A New Digital Diamond Indicator Mineral Database for the Slave Craton NWT

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Overview

This technical paper is designed to give a brief description of utilizing the new digital diamond indicator mineral databases now available for the Slave Craton, NWT, Canada. This information is now freely available in hard copy CD format from the NWT GEOLOGY Division of DIAND or alternatively through the Geosoft Internet DAP server courtesy of the NWT GEOLOGY Division of DIAND. This paper will also demonstrate how Geosoft's Chimera™ can be used for the manipulation, analysis, and interpretation of indicator mineral sample results in the search for diamondiferous kimberlites.

Introduction

The discovery in 1991 of the Point Lake kimberlite at Lac de Gras, in the Northwest Territories of Canada, led to one of the greatest staking rushes seen in the history of mineral exploration. The subsequent discovery of economic diamondiferous kimberlites by the BHP/Diamet joint venture and the development of the Ekati mine have resulted in the continued exploration of the Slave Craton for further diamondiferous kimberlites (see figure 1). This has resulted in the expenditure of several hundreds of millions of dollars on exploration.

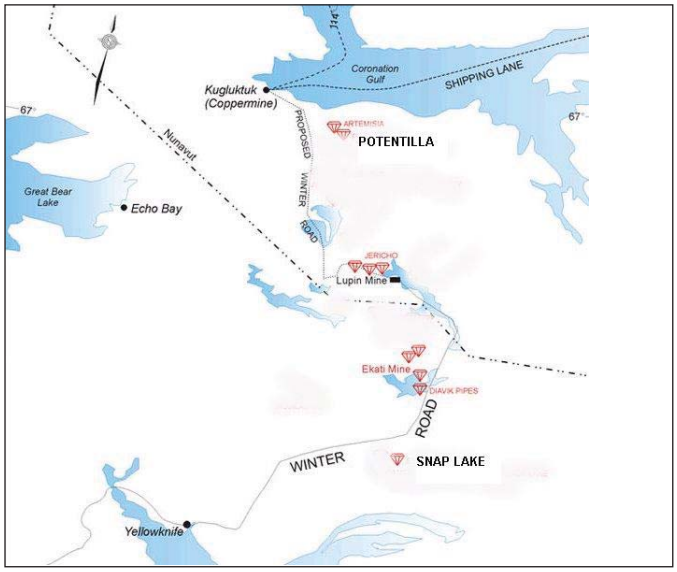

Figure 1

[1] Geophysical Consultant with over 30 years of global experience in the diamond exploration industry, and partner in Global Diamond Exploration Consultants.

The recent compilation and release of a digital database by the NWT GEOLOGY Division DIAND of Relinquishment Reports submitted by exploration companies over a ten-year period over the entire Slave Craton provides access to a wealth of information. This information is now freely available in hard copy CD format from the NWT GEOLOGY Division of DIAND or alternatively through the Geosoft Internet DAP server courtesy of the NWT GEOLOGY Division of DIAND.

Using DAP technology, access to data within a particular area of interest involves little more than specifying the boundary coordinates of the area. Using DAP data transfer technology and the Internet, the available digital data consisting of indicator mineral information and the results of mineral probing are rapidly downloaded. All of which can be accomplished in a matter of minutes.

Geophysical information, submitted as part of the Relinquishment Reports, has also been compiled to accompany the indicator mineral data and is available in the form of scanned images on CD from the NWT GEOLOGY Division of DIAND. The following examples are extracts from this indicator mineral database. The first example is that of the mineral indicator train associated with the Potentilla kimberlite in the Coronation Gulf region of Nunavut. The Potentilla kimberlite was discovered in late 2001 by Ashton Mining of Canada Inc (AMCI) and subsequent sampling of the kimberlite has confirmed it to be diamondiferous. The discovery of this and other kimberlites in this general region has led to a major staking rush over a large portion of the Northern Slave.

The indicator mineral data portrayed in the accompanying figures is that submitted by a previous explorer prior to the discovery of the Potentilla kimberlite by AMCI.

Figure 2 shows the indicator mineral train associated with the Potentilla kimberlite presented as a pie plot. Pyrope garnet, chrome-diopside, picroilmenite and chrome spinel are colour coded to show the composition of the heavy mineral assemblage present at each sample site.

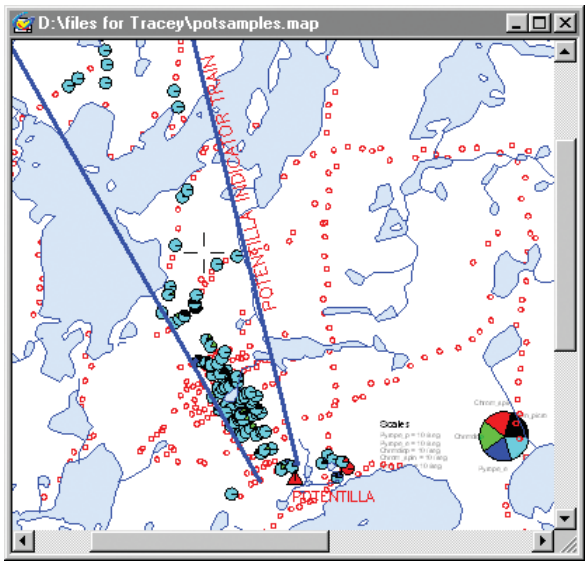

Figure 2

The pie plot shows the dominance of peridotitic pyrope garnets in the indicator mineral train. It also shows the very narrow and limited extent of the indicator train. Background counts of one or none are present less than three kilometres from the kimberlite.

