UNITED STATES DEPARTMENT OF THE INTERIOR

U.S GEOLOGICAL SURVEY
[Reports - Open file series]

Surficial deposits of the Wakefield NE. and Marenisco quadrangles, Gogebic County, Michigan /

by

Virgil A. Trent 1930-

1973

/ Work done in cooperation with the Geological Survey Division of the Michigan Department of Natural Resources.

U. S. GOVERNMENT PRINTING OFFICE : 1959 O - 511171
667-100

Surficial deposits of the Wakefield NE. and Marenisco quadrangles, Gogebic County, Michigan [1]

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The Wakefield NE. and Marenisco 7½-minute quadrangles comprise about 108 square miles in the easternmost part of the Gogebic Range, in central Gogebic County, Mich. Thin till (ground moraine) mantles shallow bedrock over most of the area. Deeper deposits of till along the southern margin of the area are also present in the east-trending Marenisco moraine described by Martin (1957). Stratified drift deposits include outwash along the main drainage network in preglacial valleys and patches of outwash and channel deposits which fringe the preglacial valleys.

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U. S. GOVERNMENT PRINTING OFFICE : 1959 O - 511171
007-100

The map shows more than 95 percent of the areas of outcrop present in the two quadrangles. I estimate the mapped outcrop area to total 13 percent of the two quadrangles, roughly 13 square miles. Outcrop is unusually abundant in this area because it was a structural high prior to glaciation (Hamlin, 1961), the rocks having been repeatedly deformed throughout most of known geologic time (Trent, 1972). Granite, flow breccia, and mafic dikes and sills form the largest proportion of rocks cropping out in the area because they do not tend to weather chemically to form and hold a soil cover. The older gneiss and schist, on the other hand, are typically chloritized which permit development of a dark humus soil which it often holds tenaciously. Stripping a deep mat of moss from one greenstone outcrop revealed abundant earthworms in a thick, black, mucky soil horizon. Afterwards, this outcrop was referred to as the "fishing-worm gneiss."

U. S. GOVERNMENT PRINTING OFFICE : 1959 O - 511171
867-100

Continental ice sheets moved across this area at four separate times during the Pleistocene Epoch. According to Frank Leverett (1928), most of the surficial materials here were deposited in middle to late Wisconsin time (the Wisconsin glaciation is the latest of the four glacial stages). Work by Leverett and by S. G. Bergquist (unpub. manuscript) suggests that the mapped area lies on the border between the Chippewa and Keweenaw sublobes of the Superior lobe of the Labrador ice sheet, the Chippewa sublobe, of western Lake Superior and northern Wisconsin, lying to the west. Twenty readings on glacial grooves and striae obtained throughout the area tend to confirm this. Striae in the eastern third of the area trend consistently west of south, and those in the western third trend east of south.

No evidence was found to indicate that glaciers modified the preglacial topography of this area greatly, except that valleys controlled the dumping of glacial debris. Leverett (1928) concluded that the preglacial topography was probably much the same as today's, with only minor changes due to glacial erosion and to postglacial deposition, chiefly by vegetable material that has accumulated as peat humus in swamps. I saw no indication of plucking or quarrying of rock surfaces; striae were observed in 25 locations but chatter marks at only one outcrop. Low-profile glacially polished and grooved surfaces, roche moutonée, were observed sporadically where tough, northeast-trending mafic dikes crop out enclosed by granite.

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867-100

Because the bedrock is at the ground surface or at shallow depth over most of the area, the topography reflects the bedrock form or structure. The bedrock surface thus revealed has controlled and channeled the ice movement and localized the deposition of glacial drift. Till on the lee sides of rock ledges is thicker than that on the stoss sides. The few deep pockets of boulder tills in the area are ablation till that records deposition after the ice at the site stagnated. Kettled moraine is common in the area.

Stratified drift occurs as outwash deposits along the valleys, as in secs. 26 and 27, T. 47 N., R. 44 W. It also occurs as kettled deposits in areas away from the main drainage, as in secs. 19 and 31, same township, and in sec. 8, T. 46 N., R. 43 W. Smaller bodies of stratified drift are common as small scattered areas in the till. Field indications that help to identify areas of stratified drift include kettled topography and areas of hummocky, frost-heaved soils that result from alternating layers of clay, sand, and gravel. Abundant stands of aspen or of evergreens are also indicators; aspen proliferate on sandy ice-contact deposits and evergreens, especially red pine, on sandy outwash.

