GEOLOGICAL SURVEY OF CANADA
OPEN FILE 7708

Canadian Molybdenum Occurrence database

**R.V. Kirkham, W.D. Sinclair, C. McCann, N. Prasad, A.E. Soregaroli,
F.M. Vokes, G. Wine, and J.J. Carrière**

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Recommended citation

CANADIAN MOLYBDENUM OCCURRENCE DATABASE

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The core of this publication comprises a database of Canadian Molybdenum Occurrences which is a digital update of a tape archive called MolyFile (Kirkham et al., 1982). Molyfile was extracted from a Canadian mineral occurrence database called CANMINDEX (Picklyk et al., 1978) for the use of deposit specialists in Mo and Cu, and was eventually transferred to a desktop database management system and updated. Meanwhile the contents of CANMINDEX and a parallel National Mineral Inventory card file were distributed to the provinces. In January, 2005, the updated desktop MolyFile tables were imported into a Microsoft ® Access® database which conforms to other World and Canadian thematic databases maintained at the Geological Survey of Canada, and extra fields not present in Molyfile were populated. Because of interest in the rhenium (Re) content of some molybdenum occurrences, this database was updated to a limited extent in 2011 by W. Dave Sinclair.

It should be noted that most of the data imported into the Canadian Molybdenum Occurrences database was collected between 1950 and 1990 when computers were slow compared to today's computers, storage space was limited, and reports generated were simple paper listings. Therefore, while data elements such as location, names, country (province), commodities, NTS area, and deposit type are relatively complete, many of the other possible data elements are scantly populated or missing altogether. Some of the occurrences do not have Mo listed as a commodity, although they may contain molybdenite. Referencing is incomplete or missing for many occurrences which have not been updated since the data was originally imported in 2005.

Resource data[1] are historical and do not conform to Securities Commission National Instrument 43-101 standards. Resource and production data were entered prior to 1987. Except for several resource entries dating from 2011-2012, tonnages are in non-metric short tons as was the practice at the time; however, grades are in metric units. Geographic coordinates (latitude and longitude) listed in the database are in datum NAD27, and most are very approximate as geographic information systems were not in use when the data were compiled. The shallow geospatial data sets that were extracted from the database and included in this open file were converted to NAD83 (CSRS) for the ESRI® shape files, and WGS84 for the Google Earth™ file.

The database schema used for this database (Chorlton et al, 2007) was developed for the World Minerals Geoscience Database Project (WMGDP: 1998-2004), a project sponsored jointly by the Geological Survey of Canada and exploration companies[2]. The web-style **Documentation** folder, modified from Laramée (2004), contains a thorough description of the GlobalDB System schema and supporting data management interfaces included with it in the folder **GlobalDBSystem321**, and can be read using an internet browser by clicking on the file **default.htm**. During the WMGDP, compilers (deposit specialists) and company sponsors suggested topics to be included in the schema. They also provided helpful feedback for the functionality of the data management interfaces. This resulted in incremental updates between releases to company sponsors. World and Canadian lode gold databases (Gosselin and Dubé ,2005a, b) were released in schema 3.19, the version used for the final release 3.6 to company sponsors in 2004. The schema, now at version 3.21, release 3.7, is a major update of version 3.19, with the addition of extra tables required for Canada-only deposits for compilations under the Northern Resource Development and Northern Mineral Resource Development programs.

The GlobalDB System schema (diagram page 6) includes sets of tables that can be used to describe six entities (things): deposits/occurrences, deposit groups, mines, production figures, resource figures, and references. The deposits and deposit groups modules describe locations, deposit type and subtype, names, country and province, commodities, geological ages, host rocks, related igneous rocks, mineralization styles, coincident features, radiometric dates, tectonic settings, shape and dimensions, NTS areas, qualified comments, links to other databases, geophysical /geochemical signature, sample data, and compilation stage and progress. The service tables: entities, tabledoc, links, columndoc, tabpages, and lookup explicitly define the entities, tables, links between tables, fields, interface tab pages, and the lookup tables, to completely define the schema. Two additional service tables: dbversion and unitcvsn, provide the title, version and authors of the current database, and conversion factors (to metric) for the production and resource figures, respectively. Resource figures are considered historical and have been reported exactly as given in the data source[1], commonly in non-metric units. The service tables, described above, should be consulted before transferring this data across database management programs and platforms, or rebuilding the data management applications when the application interfaces supplied with this Open File can no longer be used because of changes to the Windows® operating system.

