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**CANADIAN MINERAL OCCURRENCE  
INDEX (CANMINDEX) OF THE  
GEOLOGICAL SURVEY OF CANADA**

D.D. PICKLYK  
D.G. ROSE  
R.M. LARAMEE



Energy, Mines and  
Resources Canada

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Ressources Canada

1978



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## CANADIAN MINERAL OCCURRENCE INDEX (CANMINDEX) OF THE GEOLOGICAL SURVEY OF CANADA

### **Abstract**

Activities of the Economic Geology Subdivision of the Geological Survey of Canada for the most part are a series of projects dealing with one or more mineral commodities, or with the metallogeny of selected geologic regions of Canada. One of the basic components of such studies is a knowledge of the distribution of mineral occurrences and their contained commodities for the areas under consideration.

To assist these projects, a computer processable index file of all significant mineral occurrences in Canada is being assembled. Both the file and the project have come to be known as CANMINDEX (Canadian Mineral Occurrence Index). The basic contents of the file are:

1. Identification: name, alternate name(s), and an accession number.
2. Location: geographic location.
3. Geological data: commodities present and their development status; geological deposit type, and a brief geological characterization of the deposit.
4. Bibliography: a selected bibliography of documents and maps best describing the occurrence or the local geology.
5. Remarks: special aspects of the occurrence.
6. Cross-references: a provision to include accession numbers from up to four other files containing information on the occurrence.

At present, data acquisition for the file is proceeding on the basis of priorities set by the Economic Geology Subdivision and directly supports selected projects as the file is being built.

### **Résumé**

Les activités de la Sous-division de la géologie économique de la Commission géologique du Canada, consistent principalement en une série de projets relatifs à un ou plusieurs produits minéraux, ou à la métallogénie de régions géologiques particulières du Canada. Un objectif essentiel de ces études est de connaître la distribution des venues minérales et les minéraux qu'elles contiennent, dans les régions considérées.

Pour appuyer ces projets, nous préparons actuellement un fichier de référence qui puisse être traité par ordinateur, de toutes les venues minérales importantes au Canada. Le fichier et le projet sont tous deux connus sous le nom de CANMINDEX (Canadian Mineral Occurrence Index). Ce fichier contient essentiellement les détails suivants:

1. Identification: nom, nom(s) équivalent(s), numéro de référence.
2. Localité: situation géographique.
3. Données géologiques: minéraux existants et leur mode de formation; type de gîte minéral, et caractérisation géologique sommaire du gisement.
4. Bibliographie: bibliographie sélectionnée des cartes et documents décrivant le mieux la venue.
5. Remarques: caractères particuliers de la venue.
6. Renvois: ceux-ci permettent d'inclure les numéros de référence provenant d'au plus quatre autres fichiers contenant des informations sur la venue.

Pour le moment, nous procédons à la collecte des données pour établir le fichier, d'après l'ordre de priorité fixé par la Sous-division de la géologie économique; ainsi, on contribue directement aux projets en question, au fur et à mesure que l'on construit le fichier.

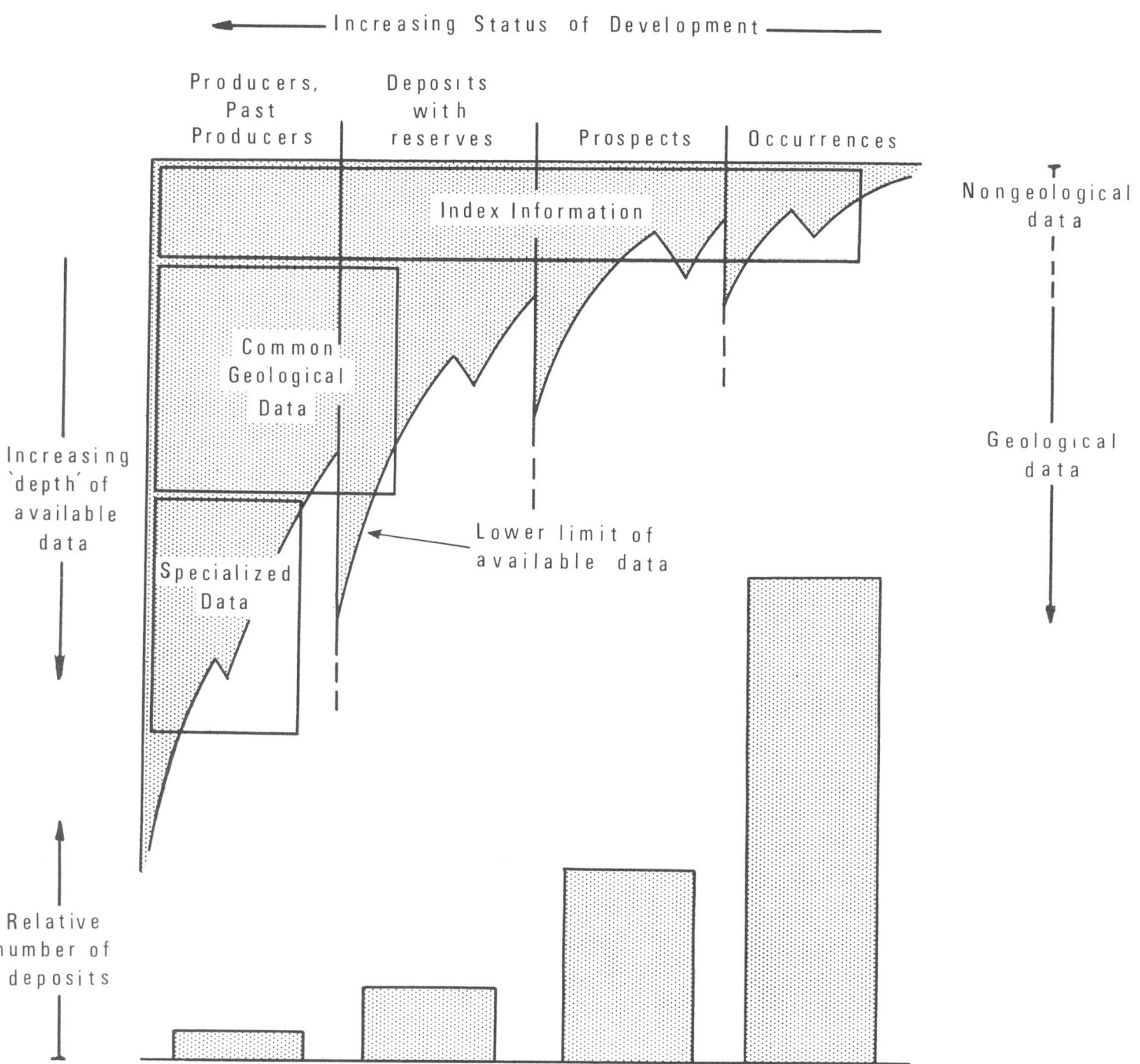


Figure 1. Schematic representation of the distribution of available mineral deposits data and relative numbers of deposits.

## CANADIAN MINERAL OCCURRENCE INDEX (CANMINDEX) OF THE GEOLOGICAL SURVEY OF CANADA

### PURPOSE OF CANMINDEX

The requirement within the Geological Survey of Canada for computer processable files of Canadian mineral deposits arises from the main activity of its Economic Geology Subdivision, the study of the geology of Canadian nonhydrocarbon mineral deposits\*. These studies are carried out as a number of projects, each of which deals with one or more mineral commodities, or with the metallogeny of selected geological regions of Canada. The objective of such studies is to improve the geological understanding of mineral deposits, and in this way to be able to provide support for mineral exploration and advise government on mineral resources.

Fundamental to these studies is the systematic compilation of data files of the distribution and geological characteristics of Canadian mineral deposits and occurrences. Compilation of these data comprises a significant part of most projects. Furthermore, in many of the projects, (as later described) computer processable files of parts of the data have been developed for a variety of project uses. However, in addition to these project files, both manual and computer processable, there is need for a single standardized computer processable file of certain elementary data for all Canadian mineral deposits and occurrences. This need is based on the following considerations:

1. Most studies of mineral deposits (outside as well as within the Geological Survey) are concerned with their identification, location and principal contained commodities. A single central file in which these data are compiled would therefore have many potential users.
2. The amount or "depth" of data available on mineral deposits is roughly proportional to the development status of those deposits. This relationship is depicted schematically in Figure 1. Deposits that have been mined or are currently being mined generally have been the best documented; developed prospects are less so, and prospects and occurrences are relatively sketchily described. However, for virtually all deposits, regardless of development status, the elementary or "index level" information is available.
3. In the past, most studies within the Geological Survey that dealt with mineral deposits spent substantial time and effort compiling these elementary data items. Where these studies overlapped, there was often duplication of compilation effort, for a variety of reasons. A single, authoritative, up-to-date file should eliminate much of the compilation effort in many studies with regard to the elementary data items, and should also eliminate further duplication of effort in this regard.
4. A machine processable file can produce plots of the geographical distribution of selected mineral deposits quickly, accurately and efficiently. If one plot is not satisfactory, another can easily be produced at the same or different scale or projection. Furthermore, a machine processable file can be used to produce, quickly and efficiently, listings and tables of selected features. Both of these functions are extremely tedious using manual methods.

5. Once the data stored in the file have been edited and corrected, further manipulation of the data introduces no additional error. This is not the case with manual files.
6. Elementary mineral deposits data in machine processable file can serve as an efficient indexing system for managing the compilation, maintenance and use of files containing more detailed and highly specialized data.

Based on this rationale, construction was undertaken of a computer processable file that would serve as a general index of Canadian mineral occurrences. This file is known as **CANMINDEX**, (**C**anadian **M**ineral **O**ccurrence **I**ndex) and the data to be acquired consist principally of: 1) identification; 2) geographic co-ordinates; 3) a list of mineral commodities present; and 4) a selected bibliography of more detailed information pertaining to the occurrence.

### CHARACTERISTICS OF COMPUTERS AND FILES

In recent years, the rapidly expanding technology associated with data processing has manifested itself in the growing number of files being assembled with the intent of being processed by computer. In particular, the computational power and introduction of massive data storage at relatively low cost and ease of programming now make computer processable files more viable than may have been the case a few years ago.

The main attribute of computers in any application, be it mathematical manipulation or searching files, is the high speed with which these tasks are accomplished. Being a machine, a computer is not subject to the usual human shortcomings of boredom and carelessness when subjected to protracted, repetitive, manipulation of large quantities of data.

Applications of computer technology are increasing in the Geological Sciences in both mathematical manipulation and word processing. In the former, uses include statistical modelling, reduction of analytical data and geophysical map reduction and production (including scribing and/or drawing of contours etc.). In word processing, activity is usually confined to the maintenance of "field notes", wherein the computer is used mainly for its retrieval capabilities.

When considering the possible use of a computer to assist in information processing, it is important to be aware of the primitive manner in which the computer treats data. The computer treats information as either "true" or "false". There is no interpretation of the data and no "shade" of meaning is ever assigned. For this reason and because of the great degree of interpretation inherent in many of the solutions to geological problems, care must be taken to ensure that the computer is not expected to provide solutions where it is incapable of doing so. For this reason, computers can best be regarded as aids in the solution of geological problems and, for the present, their greatest utility will be in the maintenance and manipulation of large volumes of objective data.

