green, gray, and purple argillite dominate. Few well-rounded cobbles scattered irregularly through the unit. Formed by glacial stream that flowed down into a stagnant ice mass.

PINEDALE TILL (PLEISTOCENE)

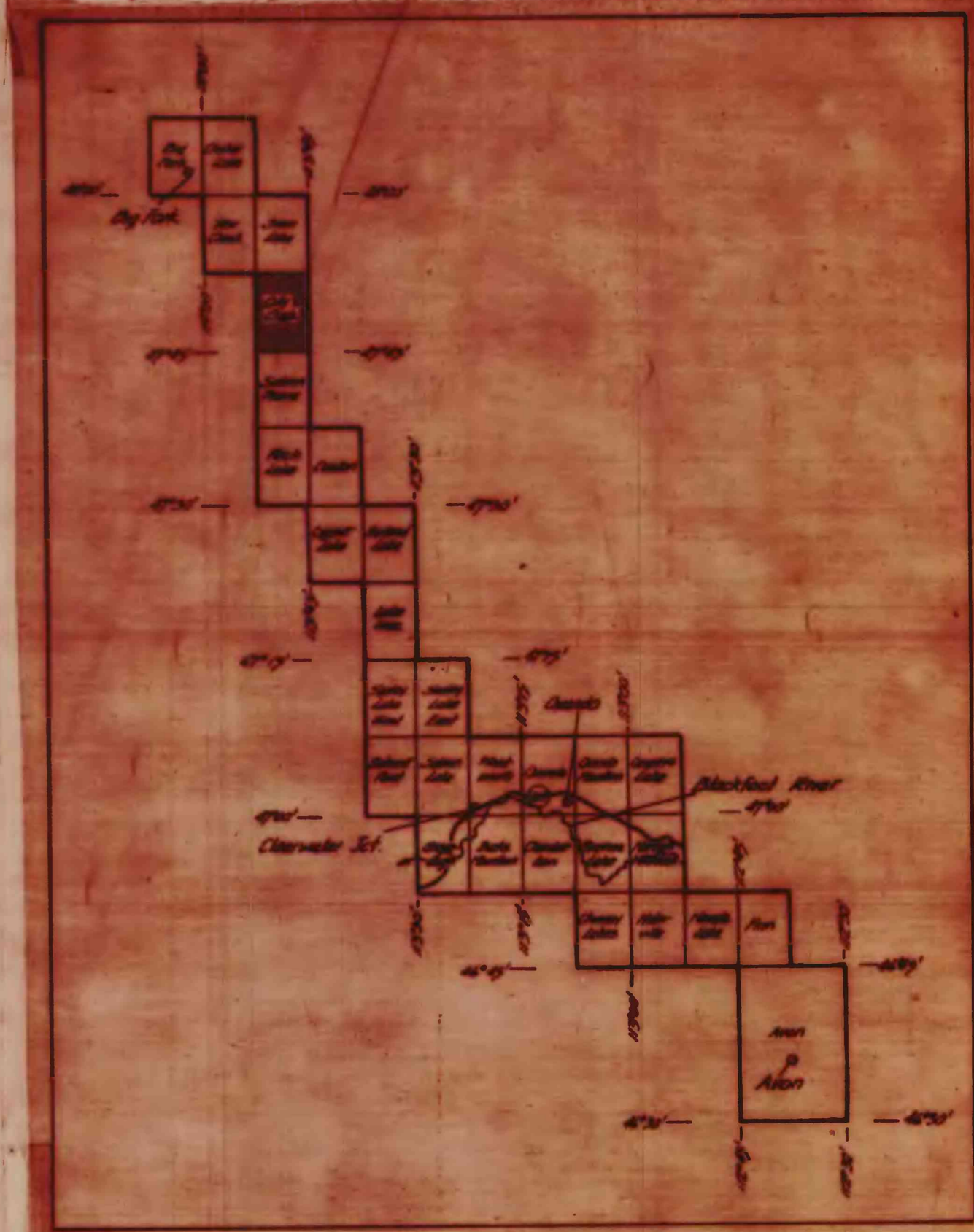
Qtv Valley facies--Characterized by a striking knob-and-kettle topography marked by numerous small kettle lakes and swamps. Many small aligned drumlins that trend about N. 15° W. suggest general northwest direction of movement of trunk glacier that overrode this till. Brown to dark brown, very coarse; consists of a heterogeneous mixture of unconsolidated to partly consolidated gravel, cobbles, and boulders in a silty to clayey matrix. Locally matrix becomes somewhat sandy. Clasts range in shape from angular to well rounded; most are rounded. Includes many rounded cobbles 8-20 cm (3-8 in.) in diameter, and many subrounded to rounded boulders 0.3-1 m (1-3 ft) across. Clasts of green, gray, and purple argillite dominate. Many large angular to subangular boulders 2-4 m (8-10 ft) across, are scattered through the till and on the surface. This till was deposited by a glacier that flowed northeastward from ancestral Lindbergh Lake Valley (south of this quadrangle) into the ancestral valley of Swan River.

Qtf Foothill facies--Forms a thin to thick veneer over bedrock; extensively mantled by colluvium. Light-brown to brown; consists of an unsorted mixture of gravel, cobbles, and boulders in a silty to clayey matrix. Clasts range in shape from angular to subrounded; most are subangular. Most clasts range from 0.1 to 6 cm (1/2-2 1/2 in.) across. Clasts of green, gray, and purple argillite, of tan dolomite, and of tan quartzite and sandstone appear to be equally profuse. Boulders 0.4-4.5 m (2-15 ft) across are common. Source of this till is unknown; likely it was deposited by an older glacier that flowed north in ancestral Swan River Valley prior to the advent of the younger glacier responsible for the drift that now mantles most of the valley floor. It may have been deposited, however, by an older glacier that flowed southward up the ancestral Swan River Valley.

p5b BEDROCK OF BELT SUPERGROUP--UNDIVIDED (PRECAMBRIAN)--Consists of several units of the Belt Supergroup, chiefly the Spokane (argillite and siltite), Empire (argillite and siltite), and Helena (dolomite) Formations. These are "bright" units in varying shades of red, purple, green, tan, and gray.

CONTACT--Approximately located or inferred. In many places wholly or partly concealed by debris or dense foliage.

FAULT--Dashed where approximately located or inferred; dotted where concealed. U, upthrown side; D, downthrown side.



Index map showing quadrangles in the Big Fork-Avon area. The Cilly Creek quadrangle is shaded. Preliminary surficial geologic maps of the following quadrangles, by I. J. Witkind, are available as U.S. Geological Survey Open-File Reports from the following office:

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|---|--------|
| Open-File Services Section
Branch of Distribution
Box 25425, Federal Center
Denver, CO 80225 | |
| 1. Cilly Creek | 77-860 |
| 2. Condon (W. half) | 77-540 |
| 3. Coopers Lake (S. half) | 77-466 |
| 4. Cygnet Lake | 77-198 |
| 5. Holland Lake (W. half) | 77-199 |
| 6. Lake Ipez | 77-200 |
| 7. Ovando | 77-196 |
| 8. Ovando Mountain (S. half) | 77-465 |
| 9. Peck Lake (E. half) | 77-539 |
| 10. Salmon Lake | 77-197 |
| 11. Salmon Prairie | 77-461 |
| 12. Seeley Lake East | 77-202 |
| 13. Seeley Lake West | 77-201 |
| 14. Woodworth | 77-203 |