Standalone custom Windows® application interfaces, developed by Robert M. Laramée[3], enable a user with a 32 bit computer equipped with the Windows operating system to browse, filter, and obtain output from this database. They are included in this Open File in the folder **GlobalDBSystem321**. All applications require an ADO connection file, or

Microsoft® data link, to each database for which they are to be used, created in the folder under the same folder that houses the application interfaces[4]. By convention, WMGDP compilers installed a folder GlobalDBSystem under Program Files on the local C: drive, but the GlobalDBSystem321 folder and files can be saved anywhere and no installation is required. Instructions for creating the mandatory Microsoft data link file are included under "**Defining database aliases**" in the **Documentation\default.htm** and in the standalone file **HowtoADO.rtf**.

GShellBrowser allows a user to browse the database record by record, and offers the same tab page view of the data offered by the original data entry interface, GShellADO, known in short form as **GShell**. The latter only works under the Windows® XP and earlier Windows operating systems, and has been included in this package for users that still have a Windows XP computer (disconnected from the Internet because Microsoft no longer supports it by supplying Security updates), or have an XP emulator installed. GQueryADO, known as **GQuery** for short, provides a user the means to filter the occurrences based on attribute values, to build a template for a custom spreadsheet and export this spreadsheet or a default summary spreadsheet, and to create folders of occurrence reports for the full set or subsets of the deposits in the database. Both GShellBrowser and GQuery work under Windows 7, once the pre-requisite ADO connection file has been created.

There are three additional programs in GlobalDBSystem321: **GQ_ADO_XtraTables**, **Documenter**, and **GBDSTools**. The program GQ_ADO_XtraTables builds or rebuilds summary tables for the use of GQuery, which improved performance over an older method of creating these summary tables on the fly. The program Documenter allows users to examine each table and field of each category of table (Data, Junction, Lookup, and Service depending on their roles), which complements the more general web page style documentation. Finally, GDBSTools provides a database manager with utilities that can check the internal integrity of the database, time stamp a new release and export SQL data scripts of the contents of the connected database. These SQL scripts can be used to populate a new database created with GlobalDBSchema321.sql in one of many SQL-enabled relational database management systems available today[5].

<div align="center">REFERENCES</div>

Chorlton, L.B., Laramée, R.M., Sinclair, W.D., and Hillary, E.M., 2007. Digital Inventory of Bedrock and Mineral deposit Geology; *in* Proceedings for a workshop on deposit modeling, mineral resource assessment, and their role in sustainable development; (ed.) Briskey, J.A. and Schulz, K.J., Proceedings of a workshop that followed the 31st International Geological Congress, Rio de Janeiro, Brazil, August 18–19, 2000, USGS Circular 1294, p. 101 – 113.

Gosselin, P. and Dubé, B., 2005a. Gold deposits of the world: distribution, geological parameters and gold content; Geological Survey of Canada, Open File 4895, 271 p., 1 CD-ROM, doi:10.4095/220379

Gosselin, P. and Dubé, B., 2005b. Gold deposits of Canada: distribution, geological parameters, and gold content; Geological Survey of Canada, Open File 4896, 105 p., 1 CD-ROM, doi:10.4095/220380

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Laramée, R.M., 2004. Global DB System, Release 3.6, World Minerals Geoscience Database Project; Geological Survey of Canada, WMGDP web site for project sponsors, accessed in 2006.

Picklyk, D.D., Rose, D.G., and Laramée, R.M., 1978. Canadian Mineral Occurrence Index (CANMINDEX) of the Geological Survey of Canada; Geological Survey of Canada, Paper 78-8, 28 p.

<div align="center">FOOTNOTES</div>

[1]DISCLAIMER – RESOURCE/RESERVES DATA

Her Majesty the Queen in Right of Canada, represented by the Minister of Natural Resources (NRCan), does not warrant or guarantee the accuracy, completeness or fitness for any purpose of Reserve and Resource information (Data) contained in this database, including whether the Data is compliant with any securities regulations or standards, and NRCan does not assume any liability with respect to any damage or loss incurred as a result of the use made of the Data.

