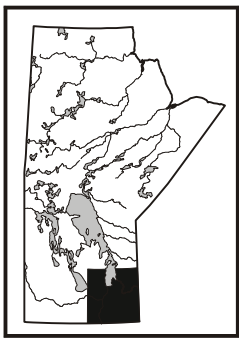
GS-26

GEOLOGY OF THE WINNIPEG REGION NATMAP PROJECT (NTS 62H/W, 62I AND 52L/W)

by G.L.D. Matile, L.H. Thorleifson[1], N. Grant[2], A. Burt[3], and J. Mann[2]



Matile, G.L.D., Thorleifson, L.H., Grant, N., Burt, A., and Mann, J. 1999: Geology of the Winnipeg region NATMAP project (NTS 62H/W, 62I and 52L/W); *in* Report of Activities, 1999, Manitoba Industry, Trade and Mines, Geological Services, p. 114-115.

SUMMARY

Under the auspices of the National Geoscience Mapping Program (NATMAP), Manitoba Geological Services Branch (MGSB) and Geological Survey of Canada (GSC) are cooperating in the completion of 3D geological mapping in the Winnipeg Region, from 49° to 51° N, and from 95° to 98° W. Emphasis is on engineering and environmental geology, surficial geological mapping, and linkage to bedrock mapping initiatives in the area. Mapping of the area southeast of the City of Winnipeg was completed under a first phase of investigations between 1991 and 1996. Coverage of the expanded study area is scheduled for completion in the year 2000.

INTRODUCTION

The NATMAP program was established by Canada's federal, and provincial governments, industry, and the academic geoscience community in 1990 to promote multidisciplinary, cooperative, computer-based programs of new geological mapping. The aim of the program is to address mineral resource development, environmental and societal concerns, as well as fundamental geological knowledge, along with ensuring the training of student geologists in mapping procedures (St-Onge, 1990).

Under the Prairie NATMAP project, initiated in 1991, new 1:100 000 surficial geology maps were completed for the Whitemouth Lake area (52E/SW; Matile and Thorleifson, 1995), the Falcon Lake area (52E/NW; Matile and Thorleifson, 1996a), the Steinbach area (62H/NE; Matile and Thorleifson, 1996b) and the St. Malo area (62H/SE; Matile and Thorleifson, 1996c). This work included synthesis of data previously collected by the former Aggregate Resources Section of Manitoba Energy and Mines, Mines Branch. Also included was a till geochemical and indicator mineral survey, based on surface till sampling and coring of the Quaternary sequence at 23 sites (Thorleifson and Matile, 1993).

Under the current Winnipeg NATMAP project (1997-2000), similar mapping and glacial sediment sampling is being completed, in the following areas: Morris (62H/SW), Winnipeg (62H/NW), Stonewall (62I/SW), Arborg (62I/NW), Selkirk (62I/SE), Pine Falls (62I/NE), Pinawa (52L/SW), and Nopiming (52L/NW).

The objectives of this expanded, Winnipeg-region NATMAP project are:

1) to obtain an enhanced understanding of the environmental framework and geological history of the Winnipeg region, through the synthesis of available information and collection of new field data, and to communicate this knowledge to users primarily in the form of new, computer-based geological maps;

2) to make major strides in understanding geological features such as the Belair/Sandilands glaciofluvial complex;

3) to further the establishment of a Winnipeg- and Ottawa-based infrastructure for the rapid production of high-quality, interactive digital cartographic products;

4) to support the training of field geologists in the production of new maps;

5) to facilitate mineral exploration, particularly in the exposed shield east of the Winnipeg River, by producing new geological and geochemical maps of the area;

6) to provide an upgraded information base designed to support construction and other engineering activity;

7) to better define geological factors that control the quantity, quality, and long term sustainability of groundwater resources in the Winnipeg region;

8) to support efforts to manage the Lake Winnipeg basin, by interpreting the evolution of the lake in recent geological time, and the role played by geology in controlling shoreline erosion; and 9) to support environmental and land use management, by mapping the composition and extent of lithological units that are relevant to issues such as waste disposal, soil geochemistry, and vulnerability of aquifers to contamination.

NEW SURFICIAL GEOLOGICAL MAPPING

Fieldwork for the new phase of work was initiated by a seven-person team during the summer of 1997, at which time data were collected in the Winnipeg area under the direction of G. Matile (MGSB), in the Stonewall area by N. Grant (University of Manitoba), and in the Selkirk area by A. Burt (University of Waterloo). In the summer of 1998, systematic data collection was completed, in the Morris area by Matile, the Arborg area by Grant, and the Pine Falls area by Burt. Systematic coverage of both the Pinawa and Nopiming areas was completed during the summer of 1998 by J. Mann (University of Manitoba).

