Energy, Mines and Resources Canada
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GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA

DESCRIPTIVE NOTES

Introduction

The surficial deposits within this area are generally thin and much of the local topography reflects the geomorphology of the bedrock (Whitaker, 1965, 1967). The Wood Mountain Upland trends roughly east-west across the central part of the area and forms part of the regional drainage divide between Hudson Bay and Gulf of Mexico. Ground moraine and glacial lake sediments occur over the northward-sloping flanks of the upland and merge into adjacent plains. The southern slopes consist mostly of stream dissected bedrock surfaces and interstream divides including remnants of bedrock pediments veneered with till or marked by scattered erratics. Pediments in the southeastern corner are devoid of drift and appear unglaciated.

Mapping of the Surficial geology of the Wood Mountain area was begun in 1988 and completed in 1990. Air photo interpretation, field study of exposures, and shallow drilling provided the controls for establishing map units, studying the stratigraphy, and establishing age relationships.

Surficial Geology

Drift forms the surface over most of the north half of the area, as well as the southwestern part west of Frenchman Valley, and veneers pediment remnants within the Frenchman River drainage east of the main valley. The drift consists mainly of till and sediments deposited in glacial lakes, including bedded silt, clay, and sand along with silty clay diamicts. Fluvial and mass wasting processes shaped much of the bedrock landscape of the southern slopes of the upland and valley bottoms include a mix of alluvium and colluvium derived mainly from local bedrock.

Till seen in stream cuts and identified in shallow boreholes is typically a silty loam with less than 5% megaclasts of Shield, eastern carbonate, and local bedrock types. Exposures of multiple tills are rare and restricted to stream bluffs in the south-central part of the area near the International Boundary.

The surface drift is mostly of Late Wisconsinan age, although the eroded nature of the glaciated surfaces over the southern slopes of the upland east of Frenchman River valley suggest parts here are much older than Late Wisconsinan. The Late Wisconsinan age is assigned on the basis of radiocarbon dates in the 14 to 9 ka range that were obtained from sediments postdating till deposition in hummocky moraine depressions within belts in southwest part of the area and in the Cypress Lake area to the west.

Gently irregular to nearly flat surfaced ground moraine and glacial lake sediments make up most of the surficial deposits north of the Wood Mountain Upland. Ground moraine covers the north-facing slopes across the central part of the area and forms the gently irregular surfaces in the northeast and northwest corners of the area. Glacial lake sediments occur in the north-central part of the area. The drift associated with ground moraines is generally thin and most valleys are incised in bedrock, except in the northeast corner where the drift includes glaciolacustrine diamicts and thicknesses range from 15 to 50 m. Surficial deposits reach 60 m thickness within buried valleys.

Hummocks, ridges, and intervening depressions with 10 to 20 m local relief form distinctive hummocky moraine landscape in the southwest part of the area, and form belts of hummocky moraine in the northeast part. Similar hummocky terrain marked by subparallel trends of ridges, referred to as 'ridged moraine', form belts of ice-thrust drift south of the ground moraine along the north-facing slopes of the eastern part of the upland. Most hummocky moraine is till although ice contact and glaciolacustrine sediments occur in places. Ridged moraine consists of slabs of bedrock intercalated with till and includes the greatest thickness of drift (118 m) recorded in the area.

Outwash deposits are rare and restricted to certain segments of abandoned meltwater channels where they underlie terraces and valley bottoms. Some stratified sands and fine gravels located along the margins of former glacial lake basins may have originated as outwash, but most of these types of sediments appear to be shoreline deposits.

Postglacial sediments are common along the lower slopes and bottoms of valleys and gullies in the area. The thicked deposits occur within Frenchman Valley where drilling records indicate that the alluvial and colluvial fill is about 30 m thick - substantially less than 75 m thicknesses recorded in the valley farther upstream. The alluvium and colluvium within most of the valleys across the southern slopes of the Wood Mountain Upland appear to be relatively thin as most are minor tributaries of large valleys to the south. Wood River and its tributaries in the north-central part are flanked by broad alluvial flats where the streams meander across glacial lake sediments. Here, much of the alluvium appears to be relatively thin, reworked glacial lake sediment which is difficult to distinguish from in situ glacial lake sediment; the two types of deposits are surficially separated on the basis of morphology. The similarity of the two types of sediment makes it difficult to determine the thickness of alluvium on the basis of subsurface information.