\* In the following text, the expression "mineral deposits" or "deposits" will be understood to include mineral occurrences, unless the context clearly indicates that it does not.

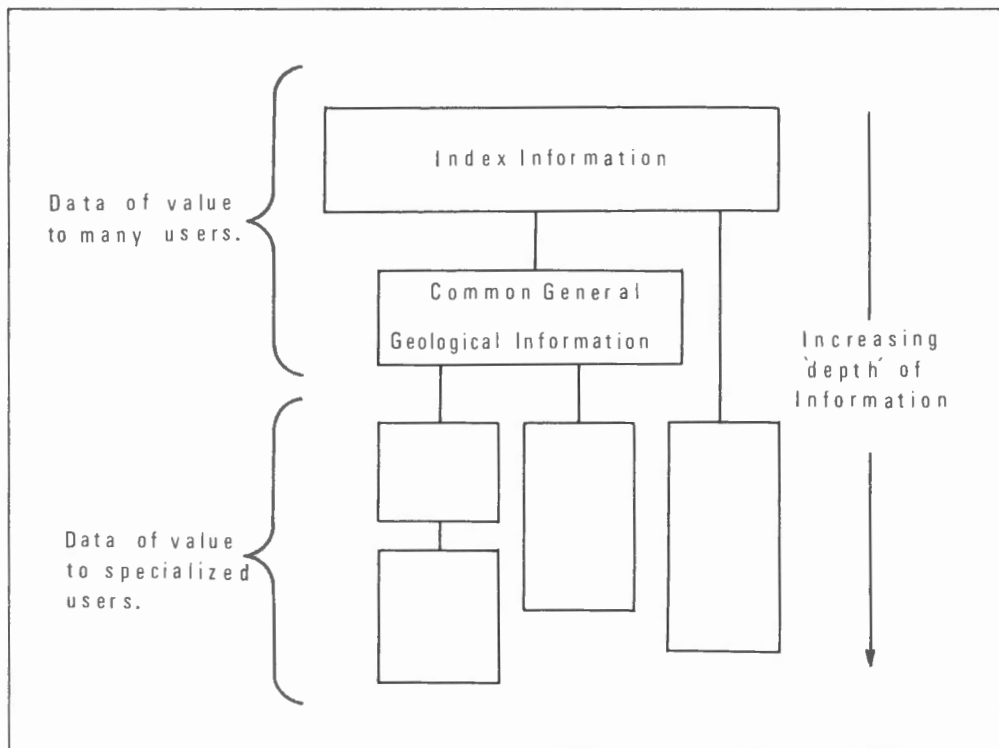


Figure 2. Schematic representation of the relationship between existing and proposed computer files within the Economic Geology subdivision of the Geological Survey of Canada.

In considering the requirements of the Geological Survey for computer processable files a number of points emerged based primarily on the activities of the Survey. As an agency, most projects within the Survey are research rather than "production" oriented. The implication of this is that specific data requirements vary from project to project and change with time as the projects change. However, as all projects involve geological data, it was recognized that a number of data items would be common to any data file. This is especially true when dealing with a specific branch of geology such as mineral deposits. The items that were identified as being common to all projects were those noted above and these have been isolated as one file with linkages to other existing and planned files. This configuration of existing and proposed files within the Economic Geology Subdivision is schematically depicted in Figure 2. In this scheme **CANMINDEX** occupies the position identified as Index Information. Provision is made for linkage to other more comprehensive files which might be of general use to many users, or directly to files of interest only to specialized users. It should be noted that the reason for maintaining physically distinct files is based on the fact that the File Management System being used to maintain our data requires that all records be of the same fixed length. Thus at present the most efficient way to collect and maintain different sets of data is to group them into physically distinct files.

#### HISTORICAL REVIEW OF COMPUTER PROCESSABLE MINERAL DEPOSITS FILES AT THE GEOLOGICAL SURVEY OF CANADA

Various geologists and groups have been actively engaged in the assembly of computer processable files in the Geological Survey since the late 1960s. Among the first files was the M-file assembled under the direction of D.R.E. Whitmore. The file was experimental and was based on the recommendations of the Committee on Storage and Retrieval of Geological Data, (Robinson, 1966; Brisbin and

Ediger, 1967). The objective of the file was to provide a means of comparing mineral deposits for a variety of users. The contents included: (1) identification of the deposit; (2) geographic location and co-ordinates; (3) commodities present; (4) production and reserves (grades and tonnage); (5) some geological information; and (6) a list of references. Data were actively assembled between 1968 and 1970 with acquisition tapering off into 1972. The life of this and other files is summarized in Table I where the time of active data acquisition and intermittent assembly are depicted by solid and dashed lines respectively and each of the files is identified as to whether it was intended for multiusers (M), or as a project (P), file.

As a result of the experience gained in the assembly and usage of the M-file, a modified version called the Operation September Test File (OPSEP) was initiated in late 1973. This file was very similar to the M-file except that emphasis was placed on the acquisition of data necessary for resource assessment. The main assembly activity carried on into late 1974 and tapered off in early 1975. Following testing of the OPSEP file, the Geological Survey requirements were reviewed again and the present system resulted. It was decided that the most efficient way to proceed was to develop two complementary files, namely **CANMINDEX** and M-2. **CANMINDEX** would contain all index level data that are available for any mineral occurrence and M-2 would contain the more comprehensive geological data usually only available for producing mines. The files are linked through a common link number. Of the two files, it was decided that **CANMINDEX** was more immediately useful, therefore the main file building activity at the Geological Survey has been to concentrate on data acquisition for **CANMINDEX** rather than M-2.

Beginning in 1969, a series of files have been assembled by the Geomathematics Section of the Regional and Economic Geology Division. These are the Superior, Slave-Bear and Project Appalachia files. All these files were assembled for the purpose of developing techniques for

Table 1

Geological Survey of Canada computerized mineral deposit files

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Mineral Deposits Section										
M-File (M)				-----	-----					
Moly-File (M)							-----	-----	-----	
Opsep Test File (M)							-----	-----		
Ba-Sr-Fl (M)										
Ni-File (P)									-----	-----
U-File (P)									-----	-----
Sed-U (P)									-----	-----
Vein-U (P)									-----	-----
Au-Ag File (P)									-----	-----
IMS File (P)									-----	-----
Geomathematics Section										
Superior (M)				-----	-----					
Slave-Bear (M)				-----	-----					
Kelly (M)				-----	-----					
Project Appalachia (M)							-----	-----	-----	-----
Economic Geology Subdivision										
CANMINDEX (M)									-----	-----
M-2 (M)									-----	-----
(M) -- File intended for multi-users (P) -- Project file				----- Active file building ----- Intermittent building or maintenance						

Modified after A.G. Fabbri

making resource evaluations using statistical approaches and have been described in a series of papers by various members of the section and their colleagues (Fabbri, A.G., 1973, 1975; Fabbri, A.G. et al., 1975; Wong, A.S. et al., 1975; Agterberg, F.P. et al., 1972; Leech, G.B. et al., 1974).

One other multiuser Mineral Deposits file, known informally as the Kelly file, was assembled in 1970 and 1971 with decreasing data acquisition activity into 1972. This was similar in content to the M-file, with modifications as appropriate based on the earlier experience. Assembly of the file continued until approximately 5400 records were coded.

One of the earliest project-related files was the International Massive Sulphides (IMS) file developed by R.I. Thorpe to assist him in his project activities. Apart from location, identification and size information, the file contains compositional data. Accurate locations are missing for many of the foreign deposits. Entries are mainly for copper, lead and zinc deposits. Assembly of the file began in 1972 and is continuing at present, although with a relatively low priority.

A similar file, IRON, was initiated at approximately the same time to assist in the continuing IRON project of the Geological Survey. As with other similar files, the information assembled pertains to identification, location, type, mineralogy and grade and tonnage. Assembly of the file began in 1972 and actively continued until 1974. The file lay dormant until 1976 when data acquisition again began in earnest and is continuing at present.

The assembly of a Gold-Silver file was initiated in mid-1973. The information collected is the usual identification, location, classification, grade and tonnage, and a coded data source. Activity in data collection has continued intermittently to the present.

Among the most recent project files initiated and currently active are the Molybdenum file and the Nickel file. Both contain basic information specific to the particular commodity and both place heavy emphasis on bibliographic information. The Molybdenum file was initiated in mid-1973 and the Nickel file was started in late 1974. A file with a similar content for lead-zinc deposits was initiated in 1972. Activity continued into 1973 at which time it tapered off. Data acquisition on a regular basis resumed in 1976.

Several files are maintained by the Uranium Resource Evaluation Section of the Geological Survey to satisfy specific requirements. The current URE-3 file is the outgrowth of three files that had been previously maintained separately. These were the Uranium File-1 (U1), Sedimentary Uranium File-2 (Sed-U2) and the Vein Uranium File (Vein-U). The information contained is the usual deposit information and additional parameters peculiar to uranium. These files were initiated in early 1975 and are still in the stage of intensive data acquisition. In addition to these, two special files have been assembled by the section. The first contains the diamond drilling results for the Blind River area and the second contains the results of a radon survey in the Cypress

Hills. As both files contain the results of specific surveys, they were complete when assembled and require no further update. At present they only require routine Systems-dependent maintenance.

The current major activity in data acquisition within the Economic Geology Subdivision is related to the Canadian Mineral Occurrence Index (**CANMINDEX**). As noted above, it has been decided that index level information would be the most immediately useful to officers of the Subdivision in particular, as well as other members of the Survey. Activity relating to this file began in earnest in early 1975 and by March 1976, a pilot project on a test file had been completed and evaluated. Resultant changes in the file were implemented and the massive effort of data acquisition proceeded.

#### **FILE DEFINITION AND TESTING OF CANMINDEX**

The reasons for discontinuing maintenance of the various files that have become dormant are varied. Project files are often not maintained when the immediate needs of the project have been satisfied. Some files are highly dependent on the activities of the individual scientists whose interests and priorities change from time to time. Others are established for test purposes and, once these requirements are satisfied, the files are discontinued. However, the most tragic circumstances under which a file may be discontinued occur when it becomes apparent that the originally intended objectives of the file cannot be satisfied because of unsuitable data content or definition. This condition usually results from a lack of communication between the file builders and the file users or insufficient testing of a given file to determine whether or not it will meet the intended objectives. Recognizing this as the most probable cause for the failure of some of the earlier files, it was decided at the outset of the **CANMINDEX** file assembly that the users would be responsible for: i) determining the data content; ii) the definition of each of the data items; and iii) testing the file to determine whether or not it satisfied their requirements.

The initial file designed for **CANMINDEX** included data to meet the requirements of the Geological Survey and the Mineral Development Sector\* of the Federal Department of Energy, Mines and Resources. A joint approach was taken because both agencies required an index level file for their own purposes and as the files would be of a very similar nature, it was felt considerable duplication of effort could be avoided. The requirements of the Mineral Development Sector were already defined in an existing file called the Mineral Establishment and Property Index (MEPI). Those of the Geological Survey had to be defined and, if not already included, were added to the MEPI file. A pilot project was designed to test the effectiveness of the file in satisfying the agreed upon objectives of both agencies.

