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**PART 2**  
**REPORTS ON NOGAP R & D STUDIES**

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**Northern Granular Resources  
Mapping Information System**

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## **1.0 Introduction**

Indian and Northern Affairs Canada (INAC) has, over the past four years, compiled an extensive inventory of information pertaining to granular resources in the Arctic.

Funded under the NOGAP program, the project has evolved from a digital inventory of high resolution marine seismic track line data, to digital renditions of interpreted geological maps, borehole locations, borrow sites and the encapsulation of all of this data into a user-friendly data management and desktop mapping system called "**inFOcus**".

This paper describes the development of the inventory, its contents and the way that the data can be used to assess and plan activities through the simple and powerful interface provided by the **inFOcus** software.

## **2.0 Project History**

The Arctic Granular Resources Inventory started in 1988 with the compilation and conversion into digital form of industry and government regional and site survey track lines. A large body of hard copy shot point maps and some digital shot point data were digitized and converted into the format for INAC's mapping system.

It was clear that effective use of the inventory would require its organization within a geographic information system (GIS). However, it was recognized that GIS is not an appropriate technology for inventory applications, especially considering the high capital, training and maintenance costs that are associated with this technology. In 1990, EOR proposed the assembly of the inventory within **inFOcus**, a simple, inexpensive data management and mapping system well suited to interrogating and visually overlaying diverse geo-referenced data sets (see Figure 1).

All of the track data compiled to date, the Beaufort borehole database and a body of interpreted geological maps were imported into **inFOcus**.

The inventory was expanded in 1991 to include a graphical database of on-land borrow sites digitized from aerial photographs. Further work is currently in progress to update the seismic tracks, build on the borrow sites inventory and to provide linkages to the ESEBASE borehole management system that contains a comprehensive borehole geotechnical database.

### 3.0 Inventory

Below is a summary of the inventory as it has so far evolved.

#### 3.1 High Resolution Marine Seismic Track Lines

Over 1,500 track lines spanning 29,000 line-km have been digitized and imported into **inFOcus**. These comprise:

- All government lines surveyed up to and including 1986 - 355 lines covering 14,000 line-km.
- All regional lines shot by Esso, Gulf and Dome to the end of 1986 - 581 lines covering 12,000 line-km.
- All site survey lines shot by Gulf and Dome in the Isserk and Erksak borrow blocks. This consists of 9 out of a total of 19 surveys conducted by Gulf in the region up to 1986 and 12 out of a total of 40 conducted by Dome. None of the site surveys conducted by Esso have been digitized.

This is not a navigation database. The intent is to be able to assess coverage, especially in the context of other information such as borehole locations and the distribution of geological units, bathymetry, lease boundaries etc. In most cases, a sufficient number of shot points have been digitized to define way points and to correlate shot point ranges to a particular geographic area.

It is now realized that digitized track lines within site surveys is overkill and that the outline of the survey area would be just as useful. The study catalogue compiled by McElhanney in 1988 provides co-ordinates of the study areas. This database has been imported into **inFOcus** and outlines of survey areas can be plotted for all studies completed up to the end of 1986.

### 3.2 Boreholes, Grabs and Cores

All borehole sites compiled up to 1988, updated to 1990 and supplemented with vibracore and grab sites, are accessible within the **inFOcus** system (see Figure 2). Summary attributes, such as hole id, owner, drill depth, etc., are contained within each record and can be accessed directly from the map of hole locations.

It is planned to import the full geotechnical database compiled by EBA so that selections of holes for map display can be based on a broad range of geotechnical search criteria.

### 3.3 Geological Maps

Geological maps associated with detailed studies of granular resources in the Isserk and Erksak borrow blocks have been imported into the **inFOcus** system. These include data control, bathymetry, isopaches of geological units and interpreted resource potential maps. These can be overlaid with one another or with seismic and borehole database information for further analysis (see Figure 3).

In 1991, geological maps associated with additional studies in the Herschel and Banks Island regions were digitized and imported into the system.

### 3.4 Borrow Sites

A major part of the 1991 inventory project was the construction of a graphical database of on-land borrow sites (see Figure 4). Source data for most of the entries were aerial photographs at approximately 1:36000 scale. Outlined deposits were digitized and linked to database records containing attribute information such as site id, resource type, geologic origin, etc. Site plan inventories have been compiled into **inFOcus** for the following areas:

- Mackenzie Valley.
- Alaska Highway corridor.
- Dempster Highway corridor
- South Slave area.
- Inuvialuit Settlement area.
- Individual communities such as Fort Good Hope and Fort McPherson.

