

# UGANDA

OPPORTUNITIES FOR  
MINING INVESTMENT



2006



# U G A N D A

This brochure highlights the opportunities awaiting mining companies and other investors in the minerals sector of Uganda. The government of Uganda has introduced attractive incentives to investors. A growing appreciation of the mineral wealth of the country, coupled with the settled business climate that has developed over the last 20 years, have led to increasing awareness by the international mining community of the actual and potential commercial development of gold, vermiculite, copper, cobalt, various specialty metals, and other minerals.

It is our hope that dissemination of this brochure will stimulate interest of investors who may not be aware of Uganda's latent opportunities, or of the government's desire to see private capital in the forefront of future developments. The brochure is published under the general authority of the Ministry of Energy and Mineral Resources of the Government of the Republic of Uganda as part of the comprehensive programme to strengthen the mineral sector and restore it to its previous importance.

Financial assistance for the preparation of this brochure was provided by The World Bank under terms of the Sustainable Management of Mineral Resources Project. It is hoped this brochure will encourage mining companies to visit Uganda to see for themselves what the "Pearl of Africa" is all about.

Further information may be obtained from the agencies and offices of the Government of Uganda listed on the inside back cover. A PDF version of this publication is also available online at [www.ugandamining.com](http://www.ugandamining.com).

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Prepared for Brian W. Hester Inc., Vineland, Ontario, Canada by B. Hester and W. Boberg with assistance of personnel of the Department of Geological Survey and Mines, including J.T. Tuhumwire (Commissioner), J. Odida (Assistant Commissioner), E. Katto (Principal Geologist) and J. Nyakaana (Principal geophysicist). 2000 copies of this edition have been printed in January 2006. Map Resources by AMB-Ink of Golden, Colorado and the Geological Survey of Uganda. Graphic Design and Layout by Kobalt Design and Communications Inc. of Toronto, Canada.

# UGANDA



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MINING INVESTMENT

THE REPUBLIC OF UGANDA 2006



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DEAR FRIENDS,

Uganda is underlain by some of the most ancient rocks, which has allowed the various mineralising episodes to impart their signatures on our subsurface.

As our knowledge advances on how our wide range of minerals occur, we see the potential for their development to be growing in our country. At present our mineral wealth is not reflected in the value of the gross domestic product although historically it has done so.

The period of political and economic turmoil that isolated the country contributed to this decline. In recent years, however, Uganda has begun to experience a renaissance due to good government policies, which have created a conducive investment climate.

The need to exploit our mineral resources is now pressing. The Investment Code of 1991 that offers specific incentives has attracted investors to our various industries. You will find the incentives we offer very attractive and the personnel of the Uganda Investment Authority look forward to explaining them to you.

We want to attract investors specifically into the mineral sector. In this regard, the Mineral Policy of 2001 and the Mining Act of 2003 provide a conducive legal, social and fiscal framework for the private sector to invest in the sector. The new and ongoing Mineral Sector Development Programme initiated by Government with support of development partners namely the World Bank, African Development Bank and Nordic Development Fund will further provide and improve the investment environment by availing modern geo-scientific data and institutional capabilities which are a prerequisite for sector investment and development. The Ministry of Energy and Mineral Development and the Department of Geological Survey and Mines have been strengthened and await the opportunity to assist potential investors. Our single purpose in making these improvements and changes is to make our mineral opportunities attractive to investors. The objective of this brochure is to contribute to this aim by summarising these opportunities in a single volume.

The records of past work by the Geological Survey of Uganda since 1919 and by others have been carefully preserved and are available upon inquiry. The information we have and the various laboratory facilities provide a vital step for an investor interested in what Uganda has to offer.

This brochure gives an overview of the financial, legal and technical aspects, which an investor will find handy and useful. It also provides names and addresses of various Government agencies from which additional information can be obtainable. Though it is not exhaustive, the brochure should serve as a useful introduction and guide to the investor who is interested in learning more about the great potential of Uganda's mineral wealth. You will also find more information about the sector on our website: [www.energyandminerals.go.ug/](http://www.energyandminerals.go.ug/), which will continuously be updated as more information is gathered.

We offer you a very warm welcome to Uganda.

Yours sincerely,

**Syda N. M. Bbumba (Mrs.), M P**

MINISTER OF ENERGY AND MINERAL DEVELOPMENT

## INTRODUCTION

This brochure brings to the attention of investors the wide variety of opportunities offered by the mining sector of Uganda. The brochure also organises the present state of the country's economic and political conditions.

Value of production from the mineral sector during the years of peak activity between 1955 and 1976 placed the industry behind only coffee and cotton as an important earner of foreign exchange. About 96% of these earnings, which in total amounted to as much as 30% of all foreign exchange earned, came from sale of blister copper from the former Kilembe mine. During a period of about twenty years fertilizer was produced commercially from phosphate. The country also supported a vigorous, small-scale mining industry in a variety of commodities. Several years of political and social unrest brought all these activities to a halt in 1979 and a labour force of 10,000 became unemployed. The mining and quarrying sector of the economy currently contributes less than one percent of gross domestic product.

Current mining activity consists of one mine producing gold and one open pit that recovers premium grade vermiculite.

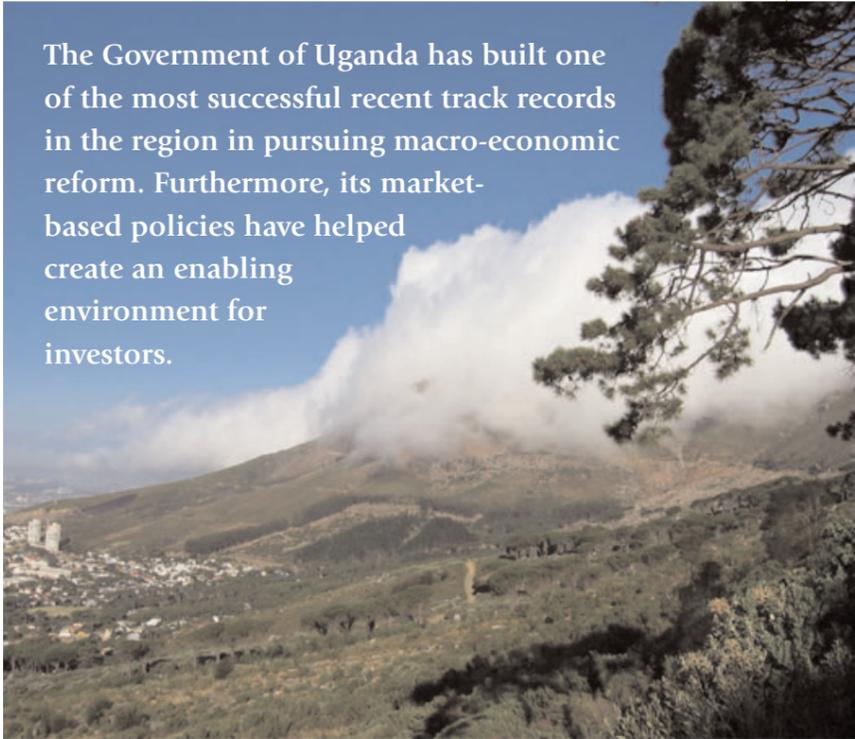
Reconstruction of the economy began in 1986 following the return to normal conditions and cessation of unrest and social disruption. Uganda has enjoyed stable conditions and growth for nearly twenty years.

The Economic Freedom Index 2004, published by The Heritage Foundation judges Uganda to be the second most free economy in sub-Saharan Africa. Gross domestic product grew at an average annual rate of 5.7% between 1999 and 2004. Rates range between 4.9% for the year 2002/03 and 6.3% for 2001/02. The annual rate of inflation has declined from over 200% in 1986 to 4.5% in 2003/04 (excluding food crops). Earnings during 2005 from foreign sources are expected to exceed one billion U.S. dollars for the first time.

The ratio of GDP per person stood at \$1354 in 2003. This figure compares well with those of the other two members of the East African Community, Kenya at \$992 and Tanzania at \$557.

The rapid spread of HIV/AIDS throughout Africa in recent years is of great concern to international investors. Uganda addressed the problem early in the development of the epidemic with the result that the number of reported incidents of the disease has decreased to an estimated 7% of the population in 2005.

The first section of this brochure presents a summary of the investment environment for mining. This section is followed by a description of the country and its opportunities as seen today. This description covers geological and geographical features, history and infrastructure in a way designed to give the investor an overview of conditions in general and particularly as they apply to the mining industry.



The Government of Uganda has built one of the most successful recent track records in the region in pursuing macro-economic reform. Furthermore, its market-based policies have helped create an enabling environment for investors.

General and specific opportunities, as perceived in the light of present knowledge, occupy the bulk of the text and are illustrated where appropriate. Arrangement of this section of the text is according to commodity and broadly in descending order of historical commercial importance.

The location of many of the recorded occurrences of minerals is depicted in a metallogenic map (fig. 11) to give the investor an idea of the geographical distribution of known resources. Another map (fig.4) shows the disposition "world class" mineral deposits in Uganda and nearby countries in relation to geological features on the continental scale.



The Mining Act of 2003, as amplified by the Mining Regulations of 2004 replaces former legislation. The Land Act of 1998 and Regulations of 2004 introduced important changes in tenure and ownership of land. Both these documents should be read in conjunction with the Mining Act. The Investment Act contains much valuable information for the investor.

The author is grateful for the help, guidance and hospitality provided by several organisations including personnel of the Department of Geological Survey and Mines at Entebbe, the Uganda Investment Authority, and staff of the several mining and exploration companies active in Uganda.

The text employs British spelling and usage of the English language. With the exception of their occasional use in historical context, units of measure are in terms of S.I. units.

*The Economic Freedom Index 2004, published by the Heritage Foundation in the United States, judged Uganda to be the second freest economy in the sub-Saharan Africa. In keeping with this openness, there is in general a very strong commitment by the Government to the private sector as the engine of growth.*

## ASPECTS OF UGANDA

### PHYSICAL GEOGRAPHY

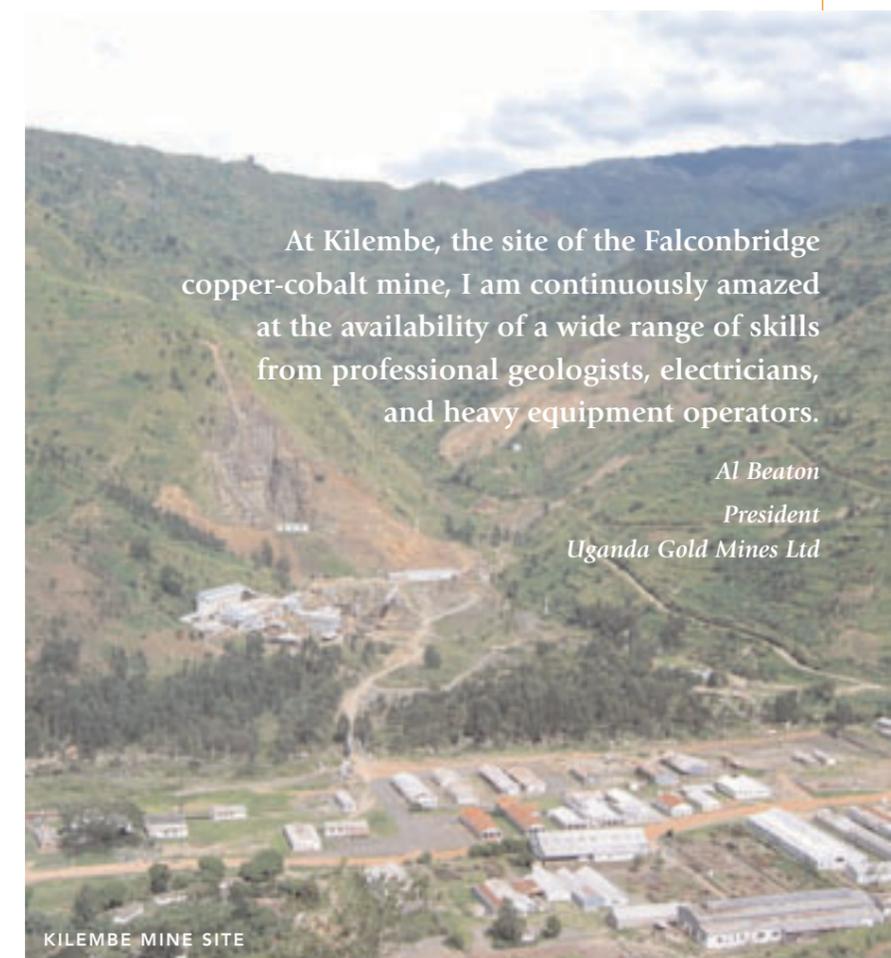
Uganda encompasses 197,097 sq km of mainland and islands, and 43,942 sq km of water for a total area of 241,038 sq km. (96,925 sq miles). This land area is about that of the American state of Minnesota. Major bodies of water shared with adjoining nations include Lakes Victoria, Albert and Edward. Uganda shares common frontiers with Kenya to the east, Tanzania and Rwanda to the south, the Democratic Republic of Congo (formerly Zaire) to the west, and Sudan to the north (fig.1).

The range in latitude is from a little over 4° North near Lutoke peak (2795 m) in the extreme north east corner of the country to 1° South on the Rwanda border, and in longitude from 29° 30' West near Lake Edward on the border with the Democratic Republic of Congo to about 35° West on the border with Kenya. The Equator passes very close to Kampala, the capital, near the northwest corner of Lake Victoria.

Except for the few areas of higher ground on the Rwenzori Mountains (5110 m) on the western frontier and Mt. Elgon (4321m) on the eastern, the greater part of Uganda consists of an ancient erosion surface of low relief at mean elevations of 1000 to 2000 m. Mt. Elgon, is of volcanic origin whilst the Rwenzori Range is caused by uplift along the Western, or Albertine, Rift Fault. Movement along this fault has led to the development of some spectacular scenery with unique flora and fauna.

The Kagera River forms much of the frontier between Uganda and Tanzania and supplies more water to Lake Victoria than any other river that flow into the lake.

Much of Uganda enjoys a mean high temperature of 25-30° C. and a mean low of about 15° C. Annual precipitation over most of the country is between 75 and 150 cm and falls on between 90 and 120 days of the year. The southern part of the country experiences two distinct rainy seasons with peaks in April and November. These two seasons merge to the north where rain falls from April to November. Microclimates with various characteristics occur in the areas of higher ground and around the major lakes. Precipitation on the higher elevations of the Rwenzori Mountains comes in the form of snow as well as rain. The higher peaks have caps of permanent snow.



At Kilembe, the site of the Falconbridge copper-cobalt mine, I am continuously amazed at the availability of a wide range of skills from professional geologists, electricians, and heavy equipment operators.

*Al Beaton  
President  
Uganda Gold Mines Ltd*

## ASPECTS OF UGANDA

### HUMAN ELEMENTS THE PEOPLE

The population was 24,748,977 according to the census of 2002 but estimated to be 26,700,000 in 2005 for the purposes of the Budget for the financial year 2004/5. These figures compare with the 16,671,705 of the 1991 census. The size of the population has nearly tripled since the count of 9,535,051 in the census of 1969. Annual growth rate of the population is now 3.5%, but that of the urban areas is 6.6% due to the migration of the rural population to towns

In an effort to reduce poverty, the Government has established a Poverty Eradication Programme. Under this programme, the proportion of the national population rated as living below the poverty line fell from 55.7% in 1992 to 37.7% in financial years 2002/3. In 1999/2000, the proportion decreased to 33.8%.



The population falls into four ethnic groups. People of the Bantu race live predominantly south and west of the River Nile and Lake Victoria whilst those of Nilotic, Nilo-Hamitic, and Sudanic races live north of the Lake. Of the Bantu people, those of the Baganda tribe are the most numerous. The previously influential minority with origins in the Indian subcontinent was an important force in commerce but was reduced by forced emigration in 1972 during the period of tyranny. With the return to stable conditions, a number of this group have been encouraged to return.

Some 37 languages are spoken as mother tongues. The laws are all written in English which is the official language and used extensively in both commerce and government as well as being the medium of instruction in all education from the early years of primary school. Kiswahili, a lingua franca over much of east Africa, with a large vocabulary and Bantu language base, is widely understood. The Luganda language is spoken extensively in central Uganda where members of the Baganda tribe (17% of the population) predominate.

The census of 2002 reports 68% of the population to be literate. This percentage is composed of an average of 76% males claiming to be literate and 61% females. In absolute terms, over five million citizens aged ten years or over are illiterate. Active promotion of literacy forms part of the Poverty Eradication Programme.

The population is divided on the basis of religion as to 87% as members of various Christian denominations, 1% Traditional, or Animist, and 12% Muslim.

Makerere University was established under the colonial administration as the first institution to grant degrees in East Africa. The university continues to produce graduates from three year courses in a wide field of studies, including geology, surveying and several engineering disciplines, but not mining. Post-graduate qualifications are offered in geology. Annual intake into the geology courses varies between five and twenty students.



Makerere now operates as one of four state universities. The other three are Mbarara University of Science and Technology, Kyambogo University, and Gulu University. There are twelve private universities.

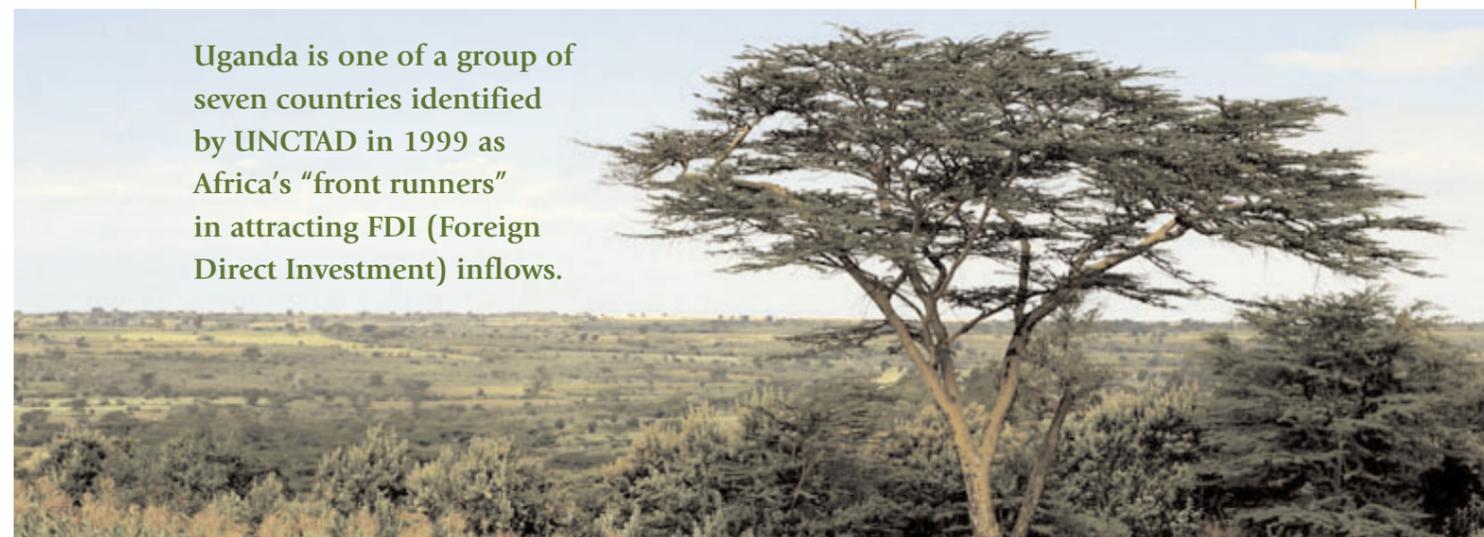
### HUMAN ELEMENTS HISTORY

The people of Uganda share a long history of migration. Those with Bantu affinities came from the west, and those with Nilotic affinities from the north. The Baganda, a Bantu tribe, flourished in the fertile area they occupy near Lake Victoria and established a powerful and well-organized kingdom that dominated much of the surrounding country. Further to the north, the otherwise similar kingdom of Bunyoro was even more extensive before European colonisation.

Less powerful, but still well organized kingdoms, were established elsewhere in the country and especially in the west. The country became a British Protectorate in 1894. Under this arrangement, no colonisation of farmland by settlers was permitted although the country otherwise had a typical colonial administration. The economy was based largely on coffee, cotton and mining. The contribution by mining declined rapidly about 1976. Uganda gained independence on October 9, 1962.

The internal ethnic strife under a succession of autocratic leaders, which followed independence, was replaced twenty years ago by the present system of democratic government.

Uganda is one of a group of seven countries identified by UNCTAD in 1999 as Africa's "front runners" in attracting FDI (Foreign Direct Investment) inflows.



### HUMAN ELEMENTS GOVERNMENT

The government administers the country from the capital, Kampala the population of which was 1,853,954 according to the census of 2002. The government exercises its authority according to the parliamentary system in a single chamber system with political parties. This present government came to power in 1986 following a protracted guerrilla war that finally succeeded in overthrowing a dictatorial regime. Since then, the country has enjoyed an enviable record of stability and growth. A new Constitution that incorporates a bill of rights was adopted in October 1995. The Constitution of 1995 conforms more to the direction in which the country is moving and replaced that of 1967. The new Constitution requires the holding of regular elections. The next presidential election is due in 2006.

## ASPECTS OF UGANDA

The Government of Uganda has built one of the most successful recent track records in the region in pursuing macro-economic reform.

### HUMAN ELEMENTS ECONOMY

The great majority of the population practices subsistence farming with a growing emphasis on cash crops such as coffee, cotton, and to a lesser extent, tea and a variety of other crops. An expanding industry produces flowers and other horticultural products for export by air. Uganda is self-sufficient in basic foodstuffs. Plantain bananas constitute the most widely consumed carbohydrate. The large quantity of this basic foodstuff makes Uganda the largest banana producing country in the world. The entire production is consumed within the country.