Resource and reserve figures are historical in nature. The Data source provided with each set of figures should be cited if the Data are re-reported.

[2]ACKNOWLEDGEMENTS
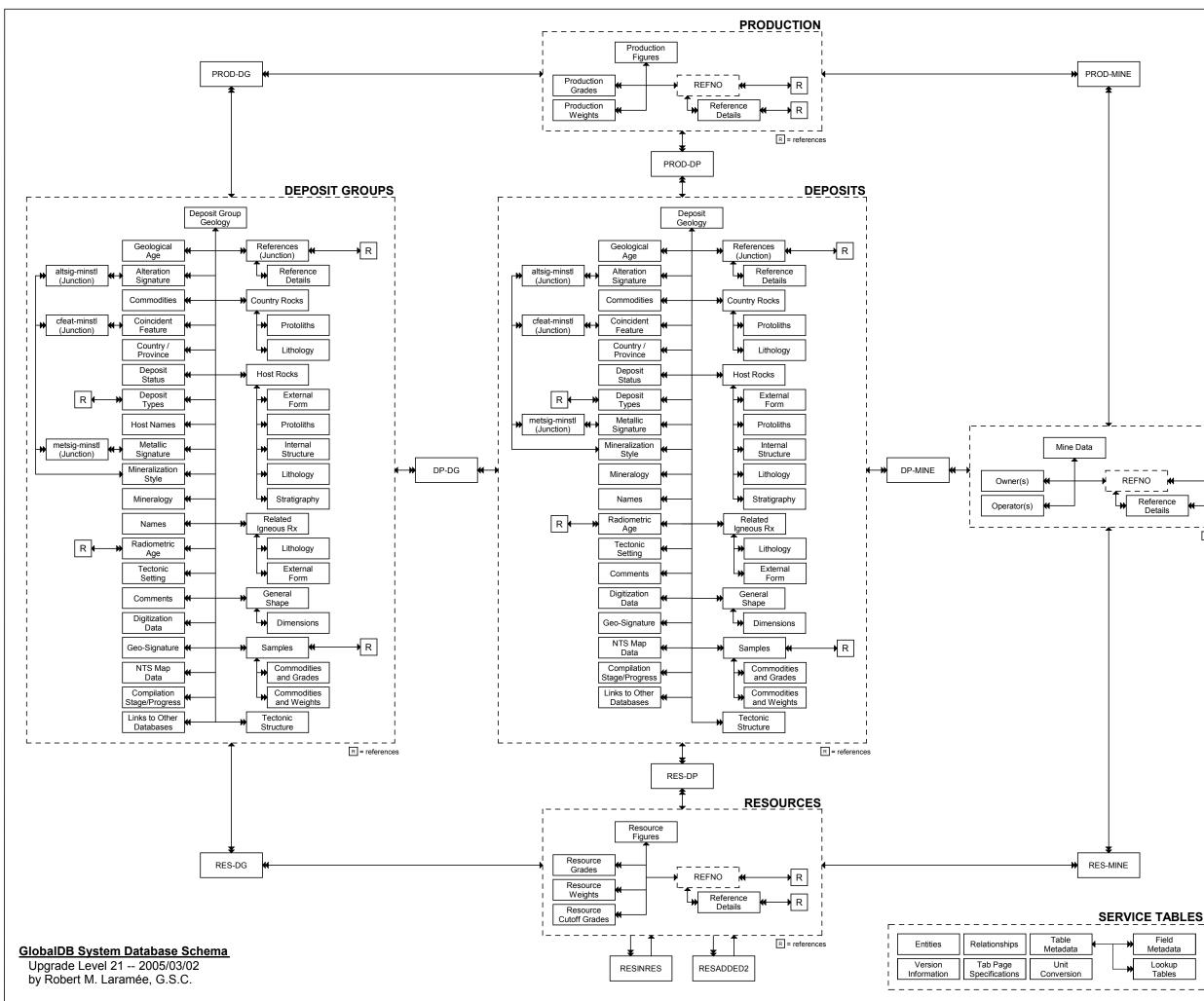
[3] DISCLAIMER – APPLICATIONS AND DATABASE

The Geological Survey of Canada (GSC) has endeavored to develop and produce this product with a minimum of errors. GSC does not, however, warrant that the product is error free nor will GSC or its Minister and officials accept liability for any loss of profits or revenue, or any other form of loss or damage relating to the use of this product.
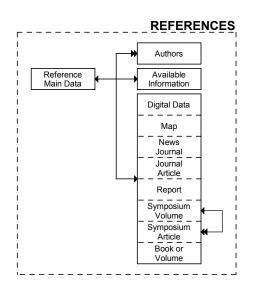
[4] CAUTION: UTILITIES MAY NOT WORK ON SOME WINDOWS COMPUTERS

