

## MINERAL OCCURRENCE DATA SYSTEM

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### ABSTRACT

*The Mineral Occurrence Data System (MODS) is a three-part database consisting of a manual Mineral Inventory File, mineral occurrence maps on geological bases and a computerized Mineral Inventory Database. The MODS contains information on approximately 4500 mineral occurrences and is designed to offer fast and easy access to information on the province's mineral resources.*

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### INTRODUCTION

The Mineral Occurrence Data System (O'Driscoll *et al.*, 1991) consists of a manual Mineral Inventory File, mineral occurrence maps on geological bases and a computerized database (Figure 1). The project is designed to offer an efficient information service about all the mineral occurrences in Newfoundland and Labrador.

Most of the MODS information was compiled from a systematic search of mineral-exploration company assessment files. Other sources of information include publications of the Geological Survey of the Newfoundland Department of Natural Resources, the Geological Survey of Canada, published news items, publications in geological and mining journals, and personal communications from mining-company and government personnel.

#### MANUAL MINERAL INVENTORY FILE

The manual Mineral Inventory File is part of the National Mineral Inventory and consists of mineral occurrence reports that summarize all data on known mineral occurrences in the province. The file presently contains about 4500 reports, which include coverage for the Island of Newfoundland (Figure 2) and selected areas in Labrador (Figure 3).

The Mineral Inventory File is continually being updated. This file was started in 1978, and since then, new geological mapping and exploration have been carried out and many new occurrences have been discovered.

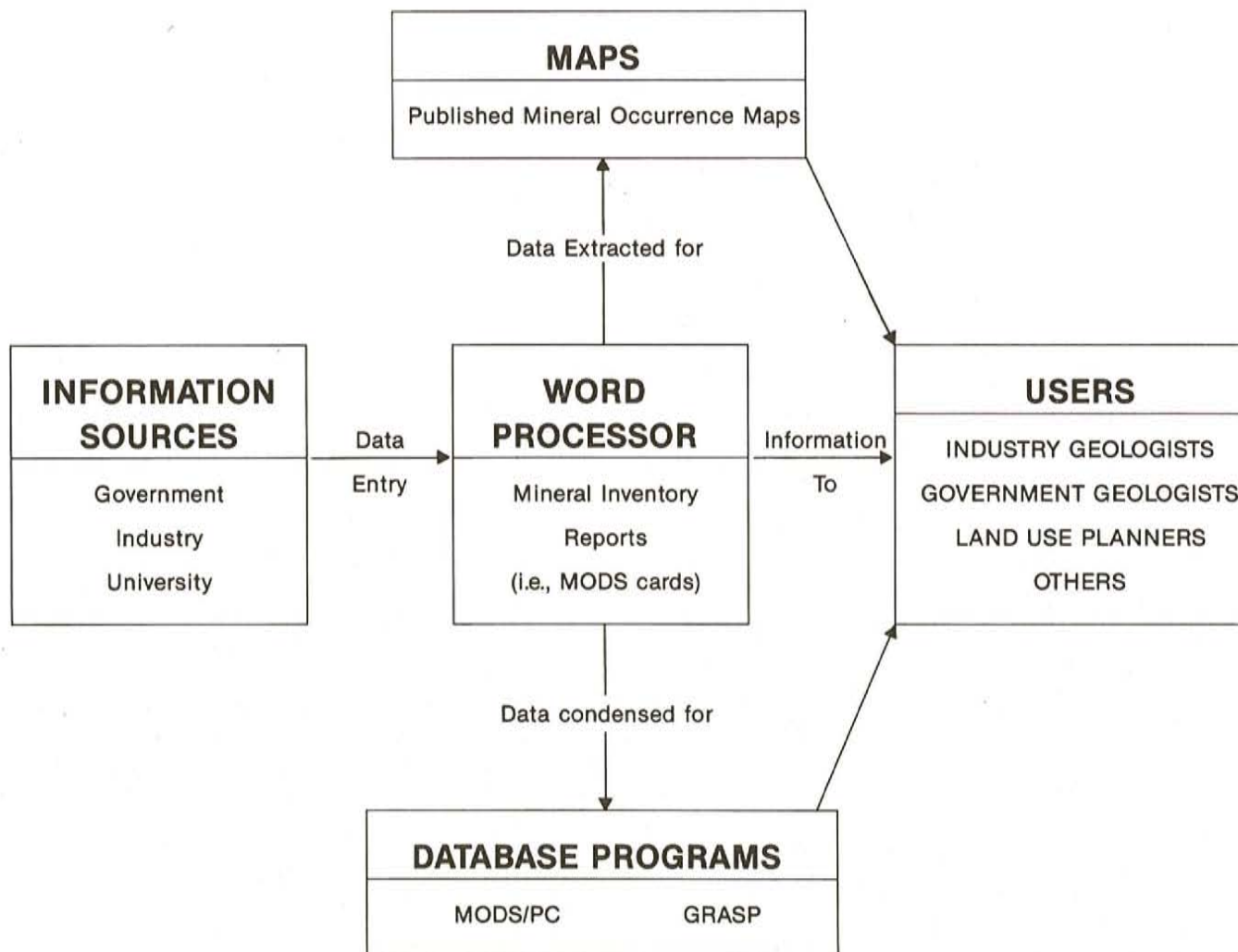
Mineral occurrence maps containing updated geological bases have been published at a 1:250 000 scale and are available upon request from the Geological Survey, Publications and Information Section. In addition, selected areas have been published at 1:50 000 and 1:100 000 scales. These maps contain locations, a listing and a brief description of the occurrences. An industrial minerals map of the Island of Newfoundland at 1:1 000 000 scale on a geological base, is also available. This map contains locations, a listing and a brief description of the various mineral occurrences.