With its demonstrated political stability and economic progress for twenty years, Uganda has qualified for substantial soft loans and grants from international agencies. The government has adopted an economic recovery programme along lines advocated by The World Bank. This programme aims at encouraging investment by the private sector and by stimulating commercial activities. Mining is anticipated to play an important role.

### LOGISTICS

Major components of existing infrastructure are illustrated in figure 2.

Uganda depends upon road and rail links through Kenya for much of its foreign trade. Continuing efforts are being made to upgrade these routes. Efficiency of the container port at Mombasa on Kenya's coast is also being improved.

The Uganda Railway forms the westerly extension of the narrow gauge Kenya Railway that passes through Nairobi on its way to the important container port of Mombasa on the Indian Ocean. In its original form, the line terminated at Kampala but two major extensions were constructed shortly before independence. One of these lines continues west from Kampala to Kasese to service the then booming copper mining development at Kilembe, whilst the other runs northwest from Tororo near the Kenya border to the town of Pakwach on the River Nile below Lake Albert, to provide improved transportation for cotton. Both lines are presently disused and need maintenance to permit traffic.

The whole railway system was sold to a private company after competitive bidding in 2005. A condition of sale is that \$322 million be spent over the next 20 years on upgrading the right of way and replacing the rolling stock. The status of the two branch lines in Uganda remains to be decided. The system is now known as the Rift Valley Railway and has a length of track in Uganda of 1241 km, including the two branch lines.

To reduce dependency on the routes through Kenya, a rail ferry for freight cars was established in 1993 on Lake Victoria to connect the Uganda rail system at Port Bell with the Tanzanian system at Mwanza about 310 km distant.

Over the longer term, it has been proposed that the Tanzanian system will be extended from an existing railhead in that country at Arusha to the port of Musoma on the east side of Lake Victoria. Such a development would permit shipments of freight through the northern Tanzanian port of Tanga on the Indian Ocean that, unlike Mombasa in Kenya and Dar es Salaam in Tanzania, is not fully utilised. Length of the journey involving the rail ferry would be substantially reduced.

Uganda has 30,000 km of maintained roads of which 8%, or 2545 km, are paved. Condition of the road system is generally good. A network of paved trunk roads covers the country in a uniform manner except for the north.

Hotels in the Kampala-Entebbe area range up to those offering service at international standards. Hotels of good quality are to be found throughout the country. Vehicles with or without drivers are available for hire in the major centres.

Uganda's roads form an essential link in the road haulage system currently used for supplying fuel, foodstuffs and general freight to the countries of Rwanda, parts of Burundi, the southern part of Sudan and the eastern part of the Democratic Republic of Congo.

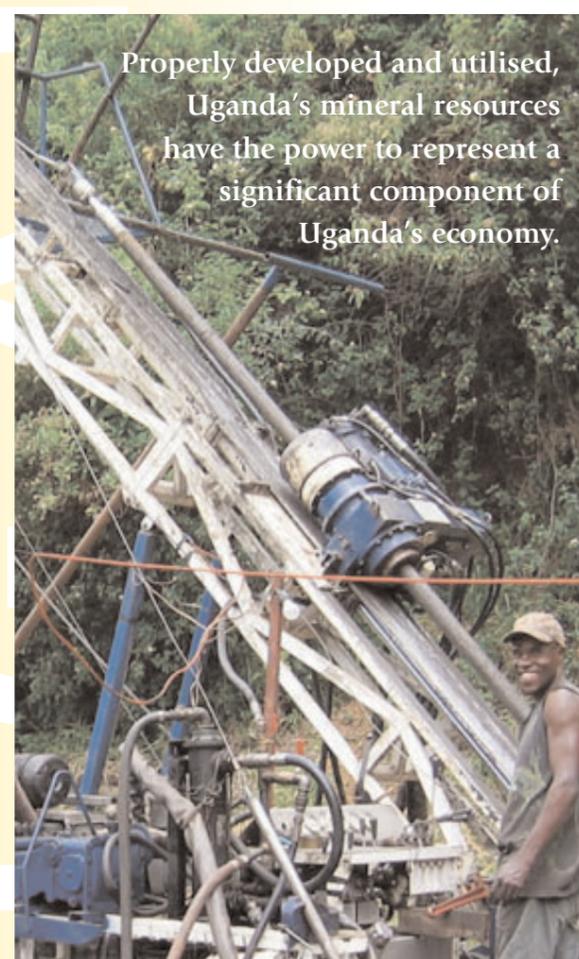


Fifteen foreign registered, commercial airlines provide scheduled passenger service to Uganda's principal airport at Entebbe on the shore of Lake Victoria and 40 km from Kampala. Flights connect with Dar es Salaam, Nairobi and other regional centres as well as several centres further away. Several flights per week connect with London and Brussels in Europe, and to centres along the Arabian Gulf. There are no scheduled commercial flights at present to other centres in Uganda. None of the seventeen airline operators registered in Uganda provide scheduled services but several offer charter services. International carriers of air cargo service Entebbe on a regular basis.

The national telephone system is now run by two entities. There are three mobile phone operators, eight internet providers and eight VSAT international gateway providers. The country is served by 117 radio stations and an increasing number of television stations. Users of these various services are growing in number at a rapid rate. Overseas telephone connections for voice and facsimile messages are easy to make and can be made from most of the towns.

The postal system works well with international mail moving quickly to and from the principal centres. Several companies offer international courier services from offices in Uganda.

Electricity is generated by oil and hydroelectric power. Uganda has a hydroelectric generating capacity estimated to be 3000 MW of which only 380 MW is utilised. Much of this power is exported to adjacent countries. Over half the power generated comes from the two stations below the Owen Falls dam at Jinja where Lake Victoria empties into the River Nile. Several smaller stations away from the city centres have been rehabilitated as part of a general programme of improvement and expansion. New dams intended for generation of power are to be constructed at Bujagali and Karuma. The grid system is extensive and is being expanded to utilise power available from the Owen Falls generators (fig. 2) at Jinja. In the more remote areas where most new mining enterprises would be expected to be, local generation of power might be necessary.



Due mainly to the lack of current demand, there are few services designed to suit the specific needs of the mining industry. The Department of Geological Survey and Mines in Entebbe offers analytical laboratories and sample preparation facilities. The Department has a diamond drill, of recent manufacture, and all ancillary equipment available for rental. With this one exception, none of the various types of drills used in mineral exploration is available in Uganda. Until a drilling contractor establishes a base in Uganda, the nearest practical source of equipment is Mwanza in Tanzania from whence drills may be shipped across Lake Victoria. The Department of Geological Survey and Mines owns several geophysical instruments that are available, together with operators, for rental at commercially competitive rates.

Support services such as steel fabricating, welding, and timber as well as fuels and most lubricants are widely available. Cement manufacture in Uganda began again during 1995 after a lapse of many years. Some cement continues to be imported from Kenya.

Policy of government is to give priority to improvement of the infrastructure. There has been substantial achievement in this direction with further improvements expected over the short term.

## INVESTMENT

### INTRODUCTION

The investment climate in Uganda began to improve in 1986 following establishment of the National Resistance Movement (NRM) government under the present leadership.

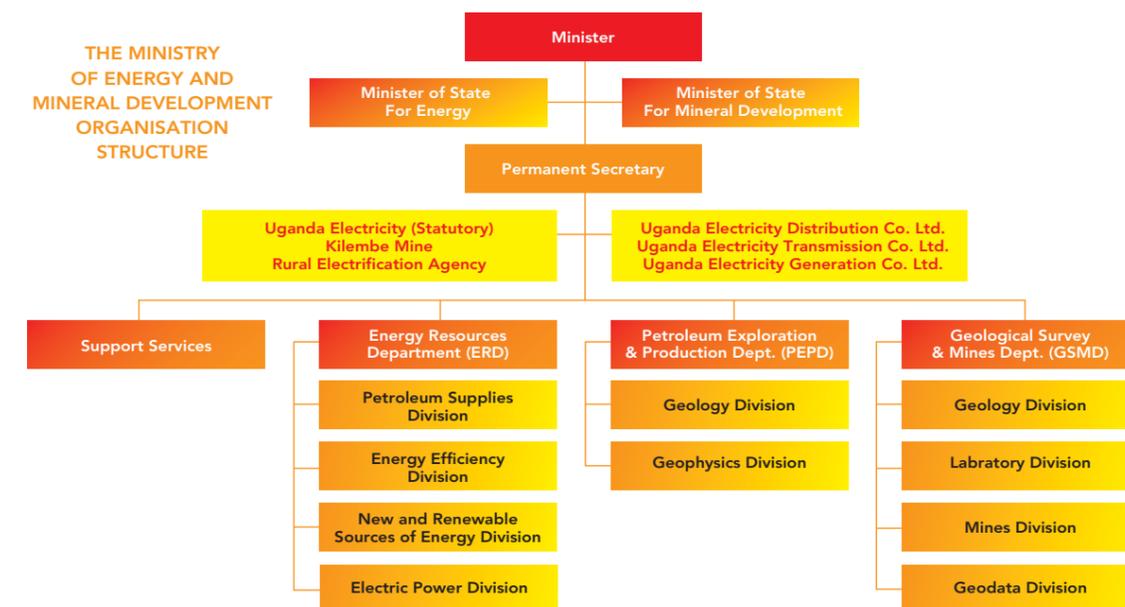
### INVESTMENT POLICY

By maintaining a liberal economic environment, the government has demonstrated commitment to stimulate the economy and to promote private investment in Uganda from both foreign and domestic sources.

To meet its objectives, the Government launched an economic recovery programme (ERP) in 1987 with the support of the International Monetary Fund (IMF), the Extended Structural Adjustment Facility (ESAF) and the Economic Recovery Unit of the World Bank (ERU). The objectives of the ERU were three fold:

- to bring about financial stability and lower the inflation rate.
- to reduce the imbalance in the external account.
- to promote growth of the economy in general.

The Structural Adjustment Credit in 1991 and the current ERC-2 provided by the donor community, confirm these objectives. With the aid of these funds, the Government is rehabilitating the infra-structure with stress given to the road system, education and primary health.



The Uganda shilling became freely exchangeable into foreign currency in October 1993. The Inter- Bank mid-rate of exchange of the Ugandan Shilling and the U.S. dollar has fluctuated between about 1700 and 2000 Shillings to one dollar over the past five years.

Interest rates on treasury bills are determined on the open market. Rates of 10.0 % (March 2004) for one-year bills compare favourably with 50% in 1990 and 21.5% in 1995. Plans are being made to establish a local securities market over the medium term.

## INVESTMENT

The Uganda Investment Authority operates under the Ministry of Finance and Economic Planning and administers the Investment Code of 1991 (as subsequently amended) that encourages private investment by streamlining procedures and guaranteeing protection of investments against appropriation. Foreign individuals and companies may own 100% of a business in Uganda. Details of incentives currently offered under the Investment Code are provided below.

Existing public enterprises are being privatised in an orderly manner under a programme of divestiture started in 1992. At present, 20 enterprises are identified for disposal. Two of these involve mining projects. The first consists of the former copper mine at Kilembe, and its ancillary businesses, and the second, the phosphate deposits.

Government policy is to encourage industries that will provide products for sale on international as well as local markets. Mining is seen as an important potential contributor to this aim.

### MINERAL SECTOR POLICY

Items of policy of the Mineral Sector defined in 2001 are:

- to stimulate mining sector development by promoting private sector participation;
- to ensure that mineral wealth supports national economic and social development;
- to regularize and improve small scale mining by local artisans;
- to minimize and mitigate the adverse social and environmental impacts of mineral exploitation;
- to remove restrictive practices on women participating in the mineral sector and protect children against mining hazards;
- to develop and strengthen local capacity for mineral development; and
- to add value to mineral ores and increase mineral trade.

Government policy with respect to mining has changed radically since 1987 as evinced by the general policies of the Uganda Investment Authority and as implied in the Investment Code of 1991.

### INVESTMENT INCENTIVES

The Investment Code (1991) reflects a major reform of Government policy and is designed to promote, facilitate and monitor investment by rationalizing the way investments are approved and by introducing incentives.

The Uganda Investment Authority (UIA) administers the Investment Code under the general authority of the Ministry of Finance and Economic Planning. The UIA endeavours to provide a "one-stop" service by issuing investment licences, certificates of incentives, registration of technology agreements, and certificates of approval for externalisation of funds. Issue of an investment licence takes no more than five days.

Incentives offered under the Investment Code of 1991 (as subsequently revised) include duty and tax-free concessions, duty drawbacks for export industries, and exemptions from corporate tax, withholding tax and dividend tax, all for specified periods. The Code allows a tax holiday for three years for an investment of over US\$300 000 and for five years for investments over US\$500,000. Investments in remote locations attract an allowance of an additional year.

Additional incentives given to investors who export their products are:

- Export Retention Account that allows exporters to retain earnings from exports in a bank account overseas and to use the retained foreign currency to buy inputs and other goods.
- Barter Trade Licence that allows exporters to import goods equivalent in value to exports.
- Export Certificates replace the previous export licences but retain the data collection component.
- Duty Drawback System returns to exporters duty paid on imported items.
- Export Finance and Guarantee Scheme.
- Simplification of Customs Procedures.

Items imported by investors attract these incentives:

- Investors may import foreign currencies without restraint. They may also purchase items for import without going through official sources.
- Special Programme for Imports that allows purchase of foreign exchange at the official (floating, free) rate on a first come, first served basis. Limits are imposed on the amount that may be borrowed from banks for this purpose.
- Open General Licence allows large manufacturing enterprises priority of access for foreign exchange at the official rate.
- Negative List of Imports is a tariff system that identifies items exempt from duty. Most items of mining-related equipment are so identified. Second-hand items up to five years old qualify.

### INVESTMENT GUARANTEES

As a member of the World Bank, Uganda exercised its right to become a full member of the Multilateral Investment Guarantee Agency (MIGA) in 1992. MIGA encourages foreign investment in developing countries by providing investment guarantees against non-commercial risks and an advisory service on ways to attract foreign investment.

The procedure is for investors to apply to MIGA for protection of their project under the scheme. Coverage is provided for 90% of the cost of investments made in hard currencies originating outside Uganda up to a limit of US\$50 million. No minimum investment is stipulated. Standard terms are for 15 years but are extendable.

To qualify for protection by MIGA, a project must be geared to economic growth, be financially viable, pay due attention to environmental considerations, and contribute to Uganda's needs of job creation, technology transfer, and export generation.

Applications for MIGA coverage are received in Uganda at either the offices of the Uganda Investment Authority or World Bank, and at MIGA's office in Washington, U.S.A.

The Investment Code of 1991 provides several ways to settle disputes between the Government and a foreign investor. These alternatives include the rules for using arbitration procedures of the International Centre for the Settlement of Disputes.

## INVESTMENT

### LEGISLATIVE FRAMEWORK

The Ministry of Energy and Mineral Development controls most aspects of the Mining Sector through the Department of Geological Survey and Mines that administers The Mining Act of 2003. Provisions in this Act allow the Minister to make regulations in certain specified circumstances. The latest version of these regulations is dated 2004. These regulations list the amount of royalty to be paid on any mineral product. The organisation of the various departments making up this Ministry are illustrated in figure.

The Constitution contains provision for the appointment by the Judicial Service of a Chairperson of a land tribunal with authority that will have an impact on the authority as exercised at present by the Minister. The extent to which these proposed changes will affect investors in the mineral industry is not yet evident but it remains the government's avowed intention to continue the policy of offering attractive terms to encourage investment.

### BUSINESS ORGANIZATIONS AND PROCEDURES

The Companies Act of 1964 (Chapter 85, Laws of Uganda), is modelled after the UK's Company Act of 1948, and allows seven forms of organisation, as follows:

- Proprietorship – involving a sole proprietor.
- Partnership – persons carrying on a business together and agreeing to share the profits.
- Limited Liability Company – formed by a group of two or more persons as a legal entity. The company conducts business independently of its members and has perpetual succession.
- Private Company – by its articles of incorporation restricts transfer of ownership of shares, limits membership to maximum of 50.
- Public Company – which includes members of the public as shareowners and must have at least seven members and two directors.
- Unlimited Company – a company in which there is no limit to the liability of members.
- Co-operative Unions and Societies – a group of at least ten people who share the objective of the pursuit of the economic interests of its members according to co-operative principles and registered under the Co-operatives Act.

Some form of limited liability and registration in Uganda is required for investors in the mining sector.

Disputes are settled by international arbitration. A Centre for Arbitration and Disputes Resolution is now functioning. Uganda is signatory to the International Convention on the Settlement of Investment Disputes.

Under the Income Tax Decree 1974 (amended to 31st October 1983) any business organisation must prepare financial statements covering each year of its operations and these must be certified by an approved auditor. Every business organisation must also file provisional income tax returns for each year of operation.

Foreign investors and partnerships or companies with more than 50% foreign ownership must register under the Companies Act in order to receive an investment licence from the Uganda Investment Authority before operating their business.

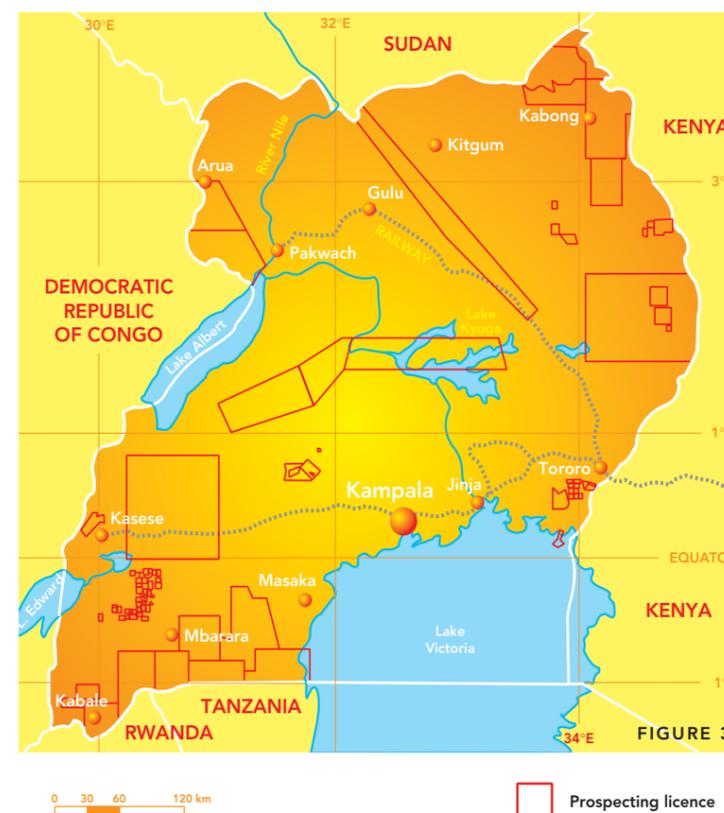
The Ministry of Tourism, Trade and Industry issues import and export licences, except for explosives, which are the responsibility of the Ministry of Internal Affairs.

## MINERAL RIGHTS

The State exercises its ownership of all the minerals by means of Mining Act of 2003 through the agency of the Ministry of Energy and Mineral Development.

Only individuals holding a valid licence to do so may prospect. Companies may not hold such licences. Licences are not issued to individuals under 18 years or to anyone who is an undischarged bankrupt. A company may only prospect when it employs at least one individual with such a licence who must also act as agent for the company.

Mineral rights may only be transferred with approval of the Commissioner of Geological Survey and Mines.



Prospecting and mining inside forest reserves require special permission from other ministries and may be withheld in the cases of wild life parks and certain other areas.

Mineral rights come in five forms:

- Prospecting Licence.
- Exploration Licence.
- Retention Licence.
- Mining Lease.
- Location Licence.

**Prospecting Licences** enable the holders to prospect for minerals anywhere in the country. Any individual holding a prospecting licence may be granted more than one exploration licence but must be able to demonstrate financial resources and present a work programme acceptable to the Commissioner.

**Exploration Licences** cover areas not exceeding 500 sq km, and are exclusive. There are certain shape restrictions. Exploration licences last for up to three years and are renewable for another two periods of two years each. Further renewals are at the discretion of the Commissioner. Figure 3 shows the sites of current licences.

**Retention Licences** apply to areas covered by exploration licences on which the licencees have made discoveries that cannot, for various reasons, be developed immediately.

**Mineral Leases** are issued where mining is justified. Terms and conditions are determined by Commissioner and are to be advised within 60 days. No lease is issued for longer than 21 years but the Act allows for renewal for no more than 15 years.

**Location Licences** are intended for small scale mining where expenditure to achieve production will not exceed five hundred currency points (a currency point is worth 20,000 Ugandan shillings).

The table on pages 14 and 15 presents the full range of licences and permits, together with time restrictions and costs that the Commissioner is authorized to issue under the Mining Act.

