

MINERAL INVENTORY PROJECT

G.J. Stapleton and J.L. Smith
Mineral Deposits Section

ABSTRACT

The primary mandate of the Mineral Inventory Project is to document all geological and mineral resource information on the Province's mineral occurrences and to make the information available to the public. Mineral Inventory personnel are also responsible for reviewing selected land-use applications and environmental assessment projects submitted to the Provincial Government, with the aim of minimizing their impact on the Province's documented mineral resources and areas of high mineral potential.

INTRODUCTION

The Mineral Inventory Project maintains the principal repository for geological information on the Province's mineral resources. The repository is composed of a two-part infobase consisting of the Mineral Occurrence Data System (MODS), which is a digital mineral occurrence database, and a collection of mineral occurrence maps (Stapleton *et al.*, 2000).

The MODS consists of summaries of data including geological descriptions, location, mineralogy, deposit type, bibliography, work histories, resource and/or reserve statistics and analytical results on known mineral occurrences. It is an important mineral exploration and research tool that offers fast and easy access to mineral occurrence information throughout all of Newfoundland and Labrador. The main delivery point for the MODS data is the Geological Survey of Newfoundland and Labrador website (<http://www.nr.gov.nl.ca/nr/mines/Geoscience/index.html>).

Clients can search the database using either the 'Mineral Deposit (MODS) Index Search Form' or the 'Geoscience Atlas'. It provides clients with a current, high-quality, online mineral deposit database that helps further define the Province's mineral potential and increase its prospectivity. It

is used by mineral explorationists to help guide their mineral exploration programs in the Province. The data generated by the Mineral Inventory Project contributes toward long-term benefits evidenced by increased investment in the mineral exploration and mining industries (Stapleton *et al.*, 2014).

MINERAL OCCURRENCE DATA SYSTEM (MODS)

The MODS data are housed within an Oracle database management system; however, data entry is achieved using an application of the Microsoft-Access database software (Stapleton *et al.*, 2005). Microsoft-Access connects to the Oracle database using object database connectivity technology (ODBC).

MODS data are obtained from three main sources; mineral industry assessment reports, government and academic reports, and thesis (Figure 1). Data are reviewed to ensure compliance with the MODS coding standards before information is delivered to clients as occurrence specific, mineral inventory reports, *via* the Geoscience Atlas and the MODS query form. Selected fields from the MODS database record (Table 1) can be downloaded from the Geoscience Atlas, which gives clients the ability to use the data spatially in a GIS environment.

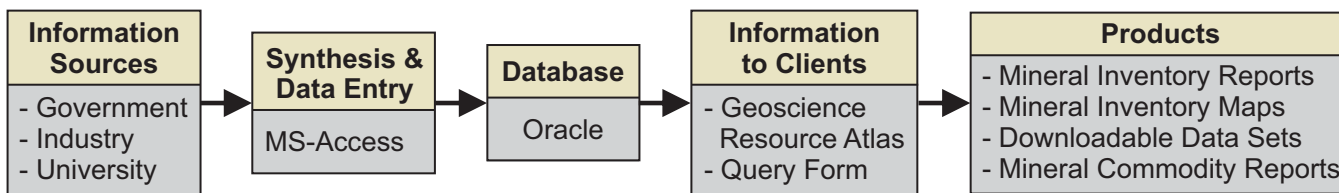


Figure 1. MODS flow chart.

Table 1. Fields and field descriptions from MODS for GIS record

Depname	Usual name
Altname	Alternate name
Recid	Record ID number
Nmino	National mineral inventory number
Comname	Major commodity present
Modslabel	Symbol for major commodity present
Commods	Secondary commodities present
Deptype	Deposit type; coded genetic classification of deposit
Desc	Description of deposit type
Status	Indicating amount of work done and hence the amount of information available on a deposit
	Producer - Commodity is extracted for sale
	Developed Prospect - Reserves or demonstrated resources of the commodity can be calculated, but the commodity has not yet been produced (<i>i.e.</i> , three dimensional data plus grade)
	Past Producer Dormant - The commodity is no longer produced, although there are known reserves or demonstrated resources
	Past Producer Exhausted - The commodity is no longer produced and there are no longer reserves or demonstrated resources
	Prospect - Two-dimensional data and grade are available, but not enough data to calculate reserves
	Showing - Mineralization exists in outcrop with little information known about its spatial extent; assay data exists
	Indication - An indication of the existence of the commodity (<i>i.e.</i> , field observation, map symbol)
Depchar	Deposit description
Geoprov	Geological province
Tectbelt	Tectono-stratigraphic zone
Strunit	Stratigraphic unit
Stratigrap	Stratigraphic age of the host unit
Rocks	Rock type(s) associated with deposit
Trench	Trenching? y = trenching done
DDH	Number of drillholes into the deposit
Working	Type of mine workings
	Underground - u,
	Open Pit or Quarry - o
	Underground and Open Pit - uo
Adit	Adit? y = adit present
Shaft	Shaft? y = shaft present
Utmeast	Easting coordinate
Utmnorth	Northing coordinate
Utmzone	UTM Zone

