

# Report : The Economic Geology Mineral Resources Information Series – an important first step to a successful mineral exploration programme

S.D. Ajagbe

Geological Survey of Namibia, Private Bag 13297, Windhoek, Namibia  
 email: sajagbe@mme.gov.na

Extensive exploration and other mineral investigations have resulted in the generation of an enormous amount of data in the form of reports submitted to the Ministry of Mines and Energy by the various companies. The Economic Geology Mineral Resources Information Series is a compilation of reported and known mineral occurrences as contained in grant reports on Open File and other relevant publications, which was initiated with the objective to provide prospective investors with a comprehensive information overview on mineral occurrences in their area of interest, and to stimulate further exploration. To date reports have been completed for seven of the 44 1:250 000 sheets covering the country. Field verification to check locations and host rock geology is carried out on those deposits and occurrences, where existing descriptions are unclear or contradictory. It is anticipated that future compilations will reflect more recent fieldwork, as well as try to propagate current thinking/modelling on some of the deposits to suggest new lines for further exploration.

## Introduction

Extensive exploration and other mineral investigations have resulted in the generation of an enormous amount of data in the form of reports submitted to the Ministry of Mines and Energy by the various companies. Reports of mineral exploration activities that have been terminated are held by the National Earth Science and Energy Information Centre of the Ministry, and can be accessed digitally through the recently installed Earth Data Namibia meta-data base under the Open File Sys-tem (A. Barth, *et al.*, 2004).

In 1996 the Geological Survey of Namibia (GSN)

decided to condense all the available information from previous exploration and other related research activities into short summary reports, each covering one 1:250 000 topographic sheet, to help the mineral investor access and assess this welter of data; in addition to these summaries one-page data sheets were to be compiled for each known occurrence and entered into the Earth Data Namibia data base. This concept was modified in 1998, so that the final product now includes a comprehensive rather than brief summary, which describes any known mineralization in detail, but at the same time saves the prospector and potential investor the necessity to go through numerous reports and files.