## CHART OF LICENCES, RIGHTS & PERMITS

Licence Group	Licence Type	Duration	Area	Terms	Fees prepaid	Deposit	Annual Rent	Roaylty	Application Form No.
EXPLORATION	Prospecting	1 Year	Unlimited	Any mineral	7.5	nil	-	-	I
	Exploration	3 Years	Up to 500 km2	Specific minerals	30	2.5	-	-	II
	Renewal	2 Years (twice)	Half	Specific minerals	30	2.5	-	-	X
	Retention	Up to 3 Years	Up to 500 km2	Specific minerals	20	2.5	-	-	III
	Renewal	Up to 2 Years	Half	Specific minerals	20	2.5	-	-	X
MINING RIGHTS	Location Class I	2 Years	500 X 300m	Precious metals vein	20	10	-	-	IV
	Location Class II	2 Years	16ha	Gem stones, not alluvial	20	10	-	-	IV
	Location Class III	2 Years	16ha	Non-precious metal	20	10	-	-	IV
	Location Class IV	2 Years	16ha	Alluvial precious metals & stones	20	10	-	-	IV
	Location Class V	2 Years	1500 X 200m	Land in river & swamp and adjoining land	20	10	-	-	V
	Location Class VI	2 Years	8ha	Limestone & chalk	20	10 for I-VI	-	-	IV
	Location Class VII	2 Years	35 X 10m	Brine & salt	30	0.25 for VII	-	-	X
	Renewal any Class	After Every 2 Years	Same Areas	Same for each	100	0.5/ha	-	-	VII
	Renewal of mining lease	21 Years 15 Years	Rectangular 3 times length	Specific commodity Specific commodity	100	0.5/ha	-	-	X
LICENCES FFOR DEALING IN MINERALS	Deal in precious metals	to end of year of issue	n/a	Any metal	100	nil	-	3% Gross value	XIV
	Deal in precious stones	to end of year of issue	n/a	Specific stones	100	nil	-	5% Gross value	XIV
	Deal in industrial minerals	to end of year of issue	n/a	Specific minerals	50	nil	-	Depends on material	XIV
	Deal in base metals	to end of year of issue	n/a	Specific metals	7.5	nil	-	3% Gross value	XIV
	Goldsmith	to end of year of issue	n/a	Precious metals	50	nil	-	-	XV
	Export permit	n/a	n/a	n/a	n/a	nil	-	-	XIII
	Import permit precious metals	n/a	n/a	n/a	n/a	0.5% of LME price	n/a	-	XXXIX
	Import permit precious stones	n/a	n/a	n/a	n/a	0.5% of LME price	-	-	XXXIX
	Import permit base metals	n/a	n/a	n/a	n/a	1% of LME price	-	-	XXXIX
Import permit industrial & building minerals	n/a	n/a	n/a	n/a	0.05/ha	n/a	-	-	XXXIX

Abbreviations: n/a – Not applicable LME – London Metal Exchange ha – Hectare  
Currency Point – Currently one currency point equals 20,000 Uganda shillings

## ISSUED BY AUTHORITY OF COMMISSIONER

Form No. – Refers to identification numbers of forms in the Mining Regulations of 2003.

## MINERAL RIGHTS

Production of certain minerals may be subjected to restriction but none is so treated at present.

Disputes arising from the administration of the Mining Act are settled in the High Court unless otherwise resolved by the Commissioner.

## FISCAL CONSIDERATIONS

Taxes and duties paid by the mining industry include corporate income tax, dividend remittance tax, royalty, customs duty, and sales taxes. Special rates apply to the mining sector in specified circumstances.

## INCOME TAX

The Income Tax Act of 1997 provides a special fiscal regime for the mining sector. Provisions include:

- up to 100% equity may be owned by foreigners.
- all exploration expenses may be charged off against income.
- investment protection guarantees.
- no import duty on mining equipment that is new or less than five years old.
- a variable rate of income tax is used to calculate tax on income derived from mining.

The rate of tax attracted by income from mining is calculated from the formula,  $\text{Rate} = 70 - 1500/x$ , where "x" represents the ratio of taxable income to gross revenues from mining in the year.

Other incentives include provision of accelerated depreciation on capital equipment.

## ROYALTIES

Regulations issued under the Mining Act provide that minerals produced for sale are subject to a royalty depending on the nature of the commodity. These rates are:

- Precious metals – 3% of the gross value.
- Precious stones – 5% of the gross value.
- Base metals and ores – 3% of the gross value.
- Coal – 3,000 shillings per ton.
- Peat – 500 shillings per ton.
- Kaolin, limestone, chalk, gypsum, and vermiculite – 3,000 shillings per ton.
- Marble, granite and other dimension stones – 3,000 shillings per ton.
- Pozzolanic materials – 500 shillings per ton.
- Phosphates – 3000 shillings per ton.
- Salt – 500 shillings per ton.

Where appropriate, the Regulations provide definitions of the quality of these commodities.

## VALUE ADDED TAX

This tax replaces the former Sales Tax and is payable on most transactions. The rate for the financial year 2005/06 is 18%.

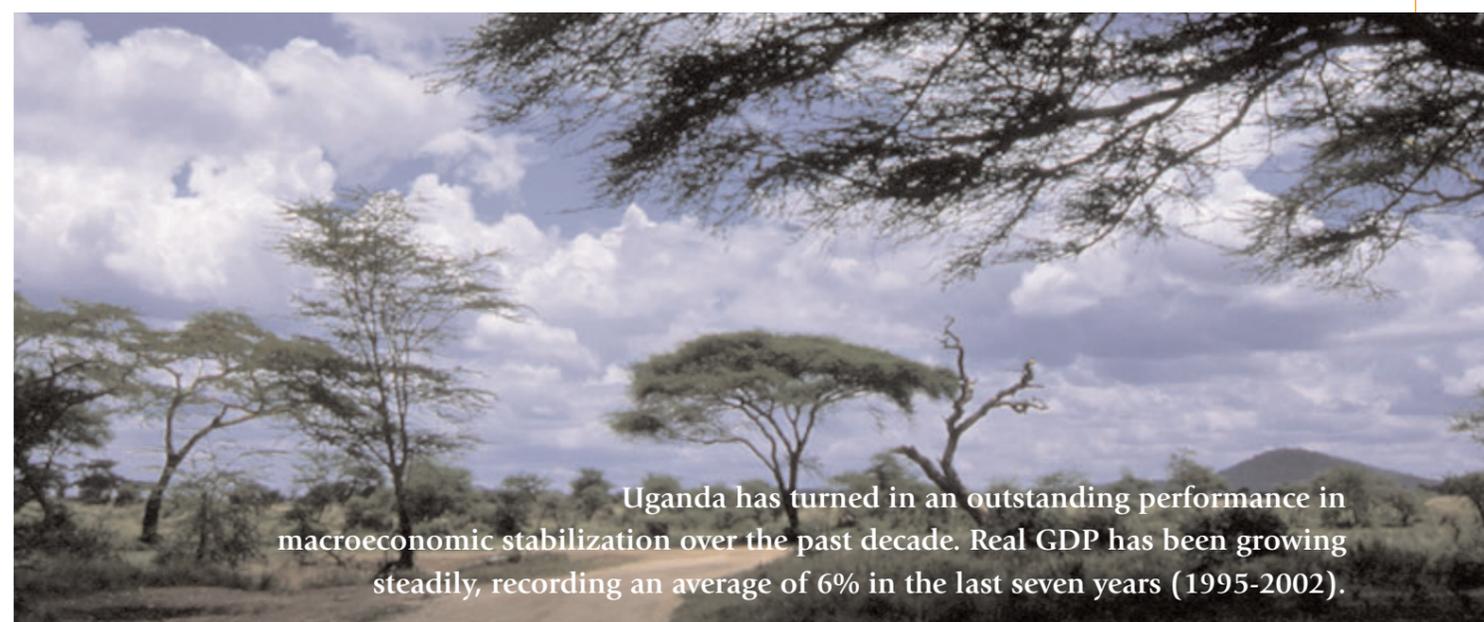
There are no foreign exchange restrictions in force and there are no constraints on exports of product.

## ENVIRONMENT

The national Environment Statute of 1995 (para.94) empowers the Minister to include in the annual budget:

- Tax incentives that encourage behaviour that is beneficial to the environment.
- User fees for certain resources.
- Tax disincentives that deter injurious environmental practices that depletes a resource or pollutes.

The Statute of May 1995 established the National Environment Management Authority to administer these provisions. Currently this authority reports to the Minister of Water, Land and Environment. The Act of 2003 requires the holder of an exploration licence or mining lease to conduct operations in accordance with the National Environment Statute of 1995.



Uganda has turned in an outstanding performance in macroeconomic stabilization over the past decade. Real GDP has been growing steadily, recording an average of 6% in the last seven years (1995-2002).

The International Finance Corporation, MIGA and similar institutions commonly become involved in financing private sector developments in countries such as Uganda, which have agreed to implement the "Restructuring" policy advocated by the World Bank. Such institutions require adherence to an agreed standard of practice with regard to the environment as a condition of their financial arrangements.

Uganda contains a wide variety of natural wonders. Among these must be counted the eastern half of the Rwenzori Mountains with their snow capped peaks and unique flora, the Murchison Falls where the White Nile river plunges through a narrow gorge, and the greater part of Lake Victoria, the second largest area of fresh water in the world with its unique population of exotic fish and birds. The Muhavura volcanoes in southwest Uganda are the home of the world's surviving mountain gorillas.

The Government of Uganda is conscious of its responsibility to the international community to conserve these unique resources.

National Parks and game reserves cover a small fraction of the country. Extractive industries in these areas are subject to special legislation. The government has established Forest Reserves in an attempt to slow the deforestation that plagues so many countries that are devoid of other sources of fuel. Companies wishing to work in such reserves require special permits.

# GEOLOGY

## INTRODUCTION

The geology and distribution of minerals of economic interest in Uganda are best considered in the context of the broader features of east and central Africa. Rocks within this area range in age from the Archaean (over two billion years old) to present. All the ancient rocks are represented by their crystalline equivalents. (fig. 4).

Uganda lies on the African Plate, which is possibly the largest area of continental crust. This plate consists of accretion of small cratons welded together by mobile belts. The intense folding and metamorphism found in the mobile belts often involves the fringes of the cratons. Ages of some rocks forming some cratons have been found to be over 2.5 billion years. Ages of over 3 billion years are recorded from the Tanzanian craton which is at present the most commercially important in east Africa, and contains 'greenstones' similar to those of the Zimbabwean, Zambian and Kaapvaal cratons further south. Gold of commercial interest occurs in the greenstones of all these cratons much as it does in the greenstones of Canada, Australia and India.

Cratons and mobile belts display their own distinctive types of mineral deposits (fig.4). Much of Uganda was eroded into a flat, peneplain in late Precambrian time. Outliers of flat-bedded sediments occur upon this ancient surface. Sediments of Karoo (Permian to Cretaceous time) that are so well developed in southern Africa, are present to only a small degree in Uganda.

The Precambrian geology of the country is described at length in the literature. Much fundamental geological work in recent years has clarified the broader features of the Pre-cambrian rocks of central Africa but much remains to be done especially in the north of Uganda where geological observations are hampered by combination of lack of outcrop, deep weathering, and dense vegetation.

The most evident geological features of post-Cambrian time are the great disruptions of the rift faulting that started in the Tertiary period and continue to recent times. Large "shield" type volcanoes formed in association with this faulting. Mt. Elgon is Uganda's most prominent example of such a volcano. Kilimanjaro in Tanzania is a better-known example.

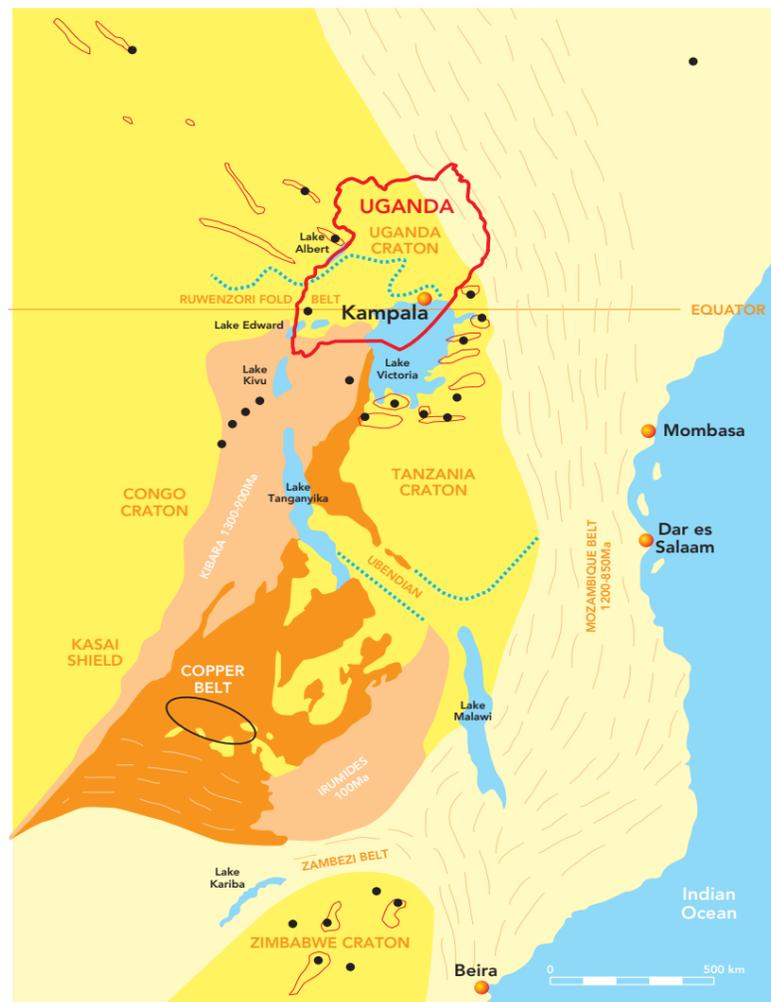


FIGURE 4 – REGIONAL GEOLOGY OF PRECAMBRIAN AGE ROCKS AND IMPORTANT MINERAL DEPOSITS

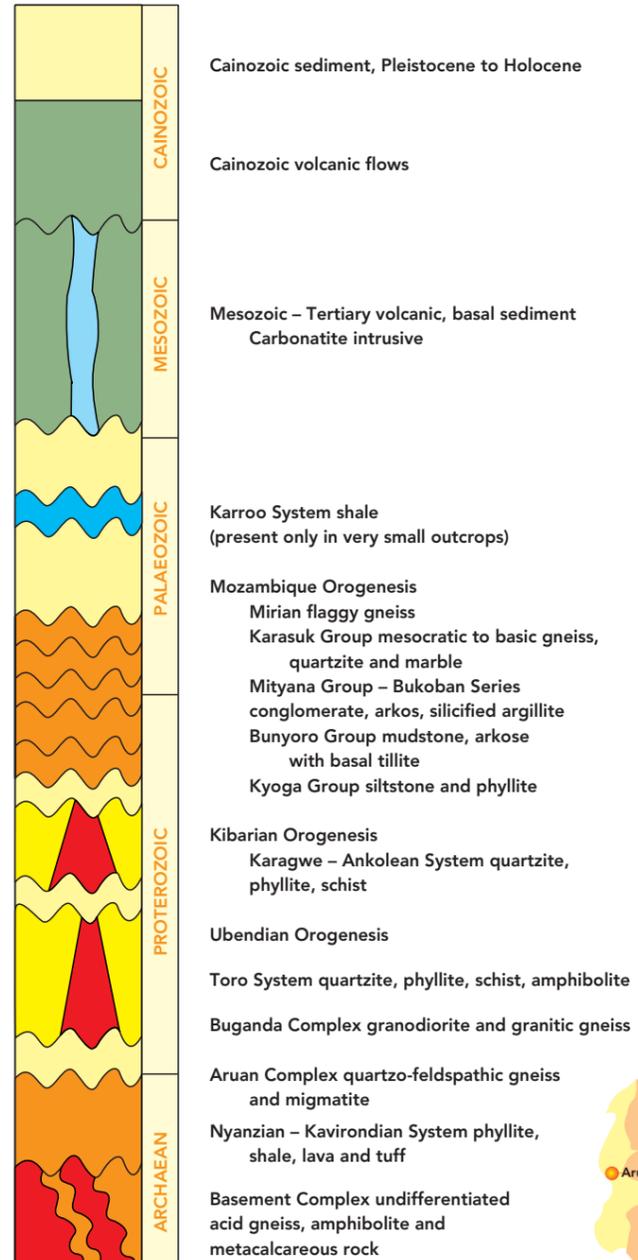
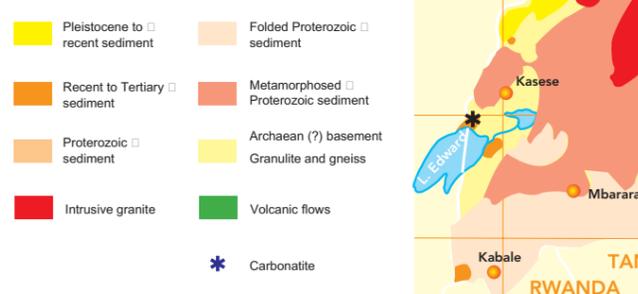


FIGURE 5 GEOLOGICAL COLUMN

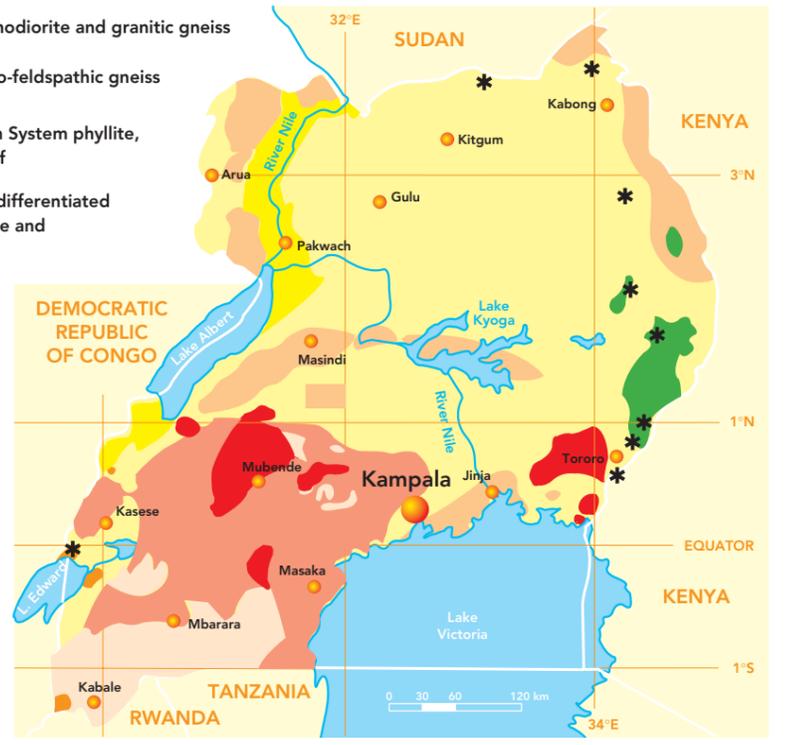


A great thickness of sediments of Tertiary to Recent age and several lakes fill the valleys formed along the rift faults. Of the lakes, the largest in Uganda is Lake Albert. Lakes Victoria and Kyoga fill surface depressions formed by warping of the land surface during movement on the rift faults.

The sequence of rocks found in Uganda is described below and represented by a geological column in figure 5. Distribution of each sequence is shown in generalized form on the map shown in figure 5. This figure also shows the position of some of the larger mineral deposits both in Uganda and adjoining countries.

Airborne geophysical surveys cover the southern part of Uganda and two lesser areas in the north (fig. 8). The magnetic surveys are particularly useful in elucidating structure of the underlying rocks. The opportunity provided by the World Bank credit will be used shortly to complete airborne surveys of the parts of the country that remain to be surveyed in this way.

FIGURE 6– GEOLOGICAL MAP OF UGANDA



## ARCHAEAN

### INTRODUCTION

Kavirondian sedimentary rocks are well-represented in Tanzania and Kenya but less so in Uganda. Followed to the north (fig.4), the exposure of this shield swings first to the northwest as it leaves Uganda and finally to the west across Lake Albert into the northern part of the Democratic Republic of Congo where it is known as the West Nile-Bonu Shield

In the Democratic Republic of Congo, and just across the border shared with Uganda, a mobile belt of intense metamorphism of later age traverses this ancient shield. This mobile belt contains the commercially important gold deposits of the Kilo Moto area. An extension of this mobile belt into Uganda has yet to be recognized but to do so is clearly of economic importance. Further work is needed to elucidate fundamental geological structures in this area.

### BASEMENT COMPLEX

In recent years, the term 'Basement Complex' has largely fallen into disuse being replaced by a variety of other names to suit the various divisions as they are recognized. The term is still usefully applied to the dominantly metamorphic rocks of granite composition on the Uganda portion of the Tanzanian Shield (age 2.5 – 3.0 billion years) for which no other term has yet been proposed. Reconnaissance mapping and single line traverse show large areas of central Uganda to be underlain by these rocks. It is believed that many of these rocks represent metamorphosed sediments but details of their composition and structure have yet to be elucidated in any detail.

### NYANZIAN SYSTEM

This system comprises the sequence of dominantly volcanic rocks of basic composition and poorly sorted sediments that form greenstone belts occurring within the Basement Complex of eastern Uganda (fig.6). The greenstone areas are of economic importance in that they host gold deposits and have the potential for hosting deposits of base metals. In the areas of Kenya and Tanzania where these rocks are more extensively developed, they are subdivided into an upper and a lower series marked by the upward transition from rocks of basic to acidic composition. The lower series is characterized by extensive "greenstone" flows of what were once basalt, or andesite, in which pillow lava structures are sometimes displayed. Beds of banded iron formation (BIF) also occur. No estimates of thickness have been made of these rocks in Uganda but in Tanzania, a thickness of 5000 m has been proposed.

The Upper Series of the Nyanzian sequence consists of an assemblage of flows, volcanic ash, and various sediments in the form of lavas of acidic (or felsic) composition, tuff, ferruginous chert, BIF with subordinate pelite (originally mudstone). The greenstones display features of metamorphism to the greenschist level with the occasional patch at the almandine amphibolite level. Deformation in the form of folds with steeply dipping axes is widespread. Outcrops are insufficient to allow full structural interpretation.

### KAVIRONDIAN SYSTEM

Rocks of this system occur in eastern Uganda where they overlie rocks of the Nyanzian System. The Kavirondian consists mainly of conglomerates, coarse feldspathic grit and quartzite that lie unconformably on the Nyanzian rocks. Some of the younger rocks are possibly derived by erosion of the older rocks. The term "greenstone molasse" has been applied to this sequence of sediments.