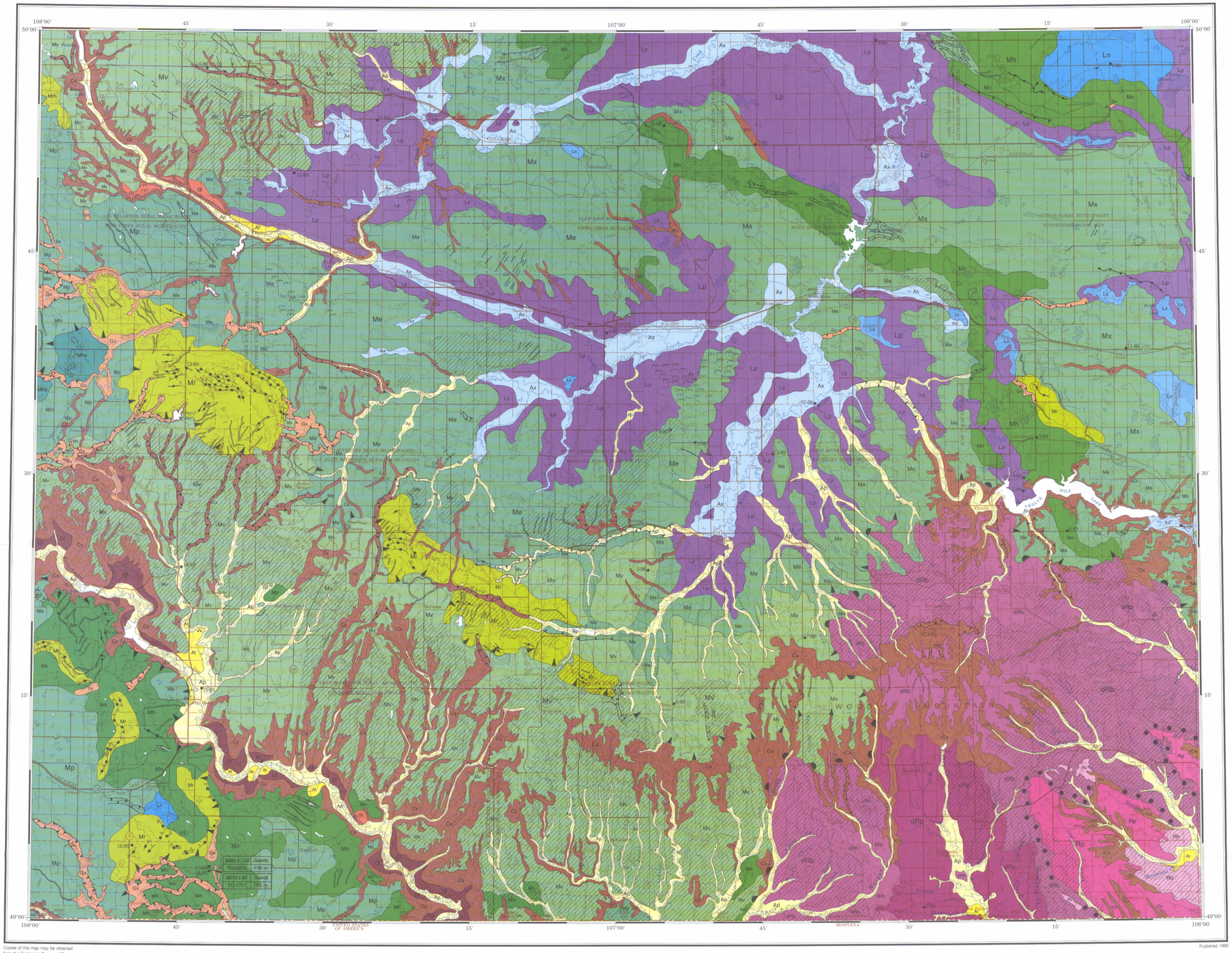
Acknowledgments

During the summer months the author was ably assisted in the field by John Kulig (1988,89,90) and Michelle Perras (1988,89) who concurrently conducted doctoral and master's theses studies, respectively, on aspects of the surficial geology in the Wood Mountain and Cypress Lake areas.