Figure 3 shows some very interesting responses in the distribution of heavy mineral indicators other than pyrope garnets. Presented as a bar chart the figure shows that within the train emanating from the Potentilla kimberlite, there are very few chromites present. Whereas in a cluster of samples approximately one kilometre east of the Potentilla kimberlite, almost all samples have positive chromite results. While the spatial relationship of these samples and the dominant WNW ice direction imply that these are unlikely to source from the Potentilla kimberlite, the difference in heavy mineral indicators also supports the notion of an alternative source possibly up ice to the SSE.

This example clearly highlights the valuable information that exists within this vast database in relation to the characteristics of indicator mineral trains.

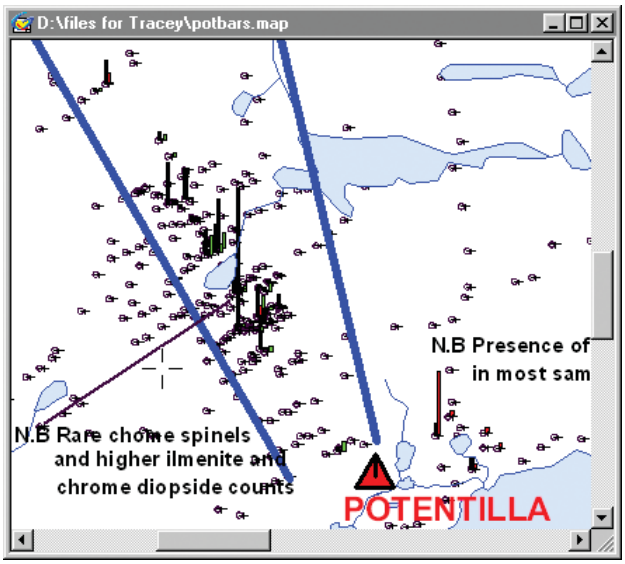

Figure 3

The second example is of data associated with the Snap Lake region of the Slave Craton. Exploration undertaken by Winspear Resources Ltd. (now DeBeers) ultimately led to the discovery of the Snap Lake kimberlitic dyke, which may well become the third diamond mine in the Slave following the BHP-Billiton Ekati and the Kennecott/Aber Diavik mines.

Figure 4 encompasses an area of approximately 1700 square kilometres and shows a number of clearly defined indicator mineral trains trending E-W parallel to the dominant ice direction.

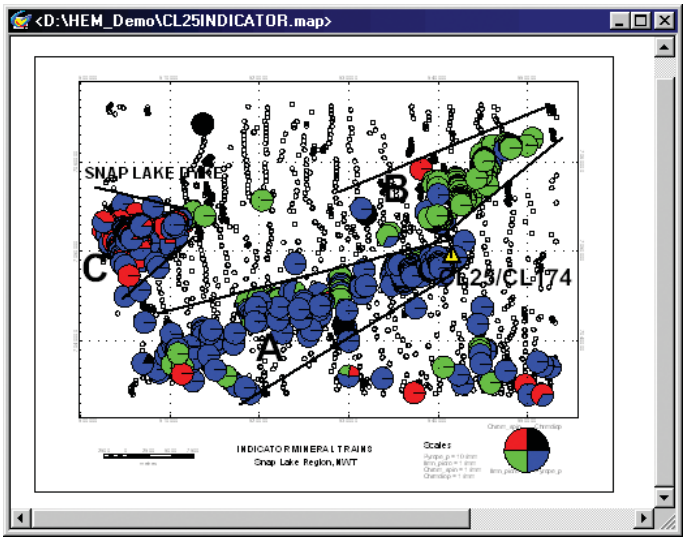

Figure 4

Train A is associated with kimberlite CL25 which occurs at the head of the indicator train and represented the first discovery by Winspear of kimberlite on the Camsell Lake Property. The pie plot shows that the dominant indicator mineral is pyrope garnet. Train B that has its source beyond the eastern margins of the area forms a further well-defined train, but significantly has picro-ilmenite as a major component of the heavy mineral assemblage. This highlights the differences that exist in the heavy mineral composition of individual indicator trains.

These differences are further highlighted in Train C, in the northwest corner of the area, where chromite and pyrope garnet are the dominant minerals observed. This train is associated with the Snap Lake kimberlitic dyke.

The above examples form but a small part of the vast database that is now available and which will form the basis of further intensive exploration in the Slave. Data previously interpreted only in the context of a single exploration property can now be interpreted in relation to a much larger sample base.

The writer wishes to acknowledge the assistance of Dr. John Armstrong of the NWT GEOLOGY Division of DIAND in compiling these examples from the database. Dr. Armstrong and staff are responsible for the compilation of this valuable exploration database.