#### **4.0 Data Management and Retrieval**

The Northern Granular Resources Mapping Information System provides a comprehensive inventory of deposit, borehole, seismic and geological information. These data can be displayed as maps and printed or plotted in various projections and at any scale.

The data are organized into "applications" focusing, for example, on seismic data or borrow sites or a particular geographic region. The data management sub-system provides the full capabilities of a relational database management system within a "point and click" non-technical user interface. The user is presented with menus of "English" descriptions (see Figure 5) of data sets or maps instead of file names and can construct, using a mouse:

- Complex queries without a knowledge of command syntax.
- Reports based on hard-wired or custom formats.
- Maps consisting of multiple overlays such as bathymetry, isopaches, borehole locations and seismic coverage.

Figures 5, 6 and 7 which follow this text show the data management interface and some example maps printed on a laser printer at low resolution. High quality figures can be produced on high resolution laser printers and plotters.

#### **5.0 Current Activities**

Planning is in progress to expand and refine the inventory. The following aspects are being considered:

- Update of the high resolution marine seismic coverage.
- Expansion of the on-land borrow site inventory.
- Import of the Yukon Shelf regional geology study.
- Refinement of database structures and cross-linkages.
- Enhancement of the applications through improved data organization, customized queries and reports.
- Development of procedures to report and update inventory statistics.

The aim in the present project is to provide a fully operational planning tool for granular resource management in the north. In support of this, several new initiatives also should be considered for future work.

## **6.0 Future Initiatives**

Presently, the base map for the inventory data is derived from the 1:2,000,000 scale CIA world data bank. For many applications, detailed cultural and topographic information will be vital. A first step would be to import the 1:250,000 NTS series digital base maps for all or specific regions of the north. All of the maps are available for import into **inFOcus**. An example of these maps is provided for the area covering western Yukon.

The off-shore equivalent is regional bathymetry for the Beaufort Sea. Sub-sets of the region are available in digital form from Canadian Hydrographic Service. However, a uniform scale coverage at 1:1,000,000, for example, would be of major benefit for many applications.

Any resource development and management plan must consider information related to jurisdiction, land ownership and control, environmental impact and development infrastructure. The Northern Granular Resource Mapping Information System lends itself to integration with these types of data. **inFOcus** applications have developed elsewhere that integrate geological, fishery, environmental, cultural and land use data that are used together to target resource conflicts and environmental sensitivities. Examples are:

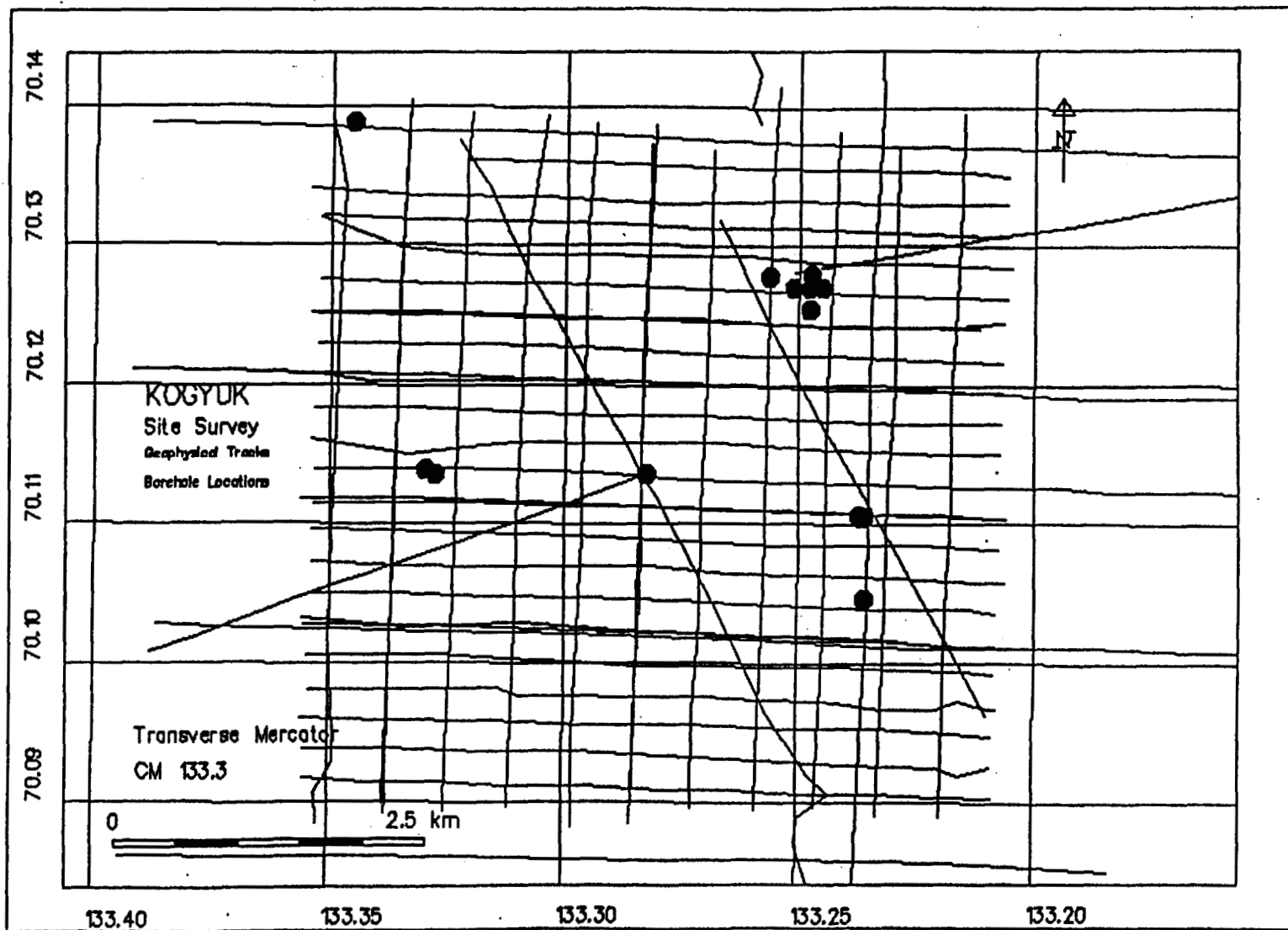
- IRMIS (Integrated Resource Management Information System) for off-shore Prince Edward Island.
- IRMIS for coastal zone Nova Scotia.
- NATLUS - the national protected lands database.

New and existing land use and environmental databases should be imported into the system and routine procedures developed to address common planning issues in a timely fashion. One of the compelling advantages of the **inFOcus** approach is its low cost and high user accessibility. Data can be delivered to all users easily.

Effective planning and advocacy for resource development is dependant on the ability for all interested groups to share and comprehend the same data. One example is the promotion of the NATLUS application by the mining industry. On the one hand, it provides a tool for the industry to assess land access restrictions. On the other, it will provide native