References

Whitaker, S.H.
1965: Geology of the Wood Mountain area (72G) Saskatchewan; Ph.D. thesis, University of Illinois, Urbana, Illinois
1967: Geology and groundwater resources of the Wood Mountain area (72G), Saskatchewan; Saskatchewan Research Council, Geology Division, Map No.5, scale 1:250 000

Geological boundary
Limit of glacial deposits
Maximum limit of Late Wisconsinan ice
Minimum limit of Late Wisconsinan ice
Coincident maximum and minimum limits of Late Wisconsinan ice
Inferred direction of last ice flow
Boulder pavement striae (ice flow direction assumed)
Pebble fabric parallel to ice flow
Moraine ridge (major, minor)
Moraine plateau
Ice thrust ridge (teeth on ice-push side)
Esker (direction of flow assumed, unknown)
Meltwater or spillway channel with minimal postglacial erosion (major, minor)
Escarpment
Buried valley
Landslide scar
Areas of gullying
Sand dune field
Gravel pit
Clay pit
Drill site 4-88
Radiocarbon date (Age | Material; Lab no | Elevation(m))



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INDEX MAP

Geology by R.W. Klassen 1987-1989

Geological cartography by the Geological Survey of Canada

Colour separations were produced using digital methods

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

MAP 1802A

SURFICIAL GEOLOGY

WOOD MOUNTAIN

SASKATCHEWAN

Scale 1:250 000 - Échelle 1/250 000

Kilometres 5 0 5 10 15 20 Kilomètres

Universal Transverse Mercator Projection

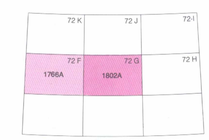
Projection transverse universelle de Mercator

Base map at the same scale published by the Surveys and Mapping Branch in 1976

Copies of the topographical edition of this map may be obtained from the Canada Map Office, Department of Energy, Mines and Resources, Ottawa, Ontario, K1A 0E9

Mean magnetic declination 1992, 14°00' E, decreasing 6.8' annually. Readings vary from 13°12' E in the SE corner to 14°51' E in the NW corner of the map

Elevations in feet above mean sea level



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

LEGEND

SURFICIAL MATERIALS
QUATERNARY
HOLOCENE

POSTGLACIAL ENVIRONMENT

COLLUVIAL DEPOSITS: *massive to weakly bedded sediments from less than 1 m to 30 m thick; derived from local bedrock and drift and deposited by mass movement and fluvial processes along and below steep upland slopes and valley walls; clast lithologies are mainly local quartzite and chert*

Cf — ***Colluvial fan:*** *silt, sand, gravel, and bedrock rubble formed by coalescing of fans and aprons along walls of major valleys; includes alluvial and sheetwash sediments*

Cx, dCx, rCx — ***Colluvial complex:*** *silt, sand, gravel, reworked drift, and bedrock.* **Cx**, *derived from drift and bedrock;* **dCx**, *derived mainly from drift;* **rCx**, *derived mainly from bedrock*

ALLUVIAL DEPOSITS: *bedded sediments generally from 10 to 30 m thick; derived from drift and local bedrock and deposited mainly by modern streams along valley bottoms and across lake plains; flat to gently irregular terrain; clast lithologies are mainly quartzite with chert, igneous and metamorphic Shield types, and carbonates*

Ap — ***Alluvial plain:*** *silt and sand with minor clay and gravel beneath floodplains; includes minor terraces and fans*

At — ***Alluvial terrace:*** *silt and sand, minor clay and gravel; occurs as low benches adjacent to alluvial plains; locally includes outwash and glaciolacustrine sediments*

Ax — ***Alluvial complex:*** *clay, silt, and sand from 5 to 20 m thick; alluvium and lacustrine and glaciolacustrine sediments, in part reworked by modern streams*

Lx — ***LACUSTRINE COMPLEX:*** *clay, silt, and sand up to 5 m thick; deposited in local lake basins as complex of ephemeral lake sediments and colluvium*

LATE WISCONSINAN

PROGLACIAL AND GLACIAL ENVIRONMENTS

GLACIOLACUSTRINE DEPOSITS: *bedded sediments from 5 to 20 m thick; deposited in glacial lakes and over stagnant ice; gently irregular to hummocky terrain with 2 to 10 m local relief*

Lp — ***Glaciolacustrine plain:*** *mainly silt and clay; flat to gently irregular*