Final follow-up field investigations were completed during the summer of 1999. In addition to confirming many aspects of mappable features, this work included detailed site excavations at exposures of Quaternary sediments throughout the area, including an aircraft-supported examination of glacial landforms and sediments in the Interlake.

Air photo interpretation and preparation of manuscript maps has been completed, and digital production of new surficial geological maps is now underway.

3D GEOLOGICAL MODELLING

Mapping of the Quaternary sediments in the study area is being extended into the subsurface, using drillhole data and geophysical surveys, in order to obtain a 3D model. In addition to new drilling, the modelling is based on existing databases including: the Manitoba Stratigraphic Database (MSD) managed by MGSB; the water well database held by Manitoba Water Resources Branch (GWDrill); and an engineering drillhole database originally compiled in the early 1970's for the City of Winnipeg and the GSC.

A major achievement during 1999 has been the construction of a new digital elevation model for southern Manitoba, using data compiled in varying formats and styles by Manitoba Natural Resources, as a single, consistent data file. This model has drawn attention to many features not previously recognized, and numerous applications already have been foreseen.

TILL GEOCHEMISTRY AND INDICATOR MINERALS

An open file summarizing data for till geochemistry, indicator minerals, matrix carbonate, and gravel fraction lithology, acquired from till samples at a 10 km spacing in the new NATMAP area, is in preparation.

OUTPUTS

During 1999, poster presentations summarizing progress of the NATMAP project were given at the Geological Society of America (GSA) North-Central conference in Champagne-Urbana, Illinois (Matile et al., 1999), and at the GSA Annual Meeting in Denver (Thorleifson et al., 1999).

[1] Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0E8

[2] Department of Geological Sciences, University of Manitoba, Wallace Building, Winnipeg Manitoba, R3T 2N2

[3] Department of Earth Sciences, University of Waterloo, Waterloo, Ontario N2L 3G1

PLANS

Plans for the coming year include:

- release of eight surficial geology maps, each covering four 1:50 000 map areas, at a scale of 1:100 000,
- release of till sampling data,
- construction of a 3D geological model, and
- final report preparation.

ACKNOWLEDGEMENTS

The authors wish to acknowledge with appreciation diligent efforts by Kenton Friesen, Jeff Gutsell, Greg Keller, and Matt Pyne who provided computer and database support for the mapping crews. We also want to thank our 1999 assistants for their hard work: Kylene Baxter, Tyler Hartz, Shannon Johnston, Liza McClintock, and Melanie McKay.

REFERENCES

Matile, G.L.D., Bamburak, J.D., Bezys, R.K., Conley, G.G., Burt, A.K., Grant, N.M., Mann, J.D., McDougall, W.J., Hughes, J.D., Thorleifson, L.H. 1999: New 3D geological mapping, Winnipeg region, Manitoba, Canada; Geological Society of America, North-Central Section, Abstracts with Programs, v. 31, no. 5, p. A-58.

Matile, G.L.D. and Thorleifson, L.H. 1995: Surficial geology, Whitemouth Lake area, Manitoba, Ontario, and Minnesota; Geological Survey of Canada, Open File 2993, Manitoba Energy and Mines, Open File 95-1, scale 1: 100 000.

1996a: Surficial geology, Falcon Lake area, Manitoba and Ontario; Geological Survey of Canada, Open File 3030, Manitoba Energy and Mines, Open File 95-2, scale 1: 100 000.

1996b: Surficial geology, Steinbach area, Manitoba; Geological Survey of Canada, Open File 3270, Manitoba Energy and Mines, Open File 96-6, scale 1: 100 000.

1996c: Surficial geology, St. Malo area, Manitoba; Geological Survey of Canada, Open File 3327, Manitoba Energy and Mines, Open File 96-9, scale 1: 100 000.

St-Onge, M.R. 1990: NATMAP: Canada's National Geoscience Mapping Program; Geological Survey of Canada, Open File 2256, 83 p.

Thorleifson, L. H. and Matile, G. L. D. 1993: Till geochemical and indicator mineral reconnaissance of southeastern Manitoba; Geological Survey of Canada Open File 2750, 1 diskette.

Thorleifson, L. H., Matile, G. L. D., Bamburak, J. D., Bezys, R. K., Conley, G.G., McDougall, W.J., Hughes, J.D., Burt, A.K., Grant, N.M., Mann, J.D. 1999: New 3D geological mapping, Winnipeg region, Manitoba, Canada; Geological Society of America Annual Meeting, Program with Abstracts.