The MODS internet application is dynamically linked to the Oracle database, which serves as the common platform for all of the Geological Survey's databases. This enables efficient sharing of information between the databases giving clients same-day access to updated information.

In 2016, the Office of the Chief Information Officer (OCIO) upgraded the MODS internet application operating system software from Microsoft Windows 2003 to Microsoft Windows 2008. This upgrade was necessary as the Windows 2003 operating system was no longer supported, which presented a significant risk to the reliability and security of the MODS application. The underlying MODS application code was not changed, but configuration modifications were required to ensure that the MODS application is compatible with the new operating system. This upgrade enables the operating system to receive vendor support and critical security patches, thus providing MODS with a secure and stable operating platform from which mineral inventory data will continue to be delivered to its clients.

GENETIC CLASSIFICATION OF MINERAL DEPOSITS FOR MODS

The MODS uses a hierarchical genetic classification system, illustrated using the "Hydrothermal, Structurally Controlled Mineralization" classification in Table 2, to classify mineral occurrences. The model is based on the host rock type and the relationship between the mineralization and the host rock. The numerical codes, and code ranges for deposit types that are related, give the user the power to search downloaded MODS data using structured query language (SQL) from database and GIS programs. The user can widen and narrow the scope of the search by using logic operators, *i.e.*, "<, >, =", and". The complete classification system is contained in Appendix B in the MODS Help File at http://www.nr.gov.nl.ca/nr/mines/geoscience/mods_help.html.

The two broadest subdivisions in the classification system are 1) "Metallic (Ferrous and Non-ferrous) Rocks and Minerals" Codes 000 to 499, and 2) "Industrial Rocks and Minerals" codes 500 to 799.

The Metallic occurrences are subdivided into four broad categories, namely, 1) Intrusive Associations, 2) Stratabound Mineralization, 3) Hydrothermal, Structurally Controlled Mineralization and 4) Metamorphogenic Deposits. Each broad category can be further subdivided as illustrated in Table 2 to show sub-categories of a given category.

The user can select all "Hydrothermal, Structurally Controlled" occurrences using the SQL statement (Deptype

Table 2. Genetic classification system for hydrothermal, structurally controlled mineralization

300–399	
HYDROTHERMAL, STRUCTURALLY CONTROLLED MINERALIZATION	
300	Undivided hydrothermal, structurally controlled deposits
310–329	STRUCTURALLY CONTROLLED VEIN SYSTEMS WITH BASE OR PRECIOUS METALS
310	Undivided hydrothermal vein systems
311–320	VEIN SYSTEMS ACCOMPANIED BY MINIMAL WALL-ROCK ALTERATION
311	Undivided vein systems accompanied by no or minimal wall-rock alteration
312	Mesothermal precious-metal association (<i>e.g.</i> , the quartz vein type of Dubé, 1990, Deer Cove, Cape Ray) may include; Au, As, Sb, locally accompanied by base metals
321–329	VEIN SYSTEMS ACCOMPANIED BY SIGNIFICANT OR WIDESPREAD WALL-ROCK ALTERATION
320	Undivided vein systems accompanied by significant or widespread wall-rock alteration
321	Precious-metal mineralization accompanied by aluminous alteration; includes most Newfoundland examples of epithermal-type mineralization, <i>e.g.</i> , Hickey's Pond, probably Hope Brook
322	Precious-metal mineralization accompanied by alkali-carbonate alteration; mesothermal examples include both broadly stratabound mesothermal mineralization in gabbroic sills (<i>e.g.</i> , Stog'er Tight) and alkali alteration and mineralization of granitoid rocks (<i>e.g.</i> , Rattling Brook, Western White Bay).
330–339	STRUCTURALLY CONTROLLED MINERALIZATION NOT ASSOCIATED WITH VEINING
330	Undivided structurally controlled deposits not associated with veining
331	Unconformity-related uranium deposits

>= 300 and <=399), or the user can be very specific and select “Mesothermal Precious Metal” Occurrences using the SQL statement (Deptype = 312). “Deptype” is the name of the MODS database field that contains the code corresponding to the deposits type as per the classification system. The other three broad metallic classifications discussed above are also subdivided in detail and can be queried and subdivided using SQL.