Ln — ***Glaciolacustrine plain:*** *mainly silt and sand with some clay; gently irregular to low hummocky terrain with 2 to 10 m local relief*

GLACIOFLUVIAL DEPOSITS: *bedded to weakly bedded sand and gravel with minor silt; generally from 5 to 20 m thick; clast lithologies are igneous and metamorphic Shield types along with carbonates and local quartzite and chert; deposited by glacial meltwater along and beyond the glacier margin*

Gt — ***Outwash deposits:*** *silt, sand and gravel underlying prominent outwash terraces within meltwater channels*

Gx — ***Glaciofluvial complex and colluvium:*** *silt, sand, gravel, and bedrock rubble underlying slopes and undivided terraces and valley bottoms; occurs within abandoned channels where mass wasting processes dominate over fluvial processes*

GLACIAL ENVIRONMENT

GLACIAL DEPOSITS: *dominantly till deposited directly by glacier ice; some diamicton, clay, silt, sand, and gravel of glaciofluvial and glaciolacustrine origin; thicknesses from less than 1 m on bedrock benches to about 130 m beneath some moraines; typical till has roughly equal proportions of clay, silt, and sand with minor gravel; clast lithologies are mostly igneous and metamorphic Shield types along with carbonates and local quartzite and chert*

Mh, Mn — ***Hummocky moraine:*** *silty loam till, 15 to 80 m thick, underlying hummocks and depressions which generally occur in broadly linear belts reflecting the trend of former ice margins.* **Mh**, *relief 10 to 30 m,* **Mn**, *relief 5 to 10 m*

Mhs — ***Hummocky dead ice moraine:*** *silty loam till some 15 to 30 m thick underlying hummocks and depressions; 10 to 20 m relief; locally includes clay, silt, sand, and gravel of fluvial and glaciolacustrine origin associated with moraine plateaus*

Mr, Mrn — ***Ridged moraine:*** *silty loam till intercalated with bedrock; 10 to 130 m thick; consists of hummocks and subparallel ridges and intervening depressions that occur in belts formed by ice thrusting along former ice margins.* **Mr**, *relief 10 to 30 m,* **Mrn**, *relief 5 to 10 m*

Mp, Me, Mm, Mx — ***Ground moraine:*** *silty loam till and glaciolacustrine sediments from 2 to 15 m thick over flat to broadly rolling bedrock-controlled topography.* **Mp**, *flat to gently irregular till plains;* **Me**, *flat to gently irregular till plains with extensive areas eroded and reworked by glaciofluvial, glaciolacustrine, and eolian processes;* **Mm**, *broadly rolling bedrock-controlled topography with 10 to 30 m relief between swales;* **Mx**, *silty clay loam diamicton, 2 to 15 m thick over flat to gently irregular plains transitional to glaciolacustrine plains*

Mv — ***Patchy ground moraine:*** *discontinuous veneer of till overlying flat to irregular surfaces of pediments and pediment remnants in Cretaceous and Tertiary sediments*

BEDROCK, REWORKED BEDROCK, AND RESIDUAL DRIFT DEPOSITS

CRETACEOUS, TERTIARY AND PLEISTOCENE

Rp | dRp — ***Bedrock plateaus:*** *Bearpaw, Eastend, Frenchman, Ravenscrag, and Wood Mountain formations, silty clay shale, silt, sand, and gravel.* **Rp**, *flat to irregular surfaces that form the unglaciated parts of the Wood Mountain upland;* **dRp**, *includes reworked bedrock and rare glacial erratics on flat to irregular surfaces within the glaciated part of the Wood Mountain upland*

Rb | dRb — ***Bedrock pediments, benches, and erosional remnants:*** *Bearpaw, Eastend, Frenchman, and Ravenscrag and Wood Mountain formations, silty clay shale, silt, sand and gravel.* **Rb**, *plateau remnants within the unglaciated parts of Wood Mountain upland;* **dRb**, *includes reworked bedrock and rare glacial erratics on flat to irregular surfaces within the glaciated part of the Wood Mountain upland;* **dRh**, *includes reworked bedrock and rare glacial erratics in badlands-type terrain within the glaciated part of the Wood Mountain upland*

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1992: Surficial geology and drift thickness, Wood Mountain, Saskatchewan; Geological Survey of Canada, Map 1802A, scale 1:250 000

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