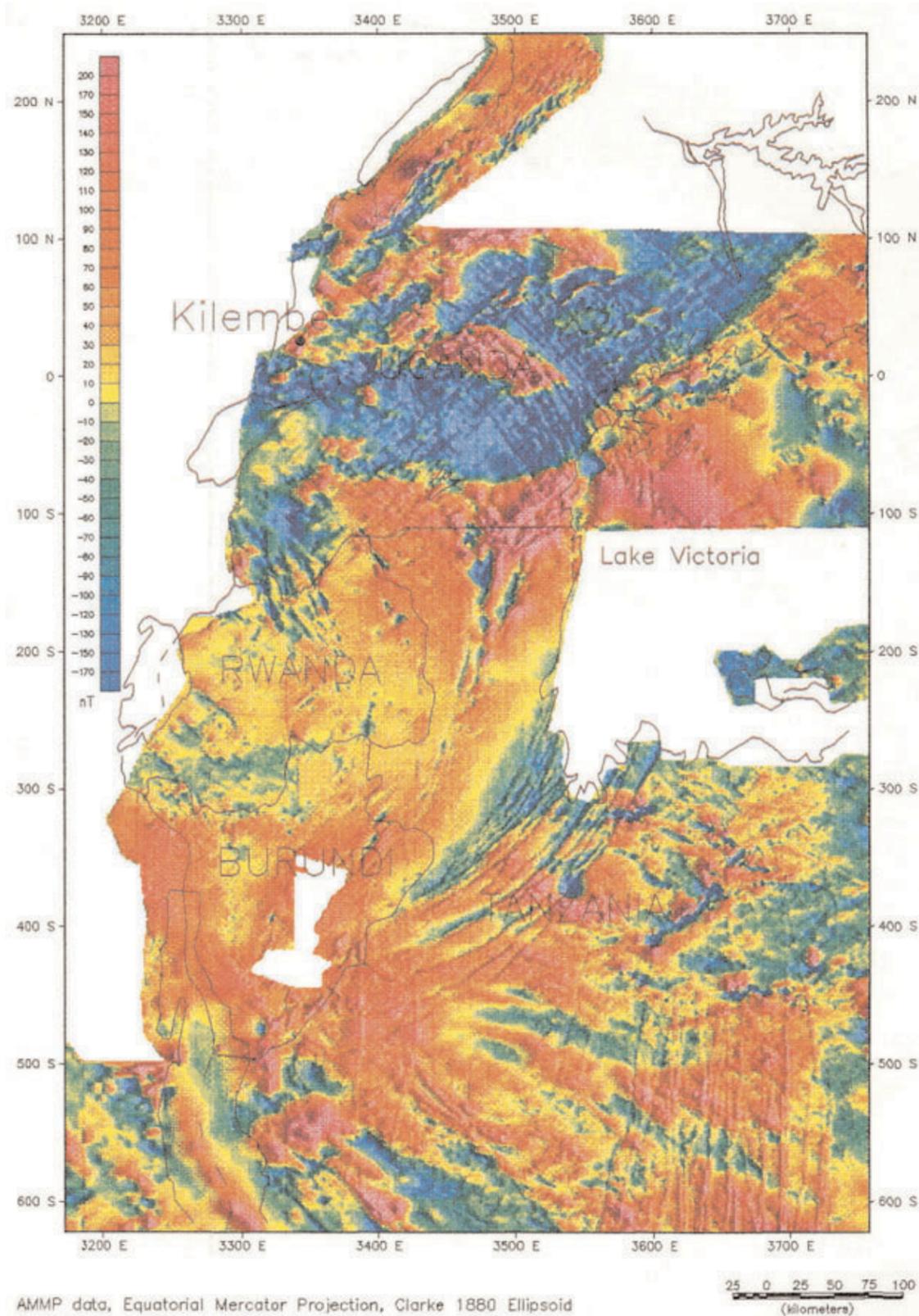


FIGURE 7 – COMPIATION OF MAGNETIC SURVEY RESULTS. (BY J. NYAKAANA)

## PROTEROZOIC

### INTRODUCTION

Correlation of rocks of the Proterozoic (or upper Precambrian) across national borders is not easy to make but is much improved now that techniques of age dating are available and as quality of mapping improves.

### TORO SYSTEM

Sometimes known as the 'Buganda-Toro' and sometimes correlated with the Ubendian. Rocks of this system occur in three areas, one in eastern Uganda along the north shore of Lake Victoria, as the core of the Rwenzori Mountains in the south west along the border with the Democratic Republic of Congo, and in the centre of the country. All the occurrences consist predominantly of non-calcareous sediments that display tight folding. Rocks in central and southwest Uganda are metamorphosed to a relatively higher degree. Structures trend mainly in a northeast direction. In places, metamorphism reaches the almandine-amphibolite level. These rocks are of great economic significance in Uganda for the strata-bound copper-cobalt deposits worked at the former Kilembe mine.

### KARAGWE-ANKOLEAN SYSTEM

Sedimentary rocks of this System are involved into the Kibaran Fold Belt that extends southwest from Uganda into Zambia. Field relations demonstrate that the System is younger than the Toro and that it contains different rock types and structures. The sedimentary features of the Karagwe-Ankolean rocks indicate deposition in shallow-water. Beds of argillite, shale and sandstone (often altered to phyllite, schist and quartzite) lie in a uniform succession. The thinner quartzite and sandstone beds are often of lenticular form.

Rocks of this System are deformed into open folds along north-south axes with circular shaped intrusions of porphyritic granite forming the cores of the anticlines. This granite has the same chemical composition as those associated throughout the world with deposits of tin and tungsten. Quartzite beds resistant to erosion form ridges of striking appearance that enclose the oval shaped ridges, or "arenas" surrounding the granite intrusions. The System derives its economic importance from the veins of tin, tungsten and niobium-tantalum that occur peripheral to the granite bodies. This mineral province continues southward into Rwanda, Burundi, Tanzania, and further into the Democratic Republic of Congo, where gold attains commercial importance.

### BUKOBAN SYSTEM

Deposition of the sedimentary rocks of the Bukoban System is thought to extend across the Precambrian-Cambrian time boundary. No fossils are known. Sediments representing this System, which are hardly deformed or metamorphosed, consist of sandstone, quartzite, shale, with minor development of dolomitic limestone, red mudstone, chert and amygdaloidal lava. A basal conglomerate is sometimes present. Bukoban rocks occur as outliers resting on the exhumed surface of an older peneplain. The System has so far, demonstrated little economic significance except as a source of glass sand.

## PALAEOZOIC

### KAROO SYSTEM

Outcrops of what are thought to be sediments of this System (Permo-Carboniferous to Cretaceous) occur rarely in Uganda where they form small outliers in down-faulted blocks. To the south, sediments of the Karoo System are developed widely and contain coalfields (in Tanzania) and uranium (in Malawi) of commercial value. Occurrences in Uganda of sediments attributed to the Karoo constitute the northern-most observed limit of this system. No coals of value are known in Uganda of this or any other age. Rocks of the Karoo System consist entirely of non-marine sediments and are not folded.

## CAINOZOIC

Rocks of this System are of sedimentary and volcanic origin. Both of these rock types occur in the down-faulted block of the Western Rift (or graben structure) that forms striking topographic features along the western border of Uganda. Knowledge of the nature of these sediments was expanded recently by the completion of several drill holes in the course of exploration for oil and gas. Geophysical surveys show these sediments to be at least 4000 metres thick within the fault-bound basins. Eruptions of natural gas occur in Lake Albert.

The volcanic rocks are composed of material ejected from numerous vents that developed along the rift faults. No volcanoes are now active in Uganda but in adjoining Democratic Republic of Congo there is one active volcano that forms part of the same field. Hot springs developed along these faults are the basis of a salt industry that supplies the local market.

The sedimentary rocks filling the rift valleys are considered as prime prospects for oil and natural gas and are known to contain radio-active sections.

## SURFICIAL PROCESSES

Much of the present land surface of Uganda has suffered deep and intense weathering over geological time that has led to the accumulation of residual concentrations of resistant minerals. Deposits formed in this way include those containing tin, apatite (phosphate), gold, tin, pyrochlore and gemstones, all of which occur in Uganda. Deposits formed by chemical action during deep weathering include uranium in calcrete and sandstones as well as nickel in laterite. Nickel deposits of this type occur in Burundi. No uranium deposits of commercial significance are known.

## GEOPHYSICAL PROCESSES

By manipulating and compiling results from airborne magnetic surveys, Nyakaana (1994) produced a map reproduced here as figure 6, showing features of continental proportions for which there is no geological explanation at present. Nyakaana lists the following as being the most significant features of this map:

- A curvilinear dyke swarm of regional extent extends from Uganda into Tanzania. Field evidence for this swarm is lacking but evidence of magnetic surveys strongly supports the interpretation of a system of ring dykes of continental proportions. The supposed dykes form a striking picture (fig. 6) of a series of parallel features open to the west. There is no geophysical information for any extension in this direction. Diameter of the outermost semicircle is 600 kilometres. The geometrical centre of these supposed dykes, lies in the Democratic Republic of Congo deep below a thick cover of the sediment filling the Congo basin.
- Two arcuate magnetic anomalies related to nickel and cobalt sulphide-rich ultramafic bodies straddle Burundi, NW Tanzania and SW Uganda. The form of these anomalies suggests they might form part of the structure described above and add an economic impetus to the study of these features.
- The distinctive magnetic characteristics of rocks of the Toro System, within which the Kilembe copper-cobalt district lies, appear to extend eastward suggesting potential for copper and other base metals in the area.
- NNW-striking magnetic features interpreted as reflecting the tantalum, tungsten, tin and gold mineral belt that straddles the Uganda-Rwanda border.
- The magnetic maps suggest extensions of the established gold-bearing greenstone belts of western Uganda, but these features are obscured by superficial cover.

These observations should have an important influence on the direction and emphasis of exploration as well as the understanding of the geological history of the region.

## GEOLOGICAL DATA BASE

### INTRODUCTION

The library of the Geological Survey contains much of the geological information gathered since the Survey was founded in 1919 during the colonial period. The collection of published and unpublished reports is virtually complete but some plans of former mines are missing.

The Geological Survey has transcribed much of the information in its care into digital format so it is able to reproduce maps on demand. Components of this material include:

- topographical maps.
- mineral licence maps.
- mineral occurrence maps.
- regional geophysical and geochemical maps (fig. 8).
- geological maps.
- Copies of published and unpublished reports.

The Geology Department at Makerere University at Kampala offers post-graduate courses but many students complete post-graduate studies abroad. These produced during of these studies often have a Ugandan component. Copies of these theses are available for reference at the department library.

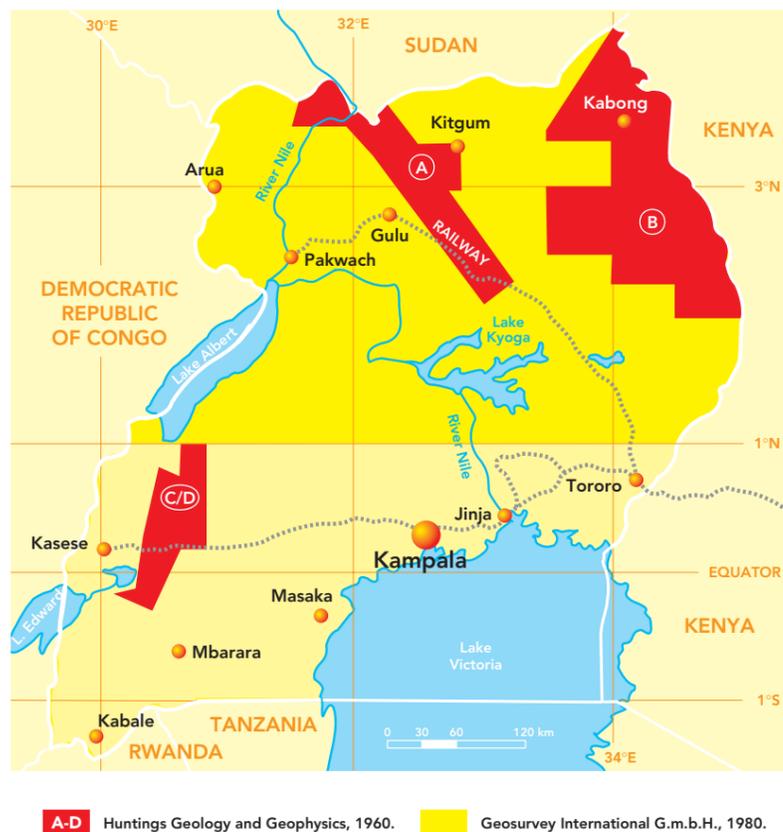


FIGURE 8 – AREAS COVERED BY AIRBORNE GEOPHYSICAL SURVEYS

### TOPOGRAPHIC MAPS

Topographical maps of the whole country have been produced on a scales of 1:50,000 and 1:125,000. (Fig.10). Copies of maps can be purchased directly or made to order for any area on scales of 1:50,000, 1:100,000, and 1:250,000.

### AERIAL PHOTOGRAPHS

The whole country is covered by aerial photography on a variety of scales.

### LANDSAT IMAGERY

Landsat digital tapes and prints at various bandwidths are obtainable directly from the international agencies involved. A number of government and international agencies within Uganda employ Landsat imagery for a wide variety of purposes. These images are available for inspection.

### GEOLOGICAL MAPS

Geological maps at various scales cover much of the country. Eighty-nine maps, each covering a quarter degree sheet and on a scale of 1:125,000, cover the entire country (fig.11). Some areas of greater interest have been mapped in more detail. Field mapping and draughting, curtailed after independence, are now continuing.

### GEOPHYSICAL AND GEOCHEMICAL SURVEYS

Airborne geophysical surveys cover three areas of Uganda and constitute about 60% of the country (fig.8). These surveys cover much of what is presently considered the more prospective parts of the country. Geosurvey International Gmbh surveyed the southern block in 1980. Results consist of magnetic and radiometric information from flight lines spaced one kilometre apart. Huntings Ltd surveyed the two northern areas in 1966. Results from all these surveys are available for examination and purchase at the Entebbe headquarters of the Geological Survey. Nyakaana discusses certain aspects of the results of the Geosurvey work in his thesis of 1994.

Maps and coloured images can be reproduced on demand to suit individual requirements. Results from the proposed airborne surveys will be incorporated into the same database.

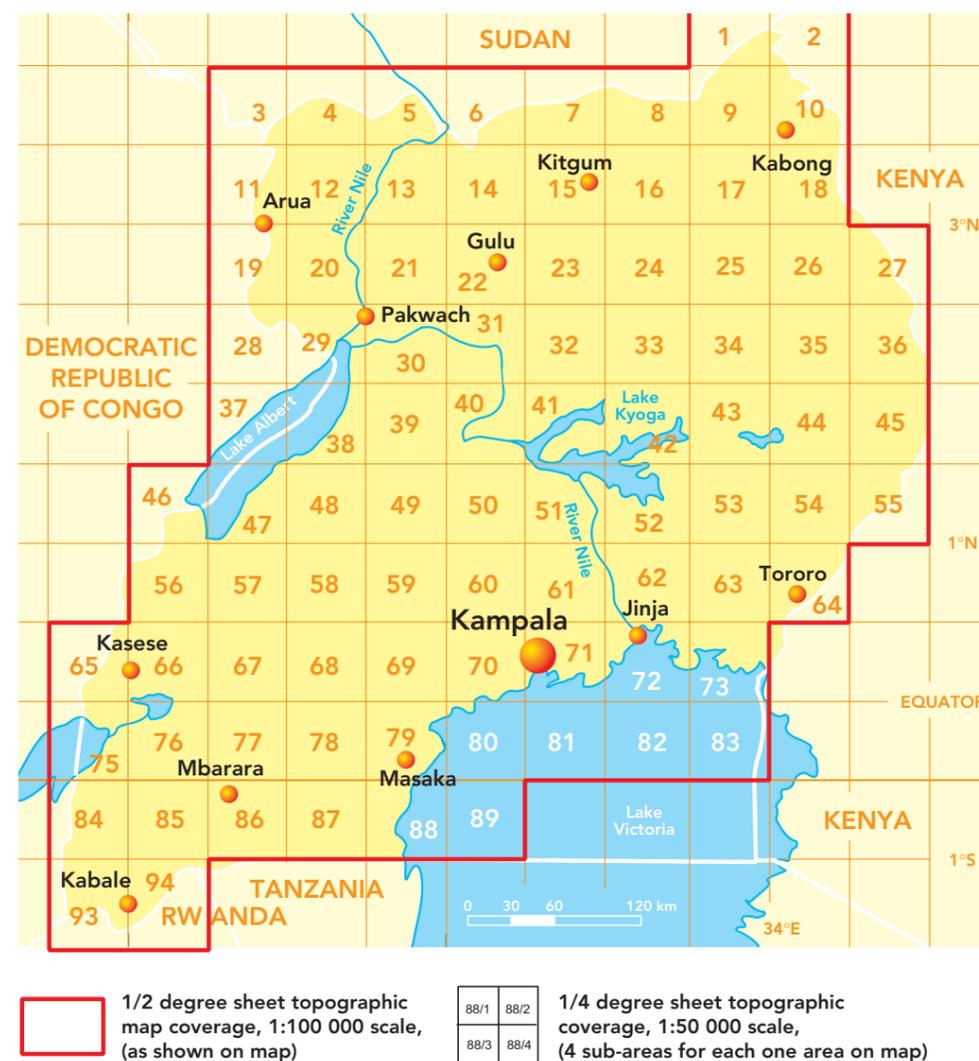


FIGURE 9 – TOPOGRAPHICAL MAP SHEETS



## MINING INDUSTRY

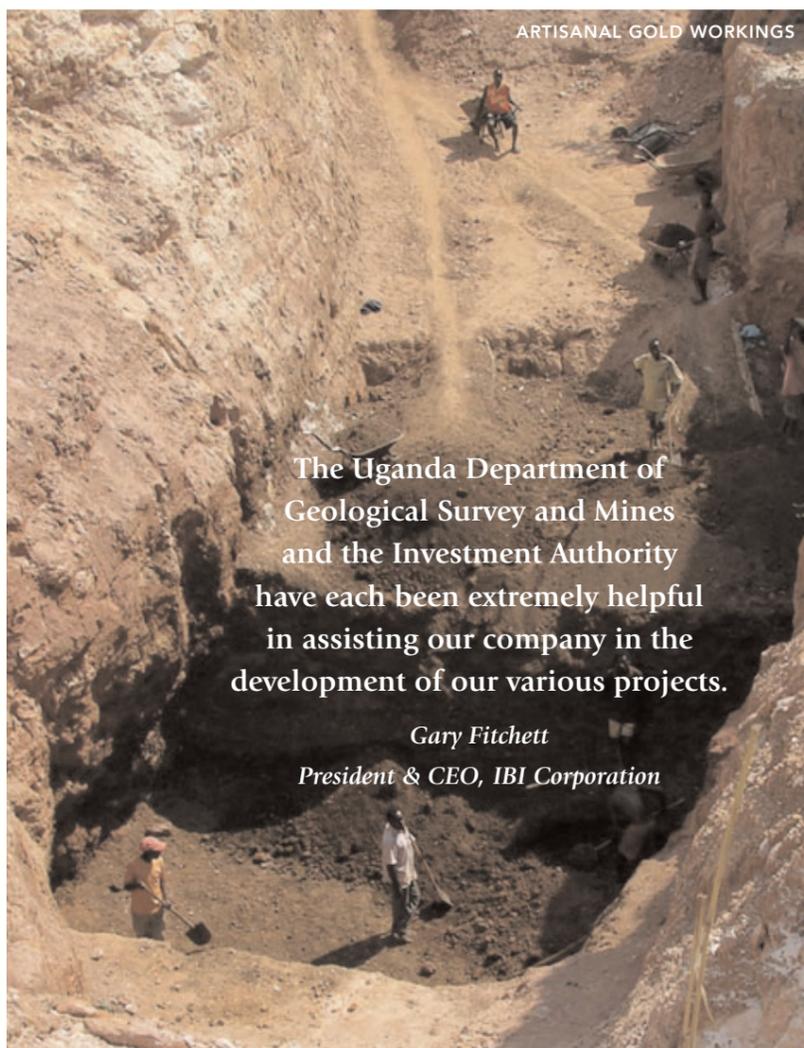
### HISTORY OF MINING

Uganda saw little prospecting or mining until the twentieth century. Copper was first noticed in the Rwenzori Mountains by an Italian expedition in 1908 but not in the area that was subsequently mined. Tanganyika Concessions Ltd. mounted a major programme of prospecting in the Rwenzori Mountains that culminated in 1926 with the discovery of the copper mineralisation at what was to become the Kilembe Mine. Results of underground exploration of this deposit were encouraging but low metal prices and the remote location did not justify production and the prospect was abandoned. In 1949, a Canadian company acquired the prospect and formed a public company that opened up the old workings and began underground development and diamond drilling. This work outlined over 9,946,000 tonnes containing an average of 2.01% copper by 1953 when financing was arranged to place the mine into production. Production began in 1956 and continued until 1978 when unsettled conditions in Uganda led to the premature closure of the mine. The copper smelter built at Jinja to treat concentrates from Kilembe, ceased operations in 1979. The plant was dismantled subsequently.

Prospecting for tin began with the discovery of the metal in 1924 at a site in Tanzania less than one kilometre south of the border with Uganda. Numerous prospects were found both for tin and tungsten. Production began in 1927. Most of the operations were on a small scale and run by individuals. The mines tended to open and close in line with fluctuations in metal prices. At Mwerasandu Mine, operations were in the hands of a public company that produced at a consistent rate from the early thirties until 1956. Low prices for both metals over a long period of years have led to a reduced production of both metals in recent years (figs. 25 and 26).

The date of the first discovery of gold is uncertain but the occurrences at Busia were first recorded by the Geological Survey of Uganda in 1932 during a mapping programme. Numerous small-scale operations by individuals started during the thirties and continued until the beginning of the second World War in 1939. After the war, mining continued of both vein and alluvial deposits. Activity was renewed with the increase in gold price during the late seventies and continues to the present.

Present activity consists of an active gold mine at Busitema and a vermiculite mine at Namekara.



