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# MINERAL OCCURRENCE DATA SYSTEM

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## ABSTRACT

*The Mineral Occurrence Data System (MODS), which is the principal repository for information on the province's mineral resources, has traditionally been a three-part infobase consisting of a manual Mineral Inventory File, published mineral occurrence maps on geological bases, and a computerized Mineral Inventory Database. The MODS database has been redesigned in Microsoft Access and now contains merged information formerly contained in the manual Mineral Inventory File and the computerized Mineral Inventory Database. The redesigned MODS in Microsoft Access is now the platform on which mineral deposit information is compiled, maintained and delivered to clients.*

## INTRODUCTION

The Mineral Occurrence Data System (MODS; O'Driscoll *et al.*, 1991), which began in the early 1970s, traditionally consisted of a manual Mineral Inventory File, published mineral occurrence maps on geological bases and a computerized Mineral Inventory Database (Figure 1). Over the past year, the MODS database has been redesigned in Microsoft Access to contain merged information formerly stored in WordPerfect and R:base formats. When the merging of the two data streams is complete, MODS will be a two-part system, consisting of a digital database in Microsoft Access accessible via the internet, and a collection of Mineral Occurrence Maps. The redesigned MODS (Figure 2) will be easier for clients to use and for MODS staff to build and maintain.

Mineral occurrence information is compiled mainly from a systematic search of mineral-exploration company assessment reports. Other sources include publications by the Geological Survey of Newfoundland and Labrador, the Geological Survey of Canada, news items, press releases, geological and mining journals publications, and personal communications with mining company and government personnel.