MINERAL COMMODITY REPORTS

Since the early 2000s, the Geological Survey has produced 9 Mineral Commodity Reports (Table 3). They are short summaries of mineral commodities with emphasis on their geological settings and exploration potential.

The primary information base for developing such reports is the MODS, which serves as a critical reference providing location data and occurrence descriptions. The commodity series reports are intended to act as a bridge between summary information of a promotional nature and the detailed information that is accessible through MODS and in the Geological Survey's Geofiles database.

UPDATES

During 2016, work proceeded on a Province-wide basis, primarily by accessing information from mineral industry press releases and assessment reports as they

gained public-domain status. NTS map areas worked on included 1M, 2D, 2E, 11O, 12A, 12B, 12H (Newfoundland) (Figure 2), and 3D, 13J, 13K, 13M, 13N, 14D, 14E, 23H, 23J (Labrador) (Figure 3).

This update provides the mineral exploration community with a more current dataset that will help further define the Province's mineral potential and prospectivity. The data generated by the Mineral Inventory Project will contribute toward longer term benefits evidenced by increased investment in the Provincial mineral exploration and mining industries.

In 2016, consistent delivery of new information through both the Online Query Form and the Geoscience Atlas continued with updated non-confidential records being copied to the public domain daily.

Table 3. Published Mineral Commodity Reports

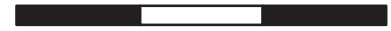
Zinc and Lead	Number 1, 2000, revised 2008
Nickel	Number 2, 2000, revised 2005, 2008
Copper	Number 3, 2000, revised 2005, 2007
Gold	Number 4, 2005, reprinted 2008
Uranium	Number 5, 2009
Rare-earth Elements	Number 6, 2011
Iron Ore	Number 7, 2012
Fluorite	Number 8, 2013
Barite	Number 9, 2014