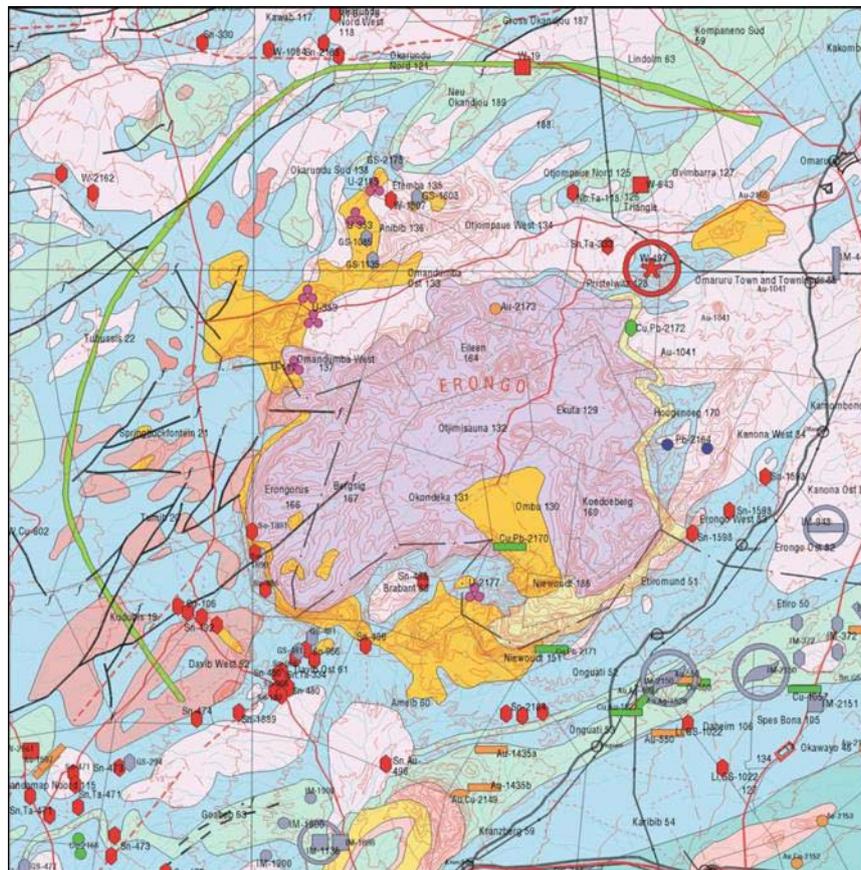


Figure 1: Part of geological map showing mineral localities

The reports consist of a comprehensive summary of each occurrence/deposit within the area under discussion, data sheets for each occurrence, a complete list of all occurrences in spreadsheet format, a plot of mineral localities on a generalized 1:500 000 scale geological map and a map showing the location of lapsed and current (at the time of publication) exploration licence areas.

By providing the prospective investor with comprehensive and easily accessible information on the known mineralization within a certain area it is hoped that through the Economic Geology Mineral Resources Information Series fresh interest will be stimulated in these occurrences, as well as in the search for new ones. With the improved knowledge of the geology of the country, together with the better understanding of the

controls on mineralization and advanced mineral exploration technology, which are available today, some of the previously investigated areas may reward further exploration.

### Mineral Deposits and Occurrences

The Mineral Resources Information series comprises the following:

#### *Plot of mineral locations*

All identified mineral locations within the sheet area are shown on a generalized 1:500 000 geological map, with an internal record (GSN) number and their commodity (Fig. 1). The map also gives a list of locations,