ARTISANAL GOLD WORKINGS

The Uganda Department of Geological Survey and Mines and the Investment Authority have each been extremely helpful in assisting our company in the development of our various projects.

Gary Fitchett  
President & CEO, IBI Corporation

### ROLE OF GOVERNMENT

The government developed an involvement in mining following independence and established a few mining companies of which it was the sole shareholder. These interests have since been disposed of but the government maintains ownership of the properties of the former Kilembe mine whilst seeking a new operator. The government still owns the phosphate deposits that were mined formerly. The government has ceased all activities in the trading of mineral products and is actively seeking, through the Uganda Investment Authority, to dispose of its interests in Kilembe mine and the phosphate deposits to interested investors from the private sector.

When it comes to profits, the evidence is that rates of return on foreign direct investment in LDCs (Less Developed Countries) are much higher than on investments in developed, or even other developing countries.



HIMA CEMENT FACTORY – HIMA CEMENT INDUSTRY

### PRIVATE COMPANIES

From the time of independence in 1962 until establishment of the present administration in 1986, adverse events and legislation discouraged foreign mining companies from considering operations and investing in Uganda. The complete reversal in the business climate that the government has maintained for twenty years has encouraged several mining companies to take positions. The main purpose of this brochure is to bring the current attitude of government to the attention of investors and mining companies in the hope they will come to appreciate the opportunities Uganda offers.

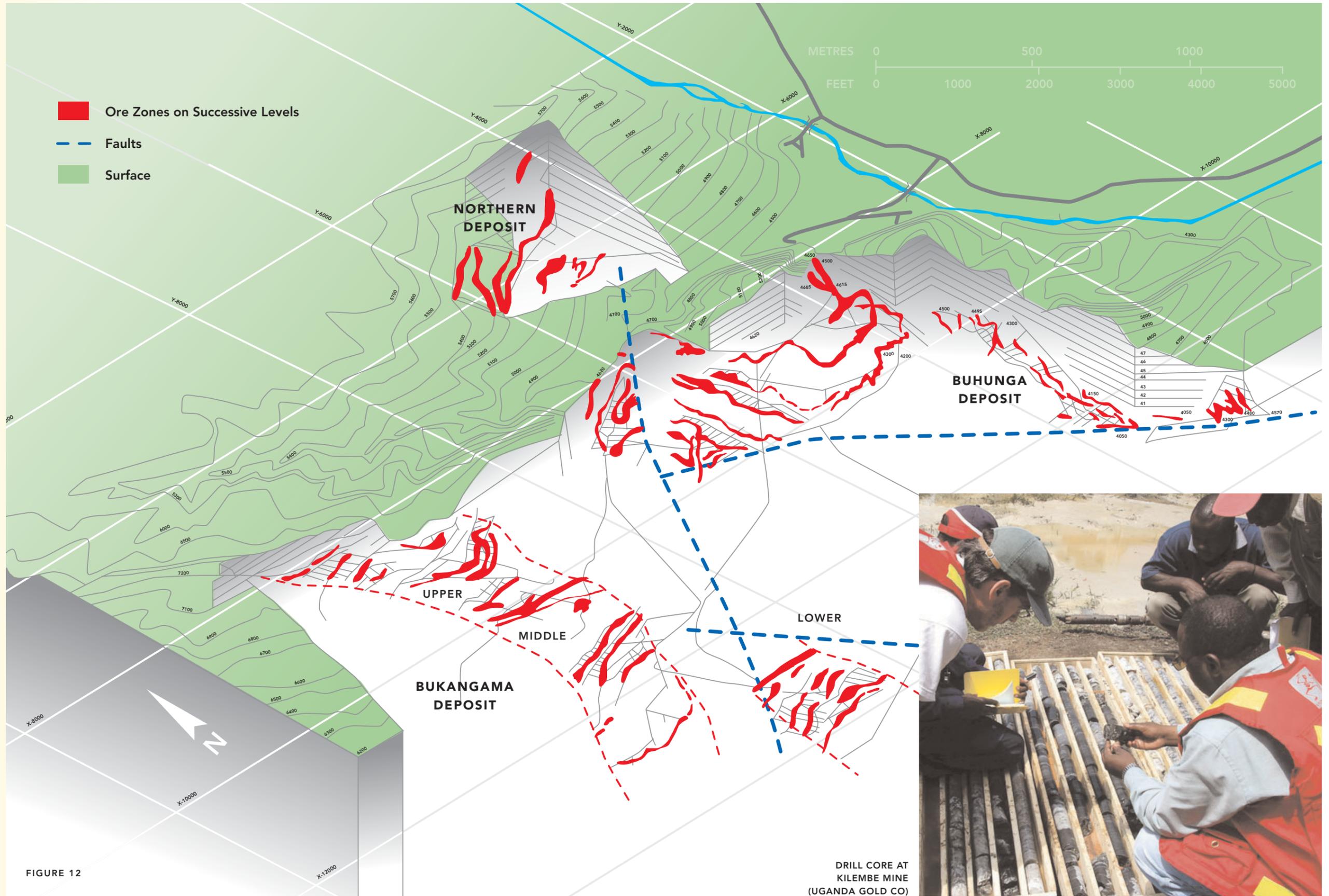
### ARTISANAL MINERS

Small-scale (artisanal) mining has a long history in Uganda where this activity formed the backbone of tin and tungsten mining. Whilst interest in these two metals has declined into insignificance in recent years, that in gold has increased. There are now many people involved in small-scale operations on gold prospects mostly alluvial but some hard rock also. Annual production is estimated to be between one and two tonnes. The Department of Geological Survey and Mines controls activities of these miners under the provisions of the Mining Act, 2003. There is little illegal mining. Most of the artisanal miners use primitive techniques. The gold is sold through licenced dealers at market rates so there is no incentive to continue the former practice of smuggling.

As part of the current programme to encourage mining, the Government provides the artisanal miners with support in various forms.

KILEMBE MINE SIMPLIFIED ISOMETRIC PROJECTION OF MINE WORKINGS

UGANDA



DRILL CORE AT KILEMBE MINE (UGANDA GOLD CO)

## COPPER-COBALT

### INTRODUCTION

Production of 271,000 tons of copper between 1956 and 1978 at the former Kilembe mine accounts for the greater part of the value of mineral wealth formerly produced by Uganda.

The several copper deposits of commercial interest exploited at the Kilembe mine were mined predominantly by underground methods with only a small tonnage mined from open cuts (fig.12). Mineralisation was discovered there in 1926 in the foothills of the Rwenzori Mountains (Mountains of the Moon) close to Uganda's western border with the Democratic Republic of Congo. The mine lies at an elevation of about 1600 m above sea level. Underground development following discovery in 1926 did not lead to production because of the remote locality and low metal prices. Blister copper was produced from a smelter at Jinja where production ceased in 1978. The mine produced a substantial quantity of cobalt concentrates as a by-product but this was not sold due to the low prevailing price of the metal.

Efforts are now underway by a public corporation (Uganda Gold) to revive mine production. If successful, cobalt will be an important source of revenue.

Cobalt is being recovered from material stockpiled on surface when the mine was in operation. Production from the stockpile began in July 1999 but ceased between September 2002 and February 2004. Average monthly production is of the order of 50,000 kg concentrate that is exported for further refining.

Large tonnages of material of what is supposed to be of possibly commercial interest lie underground adjacent to old workings in material with too low a copper content to have justified extraction during the former operation. If the present work results in a positive feasibility study, the mine would be re-activated and would constitute a major contributor to both the world's cobalt supply and Uganda's economy. Other copper deposits are scattered throughout the immediate area but none so far appears to be of commercial interest.

A public corporation (AVMIN) conducted a search over the area thought to contain the easterly projection of the sediments containing the ore-bodies of Kilembe mine between 1997 and 1999. During this work, 3675 linear kilometres were flown on 300m spacing with geophysical instruments. Results were followed up by soil geochemistry and four diamond drill holes. No encouragement was encountered.

### GEOLOGY

The Precambrian rocks which host the Kilembe mine have a strike length of about 110 km in a block uplifted by faulting that is parallel with the Albert, or Western Rift fault. Structures within this block are poorly understood. The nearby mountains to the west are both precipitous and covered with dense vegetation. Freezing conditions and snow are common at higher elevations.

Ore occurs at Kilembe mine in two main bodies within a sequence of intensely metamorphosed rocks of sedimentary origin. The ore is confined to a zone within a single stratigraphical unit of amphibolite composition that is generally interpreted as an altered sedimentary rock. It is generally accepted that the useful metals were introduced at the time of deposition of the sediments. All the formations of the sequence around the mine are tightly folded. The structural picture is confused by displacement of the ore bodies by a number of faults

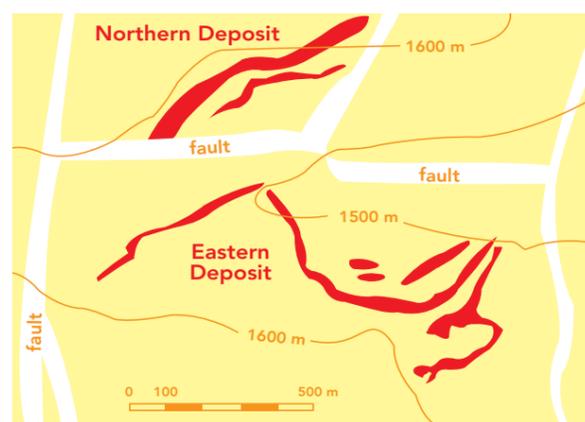


FIGURE 13 – SIMPLIFIED PLAN OF ORE ZONES AT KILEMBE MINE

(figs. 12-14) some of which displace ore. Offset continuations of the ore have not always been found. The mine reported reserves in place when extraction ceased.

Copper occurs as the sulphide mineral chalcopyrite in a highly sulphidic gangue composed mostly of a mixture of the iron sulphides pyrite and pyrrhotite. Cobalt occurs within the gangue minerals in quantities reported to average 0.17% cobalt metal, with the better values at the base of the ore horizon. The cobalt mineral linnaeite occurs with oxide and secondary minerals of copper near surface but no specific mineral of cobalt has been identified in the primary ore. The oxide ore generally has a higher copper content than average with values running up to six percent.

The stratiform nature of the ore and the predominance of sediments in the containing rocks suggest affinities with the copper-cobalt deposits of the Zambia-Congo copper belt and those of the Outokumpu-type in Finland.

Geochemical sampling proved very effective for prospecting and several techniques were developed at Kilembe that later found widespread application elsewhere in the world. Sampling of stream sediments led to the identification of three distant areas of copper mineralisation that were defined more precisely by soil sampling. Drilling and underground openings at these sites failed to establish ore (fig. 15).



### PRODUCTION AND RESERVES

Initial reserves were 12.0 million tons of which 9.9 million tons averaged 2.01 % copper and 0.18% cobalt. Reserves at closure were reported to be 4.17 million tons with a copper content of 1.77 %. The price of cobalt declined during the period the mine was producing so the content of the metal were dropped from the reserve figures. Total production was 271,000 tons of blister copper from 16.29 million tons of ore containing an average of 1.95 % copper.

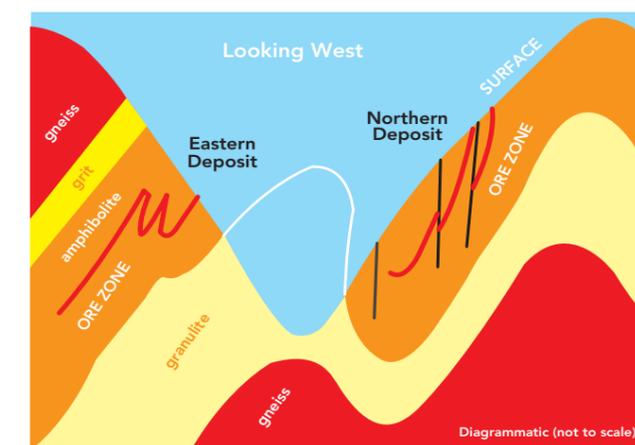


FIGURE 14 – SIMPLIFIED CROSS-SECTION OF GEOLOGY AT KILEMBE MINE

### MINING AND TREATMENT

Mining continued from 1956 to 1979. A variety of stoping methods was employed to contend with the wide range of dip and thickness of ore encountered. (fig.12). Small quantities of ore near surface were mined by open pit methods. The steep topography at the site allowed development of many levels from adits.

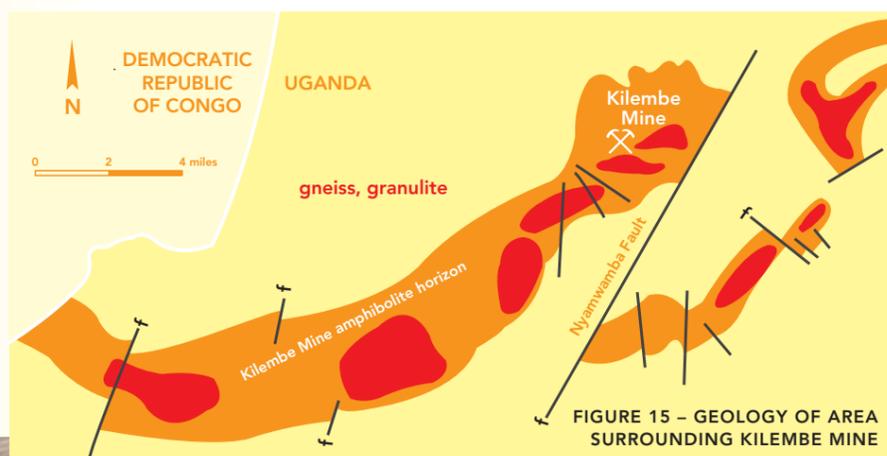
A cut-off grade for copper of one percent was employed during the mining operation. Material with a lower grade of copper, no matter what the cobalt content, was left in place. During much of the life of the mine, the price of

## COPPER-COBALT

cobalt was too low to justify recovery. Samples were not assayed for the metal. Much of this lower grade material lies on the footwall of the ore zone that was mined and where higher cobalt values are reported to occur.

Copper concentrates were roasted at a plant eight kilometres distant from the mine. The resulting sinter was then hauled by rail to the company-owned smelter at Jinja (fig. 1) where the blister copper was produced. The smelter was dismantled subsequently. The site was leased to a company that planned to recover copper from the slag using a bio-leach process but nothing came of it. The opportunity still exists.

A concentrate of iron sulphides weighing an estimated 1.1 million tons and containing about 1.40% cobalt was stockpiled at the roaster but not treated. This stockpile constitutes an important resource for cobalt at present prices and is



COBALT RECOVERY PLANT – KASESE COBALT COMPANY LIMITED

treated by a process using bio-leach technology. A consortium of companies manages the operation.

The mine has been kept on care and basis since operations ceased. The infrastructure includes a hydroelectric generating scheme, a sawmill, and a comprehensive workshop, all of which produce sufficient revenue to be self-supporting.

### OPPORTUNITIES

The main opportunity for finding more copper in Uganda lies in the vicinity of the former Kilembe mine. The value of the contained cobalt within that deposit is assuming greater importance both with the current strength in the price for the metal and its long-term outlook. Crnicki (in Tamale-Ssali 1971) concluded at that time (thirty five years ago) that applications of geochemistry were exhausted. The authors recommended detailed examination and re-interpretation of the structure of the ore zones exposed in the mine workings, followed by diamond drilling, to look for displaced continuations of the ore bed near the mine might be productive.

Advances in geochemistry in the last twenty-five years are such that repetition of former surveys of stream sediments and soils are justified. Geochemical sampling specifically for cobalt is indicated. Geophysical procedures developed since the mine closed might also be applied with advantage both in the search for mineralisation and resolution of structure.

Efforts to find additional mineralisation along the strike of the sediments hosting the ore, have not been productive so far but down from known ore appears prospective.

## CARBONATITES & PHOSPHATES

Carbonatites consist of an unusual suite of volcanic rocks that in their molten state consist of relatively small quantities of rock forming material propelled by a large amount of carbon dioxide gas. The resulting rocks consist of a variety of types reflecting the reaction of the gas with the country rock surrounding the intrusion as well as the exotic rock varieties formed by solidification of the magma itself either in the vent itself or as ejected fragments and ash around it. Carbonatites are characterized by a large quantity of carbonate minerals, some of which are of unusual composition and contain rare earth metals of possible commercial value. Some of the carbonatites in east Uganda contain large quantities of phosphate. Fertilizer-grade material was produced formerly on a commercial basis.

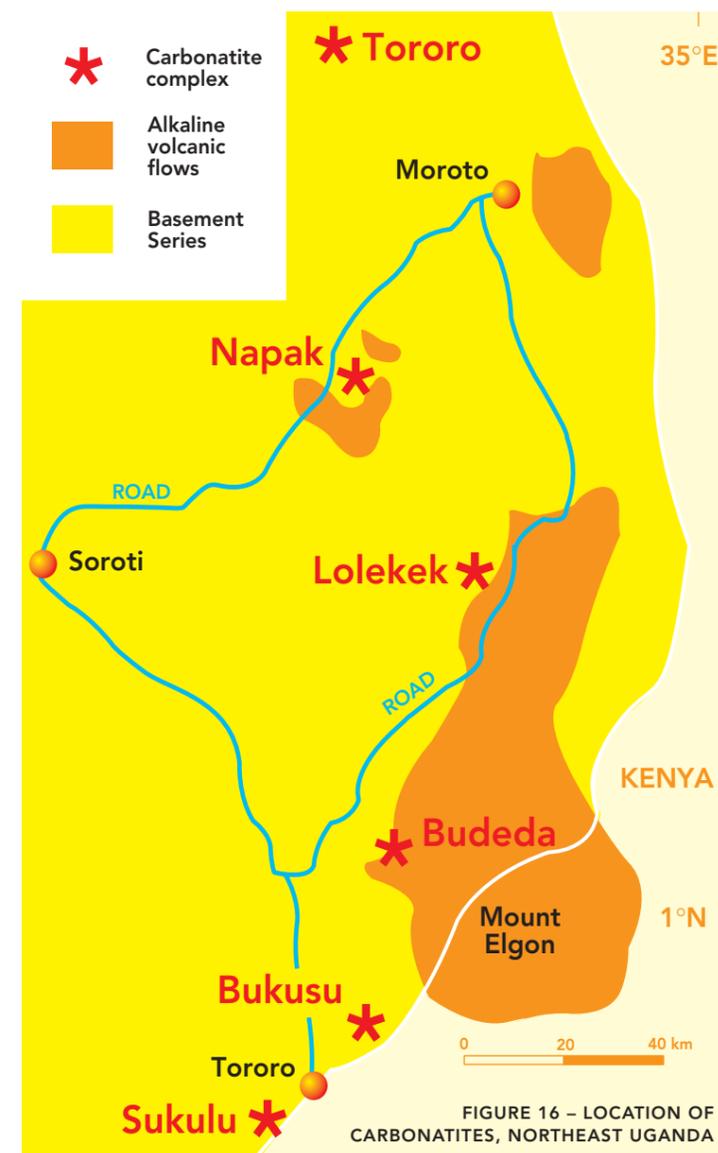
A form of vermiculite occurs and is mined at one site. (see below under 'Vermiculite').

The carbonatite rock is characterized by relatively high radio-activity, some of which is due to a low content of uranium. Whilst no uranium occurrence of commercial interest is known, deposits of sandstone, or other clastic rock, derived from the weathering of carbonatite rocks and deposited at a distance, could host uranium deposits of roll-front and calcrete types. Deposits of this type are exploited extensively elsewhere.

Carbonatites are often of recent age and found on shields of ancient rocks. It has been suggested that carbonatites are genetically related to the kimberlite rocks in which diamonds occur. The two rocks appear to be mutually exclusive. Whilst kimberlites are the common source rock of diamonds, carbonatites are not known to contain any.

Carbonatites are confined to two areas of Uganda. The more important occurrence lies in the Eastern region close to the frontier with Kenya and not far from Lake Victoria. Seven distinct bodies of these unusual intrusions of volcanic rock and their associated alteration products are known (fig. 16). The Geological Survey investigated the eastern occurrences extensively in the late sixties and early seventies of the last century. Several commercial enterprises for phosphate ran during that period.

The less important occurrence is of a single carbonatite at Bwera in the southwest of the country. This latter occurrence is small and appears to have no immediate economic significance except as a source for lime.



## CARBONATITES & PHOSPHATES

### DEPOSITS IN EASTERN UGANDA

Bloomfield (1973) recognises two distinct varieties of carbonatite in Uganda – an older, sub-volcanic type formed beneath the land surface, and a younger, volcanic type that formed at surface. Each has its characteristic suite of minerals and rock varieties.

### OLDER GROUP, SUB-VOLCANIC

This group includes the Bukusu complex (fig.16 and 17) that has a diameter of 13 km and is considered the largest carbonatite in the world. The deposit is not well exposed. Thick deposits of residual soil cover much of its extent. The extent and content of these soils has been partially investigated by drilling to assess the content of minerals of the rare earth metals and phosphate minerals that resisted weathering and were concentrated in these deep soils.

### PHOSPHATE

A reserve of 50 million tonnes of phosphatic material is reported. Until 1968, phosphatic soils from Bukusu were mined and concentrated to provide fertilizer for local consumption. The material consisted of a mixture of apatite and phoscorite. The concentrate was mixed with soda ash in Kenya to make marketable material. The raw material was found to contain amounts of aluminium and iron too high to allow production of superphosphate. Pulverized phosphate rock suitable for direct application to certain soil types was also produced on a small scale.

At the Sukulu complex (fig.16), 230 million tonnes of phosphate-bearing material occurring as residual soil and containing an estimated 12.8% P<sub>2</sub>O<sub>5</sub> were outlined by drilling (Davies, 1956). About 15% of this tonnage is iron free. The material contains an average of 32% apatite (phosphate mineral), 57% magnetite-goethite (iron minerals) and 0.25% pyrochlore (rare earth elements).