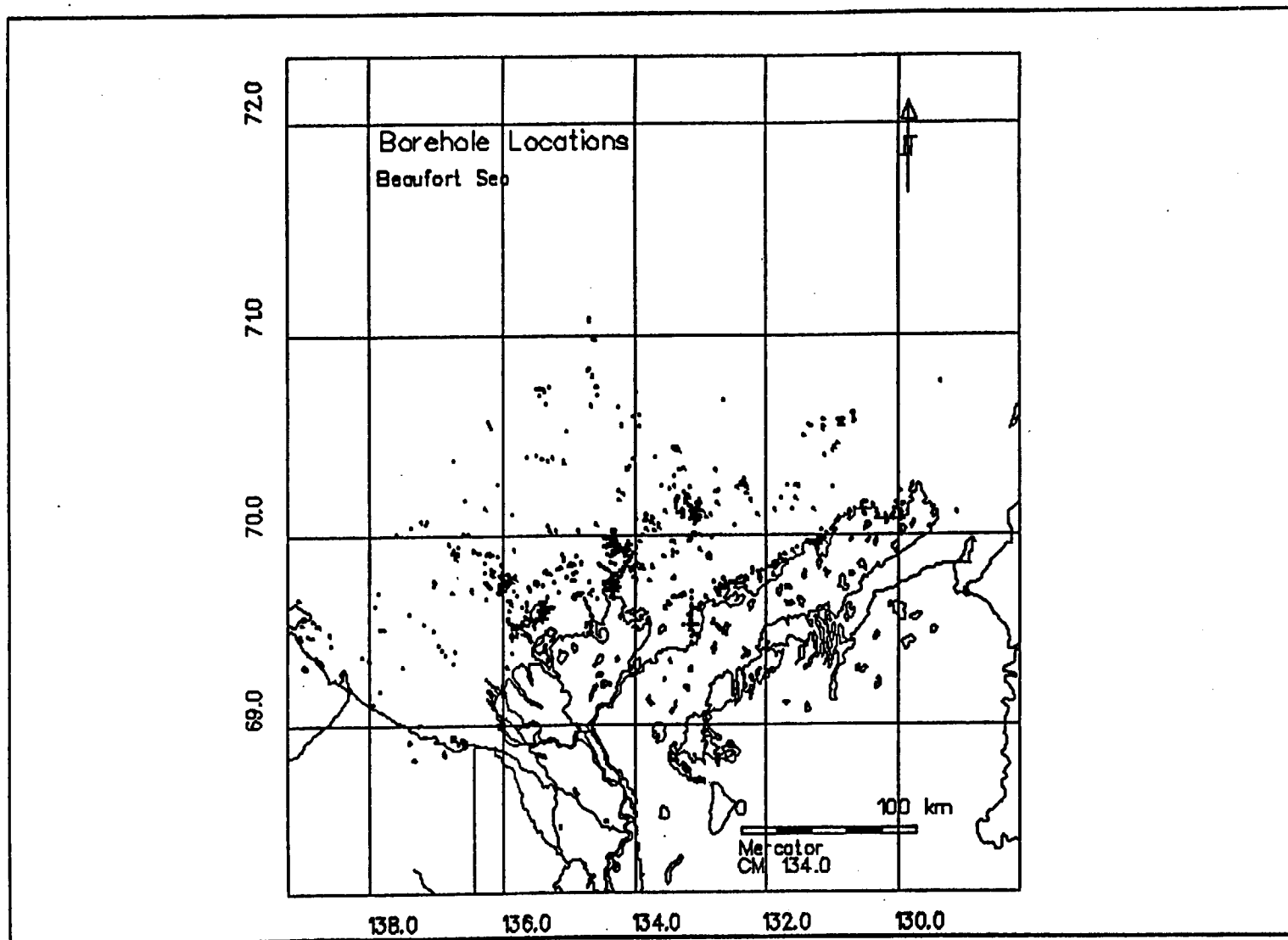
peoples and jurisdictions a clear picture of their rights and responsibilities. All parties will be able to argue their agendas based on the same information. This approach will become critical for all aspects of resource development in the north.