NEWFOUNDLAND

INDEX MAP

1:50 000 NTS sheets

0 50 100 150



KM

LEGEND

● Mineral occurrences

■ NTS areas updated

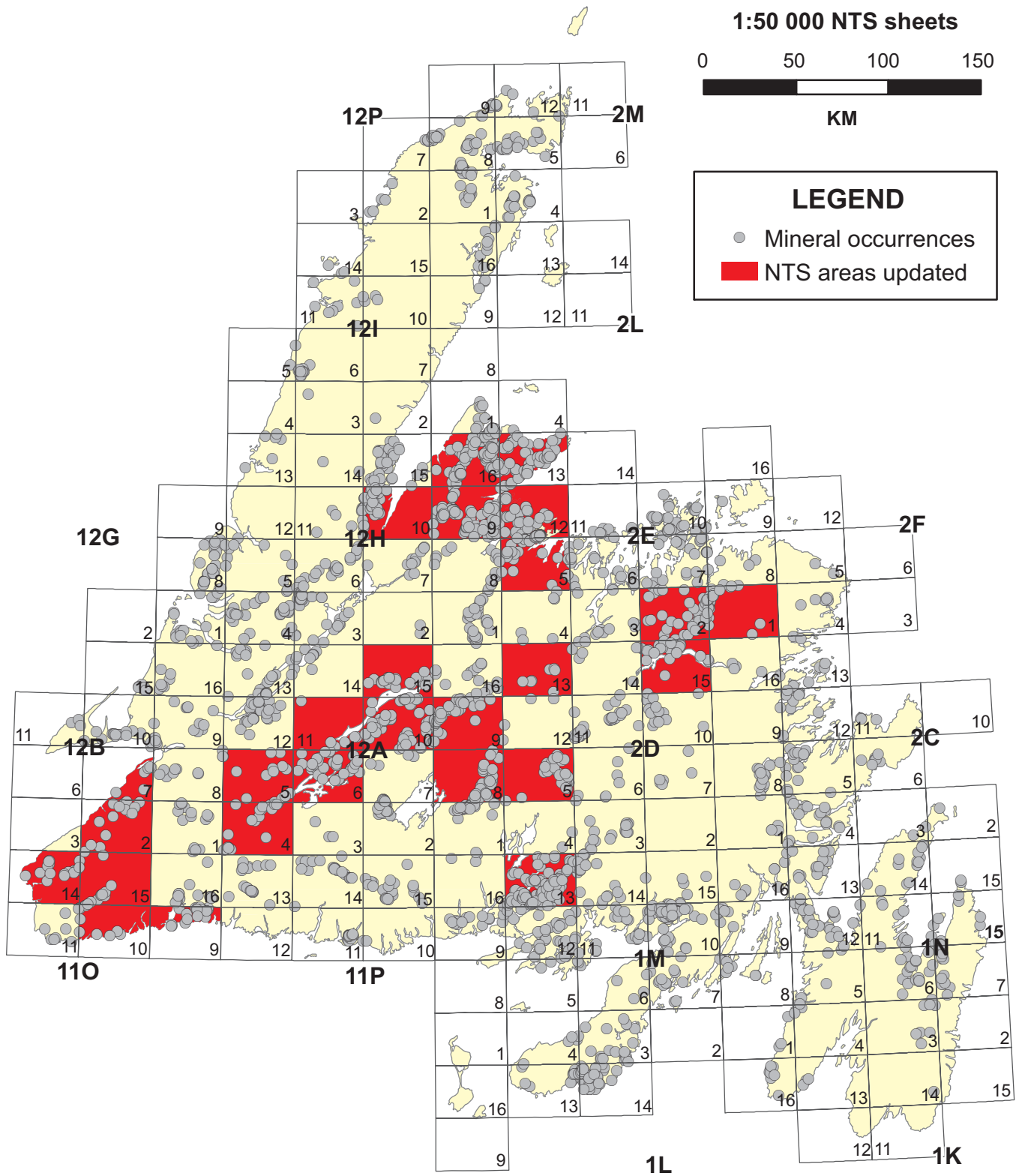


Figure 2. NTS areas updated, Newfoundland.

