

by M.L. Rinne

**In Brief:**

- Known mineral occurrences are not fully captured in Manitoba's Mineral Deposits Database
- Gaps in occurrence data are being filled from several sources, including assessment files and geochemical datasets
- First set of updates has so far resulted in approximately 100 new occurrences (and 150 updates to existing occurrences) added to the Island Lake region

**Citation:**

Rinne, M.L. 2020: Progress report on updates to the Manitoba Mineral Deposits Database, east-central Manitoba (NTS 53E, F); in Report of Activities 2020, Manitoba Agriculture and Resource Development, Manitoba Geological Survey, p. 9–12.

**Summary**

In 2020, the Manitoba Geological Survey (MGS) began work to update Manitoba's Mineral Deposits Database (MDD), mostly through reviews of historical datasets, including assessment reports. This report describes the rationale, methods and the intended product of the MDD update project, along with preliminary results from the first round of updates for NTS map sheets 53E and F. Comprehensive mineral occurrence data are fundamental to land-use and economic development planning, and are routinely used by the minerals sector to guide its increasingly data-driven mineral exploration decisions.

**Introduction**

The implementation of land-use plans and mineral development strategies in any jurisdiction requires an accurate understanding of the locations and characteristics of its known mineral occurrences. In its present form, the MDD provides an extensive digital inventory of mineral deposits and occurrences in Manitoba. However, compilation work by MGS geologists has revealed errors in some regions as well as significant omissions of known occurrences. An MDD update committee was established in 2020 to define the steps needed to improve the database, and the overall strategy defined by the committee is outlined in this report. Although historical data have not been fully reviewed for the first area selected for updates, this report provides a summary of mineral occurrences added so far to NTS map sheets 53E and F.

**Project rationale and methodology**

The MDD is currently an Oracle<sup>®1</sup> database first published by the MGS in 2009 (Conley et al., 2009) and is the most recent version of a mineral occurrence or deposit inventory in Manitoba. It was compiled from two analogue archives—the Mineral Inventory Cards database and reports of the Mineral Deposit Series (Heine, 2007)—and is available through Manitoba Mineral Resources' online Map Gallery. Although the MDD represents an important and clearly necessary improvement to the previous paper archives, it remains incomplete; information contained in assessment files, for example, is in some regions entirely absent or only partially represented in the current database. Whole-rock geochemical datasets from various sources will also allow for the inclusion of commodities—including some critical minerals—not captured in the existing MDD.

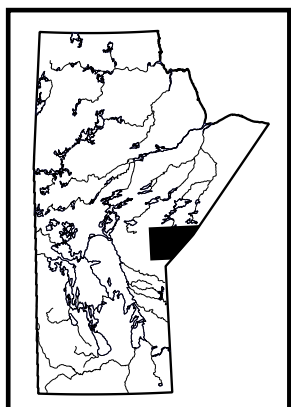
The main goal of this project is to update the MDD by adding missing data from sources including assessment files and, to a lesser extent, by correcting errors in some existing entries. The intended product is a more comprehensive and accurate inventory of mineral occurrences in Manitoba, allowing for better informed assessments of mineral resource potential.

**Definitions**

A mineral occurrence is defined as a concentration of a commodity or mineral (e.g., gold, lithium or graphite) of scientific or economic interest (Cox and Singer, 1986). A mineral deposit is an unusually large or high-grade occurrence that demonstrates potential to be extracted at a profit.

For the purposes of updating the MDD, geochemical results from surface or drillcore samples are considered to represent an occurrence where values exceed defined limits. Most of these minimum-grade criteria are the same as in Ontario's equivalent database (the Ontario Mineral Deposit Inventory; Ontario Geological Survey, 2020); some examples are listed in Table GS2020-2-1. Occurrence criteria for some commodities (e.g., lithium, rare earth elements) are to be determined.

<sup>1</sup> Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.



**Table GS2020-2-1:** Selected examples of minimum-grade or mineral criteria for occurrences.

Commodity	Minimum-grade or mineral content requirement
Au	0.5 ppm (0.5 g/t or 0.015 oz/ton) or visible gold
Ag	35 ppm
PGE (Pt+Pd+Rh+Ir+Ru+Os)	0.7 ppm
Cu	2500 ppm (0.25%)
Zn	5000 ppm (0.5%)
Pb	10 000 ppm (1%)
Ni	800 ppm
Co	200 ppm
Mo	800 ppm
Mn	50 000 ppm (5%)
W	790 ppm
TiO <sub>2</sub>	7.50%
U <sub>3</sub> O <sub>8</sub>	0.03% or minerals present
Diamond	Minerals present
Graphite	5% or present as coarse flakes or seams

During their review of historical data, MGS geologists may encounter descriptions or geochemical results that do not strictly meet the requirements described above but are deemed to be of likely interest to MDD users; such cases would be classified as ‘discretionary occurrences’ in the MDD updates.