The area chosen in which to test the **CANMINDEX** file was centred in the Bathurst area of New Brunswick. Prior to commencement of the project a number of validation procedures and checkpoints were established. These were strictly adhered to and found to be satisfactory to ensure that the data were as error free as possible. Very little change to any of the established editing procedures was required in the course of the project. An area that proved cumbersome was in the administration of the procedures which had to be instituted to allow both agencies to edit the data. We had not anticipated any problems in this regard and therefore were obligated to alter the procedures as necessary during the test period. Data acquisition began on July 14, 1975 and continued until December 12, 1975. During this time data for 440 mineral occurrences were acquired. Of these, 350 passed all stages of validation and editing and were loaded into the

test data file. This file was then subjected to testing by the commodity geologists with the view of determining whether or not it met requirements of the Geological Survey.

In assessing the pilot project a number of points became clear. We had anticipated a coding rate of approximately four records per day per coder. In the project the rate achieved was one record per day. The reason for this low rate was the stringent editing procedures and the fact that two agencies were editing the data. Because of different objectives editors for the two agencies tended to make changes that more closely suited their particular needs. This resulted in records being recoded and invariably caused delays.

An analysis of the data within the file revealed that in spite of the stringent editing procedures used, three wrong codes had remained undetected. However, the data were judged to be "clean". A more revealing result was the count of the number of times data for each of the items was available to be coded. For many items, data had either never been entered or relatively few entries had been made. All such items were examined to determine whether or not they were necessary to meet the objectives of the file. It is obvious that by their absence they could not possibly contribute to realizing the objectives, yet time and effort must have been expended in trying to acquire the data. This required that the objectives of the file be re-examined.

Mainly because of the poor data acquisition rate, it was agreed that the joint Geological Survey/Mineral Development Sector phase of the **CANMINDEX** pilot project be terminated.

#### **PRESENT FORM OF CANMINDEX**

In spite of the decision to terminate **CANMINDEX** in the form used for the pilot project, the requirements of the Geological Survey for an index level file of mineral occurrences in Canada remained unchanged. The results of the pilot project were carefully analyzed and it was decided to continue on a modified version. Modification of the data content and definition necessary to meet Survey requirements was made and data acquisition using only Survey staff was resumed.

Analysis of Geological Survey requirements revealed that information in six categories was required for each mineral occurrence entered in the file. These are:

1. Identification - The name, alternate name(s) and an accession number.
2. Location - Its geographic location in some universally accepted co-ordinate system.
3. Geological data - Commodities present and the development status of each, the deposit type, and a brief geological characterization of the deposit.
4. Bibliography - A selected bibliography of documents and maps best describing the occurrence or the local geology.
5. Remarks - A provision to verbally describe any special aspects of the occurrence.
6. Cross-references - A provision to include accession numbers from up to four other files containing information on the occurrence.

The second and third categories in particular consist of several individual data items relating to the specific information required. A complete description and definition of each data item is contained in the **CANMINDEX** Coding Guide attached as Appendix 2. In addition, this document lists valid codes for data that are entered in a coded rather than free format form. The input document attached to the coding guide may be used as a quick reference to data items included in the **CANMINDEX** file.

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\* Now the Mineral Policy Sector.

## DATA ACQUISITION:

Although the intent of the **CANMINDEX** file is to include all known mineral occurrences in Canada, the very large number of records required has forced us to be selective in choosing which occurrences will be coded.

At present, several principal sources are consulted and data are extracted, interpreted, summarized or reduced to code as necessary. These data are recorded on a single document prior to entry into the computer file. The sources are:

1. The National Mineral Inventory. This is a card file that has been developed and maintained by the Mineral Development Sector for a number of years. Information on individual occurrences is filed by commodity and by geographic area. Geographic co-ordinates, development status and references are included in the file.
2. Geological Survey Commodity Files. These are manual files maintained by each of the commodity geologists at the Survey. In general, these files are well maintained and the information on significant deposits is usually extensive. Information on smaller occurrences, however, is variable and depends to a great extent on the characteristics of each commodity.
3. Publications of the Geological Survey and corresponding provincial agencies.
4. Scientific and Trade Journals. Of these the trade journals often provide the earliest information relating to newly discovered mineral occurrences. However, a minimum of information is usually made available.
5. Open file reports. These are reports made available by federal and provincial agencies that are similar to other publications released by them, but have not formally been published.
6. Assessment records, on mining and exploration properties, filed by industry in accordance with provincial and federal regulations, are also used.

Another source that is just beginning to be exploited is existing computer files within the Geological Survey, provincial agencies and universities. The main difficulty of using data from these files lies in the fact that they all require massive editing because the data definitions are different from those used at the Geological Survey. In effect the work involved would be virtually to recode these files. Although it is usually technically feasible to transfer the data from one file to another, the differences in data definition could result in a nonuniform content of the file and could render the file unsuitable for responsible scientific application.

In assembling the data for each occurrence, the available information is examined by a coder (who is a geologist), and any interpretations or summaries that are necessary are made and the information entered onto the **CANMINDEX** coding form. All forms are then examined by the chief coder who is responsible for ensuring that all coding guidelines and standards are uniformly maintained. After passing the scrutiny of the chief coder, the information is prepared for entry into the computer through an off-line intelligent terminal. The terminal has been programmed to ensure that all necessary fields in every record have been completed, all coded data consist of valid codes, proper data types (alphabetic, numeric or mixed) are entered in specified fields, and valid ranges have been observed for numerical data. Data are stored off-line and periodically transmitted to a central computer by telephone line. At the central

computer, the data are arranged in a format suitable for loading into a file management system after which they are available for access. A more comprehensive description of this procedure is contained in Appendix 1. At present, access is mainly by members of the Economic Geology Subdivision. The overall data flow and edit points from source to user are summarized in Figure 3.

## DATA MANAGEMENT:

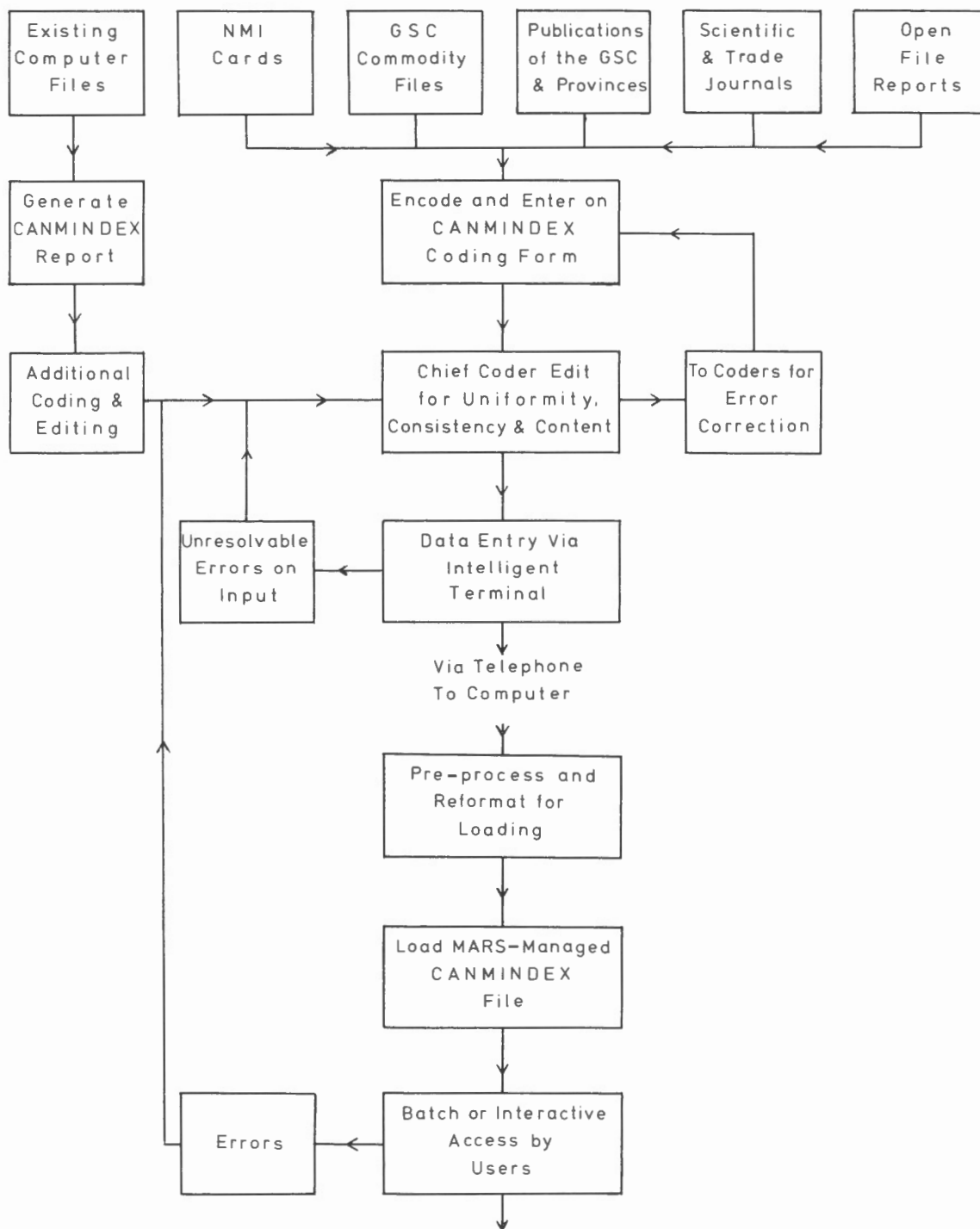
At present, **CANMINDEX** is being maintained using the MARS VI (Multi-Access Retrieval System) file management system. This is a commercially available system marketed by the Control Data Corporation and, like most file management systems, was intended for business application. The system requires that all records be of fixed length and allows the use of repeating groups and key items.

The system has a number of advantages which make it attractive at this time; it is easy to load and update, training required to use the system for retrieval is relatively short (approximately three days with a minimum of experience in using computers) and, finally, the system is very easy to abandon completely in order to make the data available for loading into another system. The main disadvantages of the system are that the definition of more than three key items adversely affects the access times and only simple data structures can be used because only one level of hierarchy is allowed. However, because of the simple nature of our file neither of these constraints is serious.

Control Data has announced the withdrawal of support for the maintenance of MARS VI, therefore our file will eventually be maintained by another system.

## THE FUTURE OF **CANMINDEX**:

The decision to use computers for data maintenance is usually based on a requirement to have speedy access to large amounts of information. The implication of this requirement is that the same large amounts of data must be collected in a computer processable form before the file can be expected to fulfill the purposes for which it was intended. The initial approach at the Geological Survey to the problem of data acquisition was to obtain complete coverage map sheet by map sheet. Although this is a neat and tidy approach, the implication is that the file will not be fully useful until coverage is complete for the whole country. Depending on the available manpower there could be a long period between beginning the data acquisition and the completion of the "first pass" in coverage (estimates in excess of 100 man-years have been made for data acquisition). The approach now taken is to have each commodity geologist specify those mineral occurrences judged to be "important". Lists of occurrences are then passed on to the chief coder who arranges the coding. The "importance" of a mineral occurrence in this sense is based on a subjective judgment by each commodity geologist and is greatly influenced by the objectives of individual projects and the geological characteristics of the various commodities. Although this approach will not result in complete coverage of all mineral occurrences on the first pass through the available data, it will, after a time, provide selective national coverage at a level considered important by the Geological Survey commodity geologists. Furthermore, and of comparable importance, the growing file will have served the objectives of a number of the commodity projects during its construction.