While the WMGDP and successive projects have been successfully using Global DBSystem since the year 2000, there are now imitations due to the evolution of the Windows operating system and the introduction of 64 bit computers. In order to use GShellBrowser.exe, GQueryADO.exe, GQ_ADO_XtraTables.exe, Documenter.exe, and GDBSTools.exe, you must first create a data link file to allow connection between the program and the database (see "Defining database aliases" under Documentation). It is known that these instructions will not work on Windows 64 bit computers, and the interfaces will not work on computers with operating systems other than Windows®. At present, the data entry and browsing program GShellADO (GShell) will not work under Windows Operating Systems greater than XP, but is included here for anyone who might have an older operating system on a computer disconnected from the Internet or who has an XP emulator.

[5] LOADING A WMGDP DATABASE USING SQL SCRIPTS

SQL scripts are provided here for anyone with an SQL-enabled database management system (DBMS) and the technical skill to modify the scripts according to the requirements of their software. We have loaded the data onto InterBase and PostgreSQL for the use of applications that emulate GQuery for the Internet and the contents of folders for loading the schema reflect our own processes. There are subtle differences in the scripts for loading the database schema among DBMSs, and some tweaks applied to the schemas supplied in this publication were specific to the Query applications. The scripts for inserting the data into the empty database schema are standard, and only one insert script is supplied per database.

PRODUCTION

PROD-DG

Production Figures
Production Grades
Production Weights
REFNO
Reference Details
R
R
PROD-MINE

R = references

PROD-DP

DEPOSIT GROUPS

Deposit Group Geology

altsig-minstl (Junction)
cfeat-minstl (Junction)
metsig-minstl (Junction)

Geological Age
Alteration Signature
Commodities
Coincident Feature
Country / Province
Deposit Status
Deposit Types
Host Names
Metallic Signature
Mineralization Style
Mineralogy
Names
Radiometric Age
Tectonic Setting
Comments
Digitization Data
Geo-Signature
NTS Map Data
Compilation Stage/Progress
Links to Other Databases

References (Junction)
Reference Details
R

Country Rocks
Protoliths
Lithology

Host Rocks
External Form
Protoliths
Internal Structure
Lithology
Stratigraphy

Related Igneous Rx
Lithology
External Form

General Shape
Dimensions

Samples
R

Tectonic Structure

R
R

R = references

DP-DG

DEPOSITS

Deposit Geology

altsig-minstl (Junction)
cfeat-minstl (Junction)
metsig-minstl (Junction)

Geological Age
Alteration Signature
Commodities
Coincident Feature
Country / Province
Deposit Status
Deposit Types
Metallic Signature
Mineralization Style
Mineralogy
Names
Radiometric Age
Tectonic Setting
Comments
Digitization Data
Geo-Signature
NTS Map Data
Compilation Stage/Progress
Links to Other Databases

References (Junction)
Reference Details
R

Country Rocks
Protoliths
Lithology

Host Rocks
External Form
Protoliths
Internal Structure
Lithology
Stratigraphy

Related Igneous Rx
Lithology
External Form

General Shape
Dimensions

Samples
R

Commodities and Grades
Commodities and Weights

Tectonic Structure

R
R

R = references

DP-MINE

MINES

Mine Data
Owner(s)
Operator(s)
REFNO
Reference Details
R
R

R = references

RES-DP

RESOURCES

Resource Figures
Resource Grades
Resource Weights
Resource Cutoff Grades
REFNO
Reference Details
R
R

R = references

RES-DP
RES-DG
RES-MINE

RESINRES
RESADDED2

SERVICE TABLES

Entities
Relationships
Table Metadata
Field Metadata
Version Information
Tab Page Specifications
Unit Conversion
Lookup Tables