U. S. GOVERNMENT PRINTING OFFICE : 1959 O - 511171
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The clayey till plain along the northern border of the two quadrangles is underlain by Jacobsville Sandstone of Cambrian age (Hamlin, 1958). The till is covered in places by outwash deposits and in places by swamp deposits, although none of the latter were exposed along 1½ miles of the pipeline trench through this area northeast of Wakefield, Mich., or in four drill holes along the east section line of secs. 5 and 8, T. 47 N., R. 43 W. Drill records supplied through the courtesy of the Bear Creek Exploration Co. show that the thickness of the till ranges from about 40 feet to well over 100 feet.

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Except where rock is deeply buried, drainage patterns ar[illegible] controlled by joints, faults, and folds in the bedrock. For exam[illegible] channels of deeper water in beaver ponds are commonly straight, evidently controlled by joints. The Presque Isle River meanders south and north of the outcrop area, but within it the fractured rock imparts a rectilinear control on its channel. The valleys on both sides of the bedrock hill in sec. 27, T. 47 N., R. 44 W., are structurally controlled. The hill itself is a cuesta, held up by a mafic sill. The main drainage, Little Presque Isle River, was probably west of this hill in preglacial time, as it is today. On a still larger scale, 1 mile northeast of the mapped area, Lake Gogebic, which is 12 miles long and 1 to 2 miles wide, is both conspicuous and anomalous when compared to other lakes in the area because of its size and form. Two of the most prominent, complementary joint sets in the mapped area have bearings of N. 25° W. and N. 65° E. matching exactly bearings of Lake Gogebic's long axis and northern dog-legged segment. Hendrix has suggested that the linear form of Lake Gogebic was due to structural control (Hendrix, 1960). Structural data from the mapped area imply that late tectonic stresses resulted in gneiss doming of the basement. Prominent, pre-existing joints such as those mentioned controlled the resultant strain pattern.

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607-100

Stratified sand and gravel along the section line between secs. 26 and 27, T. 47 N., R. 44 W., lie in a valley between two prominent ridges underlain by mafic sills. Larger deposits 2 miles north of Dunham in sec. 3, T. 47 N., R. 43 W., and east and northeast of Dunham in secs. 14 and 11, same township, have been partly mined. Other deposits mapped as outwash fringe the present drainage system.

The 1968 pipeline trench excavation exposed a peat humus section 1 to 8 feet thick, 1,000 feet long in sec. 13, T. 47 N., R. 45 W. Wood fragments of all sizes and degrees of deterioration are common in weathered peat (commonly called humus) above bleached gray clay and silty clay. Jackson Creek, to which this drainage area is tributary, flows through a water gap $\frac{1}{4}$ mile northwest of this deposit in the adjacent quadrangle. It was probably dammed during glacial recession resulting in water flooding of the low-forested slopes of tributary valleys. Many peat deposits characteristic of this region are located in drowned valleys according to Cornelia C. Cameron of the U.S. Geological Survey (oral commun., 1973).

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EXPLANATION

73-287

QUATERNARY

THIN BOULDER TILL

ROCK CROPS OUT AT OR NEAR SURFACE MANTLED BY THIN BOULDER TILL (GROUND MORAINE); SPORADIC KETTLED TOPOGRAPHY AND SWAMP DEPOSITS

OUTWASH DEPOSITS

STRATIFIED SAND AND GRAVEL INTERBEDDED WITH BOULDER TILL; KETTLED TOPOGRAPHY COMMON WITH SPARSE POTHOLE LAKES

TILL PLAIN

CLAYEY TILL PLAIN UNDERLAIN BY CAMBRIAN SANDSTONE; DEEPER GROUND MORAINE WITH SPARSE SWAMP DEPOSITS

CONTACT

OUTCROP

35 STRIKE AND DIP OF BAD RIVER DOLOMITE

ADIT

CAVED ADIT

SHAFT AT SURFACE

EXPLORATION TRENCH

MINE DUMP

SAND AND GRAVEL BORROW PIT AND MINE SITE

40' DRILL HOLE (NUMBER INDICATE DEPTH OF OVERBURDEN)

40' DRILL HOLE INCLINED SHOWING VERTICAL PROJECTION, AND ASSUMED DEPTH TO BEDROCK AT COLLAR

WATER WELL

IRON FM. CONSPICUOUS BOULDER(S), ROCK TYPE NOTED

BOULDER FIELD

LOCATION AND BEARING OF GLACIAL STRIAE