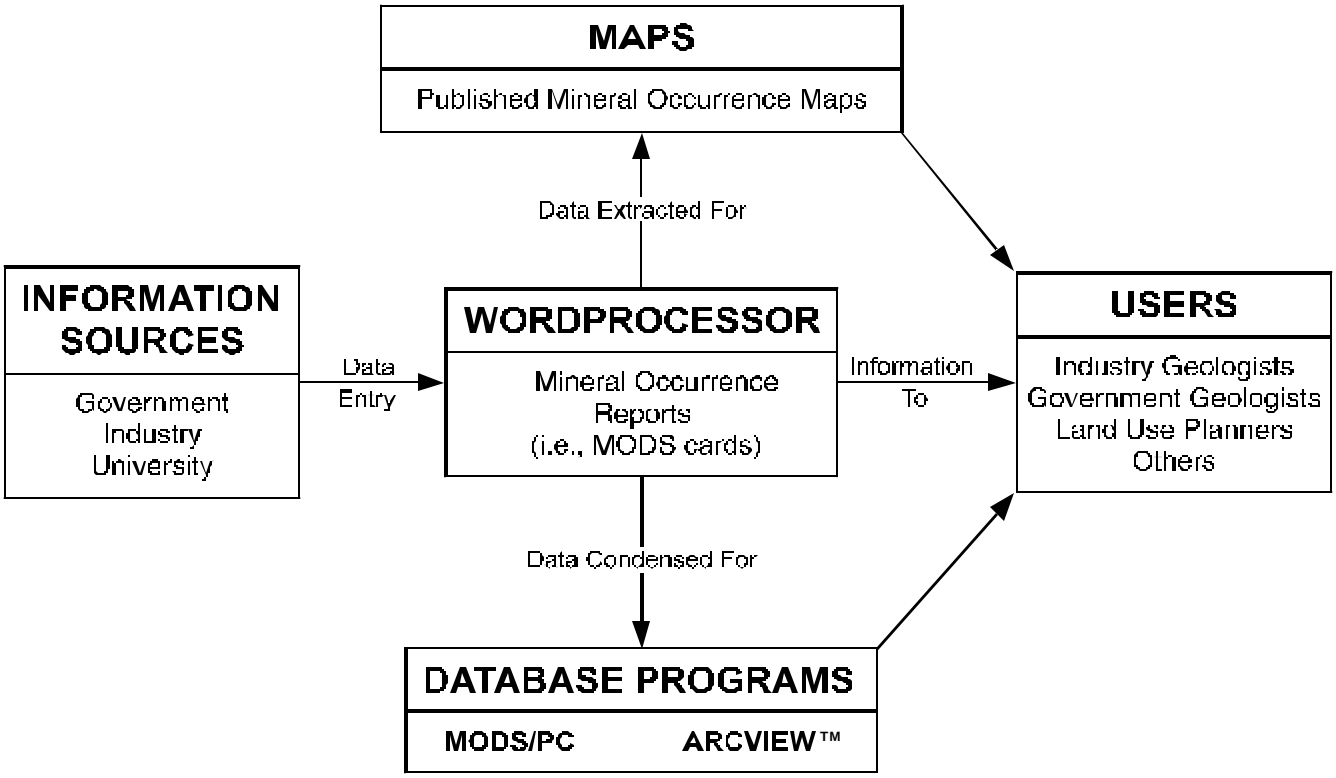
### MODS DEVELOPMENT

The MODS had its beginnings in the early 1970s when it developed as an offshoot from the National Mineral Inventory System and was initially funded under the federal-provincial Department of Regional Economic Expansion (DREE) agreements. Abbreviated mineral occurrence information was recorded in a manual card index file that was maintained at the Newfoundland Department of Mines and Energy, but also fed into the National Mineral Inventory based at the offices of Natural Resources Canada, Ottawa.

In 1976, two publications, the Mineral Occurrence Tables Newfoundland, and the Mineral Occurrence Tables Labrador (Douglas, 1976a, b), were released. Each was accompanied by a transparent overlay that contained mineral occurrence locations and was designed to be used with the geological maps of Newfoundland and Labrador at 1:1 000 000 scale.

MODS underwent a major revision in 1978. The mineral occurrence report was redesigned and expanded and the computerized database was developed using the Geological Retrieval and Synopsis Program (GRASP), which was written by the United States Geological Survey (Bowen and Botbol, 1975) and ran on the IBM OS/390 operating system. At that time, the MODS project began with the compilation and publication of a series of mineral occurrence maps, mainly at 1:250 000 scale on a geological base, which show occurrence locations and have a mineral and commodity listing for each occurrence.

GRASP and the MODS digital database were ported to a Hewlett Packard 9000/560 UNIX-operated minicomputer in 1987 and custom editing software was developed in-house in 1989. The database was ported to R:Base/MS-DOS in 1991 and to satisfy client demand, MODS data was released with an R:Base run time application, MODS/PC, in October of the same year (Stapleton and Parsons, 1991). MODS/PC was written in the R:Base database language (V2.11) and used the R:Base compiler (V1.02). It was a menu-driven, user-friendly, "turn-key" system that was




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

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

designed to run on an IBM compatible microcomputer having a 286 or better, processor.

In 1994, selected fields from the computerized Mineral Inventory Database (Table 1) were released on CD-ROM in GIS format with the Geochemical Atlas of Newfoundland (Davenport *et al.,* 1994), in 1997 with the Digital Geological Map of Labrador (Wardle *et al.,* 1997) and in 1999 with the Geoscience Atlas of Labrador (Davenport *et al.,* 1999). These GIS-based publications use ArcExplorer™, ArcView™ and Map Info™ as their viewing software. In addition to geological, geochemical and mineral occurrence data, these publications provide access to other databases and enable users to view mineral occurrence data in a broad geoscientific context.