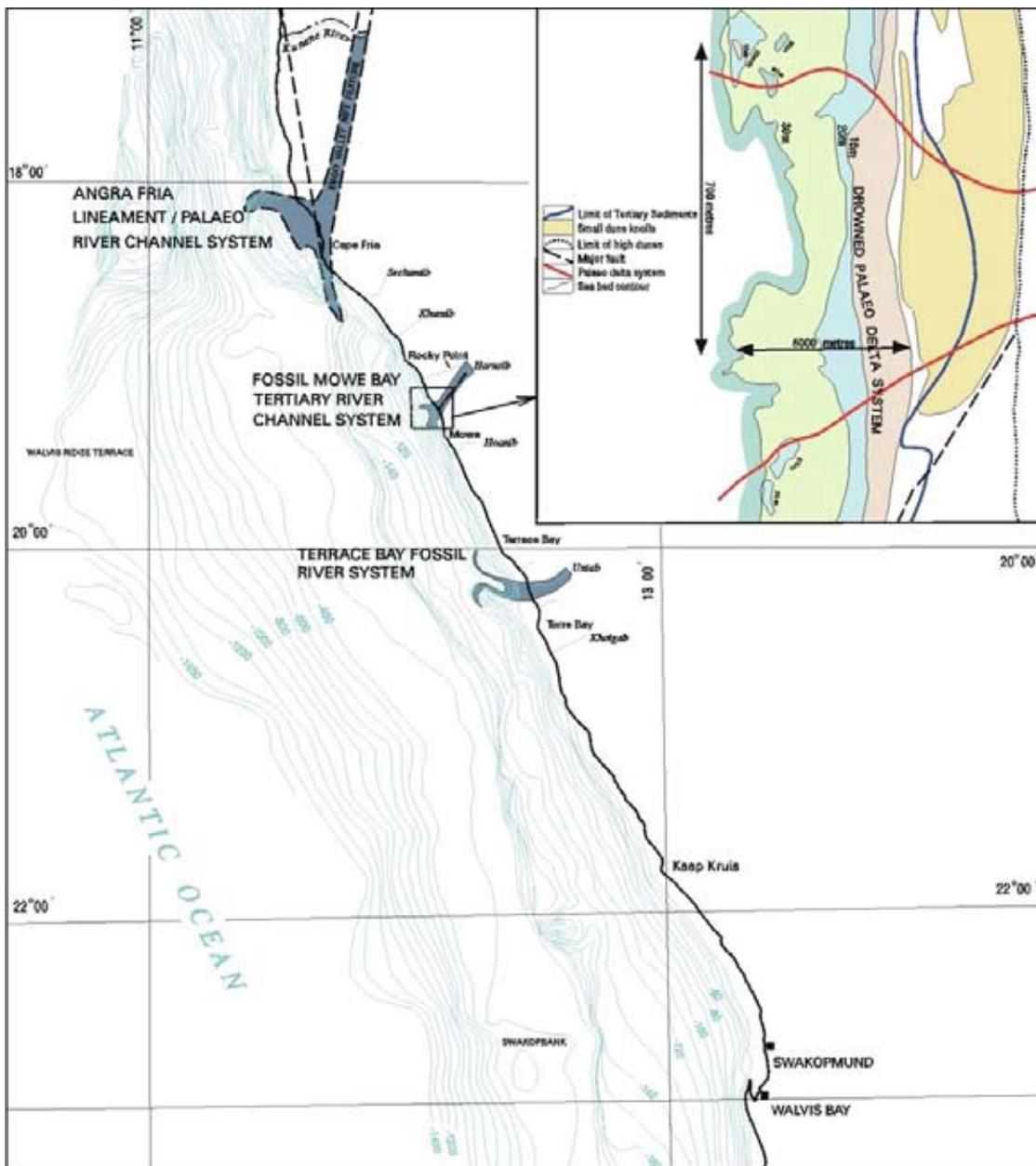


Figure 2: Tertiary Palaeo River channel – Skeleton Coast S.W.A./Namibia (after S. Lyle, 1983)