#### COMPUTERIZED MINERAL INVENTORY DATABASE

Since 1978, a computerized Mineral Inventory Database, which parallels the manual file, has been developed and maintained. This database contains information selectively extracted from the manual file and presently resides on a Hewlett Packard 9000/750 Unix-based network server, located at the Geological Survey offices on Bonaventure Avenue, St. John's. The Geological Retrieval and Synopsis Program (GRASP) developed by the United States Geological Survey (Bowen and Botbol, 1975) is used to manage and manipulate the database. Although GRASP is a powerful program that allows complex searches to be performed, it is not user friendly or available for microcomputers. Up until 1991, in order for users to access the computerized Mineral Inventory Database a visit to the Geological Survey offices and the help of MODS personnel were required.

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The three components of the Mineral Occurrence Data System (MODS) are mineral inventory reports, mineral occurrence maps and the computerized database. These can be used either individually or collectively.

A user may study the mineral occurrence map of an area to identify occurrences of interest and can then peruse the mineral inventory reports to find detailed information on one or more specific mineral occurrence(s).

Occasionally a user may want less detailed information on all occurrences of a particular type, for example, vein type, located over a large geographic area. Particular information can be selected from the database and saved on disk, displayed on screen or printed out in a report.

Mining company personnel or individuals interested in claim staking will first want to assess an area's mineral potential. Information retrieved by searching MODS/PC can be used to focus and define geographic areas of interest. More detailed information can be obtained from mineral inventory reports or from the list of references given in each report.