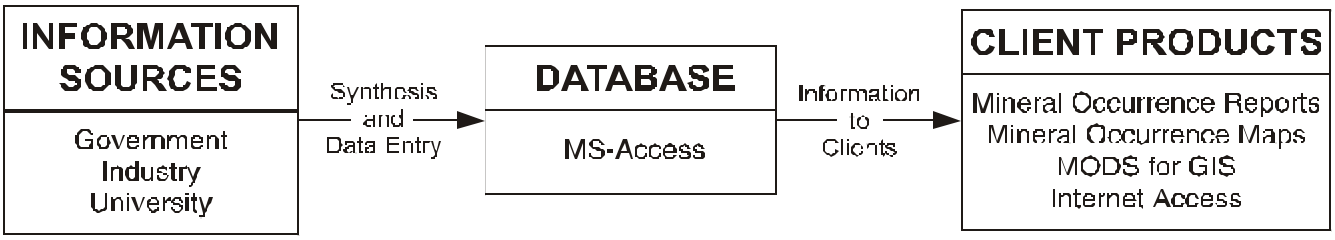
In November 1999, the Mineral Inventory Reports for Newfoundland and Labrador (Stapleton and Smith, 1999), were released on CD-ROM. This collection of about 5000 reports, in Wordperfect format, summarize all data on known mineral occurrences in the province and covers all of insular Newfoundland (Figure 3) and selected areas in Labrador (Figure 4). This publication does not include information compiled since June, 1999 because all new MODS data are compiled in Microsoft Access.

## WORK IN PROGRESS

### THE NEW MODS INFOBASE

During the past year, MODS has been redesigned and the data entry system improved to increase its efficiency and accessibility. As already discussed, MODS was formerly a three-part database (Figure 1). Last year, it was proposed to merge text information from the WordPerfect reports with the digital database fields into one digital database in MS-Access, making MODS a two-part system consisting of a digital database and a collection of mineral occurrence maps. Technical support for the development of the new MODS database including the merge program was provided by Andrea Bassan of MITI Information Technology Inc.

The traditionally digital fields have been successfully ported to MS-Access for the entire MODS and the information contained in WordPerfect reports is being bought in to MS-Access, via a computerized merge program, on a




The heart of the redesigned MODS is the infobase that uses Microsoft Access as its database management system. Information flows into MODS via a Microsoft Access data entry application and out to clients as four main products, mineral occurrence reports, mineral occurrence maps, MODS for GIS bundled with a custom data viewer and other geoscientific datasets on CD-ROM and as a database searchable via the internet.

**Figure 2.** *Organization and operation of the redesigned Mineral Occurrence Data System.*

1:250 000-NTS map-sheet basis. After the merging, the data in the MS-Access records require some manual editing which includes making reference links between the MODS record and the reference lookup table. Data in Wordperfect format for NTS map sheets 2C, 2D, 2F, 2M, 2L and 12G have been successfully merged into MS-Access with further work on other areas pending. The MODS in MS-Access will then serve as a platform from which mineral occurrence data can be distributed to clients either bundled with other geoscientific datasets in GIS format to form large geoscientific resource atlases, searched via the internet, or as a collection of mineral occurrence reports generated by MS-Access and written to a CD-ROM.

Data entry is direct using a custom-designed MS-Access data entry application that makes extensive use of picklists and lookup tables (Figure 5) to make the entry of repetitive data, such as, mineral and commodity names and references, more efficient.

### INTERNET ACCESS

The MODS internet application was developed by Spencer Vatcher, Mineral Development Division, Newfoundland Department of Mines and Energy, using Microsoft Information Server (version 4) software.

Access to MODS data can be gained via the internet from the MODS subpage (*http://209.128.28.29/ modsasp/ NTS.idc*) of the Geological Survey of Newfoundland and Labrador home page using two methods. Clients can query the database by NTS map area, major commodity, deposit name or status using the search form (Figure 6), or by using the mapping application, which can be activated by clicking inside the framed map of Newfoundland and Labrador. The search form links back to the MODS MS-Access database located at the Survey's office in St. John's, Newfoundland, and provides clients with virtually real time access to MODS data because the MODS Internet application is automatically updated on a daily basis. The MODS internet mapping application uses Mapguide software and is part of the National Geoscience Knowledge Network project, which is supported by Natural Resources Canada. It links to a copy of the MODS database that is periodically updated and housed at Natural Resources Canada, Ottawa.