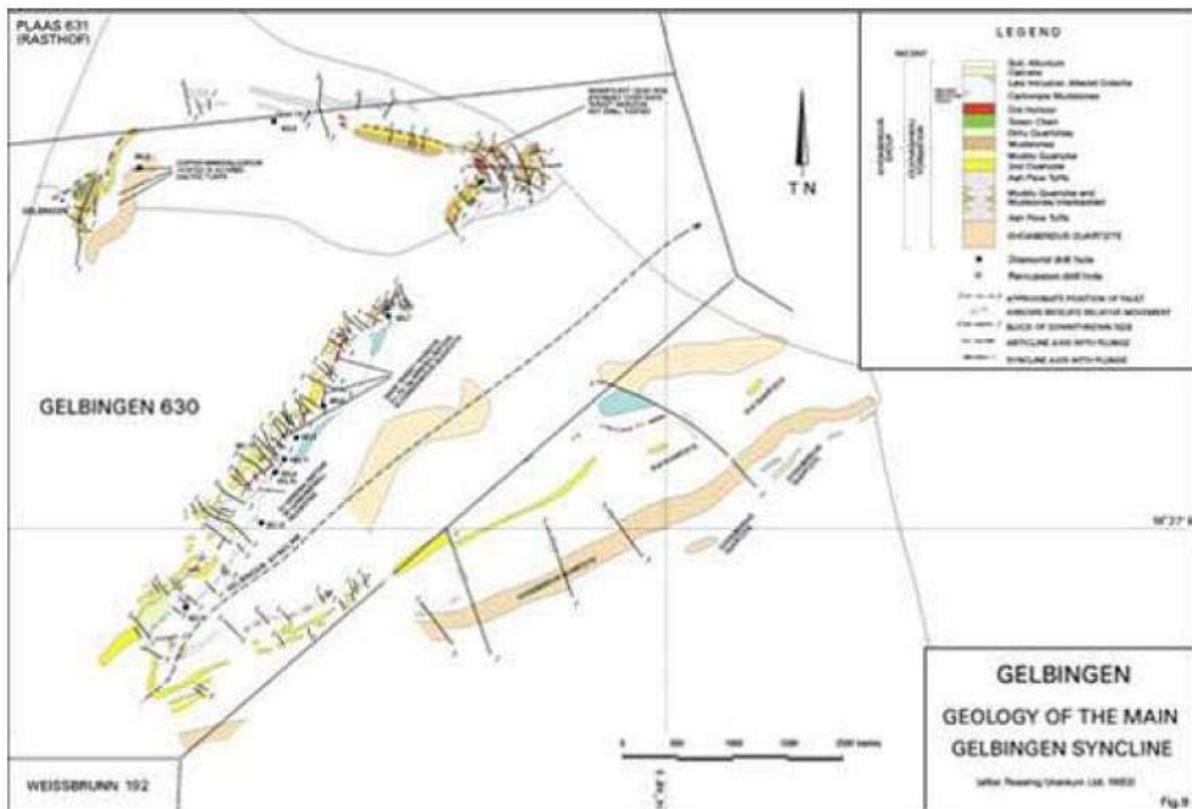


Figure 3: Geology of the Gelbingen syncline

<b>NUMBER:</b>	<b>2</b>	<b>DEPOSIT NAME:</b>	<b>Okawayo Gold anomaly</b>
<b>GSN No.:</b>	<b>2148</b>	<b>GRANT NO:</b>	<b>M46/3/1537</b>
<b>MAP SHEET:</b>	<b>2115 DD</b>		
<b>LOCATION:</b>	Coordinates: -21.84601°/15.97634°, located in the central part of the farm Okawayo 48 in the Karibib District.		
<b>REGIONAL GEOLOGY:</b>	The area lies in the Southern Central part of the intracontinental arm of the Damara Orogen. Both local Nosib Group and Upper Swakop Group stratigraphy are represented. Intrusive Salem type granites also occur in the area while a substantial portion of the area is covered by calcrete and sand.		
<b>DEPOSIT GEOLOGY:</b>	Commodity: Au A gold anomaly in calcrete/sand covered area below outcropping Nosib quartzites.		
<b>RESOURCES:</b>	Initial anomaly defined by a single station BLEG II stream sediment sample with a value of 2.03 ppb Au. Follow up work returned a peak value of 1.29 ppb Au from a calcrete/sand- covered area below the outcropping Nosib quartzites.		
<b>PROJECT INFORMATION:</b>	Prospect Inactive. Work done includes stream sediment sampling and reconnaissance geological mapping by Anglo American Prospecting Services Namibia (Pty) Ltd.		
<b>REFERENCES:</b>	Walker, P.J.A. 1994. Anglo American Prospecting Services Namibia (Pty) Ltd. Prospecting Grant M46/3/1537 - Karibib East. Unpublished final report.		

Figure 4: Occurrence/deposit data sheet

indicating the status of the mineral occurrence as a showing/minor occurrence, prospect, active or dormant working.

### *Comprehensive summary*

The comprehensive summary of the occurrence/deposit consists of a geological description, as well as details of the exploration work already carried out and results obtained. To further interest, it also contains selected geological sections and maps (Fig. 2), borehole intersections/correlations (Fig. 3), and production data of dormant and active operations where available.

### *Data sheets*

The deposit data sheets briefly summarize the salient points of each occurrence and are intended to provide an overview of its characteristics. They are also entered into the Earth Data Namibia database, using GSN number and deposit name as criteria for identification (Fig. 4).

### *Mineral licence map*

A mineral licence map, which accompanies each report, shows the locations of all historic grants within the sheet area (Fig. 5). Apart from the grant number (EPL/ERL/ML), it provides information on the licence holder/operator.

### **Current Situation**

To date seven reports have been finalized in the Economic Geology Mineral Resources Information Series, i.e. Swartbooisdrif 1712, Oshakati 1714, Opuwo 1812, Etosha West 1814, Sesfontein 1912, Kamanjab 1914

and Omaruru 2114. Sheets Rehoboth 2316, Walvis Bay 2214, Kuiseb 2314 and Warmbad 2818 are currently being edited and will be available for sale during 2004, while write-ups of areas Fransfontein 2014 and Windhoek 2216 have started (Fig. 6). The following chapters briefly describe the current status of mineral exploration in the areas covered by completed reports.