**Figure 1.** *Organization and operation of the Mineral Occurrence Data System.*



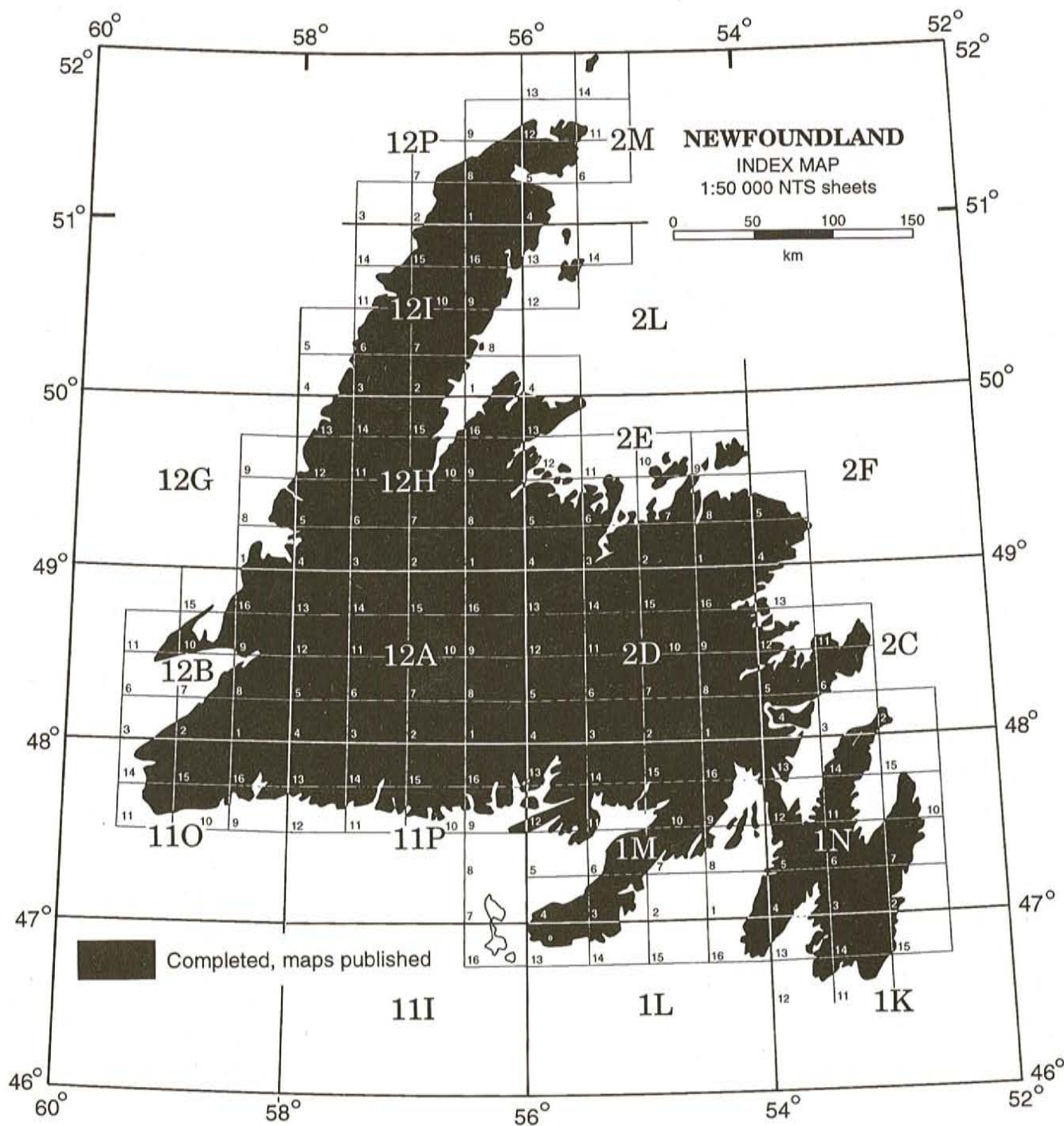


Figure 2. Index map for Mineral Occurrence Data System project, insular Newfoundland.

### DEVELOPMENT OF MODS/PC

As a result of the proliferation of microcomputers and the need for easier access to MODS information, it was decided to develop a microcomputer version of this information system in 1990 (Stapleton *et al.*, 1991; Stapleton and Parsons, 1991). The Mineral Occurrence Data System microcomputer

application (MODS/PC V1.1) was written in-house by W. Keith Parsons, Systems Analyst with the Geological Survey. It was written in the R:Base Database language (V2.11) and compiled using the R:Base compiler (V1.02). R:Base was chosen as the development tool because of the program's support of long string fields and the availability of a vendor-supplied compiler.