A plant operating at Sukulu between 1962 and 1978 made a marketable product with a phosphate content of 40-43%. In 1968 for example, 9,463 tonnes of apatite and 14,922 tonnes of calcium phosphate were sold into the local market. The Sukulu plant was destroyed during insurgent activity and the remains dismantled. A feasibility study in 1988 demonstrated the practicality of establishing a soluble potash fertilizer plant here at a capital cost of \$121 million.

Between 1944 and 1991, Uganda produced 232 247 tonnes of phosphate, all from carbonatites. Production figures are not available for the years 1974-1976 and for the years subsequent to 1991. Current demand for phosphate fertilizer is met with imports.

Carbonatite rock from Sukulu was mined as a source of calcium carbonate but reserves were reported to be low in 1968. Average composition of this rock is reported (Bloomfield 1973) to be 3.5% MgO and 3.7% P<sub>2</sub>O<sub>5</sub> in 80% calcium carbonate, but selective mining allowed production of a feed with <1% MgO and 1.7% P<sub>2</sub>O<sub>5</sub> for use in the plant. Production in 1968 was 152,500 tonnes. Blending with small amounts of calcium fluoride (fluorite) was necessary in order to keep the content of phosphate low enough to meet standards of the construction industry.

Mineral occurrences of possible commercial interest in addition to the phosphate and vermiculite include pyrochlore (a refractory mineral of complex composition containing niobium, tantalum, uranium and rare earths), titanium and vanadium, zircon and base metals.

Pyrochlore occurs in sub-commercial quantities in the complexes of Napak, Tororo, and Lolekek (fig. 16). At Sukulu, residual soils contain 230 million tonnes with an average content of 0.2% Nb<sub>2</sub>O<sub>5</sub> with low values of tantalum and low uranium relative to thorium values. The pyrochlore occurs as fine grained particles, some with a coating of iron oxide, which present problems in mineral dressing. Certain areas of this deposit contain an average of 0.7% Nb<sub>2</sub>O<sub>5</sub>.

Pyrochlore concentrates from the now dismantled pilot plant at the Tororo Industrial Chemical Factory were analysed in 1977 by the International Atomic Energy Agency and reported to contain 0.35 - 0.5% uranium reported as U<sub>3</sub>O<sub>8</sub> (yellow cake). Thorium was also reported. Pyrochlore found in soil in the western valley of the Sukulu Hills was analysed in 1952 and found to contain 0.66% uranium as U<sub>3</sub>O<sub>8</sub>.

Vermiculite occurs in soils over the Namekara complex. (see below under “Industrial minerals”). Specifications conform to market requirements. A mine is now established on this site with planned output of 40,000 tonnes of product annually.

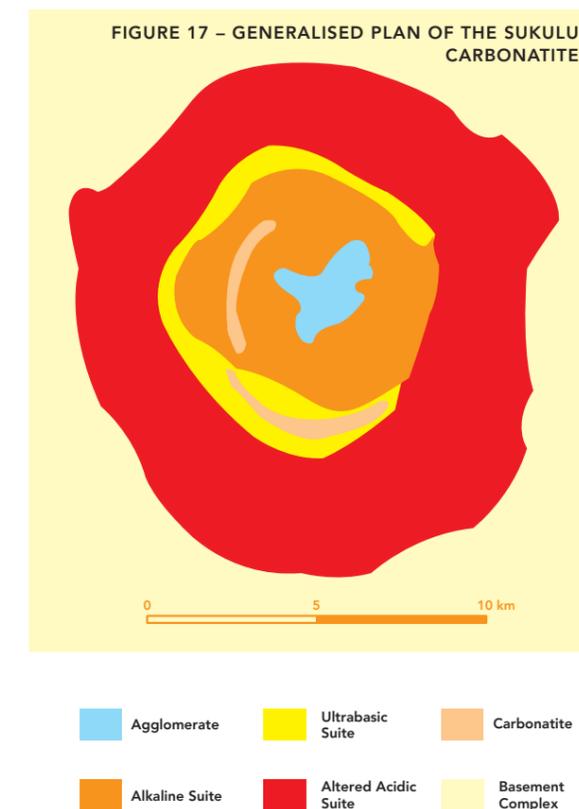
Titanium and vanadium occur widely in spinel minerals with iron but the mix is such that the constituent metals cannot be extracted on a commercial basis using current technology.

Base metal potential is suggested by the strong similarity of the geology of the Bukusu complex with the Palabora (Phalaborwa) complex in South Africa from which copper is mined on a ‘world class’ scale in addition to phosphate.

Four areas of anomalous copper values were identified during a soil sampling survey. Values obtained reached nine times the background of 50 parts per million copper. Diamond drilling of what was interpreted as the best anomaly revealed a core length of 50 feet containing 0.10% copper in the form of chalcopyrite. The source of copper giving rise to the other three anomalies remains to be investigated. At the Sukulu deposit, values of other metals were recorded in soils up to 1.5% zinc and 1350 parts per million lead. No investigation was made into the sources of these values in the bedrock. Occurrence of other metals, suggested by their widespread detection in trace amounts in soils, include molybdenum, cobalt, nickel and chromium.

Elsewhere in the world (e.g. Mountain Pass in California) carbonatites are mined for rare earths and zirconium so might reasonably be expected to occur in commercially interesting concentrations in the deposits of east Uganda. There is an association of zircon and the rare earth mineral baddeleyite with pyrochlore in the Sukulu complex. Residual soils at the Lolekek complex (fig. 15) contain up to 3% rare earth minerals. Two samples are reported by Bloomfield (1973) to contain 1.35% cerium.

The growth in demand for various metals of the rare earth group and for columbium-tantalum that developed since the evaluation made thirty-five years ago, suggests further work I justified on these intriguing, unusual deposits.



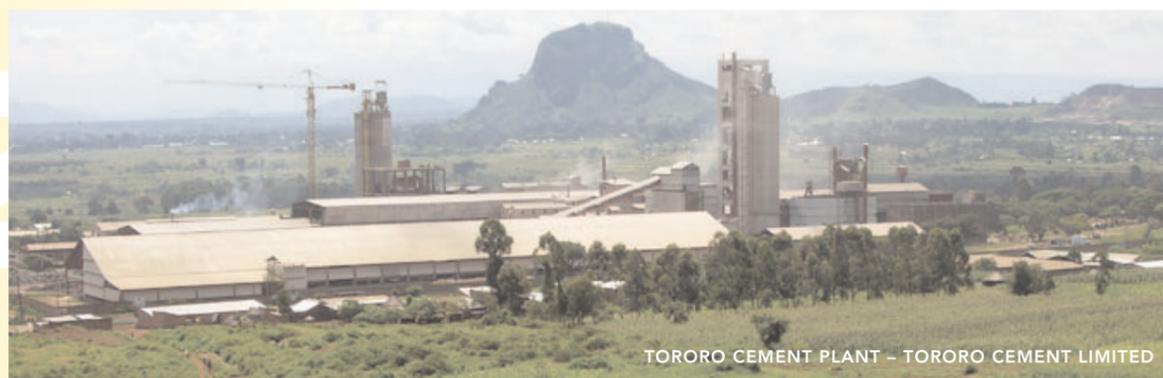
## CARBONATITES & PHOSPHATES

### YOUNGER GROUP, VOLCANICS

The Tororo Hills complex (fig.16) measures three kilometres in diameter and contains concentrations of apatite (phosphate), pyrochlore (columbium-tantalum) and barite (barium) in quantities that remain unmeasured. Some rocks here contain up to 14.5% K<sub>2</sub>O (potash) but not in a readily soluble form.

The Napak complex is thought to be the relict of a volcano that once rose 3500 metres above the surrounding plain. Only five percent of the original volume of material remains. Zircon, pyrite, pyrochlore (columbium-tantalum) and baddeleyite (rare earths) occur but their quantities have yet to be measured either in the residual soil, or the source rocks.

Occurrences of nepheline are widespread both within the carbonatite complexes themselves and in the volcanic rocks forming Mt. Elgon. Nepheline is a rock-forming mineral that is used extensively in ceramics. No work is reported which investigates the potential for occurrence of commercial quantities of this mineral.



### OTHER OCCURRENCES

The single occurrence of carbonatite in SW Uganda at Bwera is devoid of all the minerals and metals of potential interest found in the eastern Uganda examples. The occurrence lies one kilometre NE of the administrative centre of Karambi and was found fortuitously during regional exploration by staff of Kilembe Mines Ltd. No evidence exists of exploration for other deposits of this type in the general area. The carbonatite pipe is 400 feet in diameter and consists of pure calcite. As such, the rock assumes importance as a possible source for small tonnages of magnesium-free limestone of which there is a shortage in the general area.

Sediments at Bugisu in SE Uganda are reported to contain up to 1000 parts per million of niobium and 6.7% phosphorus reported as P<sub>2</sub>O<sub>5</sub>. Work has not reached the stage of an investigation for richer sections or an estimate of quantity.

### OPPORTUNITIES

The carbonatites of eastern Uganda constitute outstanding examples of this rare group of rocks. Elsewhere in the world, carbonatites enjoy important commercial significance as sources of a wide range of minerals and metals. Since the exploration of the examples in eastern Uganda over 25 years ago, the demand for speciality metals in the rare earth group and columbium-tantalum has increased greatly. For this reason alone, further examination of these unusual deposits is merited. The reported scale and scope of the previous investigation of these deposits can hardly have exhausted the possibilities of commercially valuable deposits being present.

Although the uranium content of these rocks is small and not likely to be of commercial interest, the sheer quantity of these rocks suggests the possibility of enrichment of this metal in erosion products. Uranium deposits in the form of roll-front (sandstone) and calcrete (secondary carbonate) types are valid targets for exploration. Surface expression of deposits of this type can be difficult to spot, unless specifically sought.

## GOLD BUSIA GOLDFIELD

### INTRODUCTION

The Busia goldfield (figs.19 and 20) occurs in volcanic rocks of greenstone-type in the extreme southeast of Uganda where the mineralisation continues across the international boundary into Kenya to become the Kavirondo goldfield. Gold occurs in rocks similar to those found in the other Archaean goldfields of both Kenya and Tanzania. The surface is relatively flat with a few hills formed by quartzite, volcanic rocks or granite. A road network includes the main paved road connecting Kampala to Tororo and Busia. Several secondary roads serve the area. The town of Busia lies about 200 kilometres east of Kampala on the border with Kenya.

The Geological Survey of Uganda discovered gold at Busia in 1932 during a mapping and prospecting programme. Since then, both vein and alluvial prospects have been mined sporadically. The greater part of the recorded production of 1.0 to 1.5 tonnes of gold came from the Tira and Amonikakinei mines during the period 1937 to 1952.

Busitema Mining Co. Ltd. operates a gold mine near Busia that produces gold on a regular basis.

The Geological Survey conducted several exploration and geological programmes between 1932 and 1967. No further work was done until 1990 when the French parastatal group, BRGM conducted a geochemical survey jointly with the Geological Survey. (Mroz, 1991).

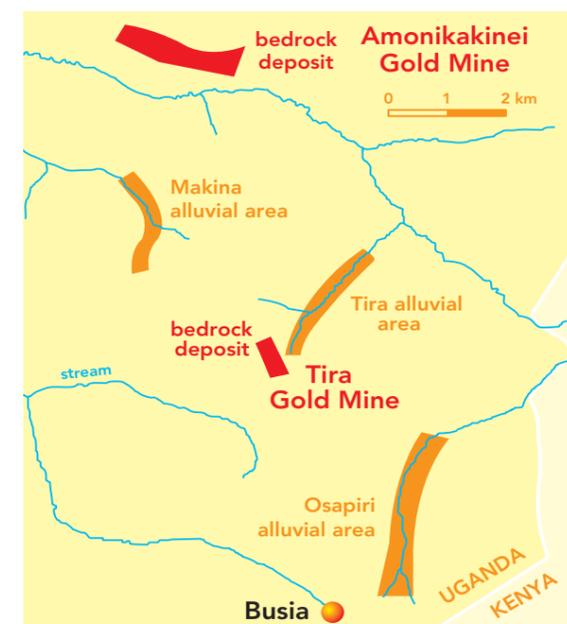


FIGURE 18 – GOLD OCCURRENCES IN BUSIA GOLDFIELD

### GEOLOGY

The goldfield lies within a greenstone belt of Archaean volcanic and sedimentary rocks of the Nyanzian System. Rocks of the Nyanzian System consist of two series of volcanic rocks, silicic and basic volcanic flows with tuff and sediments separated by a banded iron formation (BIF) unit that forms an useful marker horizon. These rocks are bounded to the north and west by granite gneiss. The eastern boundary is formed by intrusions of granites (fig. 20).

### MINERALISATION

Gold of commercial interest in the Busia goldfield is confined to the Nyanzian rocks where the metal occurs either in quartz veins within the volcanic rocks, as enrichments within the BIF, or in the rocks adjacent to the BIF. These various occurrences are typical of styles of gold mineralisation found in Archaean greenstones elsewhere.

### GEOCHEMISTRY

**1990-1991 BRGM-DGSM Geochemical Survey.** 12,311 samples of stream sediment were collected at a density of about 1.5 samples per square kilometre over 1500 square kilometres. Another 510 samples were collected during a soil survey around the Tira and Amonikakinei mines. Figure 21 shows the areas of anomalous gold values in the general region of the Busia goldfield that were found by these surveys. Four areas containing anomalous gold of possible interest are:

## GOLD BUSIA GOLDFIELD

- Tira Mine area – two soil samples along the contact of the BIF and the country rock.
- Bukade-Makina area – anomalous values occur for 5.4 km along the northern edge of the BIF about 4 km northwest of Tira mine.
- Osipari area – anomalous values follows the BIF unit from the international boundary with Kenya to the Tira fault south of Tira mine.
- Bude-Kitoja area – the long axis of a newly discovered gold anomaly of regional extent measures 8 km by 3 km strikes roughly north in Nyanzian volcanic rocks of basic composition.

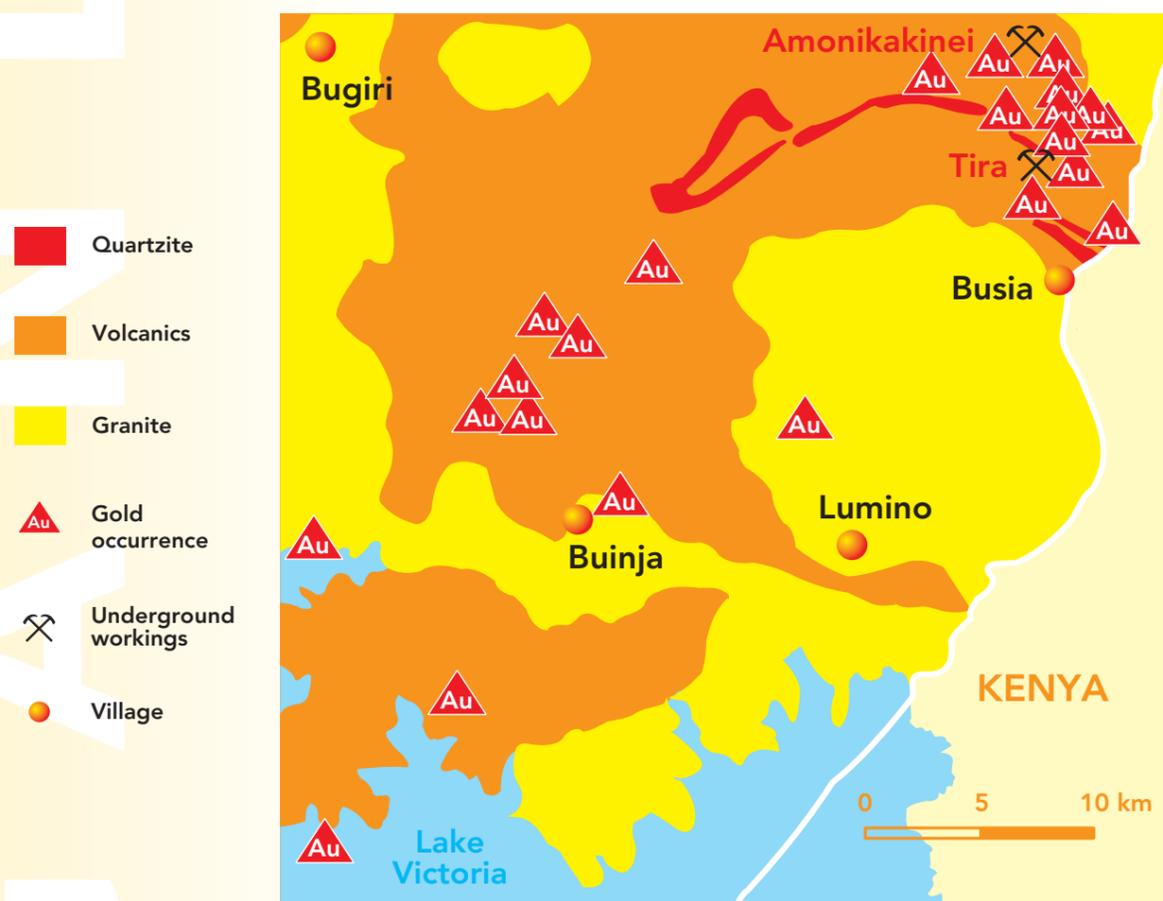


FIGURE 19 – GOLD OCCURRENCES IN BUSIA AREA

## GEOPHYSICS

Geosurvey International GmbH completed an airborne magnetic survey in 1980. In 1994, the United Nations Development Programme sponsored ground geophysical work over the Tira mine, as well as the Makina, Osipiri and Bude-Kitoja areas. This programme included further soil sampling for geochemical work. Results of the induced polarization and total field magnetic surveys defined several prominent anomalies at Tira, Makina and Osipari each of which correlates well with anomalies from chemical analyses of soils. (Byamugisha et al, 1994a, Fiset et al, 1994a, Byamugisha et al, 1994b, and Fiset et al, 1994b.)

No significant geophysical anomalies were measured at Bude-Kitoja but gold values in soil samples define an anomaly of possible interest with values averaging more than 120 ppb. These values occur over an area that measures up to 700 metres wide and is over one kilometre in length. The southern limit of the area has not been defined (Byamugisha et al, 1994d).

## GOLD BUHWEJU GOLDFIELD

### INTRODUCTION

The majority of gold produced in Uganda has been from small, but rich alluvial deposits on and around the Buhweju Plateau in southwest Uganda. Gold was first reported in the Buhweju area in 1933. The alluvial deposits are generally small, occurring in streams and swamps in the northern part of the plateau, on the surrounding scarp faces, and in the heavily forested areas below the plateau. The alluvial deposits lie on bedrock consisting of either sedimentary rocks of either the Karagwe-Ankolean System or schist and gneiss of the Toro System. Both systems are of younger Precambrian ages. A quartz pebble conglomerate occurs near the base of the Karagwe-Ankolean sequence. Figure 22 shows the distribution of gold occurrences and the general geology of the area.

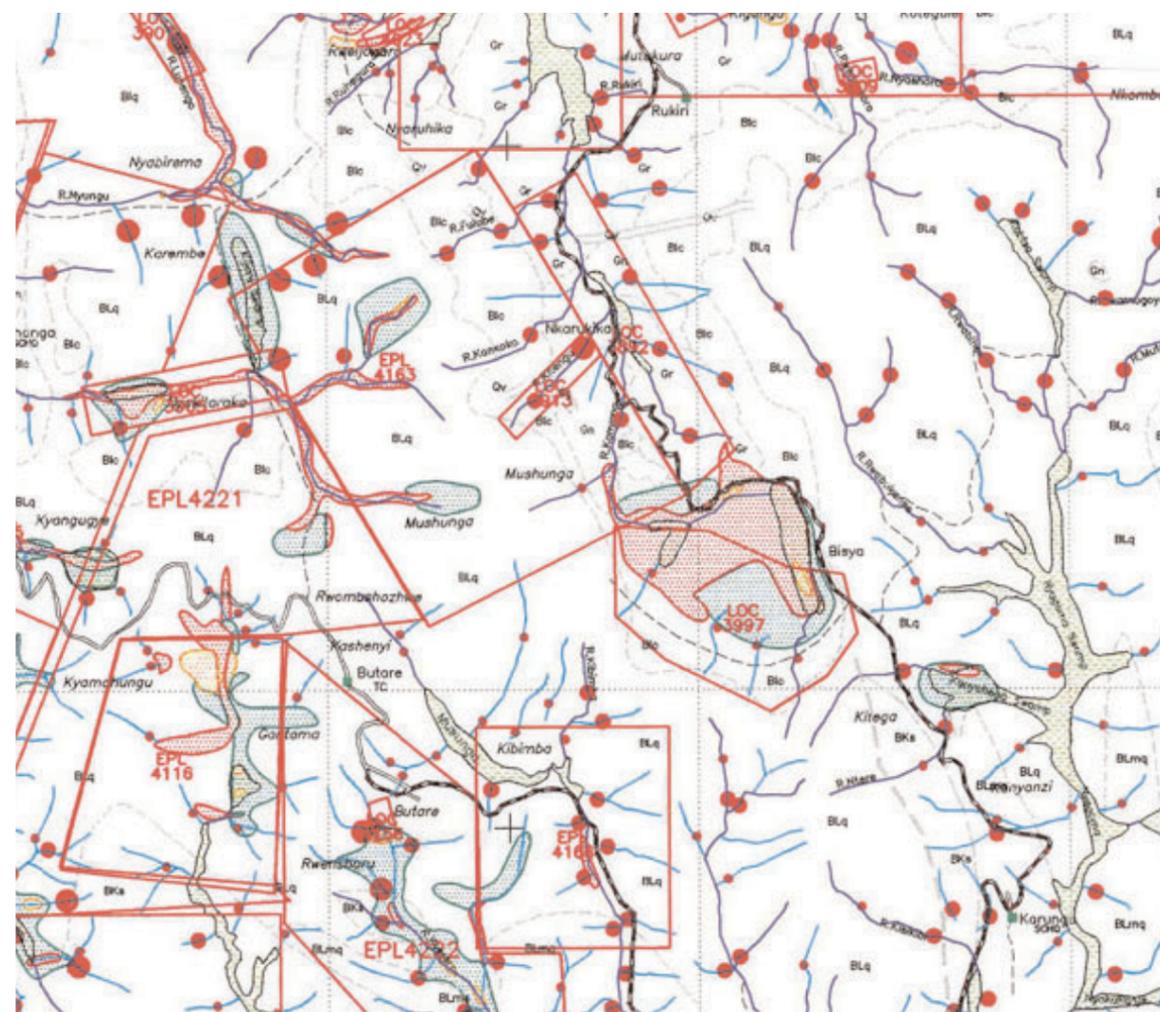


FIGURE 20 – EXAMPLE OF RESULTS FROM GEOCHEMICAL SURVEY FOR GOLD, BUHWEJU GOLDFIELD

## GOLD BUHWEJU GOLDFIELD

### GEOLOGY

Schist, quartzite, amphibolite, gneiss and granite of the Igara Formation of the Toro System (Lower Proterozoic) are the oldest rocks exposed in the area. The Igara rocks are overlain by sediment of the Buhweju Group of the Karagwe-Ankolean System. The Buhweju Group consists of an interbedded sequence of mudstone, quartzite and shale intruded by dykes of basic composition. Dykes of this type cut rocks of the Igara formation but not those of the Buhweju Group. Gold-bearing quartz veins occur in both Igara and Buhweju Formations.