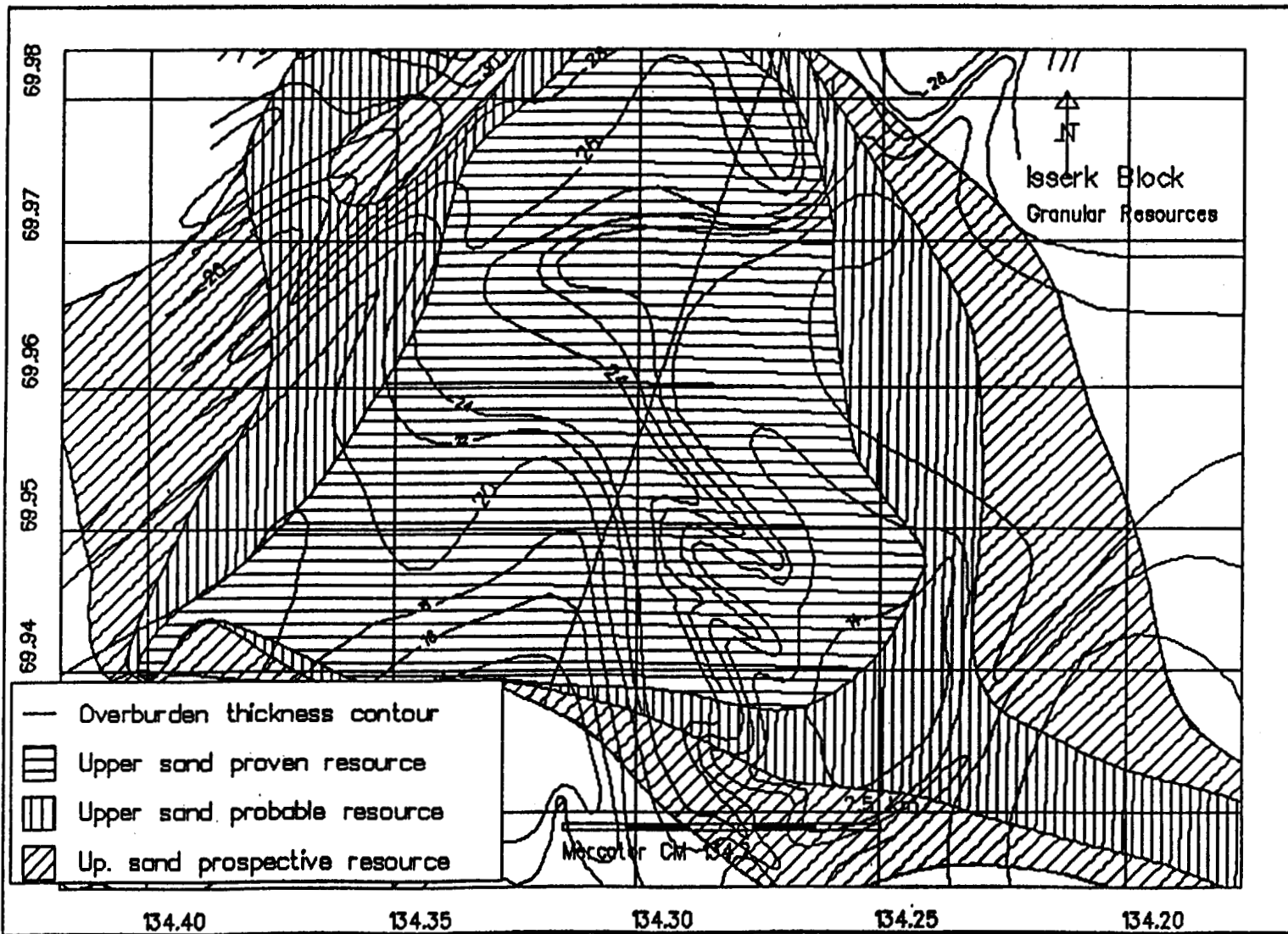
The Kogyuk Site Survey is one of several detailed geophysical and geotechnical site survey programs accessible within the existing data base.