### LABRADOR

The MODS project continues to document new mineral discoveries in Labrador that resulted from the recent intense exploration activity sparked by the discovery of world-class nickel, copper and cobalt reserves at Voisey's Bay. Efforts concentrated on NTS map areas 14C, 14D, 14E, 14F and 13M as these have been the focus of mineral explorationists in recent years.

The silica resources of eastern Labrador, in the Mary's Harbour area, and western Labrador, have been documented and work is in progress on completing the mineral inventory for southern Labrador.

### NEWFOUNDLAND

Work in insular Newfoundland this past year concentrated on documenting new gold discoveries and updating information on those previously documented. By the end of 1999, virtually all reported gold discoveries were entered in the database and preliminary work on the publication of a gold map for insular Newfoundland was complete with publication of the finished product by March, 2000. Efforts were also expended in documenting and updating industrial mineral and base-metal occurrences.

## MODS USERS

The MODS is used primarily by mineral exploration company personnel, however, it is also used by mineral exploration consultants, independent prospectors, geotech-

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

| | |
|---|---|
| dep name | Usual name for occurrence |
| alt name | Alternate name for occurrence |
| nmino | National mineral inventory number |
| major com | Major commodity present |
| mod type | Symbol for major commodity present |
| minor com | Secondary commodities present |
| dep type | Deposit type; coded genetic classification of deposit |
| dep char | Deposit description |
| status | Numeric code indicating amount of work done and hence the amount of information available on a deposit<br>1. Producer - Commodity is extracted for sale<br>2. Developed Prospect - Reserves or demonstrated resources of the commodity can be calculated but the commodity has not yet been produced (i.e., three dimensional data plus grade).<br>3. Past Producer Dormant - The commodity is no longer produced, although there are known reserves or demonstrated resources<br>4. Past Producer Exhausted - The commodity is no longer produced and there are no longer reserves or demonstrated resources<br>5. Prospect - Two dimensional data and grade are available but not enough data to calculate reserves<br>6. Showing - Mineralization exists in outcrop with little information known about its spatial extent. Assay data exists.<br>7. Indication - An indication of the existance of the commodity, i.e., field observation, grab sample, assay, etc. |
| status key | Alpha description of numeric status code as described in status above |
| geology | Code for geological unit in which occurrence lies |
| tect zone | Tectono-stratigraphic zone in which occurrence lies |
| host rock | Rock type(s) associated with deposit |
| str unit | Stratigraphic unit in which occurrence lies |
| rocks | Rock type(s) associated with deposit |
| geolwk | Geological work done? y = yes |
| geophwk | Geophysical work done? y = yes |
| geochwk | Geochemical work done? y = yes |
| DDH | Number of drill holes into the deposit |
| trench | Trenching? y = trenching done |
| adit | Adit? y = adit present |
| shaft | Shaft? y = shaft present |
| working | Type of mine workings. This field would have a value for deposits of status 1, 3 or 4<br>Underground - u<br>Open Pit or Quarry - o<br>Strip - s<br>Placer - p<br>Solution/Leaching - l<br>Underground and Open Pit - uo<br>Underground and Strip - us<br>Underground and Placer - up<br>Uncertain - un |
| size | The workings size (size) field gives an indication of the size of the mine and would only have a value for deposits of status 1, 3 or 4. It is a single digit alpha field that has three (3) possible values, s - small, m - medium and l - large. This field is divided into two (2) categories.<br>1) Underground - Size is based on total lateral advances out from a minimum 18.30 m adit or shaft.<br>s = small, < 1500 m<br>m = medium, 1500 m - 15 000 m<br>l = large, > 15 000 m<br>2) Open Pit/Strip/Placer - Size is based on amount of rock removed. Minimum 300 cu. m.<br>s = small, <30 000 cu. m<br>m = medium, 30 000 - 150 000 cu. m<br>l = large, >150 000 cu. m |
| prores | Statement of deposits production and reserve figures |
| utmzone | UTM Zone in which the occurrence falls |
| utmeast | Easting coordinate |
| utmnorth | Northing coordinate |
| nts | NTS area |