### MINERALISATION

Whilst gold is the main interest in the Buhweju area, lead in the form of galena was mined on a small scale at the former Kitaka mine. Most of the gold has come from alluvial deposits. The few attempts to mine gold from veins met with little success. Most workers who have studied the area concluded that gold occurs in the bedrock throughout much of the area but there is no agreement on the form this mineralisation takes. Several decades of work have identified sufficient indications of gold to encourage further work at Buckley's Reef and Bisya. Barnes (1961) reports a few values of possible interest in veins containing sulphide minerals at Kampono, Kanyambogo and Kitaka. Wayland (1937) reports some short lengths of streams contained rich values. One such valley yielded 4000 ounces of gold from only 300 metres of stream length.

### GEOCHEMISTRY

The Geological Survey explored an area of 1456 sq km containing the Buhweju goldfield in 1993 as part of UN Project UGA/89/001 (Pekkala et al, 1994). The 1359 samples of stream sediment samples collected during this work yielded a mean of 56.7 ppb gold. Differences in bedrock composition do not appear to influence the range of values. The study identified ten areas with anomalous values that are recommended for which follow-up work. These areas contain values of over 100 ppb gold and several which exceed 1000 ppb gold. Figure 6 shows a typical part of the 1:100,000 scale map that shows the results of this work.

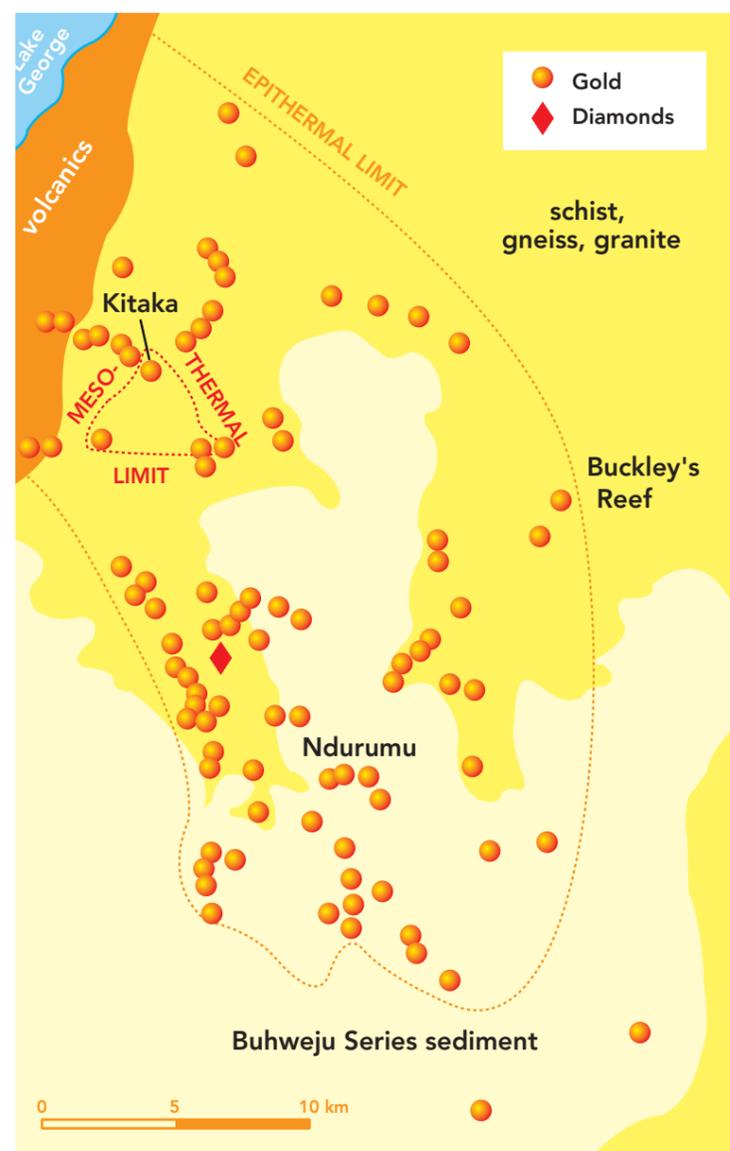


FIGURE 21 – GOLD OCCURRENCES IN BUHWEJU AREA

## GOLD KIGEZI

Gold occurs in northern Kigezi District associated with tungsten and bismuth minerals in veins within sedimentary rocks of the Karagwe-Ankolean System. (Combe 1941, Barnes 1964). Sporadic mining of alluvial deposits has continued since the 1930s culminating in a gold rush at Kanungu in 1989. Little information is available on the geology of these deposits. The reported occurrence of the gold with wolframite is unusual but not unique. The southward continuation of rocks of the Karagwe-Ankolean System into the eastern edge of the Democratic Republic of Congo contains a group of gold deposits not mined but evidently of "world class" dimensions. (Banro).

## GOLD NORTH KARAMOJA

Prospecting and mapping over many years have revealed numerous gold occurrences in this large area. Most of the occurrences appear to be of an alluvial-eluvial nature. Several have supported mining on a small scale for short periods. About ten years ago, a private company prospected an extensive area, lying within the sub-district of Kaabong of Kotido District. As the result of collecting and analysing samples of stream sediments from an area of 808 sq km, the company identified seven sections with anomalous values that were considered of sufficient merit for follow up work. Four other anomalous areas were regarded as of marginal significance and not followed.

Further prospecting by means of geophysics, trenching and drilling (5650 metres) at four sites established gold occurrences in the bedrock which here consists of gneiss of the Archaean Basement System. Low values of gold lie in narrow shears that dip at steep angles. Five distinct deposits are interpreted from drilling to contain, at the level of an indicated resource, a total of 3,960,000 tons with 320,000 ounces of gold to a depth of 300 metres. The deposits are not regarded as commercial.

## GOLD MUBENDE-KIBOGA

Little information is available about the group of gold occurrences lying at the headwaters of the Mpongo River and roughly equidistant from these two centres. Gold is reported from the saprolite zone of weathering just above unaltered bedrock.

### OPPORTUNITIES

Encouraging results from geochemical surveys indicate the need for follow-up work with additional work in the form of both geochemical and geophysical surveys. The width of the anomaly at Bude-Kitoja suggests the presence of gold values that might be suitable for bulk mining. The gold content here needs to be assessed by trenching and possibly some shallow drilling. Wayland (1923), in a short report on the northern end of the Rwenzori Mountains north and east of the Lami and Semliki Rivers noted widespread alluvial values of gold in sub-commercial interest. He speculated that this gold was released by erosion of source rocks in the mountains and that an equivalent might be present of the highly auriferous deposits of Kilo Moto in the northern part of the Democratic Republic of Congo. In an unpublished report, Wayland states that 'gold reefs are certain' in the Rwenzoris Mountains. The unpublished records in the library of the Department of Geological Survey and Mines at Entebbe contain several such references but there is no record of follow up work.



## NICKEL

An important discovery of this metal was made in NW Tanzania during 1972 by a team from the Tanzanian Geological Survey supported by the United Nations whilst exploring the southward extension of the Karagwe-Ankolean System from SW Uganda. This discovery lies about 220 km south of the Ugandan border with Tanzania and southwest of the District centre of Biharamulo and near the village of Rulenge. The discovery attracted commercial interest in 1989 when definitive drilling began and prospecting started for additional deposits. At least one such deposit has been found. Content of platinum group metals is low in the nickel deposits found so far. Production is proposed.

The original discovery contains about 25 million tons of better than one percent nickel with important credits for cobalt. Exploration for additional deposits continues. Earlier prospecting in the same geological formation in the state of Burundi to the west discovered extensive deposits of nickel in laterite that remain undeveloped. These two discoveries point to the Karagwe-Ankolean rocks in Uganda to the south and west being a potentially important nickel province, which geological features suggest continue northward into Uganda. So far, no new discoveries have been reported but further prospecting for the metal is indicated. Prospecting in the general area by a company in 1997-1999 included airborne geophysical surveys but found nothing.

The discovery in Tanzania lies on one of two, parallel magnetic features of linear form which strike slightly east of north (fig.7) and continue into Uganda close to the western shore of Lake Victoria at Simba Hills. Other linear features strike northwest out of southwest Uganda close to the borders with Tanzania and Rwanda. The causes of these anomalies are unknown but are assumed to be steeply dipping intrusions of rock of basic composition (Nyakaana).

### OPPORTUNITIES

An established belt of rocks containing commercial tonnages and nickel values strikes northward into southwest Uganda. Prospecting for nickel here is indicated.

As early as 1986, the Government adopted a strategy of openness about HIV/AIDS in Uganda and moved to establish the National AIDS Control Programme (NACP) in the Ministry of Health.

LAKE VICTORIA

## PLATINUM & CHROMIUM

A prospector discovered chromium in the form of chromite in the northern Karamoja region near at Nakiloro, 16 km north of Moroto, in 1930 but the mineral was not identified correctly. Its true nature was not recognised until 1948 (Fleuty 1958). The mineral occurs at outcrop a series of pods up to 35 by 20 metres in width. The mineral is seen in place at six localities but occurs extensively as float in the form of small fragments. (fig. 20). Chromite occurs within a discontinuous zone of ultrabasic rocks consisting of serpentinite and talc schist both of which conform to the attitude of the surrounding granite gneisses. Mapping disclosed several folds but no faulting or crosscutting intrusions. No magnetic survey of the area has been made.

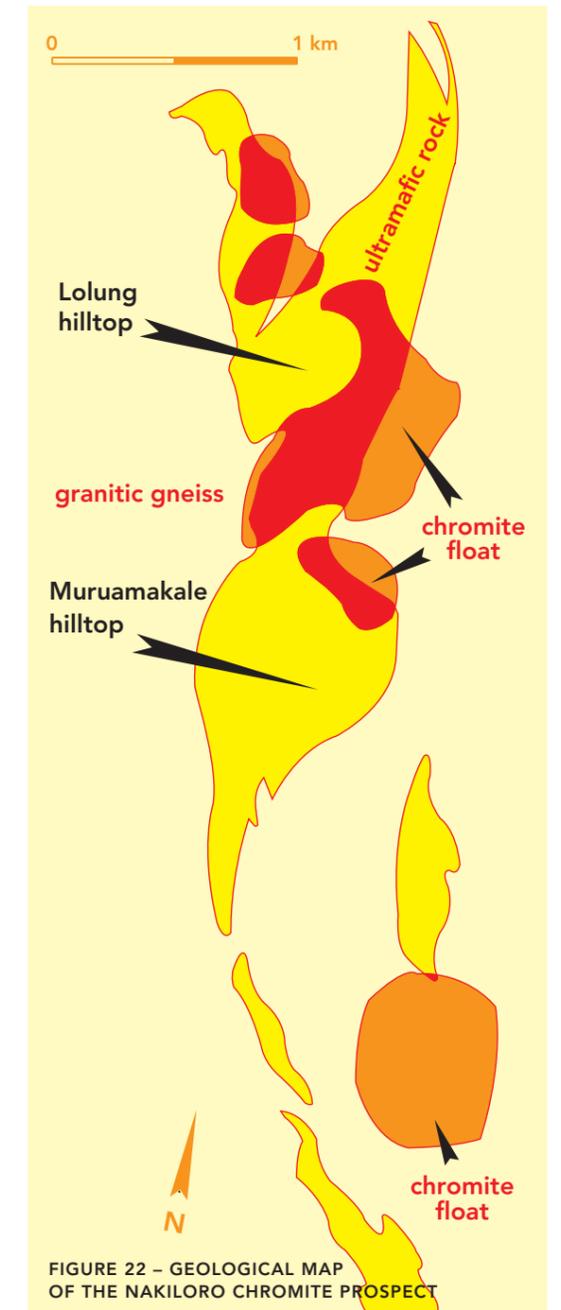
Fleuty gives results from 23 analyses (Table 1) but neither the locality of the samples nor their nature. Presumably, the samples are "grabs" collected by a company that examined the prospect in 1958. Table I gives a summary of the analyses. The chrome to iron ratio varies widely. In the past, this ratio was regarded as critical in the evaluation of chrome deposits. Too high an iron to chromium ratio is sufficient reason for rejecting the prospect. With the advent of the A.O.D., or argon -oxygen deficient process for smelting chromium, this ratio is no longer regarded as critical. The very irregularly ratio of chrome to iron in the reported analyses suggests the presence of iron in a mineral other than chromite, either as magnetite or another mineral of the spinel group.

Of particular interest are the nine assays for combined nickel and cobalt that are reported in Table I in terms of combined values of the oxides. Five of these assays are in the range of commercial interest. Of further interest are the results of the seven analyses for platinum conducted by the Geological Survey in 1956. A commercial assayer practiced in the modern procedures of detecting these metals has yet to confirm the presence of platinum group metals in the quantities quoted. The assay report from 1958 does not say so, but it is fair to assume that the values given are for platinum group metals (pgm) rather than platinum alone. The assay values are reported in terms of pennyweights per long ton. One pennyweight per ton is equivalent to about 1.53 grams. Precious metal content of ores treated in the mines on the UG-2 chrome-platinum reef in the Bushveld complex in the Republic of South Africa generally lie above five grams per tonne, or three pennyweights.

### OPPORTUNITIES

Results reported of exploration at this particular prospect suggest the following opportunities:

- 1 Investigation of the prospect by drilling and trenching to investigate the source of the chromite;



## PLATINUM & CHROMIUM

2 Drilling below the level of oxidation to investigate the nature and distribution of nickel, cobalt, and platinum group metals values;

3 Investigation of the strike extensions of the known mineralisation.

That other opportunities exist elsewhere is evident from references (Kiyegga, 1970) to traces of platinum in alluvial deposits along tributaries of the Kafu River near Mpongo. The proposed airborne geophysical survey of this part of the country may well reveal similar occurrences of ultrabasic rocks with which platinum, nickel, cobalt and chromium might be associated.

SAMPLE	Cr2O3%	FeO%	NiO+CoO	MgO%	Pt dwt/l.ton*
1	23.31	42.64	0.65	0.73	n.d.
2	33.52	19.04	0.99	0.59	n.d.
3	23.06	40.11	0.96	1.31	n.d.
4	36.53	n.d.	n.d.	n.d.	n.d.
5	41.97	n.d.	n.d.	n.d.	n.d.
6	3.25	n.d.	n.d.	n.d.	n.d.
7	27.84	n.d.	n.d.	n.d.	n.d.
8	36.28	n.d.	n.d.	n.d.	n.d.
9	44.59	n.d.	n.d.	n.d.	n.d.
10	38.46	n.d.	n.d.	n.d.	n.d.
11	38.37	n.d.	n.d.	n.d.	n.d.
12	35.97	n.d.	n.d.	n.d.	n.d.
13	37.92	n.d.	n.d.	n.d.	n.d.
14	49.95	10.25	n.d.	16.29	n.d.
15	38.92	11.48	n.d.	18.10	n.d.
16	49.46	n.d.	n.d.	n.d.	2
17	59.80	n.d.	n.d.	n.d.	2
18	45.41	28.76	0.29	11.01	4
19	46.98	23.96	0.14	16.71	2
20	36.18	18.46	0.04	19.67	1
21	55.47	14.91	0.27	19.27	5
22	50.27	30.53	1.39	2.40	3
23	55.26	18.46	1.39	10.79	1

(n.d. = not determined)

\* original assays in terms of pennyweights per long ton

## TIN, TUNGSTEN AND COLUMBITE-TANTALITE

### INTRODUCTION

Tin and tungsten were first reported in Uganda in 1926. Columbite-tantalite was recognised later where it occurs in and around areas containing tin and tungsten. Tin and tungsten occur either together, or separately. Much of the subsequent production of these metals has come from the southwest corner of the country from the former Districts of Kigezi and Ankole. The occurrences form part of a much larger mineral field that extends to the south into Tanzania and west into Burundi. (fig.21) Lesser amounts of tungsten (or wolfram) were mined near Singo in central Uganda. Primary ores are of the fracture filling type with ore minerals consisting of cassiterite (tin oxide) and wolframite (iron manganese tungstate) generally in coarse crystalline habit in a matrix of quartz and yellow mica. Some closely spaced veins were mined from open pits. Other occurrences are mined by underground methods, mostly on a small scale by independent miners. The Mwerasandu mine was owned by a public company and is the only one to have operated consistently for a number of years. The mine reported to good profits.

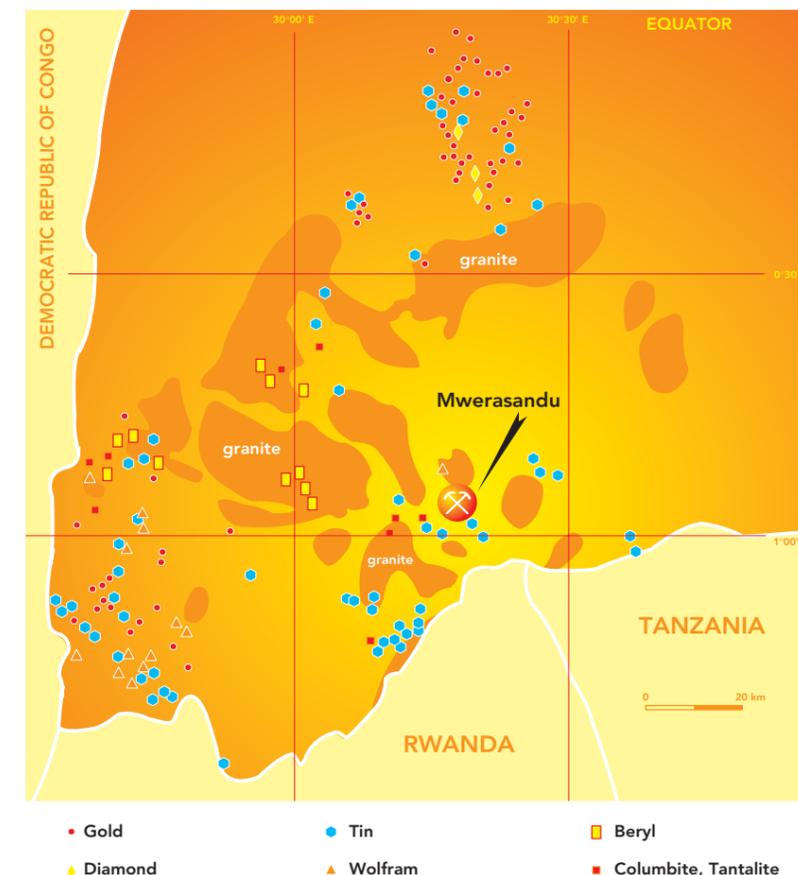


FIGURE 23 – MAP OF TIN OCCURRENCES

Mining and prospecting activity was particularly intense soon after the metals were first discovered and again during subsequent periods of high metals prices, such as the Korean War in the early fifties.

Demand for tin fluctuates with the business cycles but that for tungsten swings widely over short time spans. Current prices of both metals are relatively high in line with the increased demand for commodities.

Production of both metals has been at low ebb for several years but interest is increasing, as indicated by the number of licences issued. Some of this interest is due to the high price of columbium-tantalum. This ore is found both in the same geological environment as tin and tungsten and in pegmatite (see below).

Production of the tin and tungsten produced by the larger mines is as follows:

Mine	Black tin (tons)*	Wolfram (tons)
Mwerasandu	3000	-
Nyamuliro	-	970
Kirwa	-	626

\* industrial practice is report tin production in terms of tons of concentrate, or black tin ( cassiterite) the tin oxide that contains 75 – 80% tin metal.

## TIN, TUNGSTEN AND COLUMBITE-TANTALITE

The Kirwa deposit was mined by open-cut methods and appears to have potential in depth.

Figure 26 illustrates the total production from the various tungsten mines. The recent substantial increase in the price of tungsten has stimulated interest in this metal this is not reflected in reported production.

### GEOLOGY

Much of the ore occurs within veins in phyllite and quartzite of the Karagwe-Ankolean System. Lesser amounts occur in veins within granite intruding these sediments, but always close to the contact with the sediments.

The sediments are deformed into broad anticlines separated by tight synclines with the granite intrusions occupying the cores of the anticlines. The granite contains large crystals of feldspar and is chemically of the tin-granite type with which tin is associated in many parts of the world. The granite eroded preferentially to leave a pattern of spectacular circular ridges, often capped by quartzite, and referred to as 'arenas'. Faulting is of little importance. Pegmatite is not always present.