### Data sources

Mineral occurrence data are being extracted from several sources. Assessment files held by the Government of Manitoba contain reports of work done by mineral exploration companies in the province since the 1930s. Over 9000 reports are currently available and will provide the majority of the data for new MDD entries. Scans of the assessment reports to PDF are generally sufficient for MDD updates, though originals must be retrieved from the Assessment Library in some cases, such as when extracting surface-sample location data from large hand-drawn maps. Confidential assessment data and/or files submitted less than three years ago cannot be included in MDD updates for public release, but equivalent information may in some cases be obtained from publicly available documents such as company press releases.

Various surface and drillcore geochemical datasets will be reviewed for new MDD entries, including Data Repository Items (DRIs) released by the MGS (e.g., Rinne, 2020), surface-sample data collected during regional mapping by the Geological Survey of Canada (e.g., Ermanovics et al., 1975) and compilations such as the Canadian Database of Geochemical Surveys (Natural Resources Canada, 2020). These whole-rock geochemical datasets commonly include certain commodities (e.g., lithium, cobalt) that are underrepresented in the assessment file data.

### Methods

Given the volume of data to be reviewed and added, most new mineral occurrence entries will include only a unique identifier (MDD number), location data, relevant assay/geochemistry values (and/or minerals observed), and drillhole and assessment file information, where applicable. Several of the more detailed columns or fields in the existing MDD entries—such as geological descriptions and summaries of past exploration relating to each occurrence—will be left blank in new entries, with the exception of major deposits or new mine developments. Additionally, for each commodity reported in drillcore, only the highest assay value from each drillhole is initially recorded; any values meeting the occurrence classification requirements are then marked as occurrences at drill collar locations rather than projected vertically to surface. Although this compromised approach captures only the key characteristics necessary to inform regional land-use planning or to trigger interest in mineral resource potential, it allows for faster releases of new updates. If more detailed information is needed, end users can examine the publicly available sources of data (e.g., assessment files) referenced for each occurrence.

Reports in the assessment files do not have a consistent format, which complicates attempts to automate the data-gathering process. However, it may be possible to improve the efficiency of data gathering by using optical character recognition in some of the scanned reports.

### Release format

The MDD is being migrated from an Oracle® database to a Microsoft® Access® database. The overall structure of the original database will be preserved in the updated MDD, including reference to a unique MDD number. Although most new entries in the MDD will contain less detailed information

(such as exploration history or geological descriptions) than in most of the existing entries, existing fields will not be removed. Moving forward, new assessment data will also be added regularly by the Assessment and Consultation Geologist.

Updates to the MDD will be released by region (i.e., NTS 1:250 000 map sheet) rather than sporadically throughout the province. Until a version of the Microsoft® Access® database is finalized, regional updates will be released to the public in a simplified format as DRIs.

## Results to date

Map sheets NTS 53E and F, covering much of the Island Lake domain of the northern Superior province, were selected for the first MDD update. Excluding parts in Ontario, the region contains approximately 650 drillholes and is the subject of 150 assessment files, with most of the reported work focused on the Island Lake and Bigstone Lake greenstone belts.

Since beginning the MDD update this year, a total of 247 mineral occurrences have been identified from review of industry and government sources. Pending additional review, several of the new occurrences may be grouped together. Most of the occurrences updated in the Island Lake greenstone belt were already included in some form in the previous MDD,

although several were lacking grade or commodity information. Apart from a single zinc occurrence, all the occurrences added to the Bigstone Lake greenstone belt are new entries (Figure GS2020-2-1).

Among the new occurrence data added, notable examples are listed below, numbered as indicated in Figure GS2020-2-1:

- 1) Several shear-hosted gold veins occur near the eastern shore of Bigstone Lake, including the Diamond Queen veins discovered in the 1930s (Assessment File 91148, Manitoba Agriculture and Resource Development, Winnipeg) and a nearby series of veins discovered in 2017 across a 1 by 2 km area, with several surface samples containing greater than 30 ppm Au (Rinne, 2017; 2020).
- 2) East of the Diamond Queen veins, gold mineralization is distributed along an approximately 16 km south-southeast trend through the centre of the Bigstone Lake greenstone belt. Occurrences along this trend are from both surface and drillcore samples, with grades of up to 80.6 ppm Au. Along with the Diamond Queen veins, these gold occurrences are spatially associated with regional silicification and calcite alteration (Rinne, 2017, 2019).
- 3) There are several minor nickel ( $\pm$ copper) occurrences scattered across the southwestern part of the Bigstone Lake