· Figure 3. Generalized overall data flow and edit procedures.

## EXAMPLES OF FILE USAGE

The examples presented here are intended to illustrate the kinds of uses that can be made of the data within the **CANMINDEX** file and to some extent are patterned on actual requests that have been made for retrievals. They have been chosen to illustrate some of the capabilities of our File Management system as well as output from some of our graphic applications programs. It is not our intent to provide a detailed review of the operation of our File Management system. However, in order to offer some insight into the syntax and operation of the system, the operator-entered commands necessary to initiate retrievals are included in the first two figures although no attempt will be made to explain them in detail. In the figures, the operator-entered commands have been underlined to distinguish them from the computer-generated output.

### Example 1

A number of simple statistical capabilities are part of the MARS VI system. For example the counting capability allows the computer to count the number of records that satisfy a given criterion. This capability is illustrated in Figure 4 in which we wish to know "how many producers of lead or zinc" we have on file.

The first command simply makes the **CANMINDEX** data base available for manipulation. The second command informs the MARS VI system that we wish to access the retrieval module in order to make a retrieval from the data base. The actual retrieval request is contained in the next two lines and is made up of two parts. Part one is: IF a variable named CMST contains "PB I" or "ZN I" then the record qualifies as one in which either lead or zinc (or perhaps both) are being produced. Part two is: COUNT C1 which instructs the MARS VI system to maintain a running tally of the number of records that qualify. The response to the request is COUNT = 31.

The lower part of the figure illustrates another summary capability available in the MARS VI system.

Here we wish to have a summary of the different deposit types for records that qualify under the same criteria as above, i.e., what deposit types are represented by the 31 lead or zinc producers on file? The request for the summary is contained in the line IF SAME RECAP DEPTYP, which simply states using the same criteria as in the previous retrieval, count and tabulate all the different variables contained in the data item called DEPTYP. The response is the four line tabulation where we note that only four of a possible 17 deposit types are represented. The exact meaning of the codes representing the various types (15, 04, 05, 06) can be found in the appended **CANMINDEX** Coding Guide.

### Example 2

In Figure 5 the code for the deposit type, name, province, NTS sheet and commodities present have been listed for each of the 31 deposits above. The listing has been doubly sorted, primarily by deposit type and secondarily by province. The commands necessary to make the retrieval are contained in the first two lines. All commands after REPORTER; are required to generate the summary report. In the listing we note that eight of the producers are of type 05 (more or less concordant in sedimentary rocks). These eight have been listed alphabetically in the summary report in Figure 6 along with their deposit character. The operator-generated commands necessary to make the retrieval and generate the report have been excluded.

### Example 3

Figure 7 is a summary report of all mineral occurrences on file in the Superior Geological Province, listing the number of deposits of each of the deposit types present.

### Example 4

In Figure 8 all information available in the **CANMINDEX** file for the Gays River deposit in Nova Scotia has been reproduced in a format approximating the **CANMINDEX** coding form. This type of report is used extensively by our coding staff when editing data for the file.

### Example 5

The final printout shown in Figure 9 is a listing of the accession number, name, alternate name, latitude and longitude, commodities present, deposit type and deposit character for all occurrences in NTS block 11 K/7 in Nova Scotia. The list has been sorted by accession number and is a listing of all occurrences plotted in Figure 12.

As the following plots are only intended to illustrate some of the plotting capabilities available, all have been reduced to page size. This has resulted in the exclusion of some smaller islands in the reference sketch maps with the consequence that some occurrences appear to be in water.

### Example 6

Figure 10 is a plot of all lead-zinc deposits having a status of producer, deposit with known reserves, past producer with known reserves or past producer without known reserves. Data included are for Ontario, Quebec and Newfoundland and were originally plotted at a scale of 1:7 603 200 or 1 inch = 120 miles. The computer-generated plot has been superimposed on a sketch map of Eastern Canada to provide some indication of their distribution.

### Example 7

Figure 11 is a plot of all deposits on file for the province of Nova Scotia. These data were originally plotted at a scale of 1:2 500 000 and have been superimposed on a sketch map of the province.

### Example 8

The deposits listed in Figure 9 have been plotted in Figure 12. Each of the deposits is identified by its accession number and various symbols have been used depending on the particular deposit type. Square symbols represent placer deposits, hexagonal symbols are "more or less concordant deposits in sedimentary rocks", triangles are "vein(s), faults, shear zones and replacements, exclusive of skarn" diamonds are "other deposits in igneous rocks", ekses are "more or less concordant deposits in metamorphic rocks" and crosses are deposits with "insufficient data to classify".

```

LOAD DATA BASE FROM DE;
RETRIEVAL:

IF (CMST CONTAINS "PB 1" OR CMST CONTAINS "ZN 1")

COUNT C1:

COUNT =      31

--- END OF RETRIEVAL ---

IF SAME RECAP DEPTYP:

      2 COUNTS OF 15

     13 COUNTS OF 04

      8 COUNTS OF 05

      8 COUNTS OF 06

--- END OF RETRIEVAL ---

```

Figure 4. Example of a MARS VI retrieval from the CANMINDEX file; basic summary statistics.

```

IF SAME QUALIFY DEPTYP,IMDNAM,PROV,NTSP,NTSS,NTST,CCMM1,CCMM2,CCMM3,CCMM4,
CCMM5,CCMM6,CCMM7,CCMM8,CCMM9,CCMM10 BY HIGH DEPTYP BY HIGH PROV;
--- END OF RETRIEVAL ---
REPORTER:
FORMAT:
HEADING IS DEPOSIT TYPE,NAME,LCCATION,COMMODITIES:
HEADING IS -----,-----,-----,-----:
DETAIL IS DEPTYP,IMDNAM,PROV,NTSP,"L",NTSS,"L",NTST,CCMM1,CCMM2,CCMM3,CCMM4,
CCMM5,CCMM6,CCMM7,CCMM8,CCMM9,CCMM10;
SPACE TO 1,15,47,65 IN H1 BEFORE I1,I2,I3,I4;
SPACE TO 1,15,47,65 IN H2 BEFORE I1,I2,I3,I4;
SPACE TO 3,15,47,52,55,56,57,58,64,68 IN O1 BEFORE I1,I2,I3,I4,I5,I6,I7,I8,
I9,I10;
SPACE TO 72,76,80,84,88,92,96,100 IN O1 BEFORE I11,I12,I13,I14,I15,I16,
I17,I18;
GENERATE:

```

DEPOSIT TYPE	NAME	LCCATION	COMMODITIES
04	BUCHANS MINE	NFLD 012/A/15	ZN PB CU AU AG BA
04	MINC MINE	NFLD 012/H/16	CU ZN AU AG
04	KIDD CREEK MINE	ONT 042/A/11	CU ZN AG PB CD SN
04	CLINTON	QUE 021/E/07	CU ZN PB AG FE
04	MILLENBACH MINE	QUE 032/D/06	CU ZN AG AU
04	NORMETAL MINE	QUE 032/E/03	ZN CU AG AU PB
04	MATTAGAMI LAKE MINE	QUE 032/F/12	ZN CU AG AU NI CD
04	GARCN LAKE MINE	QUE 032/F/13	CU ZN AU AG
04	ORCHAN MINE	QUE 032/F/12	ZN CU AG AU PB
04	CUPRA - D ESTRIE	QUE 021/E/14	CU ZN PB AG CD AU
04	MANITOU BARVUE MINE	QUE 032/C/04	ZN AG CU AU PB CD
04	LEMCINE	QUE 032/G/16	CU ZN AG AU
04	LCUVEH MINE	QUE 032/C/04	CD ZN AU AG CU CO TI MC FB
05	SULLIVAN	BC 082/F/09	PB ZN AG AU IN CD CU SN
05	H B MINE	BC 082/F/03	ZN PB AG CD AU
05	BURAT BASIN	BC 082/E/01	ZN PB AG CD CU
05	NEWFOUNCLAND ZINC	NFLD 012/I/06	ZN
05	NANISIVIK	NWT 048/C/01	PB ZN AG
05	PINE PCINT MINE	NWT 085/B/16	PB ZN
05	PYRAMID	NWT 085/B/16	ZN PB
05	FARC	YT 105/K/06	ZN PB AG CU
06	WARPAN	BC 092/J/03	AU AG CU PB ZN
06	HORN SILVER	BC 082/E/04	AG AU ZN PB CU
06	MINERAL KING	BC 082/K/08	ZN PB AG CU CD BA
06	OCYNO	QUE 032/D/03	ZN PB AG CU
06	NO CASH	YT 105/M/14	AG PB ZN
06	HUSKY MINE	YT 105/T/14	AG PB ZN
06	ELSA	YT 105/M/14	AG PB ZN CD
06	KENC MINE	YT 105/M/14	AG PB ZN
15	OSBORNE LAKE MINE	MAN 063/J/13	CU ZN CO PB
15	STALL LAKE MINE	MAN 063/J/13	CU ZN AU AG

Figure 5. MARS VI retrieval from the CANMINDEX file; operator commands and report for the 31 lead-zinc producers on file.

NAME	LOCATION	CHARACTER OF DEPOSIT
----	-----	-----
BURNT BASIN	BC	IRREGULAR MINERALIZATION IN LIMESTONE BEDS
FARO	YT	CONCORDANT MASSIVE SULPHIDES IN PHYLLITE
H B MINE	BC	LENTICULAR BANDED & DISSEMINATED BODIES IN DOLOMITE
NANISIVIK	NWT	MASSIVE SULPHIDES IN DOLOMITE
NEWFOUNDLAND ZINC	NFLD	STRATIBAND IN PSEUDOBRACCIA LS ASSOC W COLLAPSE BRECCIA
PINE POINT MINE	NWT	CAVITY FILLINGS & REPL OF DOL IN REEFAL COMPLEX
PYRAMID	NWT	STRATIBAND REPLACEMENT DEPOSIT IN SANDY DOLOMITE
SULLIVAN	BC	EXHALATIVE DEPOSIT/ SLFDS & SEDIMENTS INTERLAYERED

Figure 6. Summary of type 05 (more or less concordant in sedimentary rocks) lead-zinc producers on file.

IF GEOPROV EQ SU RECAP DEPTYP:

24 COUNTS OF 06 = VEINS, FAULTS, SHEAR ZONES AND REPLACEMENTS,  
EXCLUSIVE OF SKARNS.

80 COUNTS OF 04 = MORE OR LESS CONCORDANT DEPOSITS IN VOLCANIC ROCKS  
(INCLUDES DISCORDANT MINERALIZATION ASSOCIATED WITH  
CONFORMABLE VOLCANOGENIC MASSIVE SULPHIDES).

1 COUNTS OF 05 = MORE OR LESS CONCORDANT DEPOSITS IN SEDIMENTARY ROCKS.

1 COUNTS OF 12 = MORE OR LESS CONCORDANT DEPOSITS IN INTRUSIVE IGNEOUS  
ROCKS (I.E. CONCORDANT WITH INTERNAL LAYERING AND/OR  
BASAL CONTACTS).

1 COUNTS OF 17 = INSUFFICIENT DATA TO CLASSIFY.

1 COUNTS OF 15 = MORE OR LESS CONCORDANT DEPOSITS IN METAMORPHIC ROCKS  
(I.E. CONCORDANT WITH LAYERING OF WHATEVER ORIGIN).