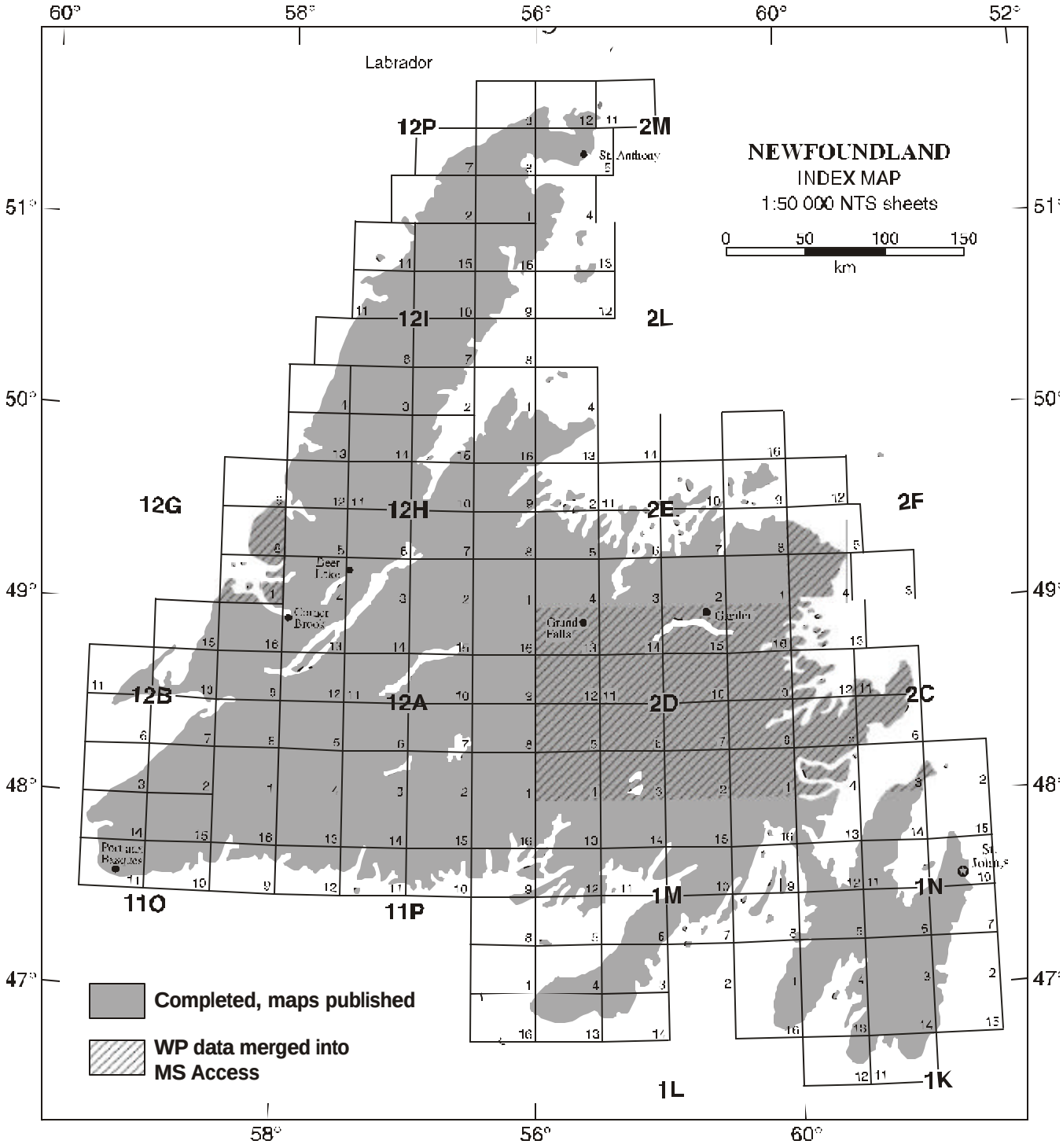



**Figure 3.** *Index map for the Mineral Occurrence Data System project, insular Newfoundland.*

nical consultants, personnel and students of academic organizations and the general public. It is used daily by government geologists in land-use-planning. Advise is given to various government departments through the Inter-departmental Land Use Committee (ILUC) referral 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.