FIGURE 1



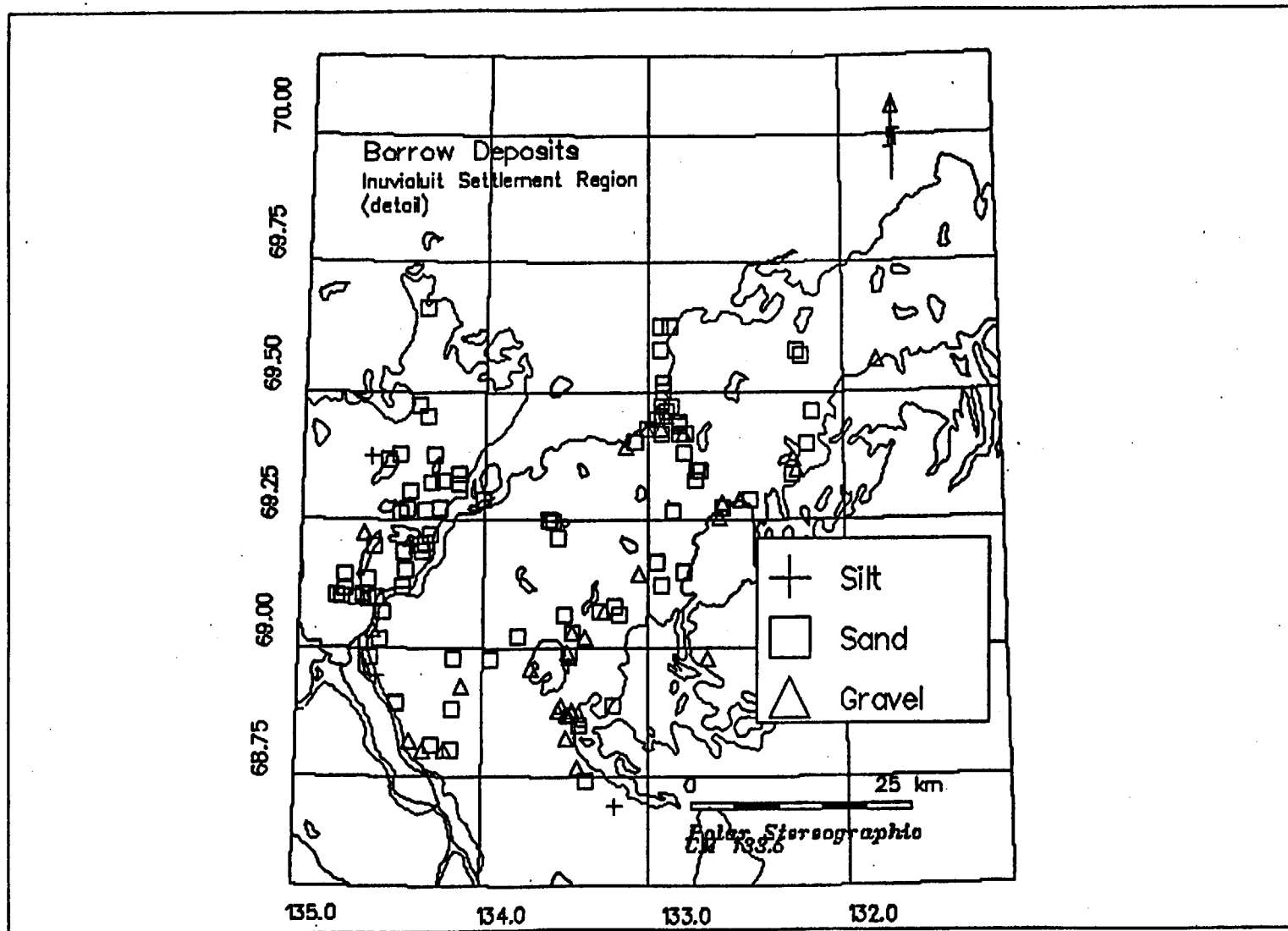
**Borehole location points contain data base reference information such as the project number, date, client, location in UTM and Lat/Long, water depth and borehole termination depth.**

**FIGURE 2**



The Isserk Block resource potential displayed with depth to deposit surface from mean sea level.

FIGURE 3



**Borrow deposit information is available for much of Canada's North West Arctic region. Individual sample points are backed-up with data base information regarding the source reference, year, location in UTM and Lat/Long, granular type and USC classification.**