1 COUNTS OF 14 = OTHER DEPOSITS IN INTRUSIVE IGNEOUS ROCKS. THIS CATEGORY  
IS NOT INTENDED TO INCLUDE PORPHYRY DEPOSITS, PEGMATITES  
OR OTHER DEPOSITS TREATED SPECIFICALLY ELSEWHERE IN THIS  
CLASSIFICATION.

---- END OF RETRIEVAL ----

Figure 7. Summary report of all deposit types on file in the Superior Geological Province.

NAME (GAYS RIVER ) ALTERNATE NAME ( ) LINK NUMBER (000200) COMPONENT (00)  
 ENTITY CODED (C) HOW LOCATED (0) MAP SCALE ( ) ENTITY COMMENT (NSDM MOD FILE )  
 PROVINCE (NS ) GEOLOGICAL PROVINCE (AO) NTS (011/E/03) LATITUDE (45 01 55) LONGITUDE (063 21 30)  
 UTM ZONE ( ) NORTHING ( ) EASTING ( ) GEOGRAPHIC SUBDIVISION (HALIFAX CY )  
 DEPOSIT TYPE (08) DEPOSIT CHARACTER (DISSEM & BLEDGS IN A DOLOMITIZED CARBONATE REEF )  
 (PB ) (2)/(ZN ) (2)/(AG ) (7)/(GD ) (7)/(MN ) (7)/(SB ) (7)/(CO ) (7)/(FE ) (7)/(BA ) (7)/(CU ) (7) OVERFLOW ( )  
 MAP REFERENCE 1 (GEC/L 1076A GSC ) (3) MAP REFERENCE 2 (GEOL 908 GSC ) (Y)  
 NMI ACCESSION NUMBER (011/E/03/PB /001) CROSS REF 1 (PB011001) CROSS REF 2 ( ) CROSS REF 3 ( )  
 REMARKS ( )  
 UPDATE REMARKS ( )  
 CODED BY (ELD) YEAR (77) MONTH (02) UPDATED BY ( ) YEAR ( ) MONTH ( )

BIBLIOGRAPHY  
 -----

-----	INIT YR	TITLE/DOCUMENT	-----
(1) ALCOCK	FJ 30	ZINC & LEAD DEPOSITS OF CANADA/ GSC ECON GEOL SERIES/ NO 8/ PG 61/ *G*	
(2) MESSERVEY	JP 29	LEAD & ZINC IN NOVA SCOTIA/ NS DEPT MINES PAMPHLET 15/ PG 33-36/ *I*	
(3) STEVENSON	IM 59	SHUBENACADIE AND KENNETCOOK MAP AREAS COLCHESTER HANTS & HALIFAX CC UNITIES NOVA SCOTIA/ GSC MEMOIR 302/ PG 54-57/ *AC*	
(4) MACGEECHE	SB 74	/ CIM BULLETIN 750/ VOL 67/ PG 61/ *CF*	
(5) LYDCN	JW 78	OBSERVATIONS ON SOME LEAD-ZINC DEPOSITS OF NOVA SCOTIA/ GSC PAPER 78-1A/ PG 295/ *CE*	

Figure 8. Reproduction, in **CANINDEX** format, of all data on file for the Gays River deposit.

LINK NUMBER = 1258 NAME = SUGARLOAF MTN ALT. NAME =  
LATITUDE = 46 26 00 LONGITUDE = 060 56 12 COMMODITIES = PB  
DEPOSIT TYPE = 06 DEPOSIT CHARACTER = VEIN IN METASEDGS

LINK NUMBER = 1299 NAME = ENGLISH TCHN ALT. NAME =  
LATITUDE = 46 18 00 LONGITUDE = 060 30 42 COMMODITIES = PB  
DEPOSIT TYPE = 05 DEPOSIT CHARACTER = DISSEM IN LMST

LINK NUMBER = 1452 NAME = ST ANN S MOUNTAIN ALT. NAME =  
LATITUDE = 46 20 LONGITUDE = 060 35 COMMODITIES = PB ZN CU AG NI MO  
DEPOSIT TYPE = 17 DEPOSIT CHARACTER =

LINK NUMBER = 1467 NAME = ELDER BROOK ALT. NAME = TARBOT MINE  
LATITUDE = 46 18 54 LONGITUDE = 060 35 30 COMMODITIES = PB AU AG CU ZN  
DEPOSIT TYPE = 06 DEPOSIT CHARACTER = VEIN IN FISSURE IN AMPHIBOLITE

LINK NUMBER = 1468 NAME = LAKE O LAW ALT. NAME = O LAW LAKE  
LATITUDE = 46 16 30 LONGITUDE = 060 58 00 COMMODITIES = NI  
DEPOSIT TYPE = 14 DEPOSIT CHARACTER = DISSEMINATED IN GABBRO DYKE

LINK NUMBER = 1470 NAME = NORTH RIVER ALT. NAME =  
LATITUDE = 46 18 36 LONGITUDE = 060 37 12 COMMODITIES = AU PB  
DEPOSIT TYPE = 01 DEPOSIT CHARACTER = GALENA OCCURS WITH AU IN PLACER

LINK NUMBER = 1471 NAME = SMITH BROOK ALT. NAME =  
LATITUDE = 46 21 30 LONGITUDE = 060 32 30 COMMODITIES = CU  
DEPOSIT TYPE = 06 DEPOSIT CHARACTER = DISSEM & VEINS IN DYKE

LINK NUMBER = 1472 NAME = BARACHOIS RIVER (MCUT OF) ALT. NAME = MAC DONALD POND  
LATITUDE = 46 21 00 LONGITUDE = 060 32 24 COMMODITIES = AU CU  
DEPOSIT TYPE = 06 DEPOSIT CHARACTER = QUARTZ VEIN IN GRANITE

LINK NUMBER = 1474 NAME = TARBOT ALT. NAME = SCHOOL BROOK  
LATITUDE = 46 20 30 LONGITUDE = 060 34 10 COMMODITIES = AU CU  
DEPOSIT TYPE = 06 DEPOSIT CHARACTER = QUARTZ VEINS IN HORNBLende GRANITE

LINK NUMBER = 1489 NAME = STEWART BROOK ALT. NAME =  
LATITUDE = 46 27 45 LONGITUDE = 060 57 40 COMMODITIES = CU  
DEPOSIT TYPE = 15 DEPOSIT CHARACTER = DISSEMINATIONS IN HORNBLende-MICA SCHIST

LINK NUMBER = 6018 NAME = MARGAREE RIVER ALT. NAME =  
LATITUDE = 46 20 27 LONGITUDE = 060 56 52 COMMODITIES = CU  
DEPOSIT TYPE = 17 DEPOSIT CHARACTER = CONTACT BETWEEN LIMESTONE & METAMORPHICS

LINK NUMBER = 6019 NAME = PEMBROKE LAKE ALT. NAME =  
LATITUDE = 46 30 LONGITUDE = 060 59 COMMODITIES = PB  
DEPOSIT TYPE = 17 DEPOSIT CHARACTER =

LINK NUMBER = 6020 NAME = KINGROSS ALT. NAME =  
LATITUDE = 46 27 LONGITUDE = 060 55 COMMODITIES = CU  
DEPOSIT TYPE = 17 DEPOSIT CHARACTER = IN ANDESITE & RHYOLITE

LINK NUMBER = 6021 NAME = MIDDLE RIVER ALT. NAME =  
LATITUDE = 46 17 LONGITUDE = 060 54 COMMODITIES = ZN PB  
DEPOSIT TYPE = 17 DEPOSIT CHARACTER = IN HORNBLende SCHIST & SYENITE

LINK NUMBER = 6022 NAME = MILE BROOK ALT. NAME = EGYPT BROOK  
LATITUDE = 46 21 06 LONGITUDE = 060 55 48 COMMODITIES = CU ZN PB AG  
DEPOSIT TYPE = 17 DEPOSIT CHARACTER = ASSOCIATED WITH INCLUSIONS IN GRANITE

LINK NUMBER = 6023 NAME = OYSTER POND ALT. NAME =  
LATITUDE = 46 18 LONGITUDE = 060 31 COMMODITIES = PB  
DEPOSIT TYPE = 17 DEPOSIT CHARACTER = DISSEMINATIONS IN LIMESTONE

LINK NUMBER = 6024 NAME = MARGAREE VALLEY ALT. NAME =  
LATITUDE = 46 25 30 LONGITUDE = 060 50 35 COMMODITIES = CU  
DEPOSIT TYPE = 17 DEPOSIT CHARACTER = IN DIORITE

LINK NUMBER = 6025 NAME = MARGAREE ALT. NAME = MCLEAN BROOK  
LATITUDE = 46 25 23 LONGITUDE = 060 57 43 COMMODITIES = CU  
DEPOSIT TYPE = 06 DEPOSIT CHARACTER = WITHIN FRACTURE ZONES IN GRANITE COMPLEX

LINK NUMBER = 6026 NAME = PRICES POINT ALT. NAME = PRICE POINT  
LATITUDE = 46 16 36 LONGITUDE = 060 34 30 COMMODITIES = CU PB MO ZN FE  
DEPOSIT TYPE = 06 DEPOSIT CHARACTER = IN JOINTS QTZ STRINGERS & DISSEM IN QTZ DIORITE

LINK NUMBER = 6027 NAME = NORTHEAST MARGAREE RIVER ALT. NAME =  
LATITUDE = 46 27 LONGITUDE = 060 55 30 COMMODITIES = AU  
DEPOSIT TYPE = 01 DEPOSIT CHARACTER = PLACER DEPOSITS IN RIVER SAND

Figure 9. Listing of several parameters for all occurrences on file for NTS block 11 K/7.

Figure 10. Lead-zinc producers, deposits with known reserves, past producers with known reserves and past producers without known reserves in Ontario, Quebec and Newfoundland.



Approximate area  
of figure 12.