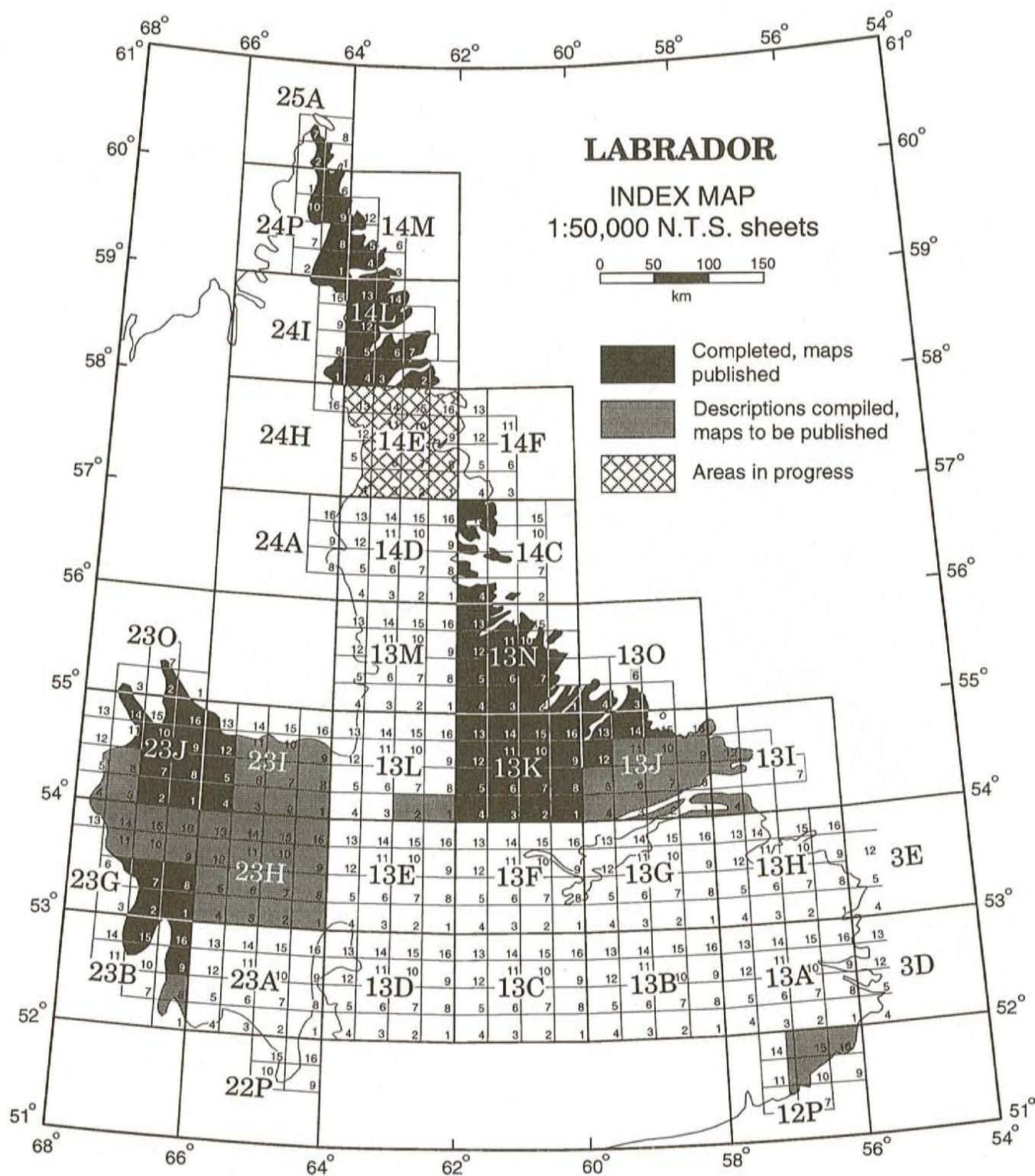


Figure 3. Index map for Mineral Occurrence Data System project, Labrador.

The minimum system requirements needed to run the MODS/PC program include an IBM-compatible micro-computer with an 80286 processor, 640 K of RAM, a hard disk, and a CGA videocard/monitor. As well, the system must

have at least 475 K of free memory. To achieve this, certain memory resident programs may have to be deactivated.

The MODS/PC system is distributed on one 3½" diskette



in a compressed format. An installation program (*install.exe*) aids the user in setting up the system by checking the target microcomputer's parameters, copying files to the hard disk, and decompressing these files. PKZIP, the industry-standard compression utility distributed by PKware Inc., is used to compress the MODS/PC system. Possession of the compression software is unnecessary as the files are in a self-extracting executable format. The compression ratio is better than ten to one, so considerable hard-disk space is required to install the databases.

The user may select between Newfoundland occurrences (2682 records occupying 6.5 Mb), Labrador occurrences (1347 records occupying 3.3 Mb) or a demonstration dataset (168 records occupying 454 kb). The program itself occupies about 400 kb of hard-disk space.

The MODS/PC program is menu-driven and provides the user with complete access to the computerized Mineral Occurrence Data System. The program allows the user to search, view and output occurrences from the database. Custom-designed searches are achieved by setting conditions and using Boolean logic to combine these conditions in different ways. Data portability is provided by the ability to write data to an ASCII delimited file. This allows input of a user-selected dataset to other application programs such as spreadsheets and databases or portability to other types of computer systems such as non-DOS microcomputers, workstations, or mainframes. Full user documentation is supplied with the program.

Each mineral deposit is described by a single MODS record, which has fifty-nine information fields. More detailed information on the deposit can be obtained by consulting key references listed in each record or by examining the hard-copy mineral-inventory reports maintained at the Geological Survey offices. These reports will allow information to be traced back to its source publication.

#### MODS/PC VERSION (1.1)

Since its release in 1991, MODS/PC has been very well received. Presently, there are 86 companies and individuals on the subscribers list. Plans are currently being made to release a second update (V1.2), in early spring 1996. This update will append approximately 300 new records to the datafiles. There will be no change made to the software.