**FIGURE 4**

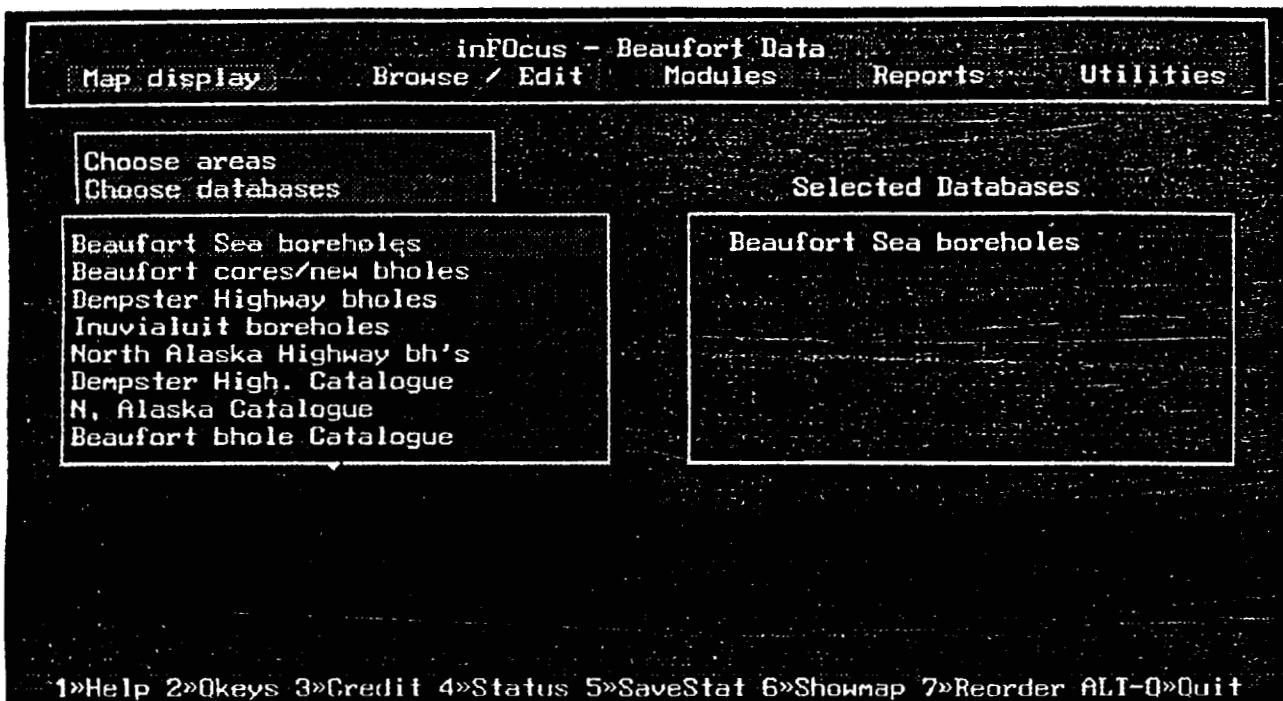


FIGURE 5

Databases menu in inFOcus. Databases are referred to by "English" aliases, thus insulating the end user from the need to remember cryptic filenames.

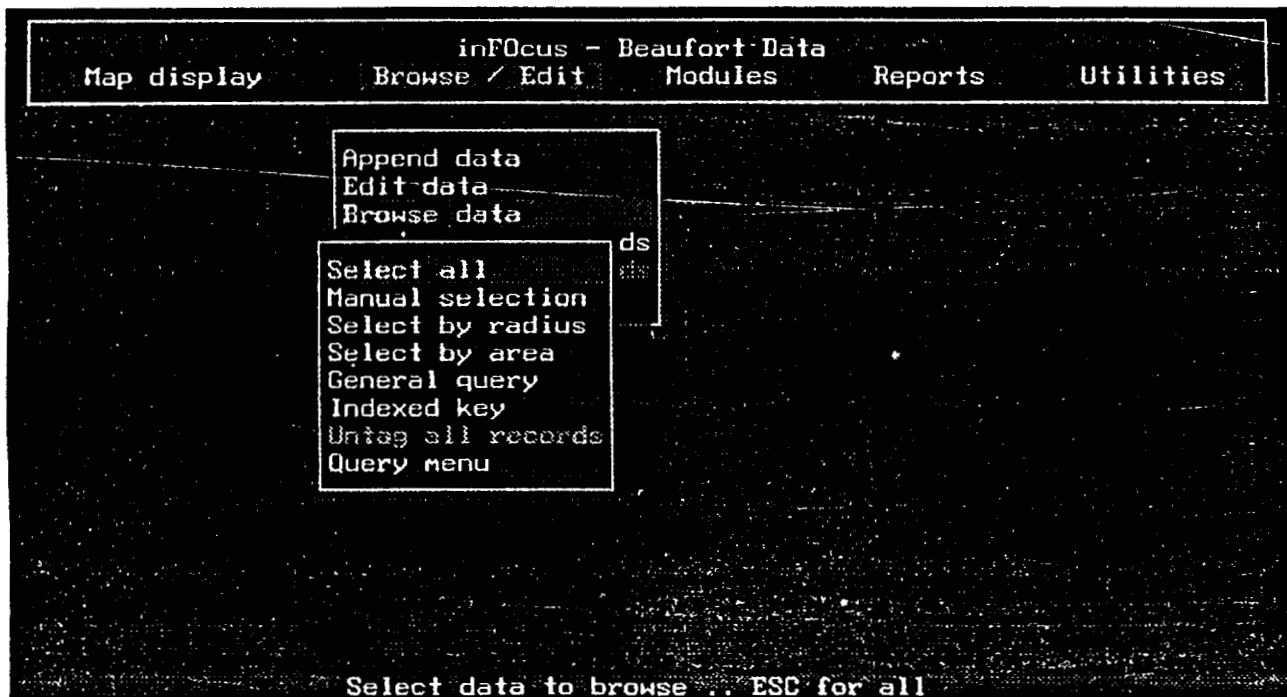


FIGURE 6

Databases can be searched in a variety of routine ways, in addition to general queries that are constructed through a mouse driven query interface.