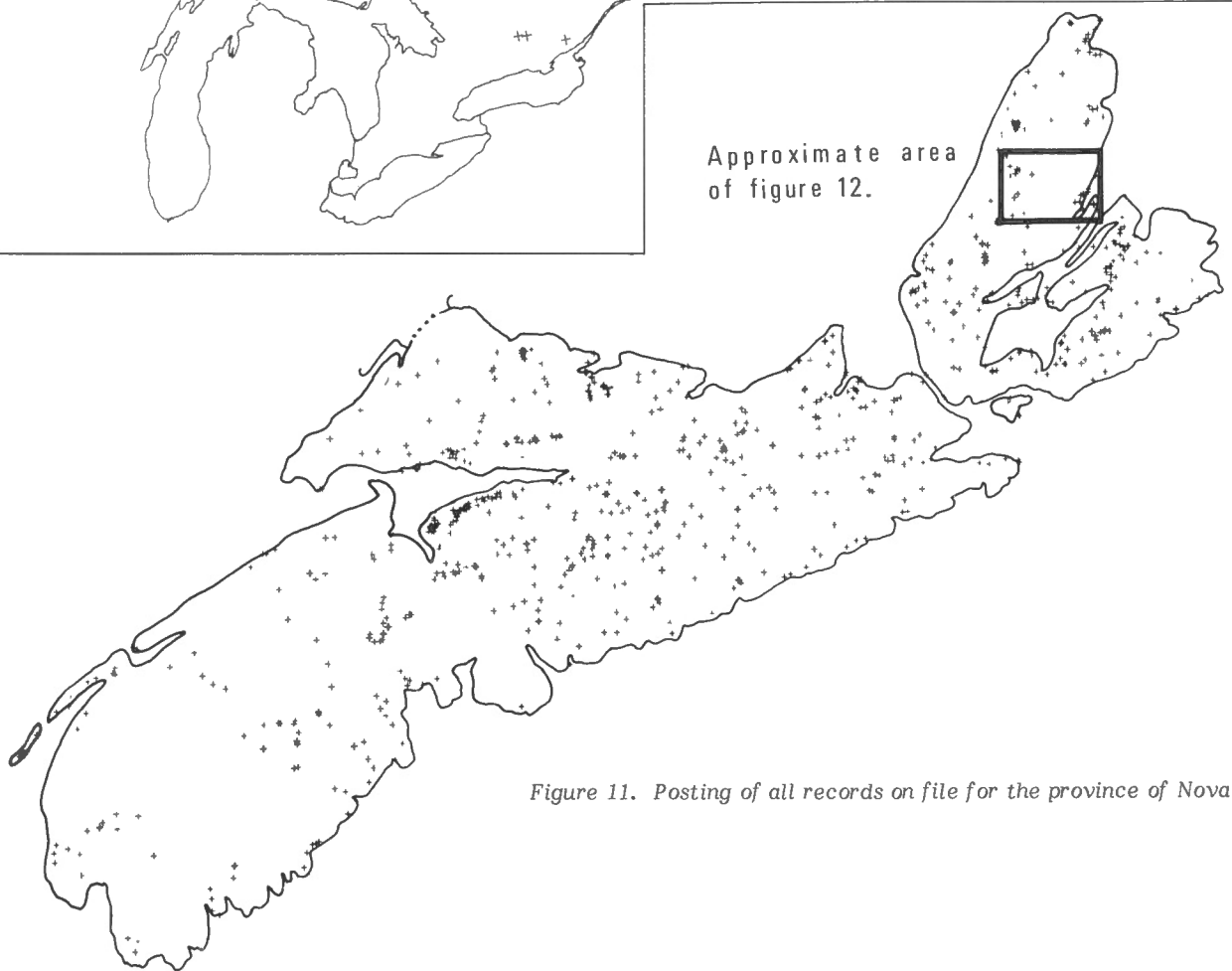


Figure 11. Posting of all records on file for the province of Nova Scotia.

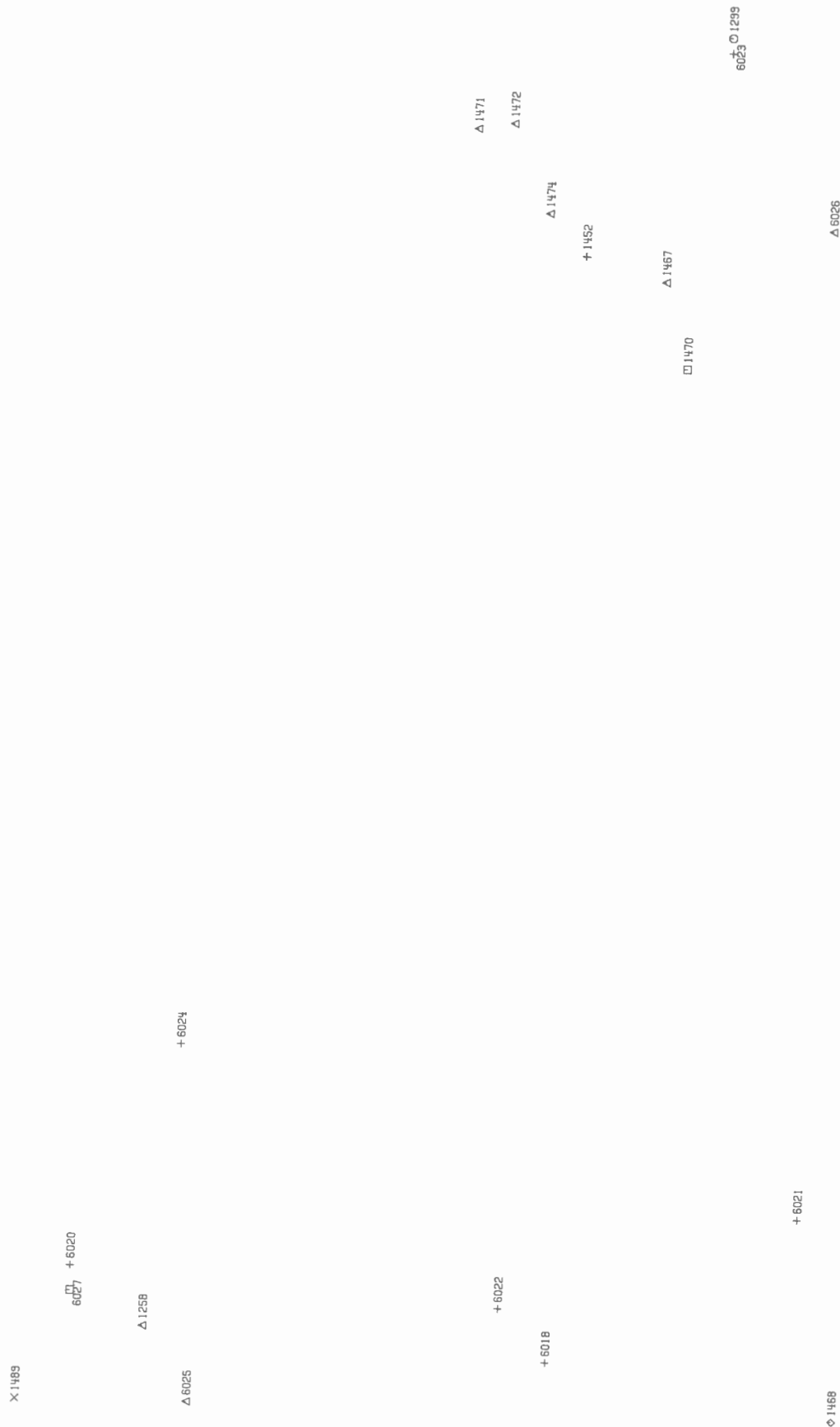


Figure 12. All mineral occurrences in NTS block 11 K/7 plotted by deposit type (See Fig. 9).

## ACKNOWLEDGMENTS

Much of the success of the **CANMINDEX** project is directly due to the active participation, in its definitive stages, of members of the Economic Geology Subdivision of the Geological Survey and members of the Information Systems section of the Mineral Development Sector under the direction of J.P. Goddard. In particular the efforts of the late D.R.E. Whitmore, and of D.F. Sangster and O.R. Eckstrand in data definition can not be over emphasized. Data acquisition is proceeding through the efforts of D.G. Rose and his group in the Mineral Data Bank. It is a pleasure to acknowledge the participation of several provincial Surveys in the definition of the **CANMINDEX** file content and in making data available to the Geological Survey of Canada.

The overall project has been under the direction of W.W. Hutchison, Head, Data Systems Group.

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APPENDIX I

**CANMINDEX DATA ENTRY PROCEDURE AND DATA FLOW**

Reference to specific data processing equipment and software systems are made throughout this appendix. Such reference is made only in the interest of clarity and is not to be taken as an endorsement of the equipment or products by the Department of Energy, Mines and Resources, the Geological Survey of Canada or any of its officers.

The CANMINDEX data entry procedure is a three step operation:

- a. data entry on an intelligent terminal: data is entered through the terminal and verified immediately, before it is stored on flexible magnetic diskettes;
- b. transmission of data from the diskettes to the main computer via telephone line;
- c. loading of data into the MARS managed CANMINDEX file.

This appendix describes in detail each of the above steps and is summarized in Figure 13. This method of data entry has been in use for approximately a year and replaces punched cards completely. This not only results in a saving of time and effort, but also frees us from the more rigid coding forms required for keypunch operations. The forms used are more convenient and more legible for visual verification.

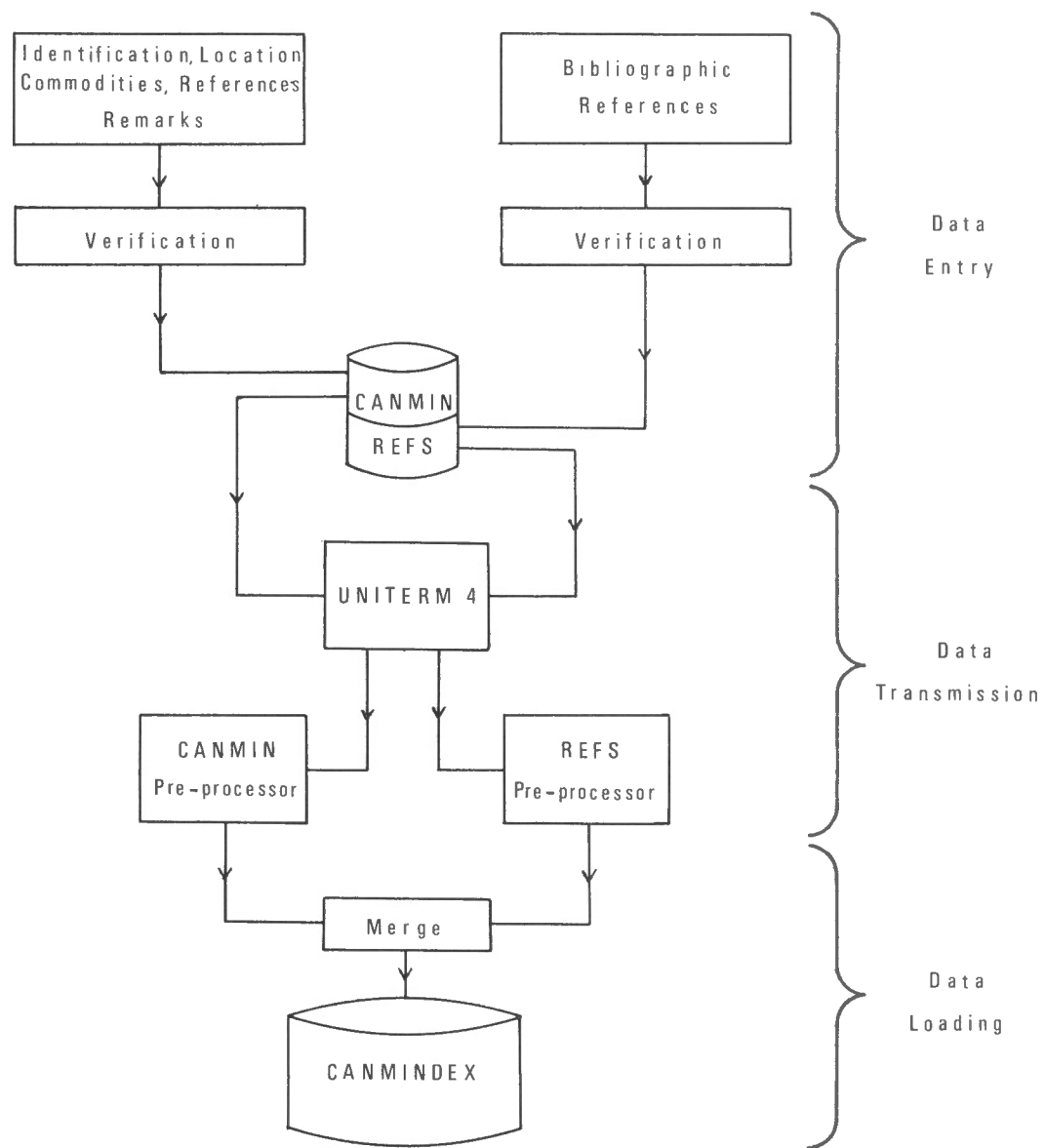


Figure 13. CANMINDEX data flow and entry procedures.