#### MILESTONE REACHED

The MODS reached a milestone this year with the publication of the Belleoram–St. Lawrence map sheets (NTS 1M, 1L). This completes the series for insular Newfoundland (Figure 2); the first map was published in 1979. The

Belleoram–St. Lawrence (NTS 1M, 1L) map area contains abundant mineral deposits and areas of good mineral potential. The St. Alban's area contains potential for gold, base metals and granophile elements. In the Hermitage area, significant base-metal deposits have been discovered and are currently under active exploration. The Burin Peninsula contains long linear belts of argillic and advanced argillic alteration (e.g., the Hickey's Pond belt) and several areas have been explored for gold.

Late Devonian granites north of Fortune Bay are host to molybdenite, tin and rare-earth metals deposits. The St. Lawrence granite hosts large fluorite deposits that have a long history of production. These deposits are presently being studied for the feasibility of re-opening the St. Lawrence fluorspar mine.

#### FIRST DIGITAL MODS MAP

The first colour, digital, mineral occurrence map will be published in 1996. It will cover all of Labrador north of 58 degrees latitude (Figure 3), which includes the Ramah Group. The Ramah Group is a Proterozoic, supracrustal, succession, consisting of a lower, shallow-water, siliciclastic sequence overlain by a deep-water, argillite-carbonate sequence (Knight and Morgan, 1977). It hosts a widespread massive bedded pyrite–chert formation. The northern and central parts of the group are gently to moderately folded and only weakly metamorphosed. That part of the group south of Saglék Fiord has been strongly metamorphosed up to amphibolite facies (Ryan *et al.*, 1983). Mineral occurrence information had to be compiled in this area in light of the proposed national park in the Torngat Mountains. Before the park boundaries can be established, information concerning the area's mineral potential had to be compiled.

#### WORK IN PROGRESS

Mineral occurrence information is currently being compiled on NTS 14E, which is underlain by five separate geological units. These are, 1) quartzofeldspathic gneiss and migmatite, 2) quartz–feldspar–biotite–garnet  $\pm$  sillimanite gneiss and related anatexite (Tasiyak gneiss), both of the Paleoproterozoic Churchill (Rae) Province; and 3) quartzofeldspathic gneiss and migmatite of the Archean Nain Province. These units have been intruded by both 4) anorthositic and 5) granitic members of the Mesoproterozoic Nain Plutonic Suite. The area is cut by the Nain–Churchill boundary, which represents a major structural break. Mineral exploration activity on NTS 14E is high and is being spurred by the recent discovery of the Voisey's Bay Ni–Cu–Co discovery.



## MODS DATA TO BE RELEASED ON COMPACT DISC

Selected fields from the MODS/PC record (Table 1) will be released on compact disc with the Geochemical Atlas of Newfoundland (Davenport *et al.*, 1994). The atlas operates as a 'turn-key' system on a personal computer that will use ArcView™ as its GIS viewing system. Along with geochemical and mineral deposit data, the atlas will include bedrock- and surficial-geology layers and the diamond-drill hole database. This system will enable MODS users to view abbreviated mineral deposits data in a geological and geochemical context.

**Table 1.** Fields from the MODS/PC record released on compact disc with the Geochemical Atlas of Newfoundland

Dep_name	Usual name for occurrence
Alt_name	Alternative name for occurrence
Major_com	Major economic commodity in occurrence
Minor_com	Secondary commodities in occurrence
Status	Development status
Geol_age	Age of deposit
Strat_unit	Stratigraphic unit of host rocks
Host_rock	Lithology of host rocks
Dep_char	Brief description of occurrence
Status_key	Development status as numerical code
	1-current producer
	2-developed prospect
	3-past producer (dormant)
	4-past producer(exhausted)
	5-prospect
	6-showing
	7-indication
Nmino	National Mineral Inventory Number
Entcom	Information on nature and source of occurrence location
Ref1	Information sources; First reference
Ref2	Information sources; Second reference
Ref3	Information sources; Third reference
Ref4	Information sources; Fourth reference
Ref5	Information sources; Fifth reference

## MODS USERS

The MODS is used primarily by mineral-exploration company personnel, however, it is also used by mineral-exploration consultants, geotechnical consultants, personnel and students of academic organizations and the general public.

The MODS is used daily by government geologists in land-use planning. Advice is given to various departments of government in establishing wilderness areas, hydro developments, provincial and national parks, and any other developments that may conflict with future mineral exploration and development. In addition, municipal councils

and the provincial Department of Municipal Affairs are advised of the location, extent, and nature of mineral deposits in specific areas, so that new housing and commercial developments, municipal parks, water reservoirs and sewage-disposal systems can be located, where possible, in areas of low-mineral potential.

Copies of the file are made available to the various agencies of the federal government such as the Mineral Policy Sector and the Geological Survey of Canada. These are then adapted to the National Mineral Inventory, MINSYS and CANMINDEX.

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