### *Swartbooisdrif 1712*

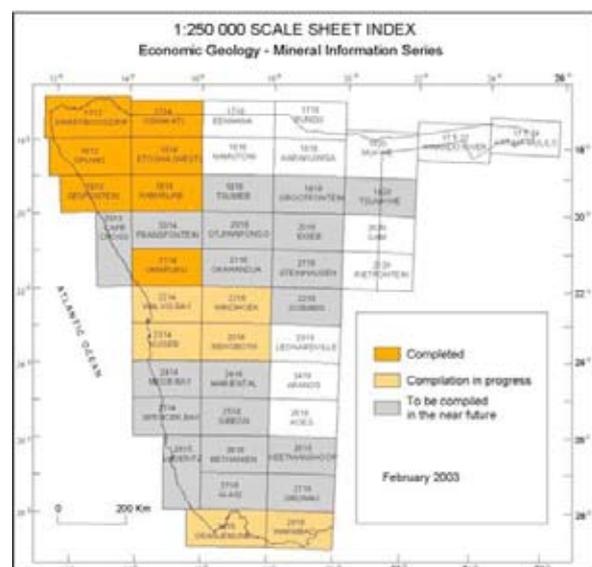
Mineral occurrences within the area Swartbooisdrif 1712 include base metals, platinum group elements (PGE), radioactive minerals and semi-precious stones, such as garnet, sodalite and amazonite. The mafic to ultramafic satellite bodies occurring near and around the Kunene Anorthosite Complex (KAC) are particularly notable for base metal and PGE mineralization, while the Damara metasediments of the Nosib Group and Abenab Subgroup host numerous base metal occurrences. In the past, exploration work has concentrated largely on the satellite intrusions of the KAC, as they were thought to represent the ultramafic, differentiated and potentially PGE and base metal-rich part of the complex. Within the Epupa Metamorphic Complex, which encompasses the oldest rocks in Namibia, only a few minor base metal occurrences and showings have been discovered to date.

### *Oshakati 1714*

Sandstones and carbonates of the Damara Sequence (Nosib Group, Tsumeb and Abenab Subgroups) are host to a number of base metal occurrences. Exploration work in this area includes electromagnetic and magnetic surveys, and was mainly targeted at Tsumeb/Kombat or MVT-type Cu/Pb/Zn mineralization.



**Figure 5:** Part of map showing mineral licence areas



**Figure 6:** Current status of the Economic Geology Mineral Resources Information Series

*Opuwo 1812*

Mineralization in the Opuwo area is hosted throughout the entire stratigraphic succession and ranges from copper, lead, zinc and gold within the Epupa Meta-morphic Complex, through copper, lead, zinc and iron associated with both sedimentary and intrusive phases of the Damara Sequence, to uranium within Karoo sediments. Diamonds are found along the Skeleton Coast, both onshore and offshore (Fig. 7). A few fossil salt pans are also located along the coast.

Specifically, the Upper Abenab Subgroup sediments, which consist of light- to dark- grey, banded to laminated stromatolitic dolomites, platy oolitic and diachronous limestones and meta-evaporite host lead, zinc and copper mineralization. The Lower Abenab Subgroup, which comprises calcareous arenite and argillite, cherty dolomite and limestone, contains copper, silver, barium and arsenic close to the unconformable contact with the underlying Nosib Group quartzites, while the zone of unconformity between the Upper Abenab Subgroup and the overlying Chuos Formation hosts manganese, iron and gold.

*Etosha West 1814*

Only a few mineral occurrences/showings have been located within this area to date. They consist of minor copper showings in Nosib Group quartzites, and drainage/soil anomalies with high base metal values. Most of the latter occur within the Lower Tsumeb Sub-

group metasediments or are associated with the Tsumeb Subgroup/Mulden Group contact (Damara Sequence). Inland salt pans are found within the Kalahari Group sediments of the Owambo Basin in and around the Etosha National Park.

*Sesfontein 1914*

Mineral occurrences found within the greater Sesfontein area include diamonds in Tertiary and Quaternary raised beaches (Fig. 7), as well as base and precious metal occurrences and anomalies within marbles, schists and quartzites of the Ugab Subgroup. In addition, base and precious metal mineralization is present in diamictites, shales, iron formation and conglomerates of the Chuos Formation (Damara Sequence).