**Data Entry**

Entry of **CANMINDEX** data is effected through the use of an intelligent terminal. This terminal, a Datapoint 1100 in our application, consists of a central processing unit, a cathode ray tube (CRT) display, a typewriter-like keyboard and two diskette drives (it would also be possible to add to this two more diskette drives, a magnetic cassette drive, and a printer). The diskettes are a storage medium for programs, utilities and/or data and each can hold approximately a quarter million characters. The terminal is programmable and for data entry is used entirely off-line. The data entry software system called Dataform 1100, displays a blank coding form image onto the CRT, with a cursor blinking at the beginning of the first data field. Data is entered via the keyboard and each item is verified immediately. Edit criteria are assigned to each data field: numeric, alphabetic, left or right justified, presence or absence of data, value out of range, etc. It is also possible to have a different program executed for each data field for either verification or transformation of codes. After the form image has been filled satisfactorily, it is written on a diskette and the next coding form image appears on the CRT display. The greatest advantage of this method is the immediate correction of errors.

For data entry, the **CANMINDEX** coding form is broken down as four different sub-forms or "screens": IDENTIFICATION AND LOCATION, COMMODITIES, REFERENCES AND REMARKS and BIBLIOGRAPHY. Only one of those screens appears on the CRT at any one time. The first three screens form a sub-system and are entered in succession: 1-2-3-1-2-3-etc. The BIBLIOGRAPHY forms another sub-system with one screen per bibliographic reference. This breakdown permits the entry of bibliography to be made at a different time from the rest of the data and allows a more efficient use of space on a diskette. After a data entry session is terminated, the data diskette contains two parallel files: a file called CANMIN contains all data from the front of the **CANMINDEX** coding form; a second file called REFS contains all the bibliographic references relating to the first file (which appear on the back of the coding form).

**Data Transmission**

A system utility called UNITERM4 is used to facilitate transmission of data from a diskette to the main computer (CYBER 74). UNITERM4 is a terminal emulator program which allows the use of the intelligent terminal as an ordinary teletype terminal with the following exception. Data or instructions can be sent either from the keyboard or from a diskette and data can be received on the CRT only or on the CRT and the diskette. These options are the choice of the terminal user and totally transparent to the CYBER. Two programs, stored on disk on the CYBER, are used to receive data sent from the terminal. The first one, CANMIN, reads data from the diskette file CANMIN and assembles a long fixed length record of 490 characters from the "three-screen" sub-system. The other one, REFS, reads data from the diskette file REFS to assemble the bibliographic references file of appropriate fixed length records.

**Loading Data into the File**

After both data files, CANMIN and REFS, have been transmitted from the diskette to the CYBER, two operations remain. The first is a merge process by which records from both files are verified on a one to one basis (this process involves the use of a special COBOL program and of the CYBER system SORT/MERGE utility). This ensures that no bibliography exists for non-existent deposits and also checks that for every deposit, there is at least one bibliographic reference. It may be that no bibliography has been recorded for a deposit; if this occurs, a message from the CYBER will request operator confirmation before resuming processing. After this vital step is completed, the last one is a straightforward MARS VI LOADER operation. When data gets to this final step, the only possible remaining errors are errors of substance; an example of this could be a wrong value coded for DEPOSIT-TYPE. Valid values are 01 through 17. While the correct value may be 14, it could have been entered as 13, a wrong but valid code. This type of error must still be detected visually, hence the importance of thorough verification, before data entry is started.

APPENDIX 2  
CANMINDEX CODING GUIDE

(Version V, August 1978)

by D.R.E. Whitmore  
September 1975

Revised February 1977 by D.G. Rose  
Revised December 1977 by D.G. Rose  
Revised March 1978 by D.G. Rose  
Revised August 1978 by D.D. Picklyk

\*\*\*\*\*

Note: Certain "special" characters must not be used by the coder.  
These are:

- a) colon :
- b) semicolon ;
- c) comma ,
- d) apostrophe '

In place of the comma or semicolon, the slash (/) should be used as punctuation or separators in free format fields.

The period (.), although allowed as punctuation, is by convention replaced by the number sign (#).

The hyphen (-) and percent sign (%) may be used as required.

\*\*\*\*\*

REVISIONS

March 1978

Page 4. Under HOW LOCATED - addition - "Note that codes V through G  
....."

Page 4. Under 0 = other. - addition - "checking or replotting by the  
coder,"

Page 9. Under type 15 - addition - "Used only when the identity ....."

August 1978

Page 1. Para. 3. ....IMD unless it is clear that

Page 1. Note ..... marked\* are essential to the record; data must be  
supplied for these items or the entire record will be invalid



## NMI ACCESSION NUMBER

The NMI accession number is in five parts, separated by slashes on the coding form:

- |   |                               |
|---|-------------------------------|
| 1. First numerical part                         | 3 characters, RIGHT JUSTIFIED |
| 2. First alphabetical part                      | 1 character                   |
| 3. Second numerical part                        | 2 characters, RIGHT JUSTIFIED |
| 4. Second alphabetical part<br>(Commodity Code) | 3 characters, LEFT JUSTIFIED  |
| 5. Third numerical part                         | 3 characters, RIGHT JUSTIFIED |

e.g. 032/C/04/CU /017  
nnn a nn aaa nnn

NOTE: The first six characters of the NMI accession number constitute the NTS block in which the IMD is located, and must therefore be consistent with the item "NTS".

## NAME LEFT JUSTIFIED, ALPHANUMERIC

This is simply the name the IMD has in the literature. Normally the name will be taken, as is, from the NMI card or other source. Where there are several names, what appears to be the most commonly used one at the time of coding should be used. If there is no name the field may be left blank, but preferably a name should be assigned using some nearby geographical feature. The name chosen should be unique in the file. For this reason the coder should avoid using a mining or exploration company name if the IMD is not the principal operation of the company.

Note: The terms "showing", "occurrence", "prospect", "property" etc., should be omitted. The use of "mine" is valid provided that the IMD has been worked or developed as a mine.

## ALTERNATE NAME LEFT JUSTIFIED, ALPHANUMERIC

Whenever significant data has been recorded under a name other than the IMD name, the name(s) is (are) recorded in this data item.

## ENTITY CODED\* FULL FIELD, ALPHA

Basically the reason for this entry lies in the difficulty in rigidly applying any definition of a mineral deposit so that each entry (IMD) will correspond exactly with a mineral deposit. Ideally there would be this correspondence and each IMD would be coded S. If neither of the other conditions (codes C or P) do apply to the data available, all IMD's should be coded S.

Codes are as follows:

- |   |                 |   |
|---|-----------------|---|
| S | <u>Simple</u>   | A single body of mineralization.  |
| C | <u>Compound</u> | More than one body of mineralization for which the information cannot or need not be separated to refer to the individual deposits and the whole is entered as one IMD. In this case, explanatory comments should be put in the REMARKS field, i.e. 2 quartz veins - 400 ft. apart. |
| P | <u>Partial</u>  | A part of a single mineral deposit where the total deposit is under two or more different managements or jurisdictions. The data cannot reasonably be combined.   |

Examples here might be the Flin Flon Mine or Bay Copper. Again, details should go into REMARKS.

Note: The majority of IMD's will be coded S. Coding deposits C or P must be regarded as a temporary expedient.

## HOW LOCATED\*

FULL FIELD, ALPHA

Enter a code here to indicate how the point whose location is given below (under Lat-Long, UTM etc.) was decided upon. Note that codes V through G are used only when the coder measures the co-ordinates.

V = if point has been verified or plotted on a map of 1:250,000 or better by someone with first hand information on the deposit.

P = a clearly defined point (dot or cross) on map showing lat & long (e.g. published map).

M = well defined point on a map, diagram in a trade publication, etc. which does not show lat & long. Transfer of point to another map is necessary to determine lat & long.

S = an area or poorly defined point on map showing lat & long; e.g. a claim group or symbol where not clearly stated that centre of symbol is point to be taken. Centroid is taken.

A = an area (e.g. claim group, drilled area, group of showings) on a map, diagram etc., which does not show lat & long. Centroid is taken and transfer is required.

G = position deduced from written or verbal description.

O = other. Includes lat & long taken from other documents without checking or replotting by the coder, or mean of two or more locations none of which can be identified as the best.

## MAP SCALE

FULL FIELD, ALPHA

A code to indicate the scale of the map from which the location is measured, i.e. the scale of a geology map showing lat/long. or the scale of the topo. map used when transferring of the point is necessary.

Note: This field is coded only when a location is measured by the coder, i.e. when a code other than "0" is used in the "HOW LOCATED" field.

Codes are as follows:

A	≤	1:12,000
B	>	12,000 ≤
C	>	25,000 ≤
D	>	50,000 ≤
E	>	100,000 ≤
F	>	125,000 ≤
G	>	150,000 ≤
H	>	200,000 ≤
I	>	250,000 ≤
J	>	300,000 ≤
K	>	500,000

## ENTITY COMMENT\*

LEFT JUSTIFIED, ALPHA

Enter the object or point whose location is defined by the lat/long, followed by the source document from which the location is obtained.

i.e. Shaft/ NMI  
Trench/GSC MAP 1341A

In many cases, it is impossible to determine precisely what is the object or point defined by a recorded location. The coder should then simply indicate the source document.

## PROVINCE\* LEFT JUSTIFIED, ALPHA

The data is coded according to the following closed list:

NFLD	for	NEWFOUNDLAND
NS	"	NOVA SCOTIA
PEI	"	PRINCE EDWARD ISLAND
NB	"	NEW BRUNSWICK
QUE	"	QUEBEC
ONT	"	ONTARIO
MAN	"	MANITOBA
SASK	"	SASKATCHEWAN
ALTA	"	ALBERTA
BC	"	BRITISH COLUMBIA
NWT	"	NORTHWEST TERRITORIES
YT	"	YUKON TERRITORY
OFSR	"	OFFSHORE, INCLUDING ALL OTHER AREAS IN CANADA NOT LISTED ABOVE.

Note that no punctuation is used, nor are spaces left between the characters, e.g. BC not B C, and that the field is left justified.

Note also that major subdivisions of territories or provinces, e.g. Keewatin, Labrador, are entered under the item GEOGRAPHIC SUBDIVISION.