Copies of the file are made available to various agencies of the federal government such as the Mineral Policy Sector and the Geological Survey of Canada.

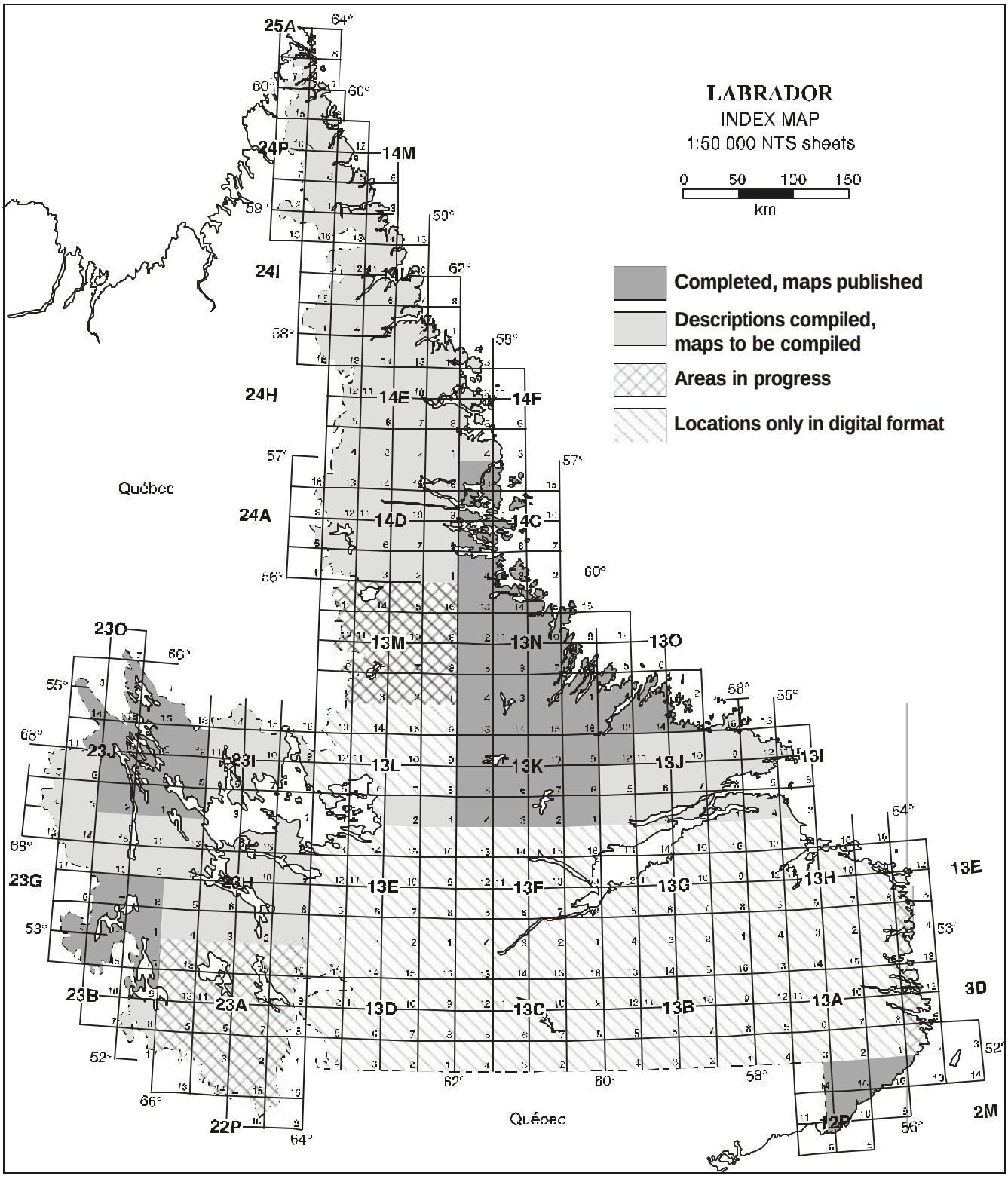



**Figure 4.** *Index map for the Mineral Occurrence Data System project, Labrador.*

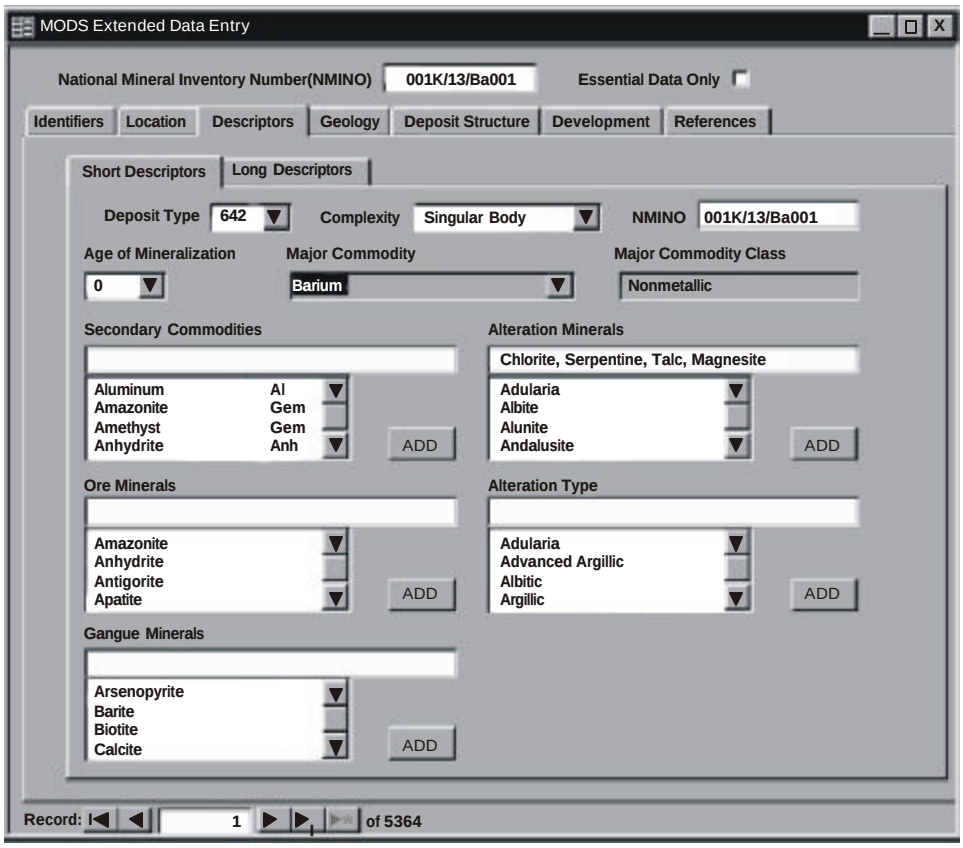



**Figure 5.** *MODS Data Entry Form.*

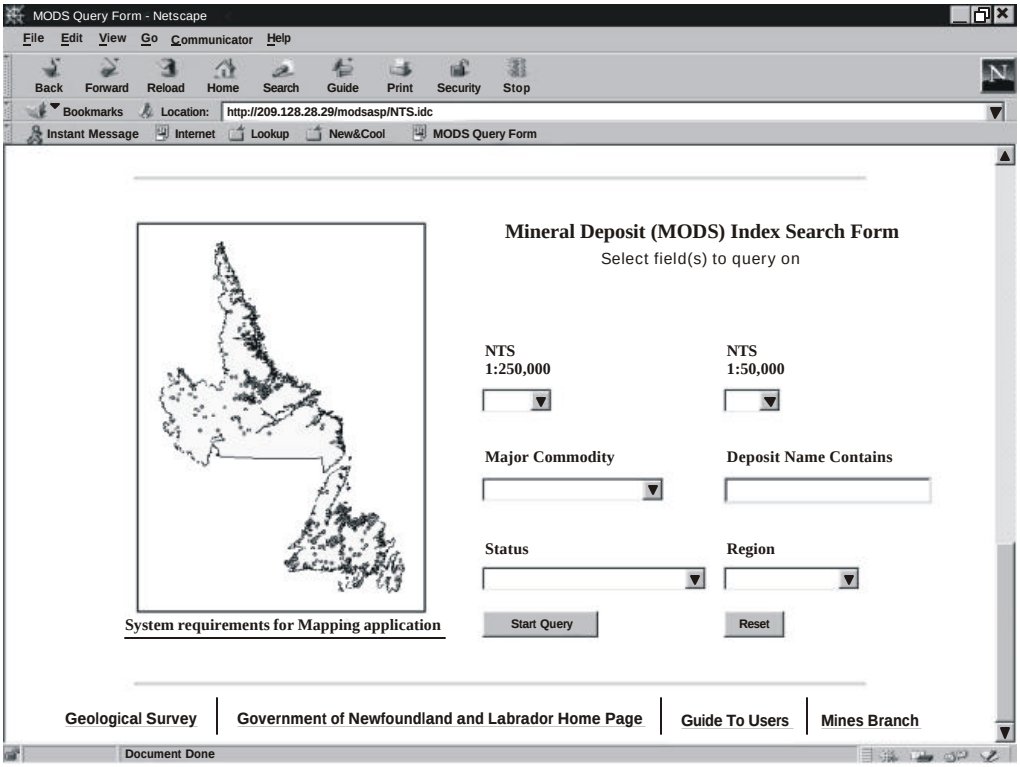



**Figure 6.** *MODS Internet Query Form.*

## REFERENCES

Bowen, R.W. and Botbol, J.M.
1975: The Geological Retrieval and Synopsis program (GRASP). United States Geological Survey, Professional Paper 966, 87 pages.

Davenport, P.H., Nolan, L.W. and Honarvar, P.
