Design and development of a lithogeochemical database for regional exploration using dBASE IV

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ABSTRACT

The paper describes the design and development of a PC based lithogeochemical database system, using dBASE IV, for use in regional geochemical exploration. The system is arranged in a hierarchical structure of menu-driven modules. Although primarily developed as an aid in data capture and management, selection modules to interrogate the database can be designed so as to reflect geological models appropriate to the type of mineralisation being sought. Data is stored in the database in the form of a lithological description for each sample, its unique number, its location and relevant geochemical analyses. Data entry is facilitated by the use of a menu-driven capture program and the user is offered a range of options to enter, update and delete information as well as to selectively abstract and print data. dBASE IV was chosen for its ease of use on a PC and its relational capacity in holding, retrieving and matching both descriptive and numerical data.

The system was developed "in house" in Rossing's Exploration department and is used to store and access lithogeochemical data from a wide range of geological environments. The system is flexible enough to allow a variety of elemental suites to be incorporated in the database so it can be applied to a variety of exploration programmes.

INTRODUCTION

Rossing Exploration is involved in a wide variety of mineral exploration programmes in Namibia. See Figure 1. Targets include industrial minerals and base and precious metals. A broad spectrum of exploration techniques is applied in mineral search but geochemistry is one of the most widely used because of its appropriateness in the arid environment of Namibia in which rocks have undergone long periods of weathering. Soil, rock and drainage geochemistry are all applied at various stages of exploration programmes but are mainly used to highlight areas for detailed investigation. Use of the term "regional" in the title therefore, is interpreted as implying areas of 1km or several square kms. (1,2) By and large, area selection is on the basis of geological criteria, with geochemistry being applied to test or confirm favourable environments for mineralisation in the area as a whole. Individual grant areas up to 100 sq. kms in size can be held under the Namibian prospecting licence system.

Once selected, a regional reconnaissance programme employing lithogeochemistry is often undertaken on an entire grant area in order to highlight particular locations for initial detailed work and to obtain a preliminary geological and geochemical picture of the area. Elements selected for analysis are predominantly the target and associated trace elements, and pathfinder elements are employed where warranted.

One such programme in which the author was involved was a search for epithermal gold mineralisation in central Namibia. Having withdrawn a large block of ground considered suitable for this type of mineralisation, an initial geological and geochemical reconnaissance was begun. This involved geological mapping and simultaneous rock sampling of numerous lithologies throughout the area. The approach called for the collection of large numbers of rock samples and their subsequent analysis for up to ten elements. It soon became obvious that this approach, though useful, could be more valuable if a method of integrating the large amounts of geological and geochemical data thus generated could be developed. The idea of a database to incorporate the two complimentary data sets was therefore put forward. This paper outlines the approach taken in the