*Kamanjab 1914*

Numerous base and precious metal occurrences have been discovered in the area, especially in the sheared Proterozoic Khoabendus Group and the Neoproterozoic Damara Sequence. The basal clastic unit of the Damara Sequence (Nosib Group), which overlies the Khoabendus Group with an angular unconformity, has a potential porosity control on localizing mineralization, and exploration work carried out to date suggests that most of the occurrences in this area are probably associated with this unconformity. Others are associated with or controlled by the Rehderstal Fault, which is a very prominent reverse fault in this area.

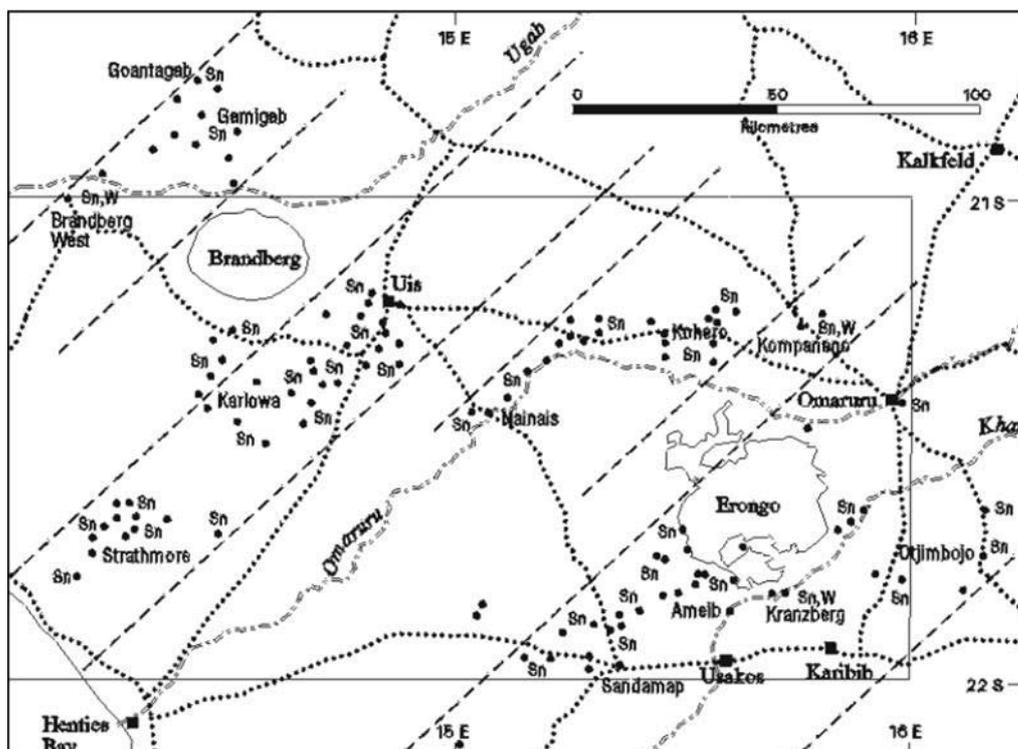


Figure 8: Pegmatite belts of central Namibia

Mineralization is essentially hydrothermal, both epigenetic and syn-genetic, and mainly associated with quartzites and volcanics of the Khoabendus Group, quartz veins and veinlets, conglomerates and fault/fracture breccias. These include the occurrences associated with the Rehderstal Fault on the farms Rehderstal and Klein Omaruru, as well as those within the volcanosedimentary sequences on the farm Kopermyn. Local gossans and gossanous ferruginous quartzites contain, or are associated with, prominent mineralization on the farms Tevrede, Vaalberg and Gelbingen. Mulden Group clastics host green-bed type argillitic mineralization. Industrial minerals, mainly fluorite and barite also occur in the area.