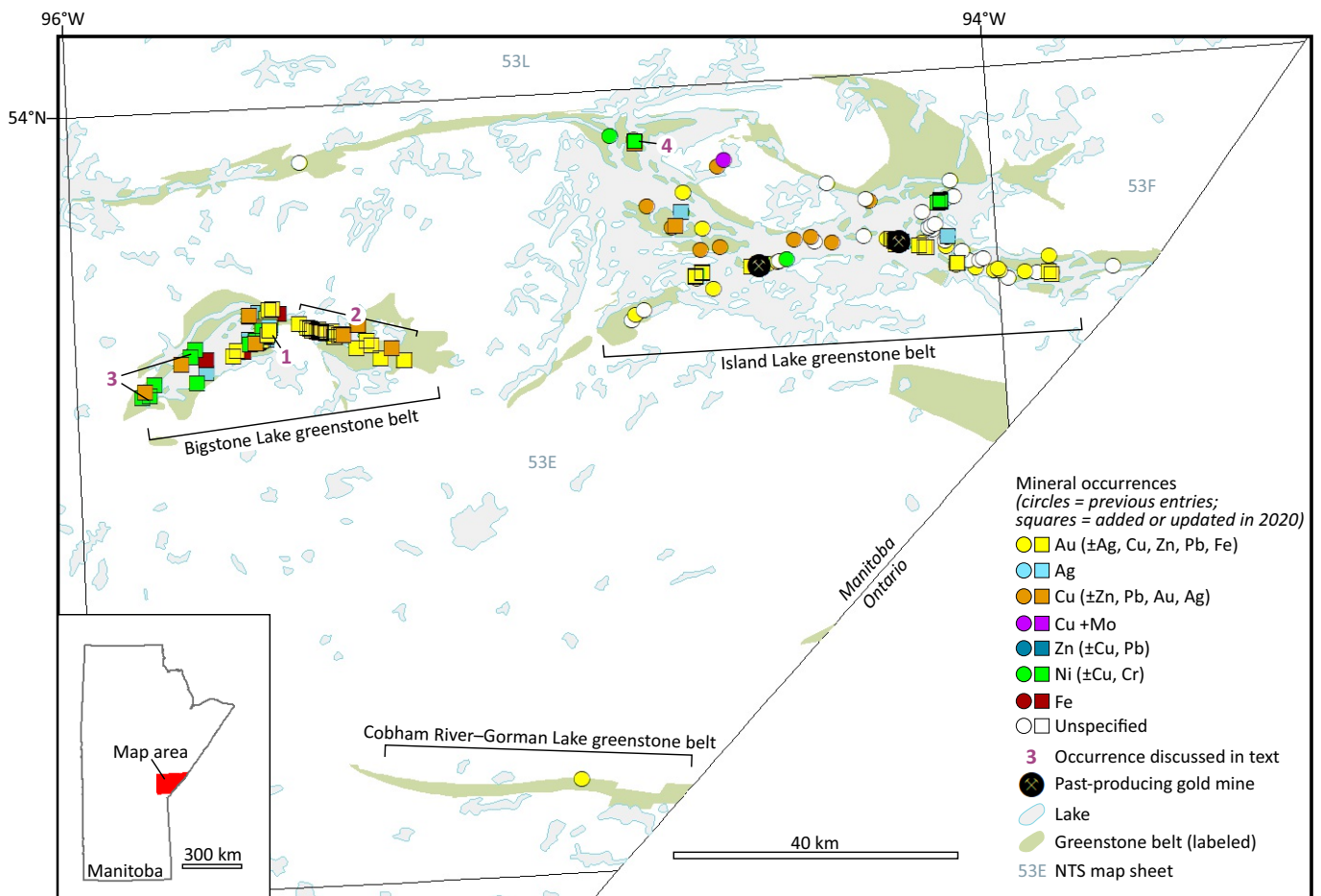


Figure GS2020-2-1: Mineral occurrences in NTS map areas 53E and F, including new data added in 2020.

greenstone belt. Most are from unmineralized or weakly mineralized peridotite and komatiitic basalt sampled in 2016 and 2017 (Rinne, 2020). One of the nickel occurrences corresponds to a sulphide-mineralized drillcore interval with 0.33% Ni (drillhole BS-73-3d, Assessment File 93492).

- 4) Additional data were added to the Nickel Island occurrence in the western part of the Island Lake greenstone belt. The existing MDD entry in this area reports up to 6800 ppm Ni, whereas recently added data includes drilling results from the 1950s with up to 2.88% Ni and 0.27% Cu (Assessment File 99325). Wolfden Resources Corporation also noted higher nickel grades (4.33% over 4.5 m) and potential for platinum-group elements at the Nickel Island occurrence.

## Economic considerations

Filling gaps in Manitoba's mineral occurrence data will allow for more accurate assessments of the potential for specific commodities in different parts of the province. This type of information is necessary for the design and implementation of land-use and economic development plans (e.g., parks and infrastructure planning within government, geological survey project planning or community economic development strategies). In the private sector, collection and interpretation of geological data plays a central role in mineral exploration decisions, and the release of new (or previously unrecognized) mineral occurrence data may inform renewed exploration efforts in some regions. Furthermore, as artificial intelligence or machine learning techniques are increasingly applied by the mineral resources industry, the MGS anticipates a growing reliance on large datasets such as the MDD.

## Acknowledgments

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