1994: The Digital Geochemical Atlas of Newfoundland. *In* Current Research. Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 94-1, pages 279-299.

Davenport, P.H., Nolan, L.W., Wardle, R.J., Stapleton, G.J. and Kilfoil, G.J.
1999: Geoscience Atlas of Labrador. Newfoundland Department of Mines and Energy, Geological Survey, Open File LAB/1305, version 1.0.

Douglas, C.
1976a: Mineral Occurrence Tables Labrador. Newfoundland Department of Mines and Energy, Mineral Development Division, Open File Lab 326, March, 1976.

1976b: Mineral Occurrence Tables Newfoundland. Newfoundland Department of Mines and Energy, Mineral Development Division, Open File NFLD 888, March, 1976.

O'Driscoll, C.F., Smith, J., Stapleton, G. and King, D.
1991: Mineral Occurrence Data System. *In* Current Research. Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 91-1, Pages 395-397.

Stapleton, G. and Parsons, W.K.
1991: MODS/PC - Mineral Occurrence Data System for Personal Computers, Users Manual. Newfoundland Department of Mines and Energy, Geological Survey Branch, Open File NFLD/2174, 80 pages and 4 disks.

Stapleton, G.J. and Smith, J.
1999: Mineral inventory reports for Newfoundland and Labrador. Newfoundland Department of Mines and Energy, Geological Survey, Open File NFLD/2688.

Wardle, R.J., Gower, C.F., Ryan, B., James, D.T., Nolan, L.W., Nunn, G.A.G. and Kerr, A.
1997: Digital geological map of Labrador, version 1.0. Newfoundland Department of Mines and Energy, Geological Survey, Open File LAB/1226.