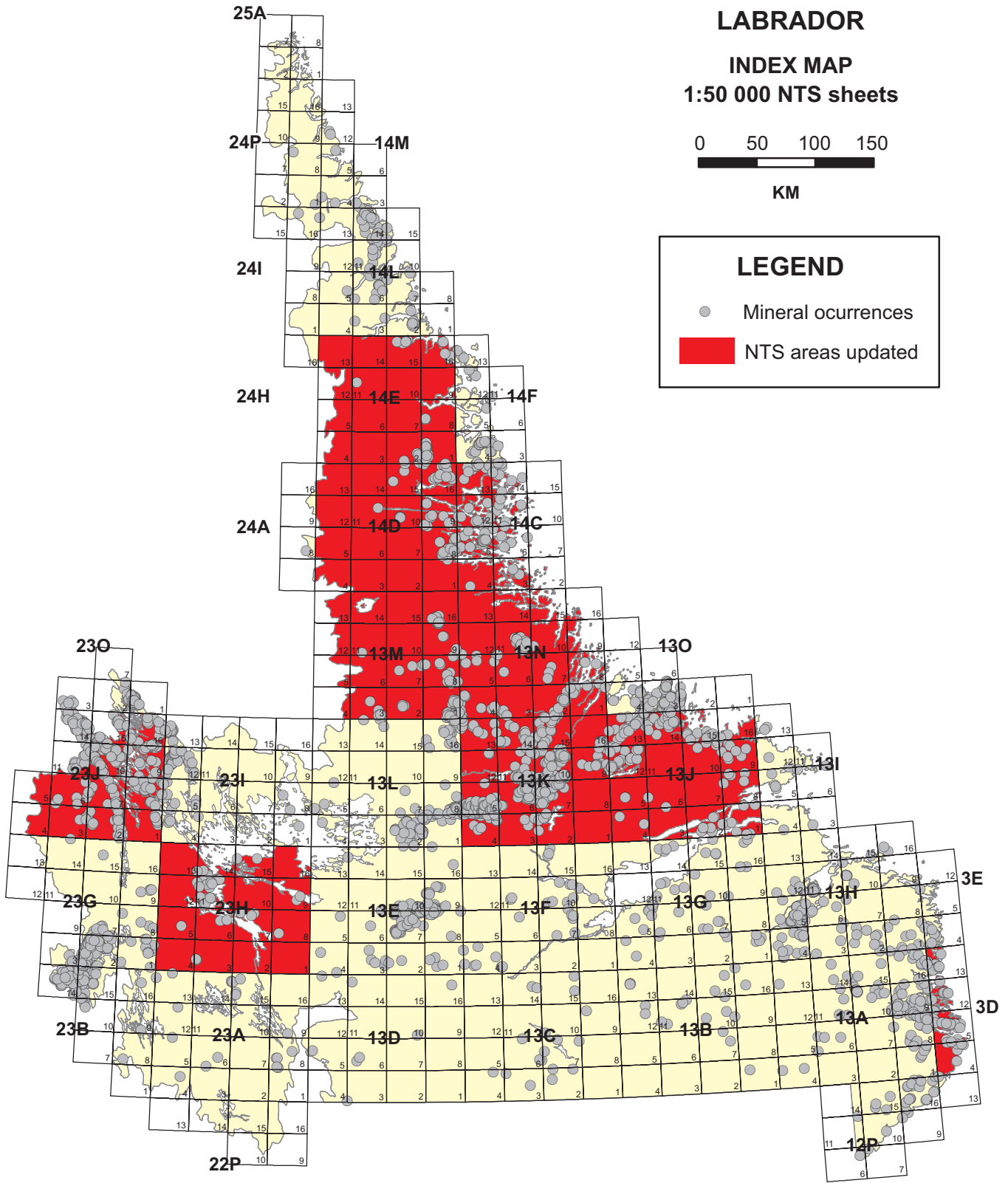


Figure 3. NTS areas updated, Labrador.

MODS USERS

The 2016 web server statistics for the Mineral Inventory Database indicate that it was accessed 25 899 times, representing an increase of approximately 24% over 2015 (Figure 4), and during the past ten years it has been consistently used, averaging 26 215 hits per year. A hit is logged when the user opens a mineral inventory record. This increase in usage directly corresponds with the up-tick in the junior mining sector. A detailed study of the 2013 web server statistics (Stapleton *et al.*, 2015) indicated that the database has a global audience; being accessed from one hundred countries, representing approximately half of the countries of the

world. It is accessed most frequently from Canada and the commodity of greatest interest is gold.

LAND-USE PLANNING

The MODS is used daily by government geologists in land-use planning. Advice is given to various government departments through the Interdepartmental Land Use Committee referral process and the environmental assessment registration process on establishing wilderness areas, hydro developments, provincial and national parks, cottage developments, water reservoirs, *etc.*, so that, where possible, these developments proceed in areas of low mineral potential.

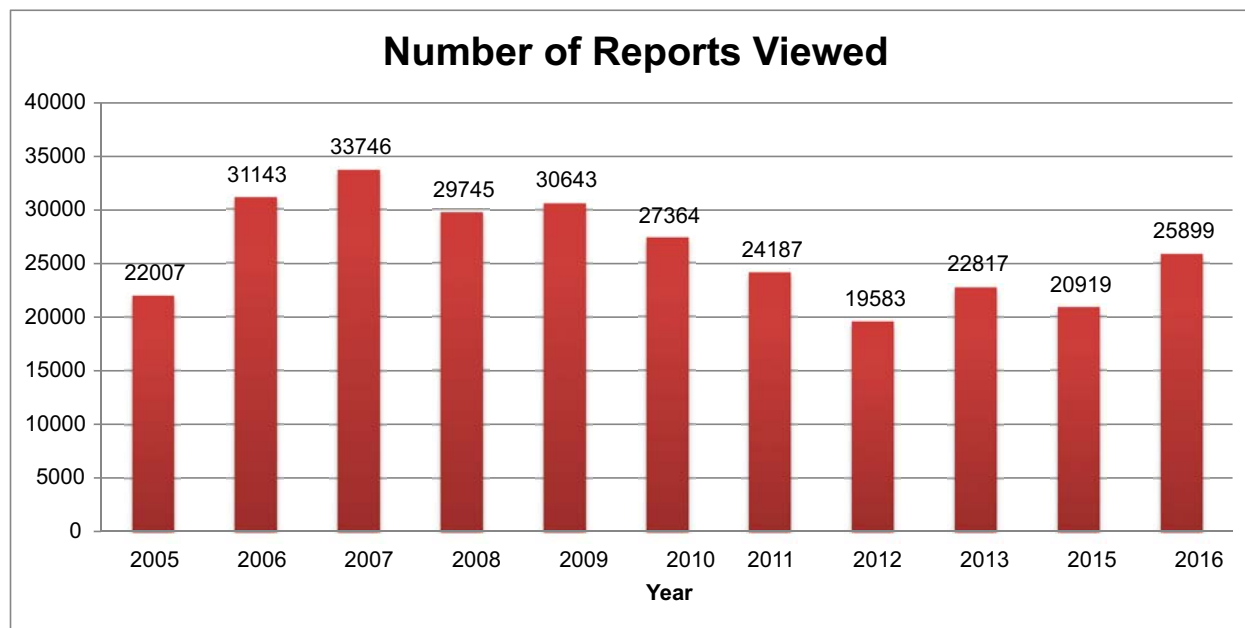


Figure 4. Number of reports viewed per year 2005–2016 (data for 2014 unavailable).

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