## GEOLOGICAL PROVINCE\* FULL FIELD, ALPHA

This data is obtained from the National Atlas of Canada Map "Geological Provinces" by R.J.W. Douglas 1973 and coded according to the following closed list:

AT	ATLANTIC SHELF
PA	PACIFIC SHELF
AR	ARCTIC SHELF
GR	GRENVILLE PROVINCE
SO	SOUTHERN PROVINCE
BE	BEAR PROVINCE
CH	CHURCHILL PROVINCE
NU	NUTAK PROVINCE
SL	SLAVE PROVINCE
SU	SUPERIOR PROVINCE
HP	HUDSON PLATFORM
SP	ST. LAWRENCE PLATFORM
IP	INTERIOR PLATFORM
AP	ARCTIC PLATFORM
AO	APPALACHIAN OROGEN
CO	CORDILLERAN OROGEN
IO	INNUITIAN OROGEN

## NTS\*

The NTS block in which the IMD is located is designated by three quadrangles, separated by slashes on the coding form:

1. Primary quadrangle - 3 characters RIGHT JUSTIFIED, NUMERIC
2. Secondary quadrangle - 1 character ALPHABETIC
3. Tertiary quadrangle - 2 characters RIGHT JUSTIFIED, NUMERIC

E.G.: 041/N/02

## LATITUDE\*

Degrees - 2 characters	NUMERIC
Minutes - 2 characters	RIGHT JUSTIFIED, NUMERIC
Seconds - 2 characters	RIGHT JUSTIFIED, NUMERIC

## LONGITUDE\*

Degrees - 3 characters	RIGHT JUSTIFIED, NUMERIC
Minutes - 2 characters	RIGHT JUSTIFIED, NUMERIC
Seconds - 2 characters	RIGHT JUSTIFIED, NUMERIC

Either the LAT. & LONG. (at least to degrees and minutes) or the UTM co-ordinates must be entered for each IMD. If the UTM co-ordinates have been measured, they should be entered rather than the LAT. & LONG.

## UTM ZONE\*

2 characters	RIGHT JUSTIFIED, NUMERIC
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## NORTHING\*

7 characters	NUMERIC
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## EASTING\*

6 characters	NUMERIC
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GEOGRAPHIC SUBDIVISION	LEFT JUSTIFIED, ALPHA
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More or less permanent administrative subdivisions within a Province or Territory. E.G.: County, Township, Parish, District, etc.

DEPOSIT TYPE*	NUMERIC
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A two-digit code from the following list. Enter the term which best reflects the dominant aspect of the deposit. Discrepancies and peculiarities may be indicated in the DEPOSIT CHARACTER field.

Classification terms	Examples
01. Placer deposits	Klondike; Elliot Lake; Nataskquan, Que. (beach sands);
02. Laterite and other residual deposits.	Banks Island, B.C. (Ti, V);
03. Evaporites (gypsum, anhydrite, halite, etc.).	Sask. Potash; Windsor Gypsum;
04. More or less concordant deposits in volcanic rocks (includes discordant mineralization associated with conformable volcanogenic massive sulphides). Volcanogenic Cu-Zn deposits and Ni deposits in ultramafic flows will fall into this class.	Kidd Creek; Millenbach; Brunswick No. 12; Western Mines; Texmont; Dumbarton;
05. More or less concordant deposits in sedimentary rocks.	South March (Ont.); Right's River, N.S.; Sullivan; Silvermines; Redstone; Strathcona Sound;
06. Vein (-s; one or a few), faults, shear zones and replacements, exclusive of skarns.	Copper Rand - Chibougamau; Falconbridge main mine; Gordon Lake, Ont; Beaverlodge (U); Cluff Lake (U, Sask.); Churchill Copper; Opemiska; Nigadoo; Bluebell; Keno Hill; Yellowknife; Federal Zinc;

- |  |  |
|--|--|
| 07. Stockwork, veinswarm, breccia pipe (to include volcanogenic alteration pipes if conformable massive sulphide is absent or negligible). Most porphyry deposits will fall into this class.   | Bethlehem Copper; Granisle; Tribag; Louvem; Britannia Mine; Wilmar (Cochenour) granodiorite orebody (Au);  |
| 08. Collapse (solution) breccias and other breccias, mainly discordant, in carbonate rocks.  | Robb Lake;   |
| 09. Skarn (Tactite) deposits.  | Marmora, Ont; Craigmont; Gaspé Copper; Meat Cove; Cantung; Phoenix (Greenwood);  |
| 10. Greisen deposits. This class will mainly be used for tin, tungsten, and beryllium deposits.  |  |
| 11. Pegmatite  | Bernic Lake; Faraday; Mt. Copeland;  |
| 12. More or less concordant deposits in intrusive rocks (i.e. concordant with internal layering and/or basal contacts).  | Creighton (Contact zone); Raglan-Donaldson; Dumont; Bird River Sill (Cr); Dore Lake complex (V, Ti);   |
| 13. Deposits in carbonatites and related alkalic complexes. This category is not intended to include porphyry deposits.  | St-Honore, Que. (Nb, REE);   |
| 14. Other deposits in igneous rocks. This category is not intended to include porphyry deposits, pegmatites or other deposits treated specifically elsewhere in this classification.   | Frood-Stobie Mines; Lynn Lake; Giant Mascot; Moss mine (Mo); Lac Tio, Que.; Port Coldwell complex, Ont. (Cu); Podiform chromites, Eastern Townships; |
| 15. More or less concordant deposits in metamorphic rocks (i.e. concordant with layering of whatever origin). Used only when the identity of the original rock has been obscured. That is, types 04, 05 etc., take precedence when the host is recognizable. | Thompson Mine, Man; Ecstall, B.C.; Anglo-Rouyn, Sask; Minto, Yukon; Glendower, Ont. (Fe);  |
| 16. Other (i.e. not in list above).  | Eastern Metals;  |
| 17. Insufficient data to classify.   | Geneva Lake;   |

## DEPOSIT CHARACTER

LEFT JUSTIFIED, ALPHA

A free format statement using key words from the source document (NMI sheet etc.) to indicate: (a) morphology of the mineralization and (b) the host rock(s).

e.g.: Disseminated and Veins in Diorite  
Massive sulph at contact of volcanics & sediments

COMMODITY AND STATUS\*

COMMODITY - 1 to 4 CHARACTERS      LEFT JUSTIFIED, ALPHANUMERIC

Commodities are the elements or minerals present at the IMD. All commodities reported are entered together with their status as defined below. Provision is made for ten commodities. If there are more than ten, the letter Y (=yes) is entered in OVERFLOW and the additional commodities are listed in the REMARKS field.

Note:      The commodities must be entered by numerically increasing status, i.e. all with status "1" are entered before those with status "2", etc. Within each status group, however, the order of coding is arbitrary.

COMMODITY STATUS - 1 character      NUMERIC

Each commodity is classified separately according to the following scheme.

1. Being Produced. Commodity is being extracted for sale.
2. Reserves, never produced. Reserves, or demonstrated resources, of the commodity are reported or can be calculated but the commodity has not yet been produced. (i.e.: three dimensional data plus grade).
3. Reserves, was produced. The commodity is no longer produced although there are known reserves or demonstrated resources.
4. Exhausted. The commodity is no longer produced and there are no known reserves or demonstrated resources.
5. Grade, two dimensions. Two dimensional data (e.g. length and width) and grade of the commodity are available\*, but not enough to calculate reserves.
6. Grade, one dimension. One dimensional data and grade. (e.g. 1 drill hole).
7. Present. Commodity reported, but insufficient data are available\* to allow the status to be classified.
8. THE COMMODITY OCCURS at a producing mine or in a significant deposit, but it is not known whether it is being or will be extracted for sale.

\* Available is used here to mean published or otherwise in the public domain.

OVERFLOW      ALPHA

If more than ten commodities are present enter Y, otherwise leave blank.

MAP REFERENCES

MAP REFERENCE 1, 2      LEFT JUSTIFIED, ALPHA

The first map reference should be a geological map (or diagram) which shows the location of the IMD. If the location does not appear on a map, enter one which shows the geological environment of the occurrence. A second geological map, if applicable, may be entered under MAP REFERENCE 2. Topo maps should be entered only if they show the location of the IMD.



YEAR NUMERIC  
 Year coded, omit 19, e.g. for 1976 enter 76.

MONTH RIGHT JUSTIFIED, NUMERIC  
 Month coded. 01 = January, etc.

UPDATED BY LEFT JUSTIFIED, ALPHA  
 Initials of person making update.

YEAR NUMERIC  
 Year updated, omit 19.

MONTH RIGHT JUSTIFIED, NUMERIC  
 Month updated, 02=February etc.

BIBLIOGRAPHY

The bibliography section provides for the coding of seven documents. These do not have to be published material; i.e., theses and assessment files are valid references.

Each reference comprises four fields, listed below:

AUTHOR - 16 characters LEFT JUSTIFIED, ALPHA

Author's surname, truncated at right if more than sixteen (16) characters.

Note that for articles with anonymous authors, for example reports in the Northern Miner, this field should be left blank.

INITIALS LEFT JUSTIFIED, ALPHA

First two initials of the author.

YEAR

Last two digits of the year of publication; e.g. 71 for 1971.

TITLE/DOCUMENT - 200 characters ALPHANUMERIC

This field is for the TITLE, DOCUMENT, VOLUME and NUMBER if applicable, FIRST PAGE and CONTENTS in that order.

The data items are entered in free format separated by slashes, i.e. there is no specific space reserved for each item. The title of the report, paper, etc., should not be abbreviated except to omit prepositions or articles which are not essential to preserve the meaning. The document, however, may be abbreviated providing that it is readily recognizable (i.e. GSC PAPER 60-13, ODM GEOL REPT 110, NS DEPT MINES MEMOIR 6, etc.). The volume and number should be included if applicable, and should be coded in Arabic rather than Roman numerals (i.e. VOL 3, not VOL III). Next, show the page(s) on which the relevant information is found. Finally, if the reference is at hand the coder should determine, according to the list given below, the two principal fields of information covered by the reference. The contents are coded thus: \*AC\* or \*C\*. Note: The contents is not a required item, and should be coded only if the reference is readily available. Note also that, if coded, the asterisk delimiters must be included.

Appendix 2 (cont'd)

- A\*\* LOCATION
- B REGIONAL GEOLOGY - a detailed account of the regional geology. Only the best and most recent should be coded if several references cover this field.
- C\*\* DEPOSIT GEOLOGY - detailed description of the geology of the deposit. The best should be coded, but if other references contain additional details these should also be coded.
- D GEOCHEMISTRY, GEOPHYSICS - for references whose principal data are geochemical or geophysical.
- E\*\* HOST ROCK STUDIES - geological or geochemical studies of the host rock of the deposit.
- F\*\* MINERALOGY - mineralogical studies of the ore.
- G PRODUCTION, RESERVES, ASSAYS, GRADES - numerical data concerning the deposit.
- H SPECIALIZED STUDIES - i.e. petrological, metallurgical.
- I GENERAL - other than above.

\*\* If more than two fields of information are covered priority is given to these codes.

Below is an example of an entry in the BIBLIOGRAPHY section. Shown first is a reference as it might be found on an NMI sheet or accompanying a paper; below that is the format it should have on a CANINDEX coding form:

Hogg, N., 1950: The Porcupine gold area; Canadian Mining Journal, vol. 71, no. 11, p. 102-106.

AUTHOR - HOGG  
INITIALS - N  
YEAR - 50  
TITLE/DOCUMENT - THE PORCUPINE GOLD AREA/CANADIAN MIN JOUR/VOL  
71/NO 11/PG 102/\*CB\*



BIBLIØGRAPHY

AUTHØR ( ) INITIALS ( ) YEAR ( ) TITLE/DØCUMENT ( )

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