#### *Omaruru 2114*

The Omaruru sheet economic geology report contains over 400 mineral locations, and mineralization in the area is dominated by pegmatite-hosted tin, tantalite, niobium and related minerals. The three prominent tin zones are the Cape Cross – Uis, Nainais–Kohero and Sandamap–Erongo belts (Fig. 8). Tin occurrences are also associated with the Mesozoic anorogenic complexes of the Damaraland Alkaline Province. Other mineral occurrences and deposits include tungsten in skarns and greisen zones, extensive limestone/marble deposits, graphite, base metals and gold. A few uranium prospects and numerous gemstone occurrences and workings are also located within the area.

#### **The Future**

It is the aim of the Economic Geology Mineral Resources Information Series to cover the whole of Namibia, or at least the most prospective areas, within the next five years. Furthermore, completed reports will be updated regularly with new data and information.

At present the publications within this series are true “summaries” containing largely information from existing exploration reports and other relevant texts, while field work has been restricted to the verification of locality data and sporadic geological checks. In addition, adjustments were made in the usage of stratigraphic terminology. It is planned, however, that future compilations will have a greater input from current field work, as well as reflect recent ideas on deposit modelling and related subjects to a greater extent. Furthermore, archival geochemical data which form part of the exploration work carried out, and which are currently being processed, will be included.

There is no doubt that some areas of the country with a highly prospective geology have not yet been exhaustively explored, and it is the aim of the Economic Geology Mineral Resources Information Series to highlight

such areas. It is hoped that mineral exploration companies as well as the public in general will find these summary reports a valuable assistance in their quest for information, and that they may contribute to attract much needed investment to the minerals sector of the Namibian economy.

#### **References**

- Ajagbe, S.D. 1999. Economic Geology Mineral Resources Information Series. Summary of Mineral Deposits and Occurrences: Swartbooisdrif Sheet 1712. *Geological Survey of Namibia*, 53 pp.
- Ajagbe, S.D. 1999. Economic Geology Mineral Resources Information Series. Summary of Mineral Deposits and Occurrences: Opuwo Sheet 1812. *Geological Survey of Namibia*, 85 pp.
- Ajagbe, S.D. 2000. Economic Geology Mineral Resources Information Series. Summary of Mineral Deposits and Occurrences: Oshakati Sheet 1714. *Geological Survey of Namibia*, 37 pp.
- Ajagbe, S.D. 2000. Economic Geology Mineral Resources Information Series. Summary of Mineral Deposits and Occurrences: Etosha West Sheet 1814. *Geological Survey of Namibia*, 17 pp.
- Ajagbe, S.D. 2000. Economic Geology Mineral Resources Information Series. Summary of Mineral Deposits and Occurrences: Sesfontein Sheet 1912. *Geological Survey of Namibia*, 35 pp.
- Ajagbe, S.D. 2001. Economic Geology Mineral Resources Information Series. Summary of Mineral Deposits and Occurrences: Kamanjab Sheet 1914. *Geological Survey of Namibia*, 87 pp.
- Ajagbe, S.D. 2002. Economic Geology Mineral Resources Information Series. Summary of Mineral Deposits and Occurrences: Omaruru Sheet 2114. *Geological Survey of Namibia*, 2 vols., 326 pp.
- Barth, A., Eckardt, J., Petzel, V. and Schreiber, U. 2004. Report: Earth Data Namibia - a milestone in information management at the Geological Survey of Namibia: background, data base design, features, further planning. (This volume)
- Hart, K.O. 1990. Geological Report to accompany an application for renewal of Exclusive Prospecting Grant No. M46/3/1475 - Kamanjab North. *Rössing Uranium Ltd. Unpublished report*, 5 pp.
- Lyle, S.D. 1982. Geological report on reconnaissance investigation on the offshore gravel bearing terraces located in the marine concession between Hoanib River in the south and Sechumib in the North - Skelton Coast. *Unpublished report*, 21 pp.
- Petzal, V.F.W. 1990. Progress report on geological exploration conducted on the farm Sandamap Noord 115, Damaraland District. Grant M46/3/1614. *Gold Fields Namibia Ltd. Unpublished report*, 37 pp.