Deposits of both tin and tungsten of commercial interest occur as fracture fillings within phyllite and quartzite of Karagwe-Ankolean age. Phyllite predominates in the succession but some of thinner quartzite beds and lenses play an important role in localizing the mineralised fractures. Blue tourmaline occurs frequently in the country rock containing ore but seldom in the veins.

Veins are found in two types of the fracture – steep ones resulting from movement (shears), and nearly flat one (tension). Tin is less frequent in the steep fractures many of which are often filled with barren quartz. Veins of this type at Mwerasandu attain a thickness of up to ten metres (photograph on page 14). The relationship of these barren veins to the tin bearing sections at the Mwerasandu mine is not clear. (figs.26 and 27). The sections contain tin also contain golden-yellowish mica. Sulphide mineralisation is generally inconspicuous.

### MINING

All the host rocks of the mineralisation are competent and present few mining problems. At Kirwa, a stockwork of narrow veins containing finer grained tungsten than is typical, was mined in a series of shallow benches cut into the hillside. Elsewhere, and more typically, the veins are sufficient wide and discrete to permit mining as separate

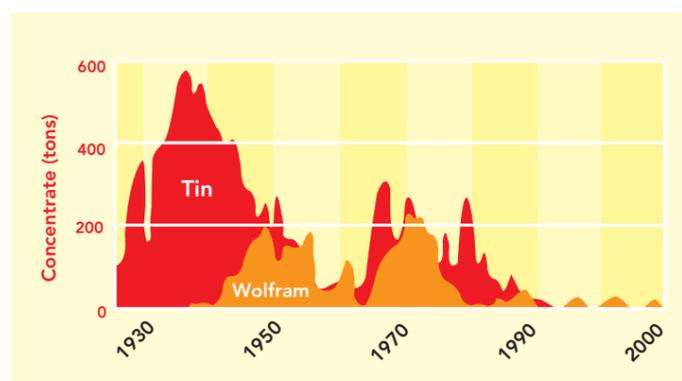


FIGURE 24 – ANNUAL PRODUCTION OF TIN AND WOLFRAM

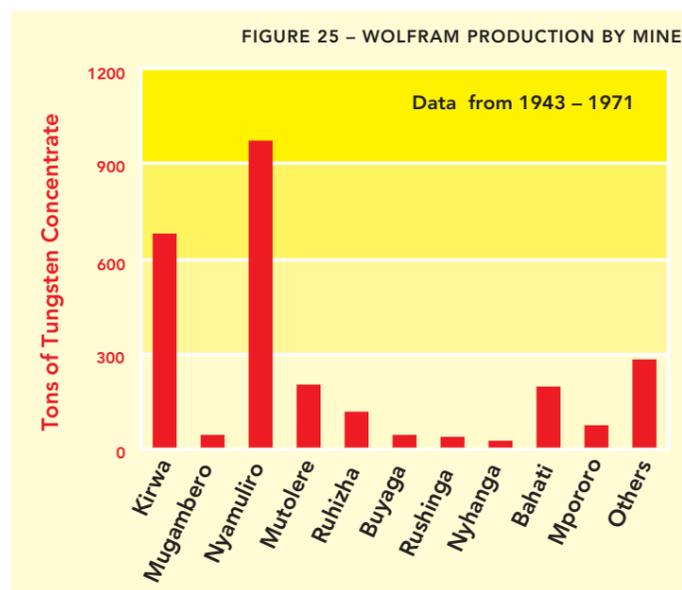


FIGURE 25 – WOLFRAM PRODUCTION BY MINE

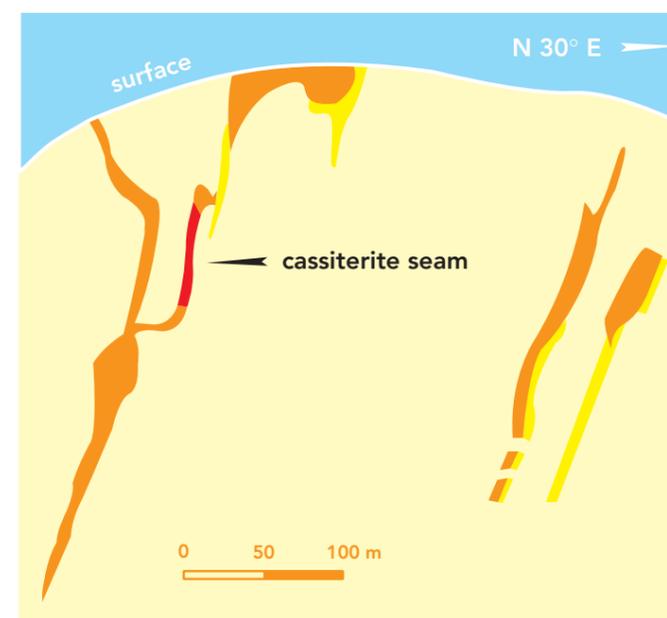


FIGURE 26 – CROSS-SECTION OF MWERASANDU MINE

### OPPORTUNITIES

Small-scale mining opportunities, both in bedrock and superficial deposits are attractive for tin and tungsten, and possibly for columbium-tantalite. Structural and chemical controls of these deposits have yet to be studied in any detail. Such work, including an analysis of the fracture system, might aid discovery of larger concentrations of the metals in a target attractive to mining companies. There is insufficient information on the nature of the veins to allow predictions to be made of the behaviour of the metal content in depth.

Operations at the Mwerasandu mine ceased in 1956 after nearly thirty years of continuous production. Records show values of tin in the low range of commercial interest both in tailings and eluvial material around the flank of the hill occupied by the former mine. No comprehensive report on the geology of the mine is available. Plans of the mine workings suggest that many of the lateral workings were exploratory in nature and driven in the hope of cutting high-grade tin values. If this is so, then a structural analysis of the vein patterns might reveal controls of ore not recognised previously. Justification for such work can only come when metal prices are conducive.

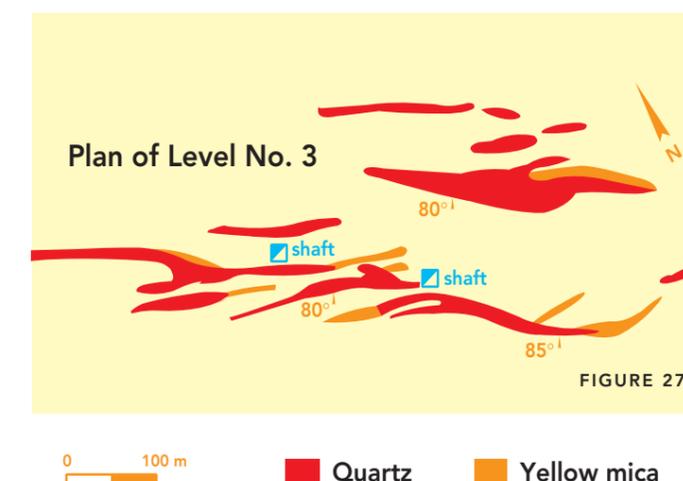


FIGURE 27 – TYPICAL PLAN OF A LEVEL AT MWERASANDU MINE

units. Artisan miners follow these veins down dip from outcrop using underhand stopping methods. Deeper mining from an adit might be tried where values persist downward. Few shafts exist in the area except at Mwerasandu where the vein structures were followed by several shafts down to about 300 metres below surface.

Both eluvial (concentrated by weathering in place) and alluvial (concentrated by action of running water) deposits of tin occur but no large tonnages are recorded for any single deposit. Artisan miners have successfully mined several deposits but there is little apparent opportunity for large-scale operations.

The coarse texture of the mineralisation in the veins renders it difficult to assess by standard sampling procedures but concentration by gravity is simple.

## RADIO-ACTIVE MINERALS

### INTRODUCTION

Uganda has seen little prospecting for radio-active minerals other than regional studies by government agencies. A few occurrences of possible interest were reported. Opportunities for discovering these minerals in commercial quantities appear good.

A report of 1985 "Projet international d'évaluation des ressources en uranium – Ouganda" by the International Agency for Nuclear Energy (IUREP), an independent agency reporting to the United Nations, organisations work up to that date. Little has been reported since.

### HISTORY

Much of the small amount of prospecting accomplished, was by government agencies. The Geological Survey made its first survey for uranium in 1949. Uranium occurs over a wide area but only in trace amounts and mainly in the form of minerals of only mineralogical interest. The Geological Survey tested all available mine openings and made many road traverses with radiometric devices during colonial time without making any significant discoveries.

An example of the copper uranium mineral tourbenite was found in the Kilembe mine.

During the late Fifties of the last century, various small areas were surveyed variously by ground and airborne methods. Lundberg Explorations, a geophysical contracting company, surveyed 1100 sq km in the eastern part of the country. During 1960, a strip of land including the Aswa shear zone (fig.6) was surveyed for its entire length. In a programme financed by the UN in 1962 that included 50,000 linear km of airborne survey of three areas – the Aswa shear, around Fort Portal, and in Karamoja in the north east of the country.

Pits were sampled at the Sukulu carbonatite in 1970. Pyrochlore was recovered and after separation was found to contain between 0.35 and 0.5 % uranium as  $U_3O_8$ , with 0.2%  $Nb_2O_5$  (Niobium). A potential of 200 million tons of loose material is estimated to occur with a uranium content of 0.0012%, or 2400 tons of uranium as  $U_3O_8$ . This percentage of uranium is too low to be commercial significant.

A company flew radiometric surveys over two concessions in southwest Uganda during 1976 with follow up work on the ground, but no positive results were reported. Another company was more successful with its survey of the thick succession of young sediments south west of Lake Albert where it detected 300 parts per million  $U_3O_8$ . The mineral containing this value was not established.

Surveys in the Ruwenzori Mountains in 1976 detected extensive areas of above background radio-activity caused by small quantities of davidite, a refractory mineral containing uranium.

In 1980, another aerial survey covered the whole country south of latitude 1°N using gamma spectography.

### OPPORTUNITIES

- The IUREP report rates the sediments of the Albert rift to be the most attractive based on present knowledge but also draws attention to the possibilities of the 'unconformity' model. Other successions of sediments derived from the erosion of radio-active source rocks, such as the carbonatites of eastern Uganda, and the several radio-active granites, could well be the host for roll-front and calcrete deposits of uranium.
- Deposits of the 'unconformity' model occur in gently deformed sediments of late Precambrian age (Proterozoic) near the unconformity with underlying crystalline rocks. Examples occur in Canada northern Saskatchewan, in northern Australia, and Niger. The importance of deposits conforming to this model as a source of uranium was only recognised after much of the work in Uganda was completed. Several examples in Uganda where these relationships occur include:

- 1 Southwest Uganda where sediments of the Proterozoic Karagwe-Ankolean type overly basement rocks, especially southwest of Mbarara and around Buhwezu.
- 2 Eastern Uganda at the now folded base of the Toro sequence on underlying crystalline rocks.
- 3 Central Uganda at the base of the undisturbed sediments occurring as outliers between Lakes Albert and Kyoga.

The IUREP report estimates the extent of these various targets to be:

- Buganda-Toro area 18,000 sq.km:
- Base of Karagwe-Ankolean area 12,000 sq. km.
- Lakes Albert (Bunyoro) and Kyoga area 5,000 sq. km.

- The airborne geophysical survey by Geosurveys gmbh in 1980 revealed radiometric anomalies. The airborne geophysical survey by Geosurveys gmbh in 1980 revealed radiometric anomalies.
- Low values of uranium are reported from sediments within the rift valley between Lakes Albert and Edward. These rocks are all less than ten million years old. Deposits of in this environment might be amenable to leaching in place as practiced in Texas and Wyoming. Total area occupied by these sediments is:
  - Southwest of Lake Albert, 12,000 sq km.
  - Around Lake Edward, 5000 sq km.
  - Buhwezu plateau 900 sq km.
- Some intrusions of granite are considered favourable, but interest in them is as source rocks of uranium that is concentrated in sediments derived by erosion of the granite.
- The carbonatites contain uranium in form of pyrochlore. Uranium from this source might be concentrated in sediments derived by erosion of the carbonatites and now lying distant from the source.



## GEMSTONES

There are few records of gemstone production in Uganda. Examples of nearly gem quality garnet, ruby-like corundum and other stones are reported occasionally in north east Uganda by individual miners but there has been no consistent production of even exploration effort. Occasional parcels of stones have been sold from the North Karamoja area.

In general, primary occurrences of the corundum group, such as rubies and sapphires, are found commonly in areas underlain by granulite and in the watercourses draining from them. Granulite is an intensely metamorphosed rock found throughout east Africa and especially in the adjoining country of Tanzania where many occurrences of gemstones have been recorded in recent years. The vestiges of limestone seen occasionally in granulite in Tanzanian indicate the rocks once consisted of a sequence of sediments. Such occurrences appear favourable for the formation of gemstones. Examples of this model are valid exploration targets.

According to one theory, granulite develops in zones of high pressure along zones of displacement in the crystalline rock of the Basement complex and the later mobile belts where the special conditions of stress and chemistry (presence of limestone and marble) are conducive to gemstone formation.

### OPPORTUNITIES

Precious and semi-precious stones occur in at least two localities in the north east of the country. Granulite enjoys far wider distribution but is not mapped in any detail or prospected in anything more than a reconnaissance manner. Alluvial and eluvial occurrences of gemstones are particularly suitable for mining by artisanal workers because of the comparative ease of working.



IMPROVED GROWTH OF CORN PLANT  
DUE TO APPLICATION OF PHOSPHATE

## DIAMONDS

### INTRODUCTION

Diamonds are reported as recovered during the working of alluvial deposits for gold at three closely spaced sites in the Buhweju goldfield and south Kasese (fig.11 and 22). The occurrences are purely of mineralogical significance. No source rock of these stones has been identified. It is possible the diamonds were derived from the erosion of a sedimentary rock but the original source is almost certain to be a kimberlite occurrence even though no examples of this rock are known in Uganda. The records make no mention of the presence of the so-called 'indicator' minerals in the alluvial material.

There is no record of any serious prospecting for diamonds except for that conducted by Mineral Prospecting (U) Ltd from 1965-1974, which did not result in any discoveries of consequence.



The Government of Uganda has been a significant enabler in helping us build our vermiculite resource step-by-step from an underdeveloped location in Uganda's virgin bush into a globally successful industrial minerals supplier.

Gary Fitchett  
President & CEO  
IBI Corporation

### OPPORTUNITIES

An extensive field of kimberlite occurrences, some of which are diamondiferous, has been explored extensively in Tanzania. The field is roughly elliptical in shape with the longer axis measuring 560 km up to the shore of Lake Victoria but striking north-west across the lake towards the southern part of the country. In Tanzania, the diamond deposit at Mwadui has already produced nearly 20 million carats. Diamonds occur in several other kimberlite deposits in Tanzania.

It may be of significance that carbonatite intrusives (q.v.), which are well developed over a wide area of eastern Uganda are generally considered to derive from an igneous source similar in chemical composition to the one from which kimberlite forms. From observation, the two types of intrusive appear to be mutually exclusive in that they are not observed to occur close together.

Thus in Tanzania, mapping discloses nineteen carbonatite intrusions in three crudely defined groups around the perimeter of the area containing the known kimberlite occurrences. It is appealing to speculate that the carbonatite bodies in the eastern part of the country form a fourth group and by so doing, define an extension of the diamondiferous kimberlite from Tanzania into central Uganda.

## EVAPORITES

### INTRODUCTION

The evaporite minerals gypsum, salt and trona (sodium bicarbonate) occur in Uganda. All occurrences are at or near surface in soft sediment filling the rift fault.

### GYPSUM

Gypsum occurs in small quantities and is exploited on a small scale to supply the local cement industry. An area of about two square kilometres within rift valley sediment at Kibuku contains deposits of gypsiferous clays up to six metres thick. On average, the clay contains about 10% gypsum. Estimated reserves are of about 1,200,000 tonnes. There is a strong demand for gypsum from the cement plants at Hima and Tororo. Demand for gypsum is expected to increase to meet increased production of cement. Known prospects for gypsum are known in Kashasa River area, Kanyatete, Muhokya and Lake Mburo.



SALT RECOVERY AT LAKE EDWARD

### SALT AND TRONA

Deposits containing a mixture of salt and trona in various proportions occur in several crater lakes and hot springs on a sufficient scale to support commercial production. There is also artisanal activity. The salts occur as a mixture of sodium and potassium chloride with bicarbonates. A resource estimated at ten million tonnes occurs in crater lakes at Katwe near the northern end of Lake Edward. The salt mixture includes ammonium salts. Inappropriate design led to the failure of a plant intended to recover these salts on a commercial scale.

### OPPORTUNITIES

Recovery of trona on a commercial scale remains a distinct possibility. An operation of this kind has run for many years in Kenya and a similar one has been considered in Tanzania. Scope for work on a small scale remains good.

## PEGMATITE MINERALS

### INTRODUCTION

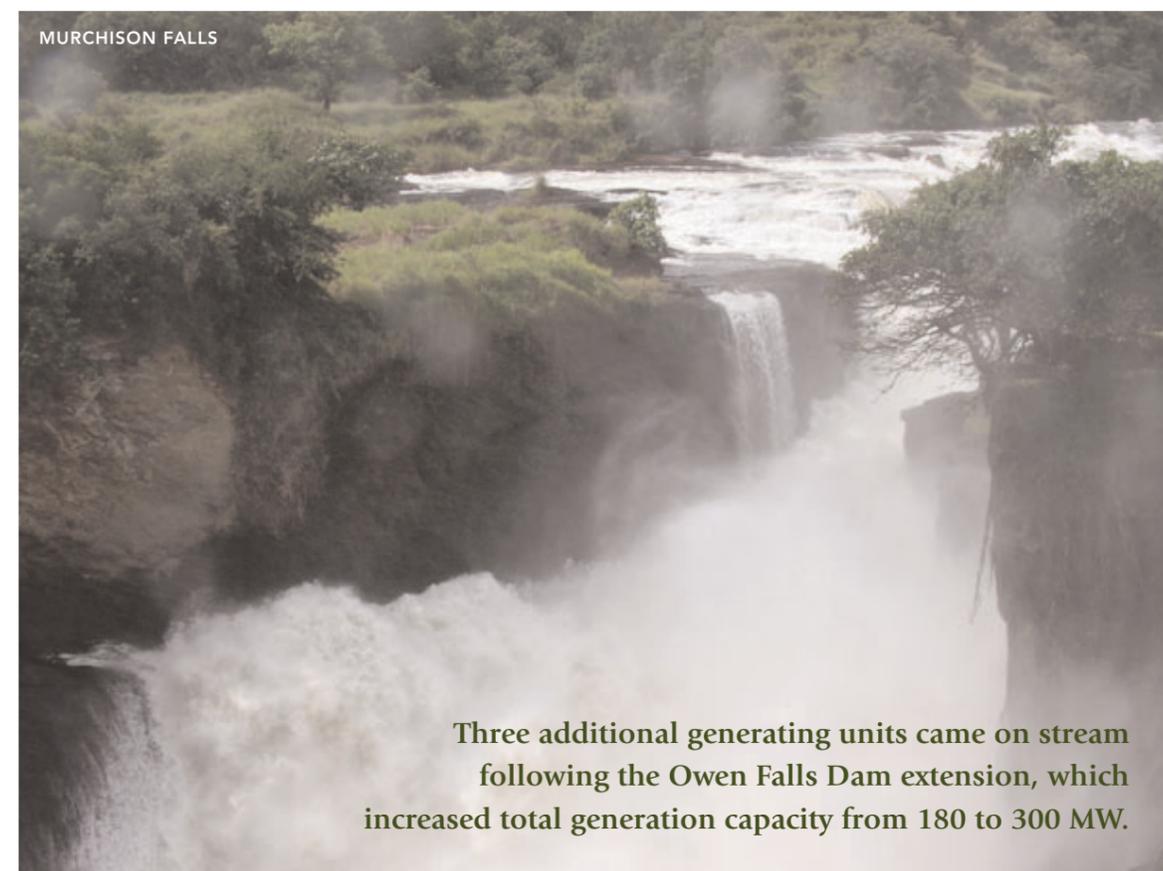
Independent miners working on a small scale have produced several valuable minerals from pegmatite related to certain granites found intruding sediments of the Karagwe-Ankole System in the south west of the country.

### COLUMBITE-TANTALITE

Coarse crystals and masses of this mineral were mined in small quantities from pegmatite on a small-scale for many years by independent miners. Production in 1959 reached 203.8 tons but has been less than ten tonnes in most recent years. Prices strengthened recently so there is encouragement for small-scale miners to pursue this commodity either in pegmatite, or in veins.

### BERYL

Production was continuous from 1944 until 1976 with peak production of 1031.20 long tons reported in 1961. Occurrences lie in the Ankole and Kigezi Districts of southwest Uganda. Deposits of lesser importance occur in the Buganda District. A matrix of white clay (kaolin) makes for easy working of deposits in the Ankole rocks. Concentration is by hand sorting which can be wasteful when there is fine material present. Resources left at known deposits are reported to be low but there is scope for discovery of new occurrences that would be attractive to small-scale miners.



MURCHISON FALLS

Three additional generating units came on stream following the Owen Falls Dam extension, which increased total generation capacity from 180 to 300 MW.

## OTHER INDUSTRIAL MINERALS

### VERMICULITE

Good quality vermiculite constitutes a significant resource at a prospect lying within the boundary of the Bukusu carbonatite complex on the east side of the country. This occurrence is mentioned above under 'Carbonatites' and is presently the site of a mining operation. Vermiculite is also reported from the Sukulu carbonatite area.

The best-developed site on the Bukusu carbonatite is at Namekara where the vermiculite mine is situated. The main occurrence is on a ridge 10 km long and of semi-circular form. The vermiculite occurs four to five metres below surface in weathered material as a residual product resulting from leaching of phlogopite mica. Overburden consists of magnetic rubble. The mining company quotes a reserve of five million tons of high-grade vermiculite.

Both Bukusu and Sukulu carbonatite complexes have potential for further discoveries.

The world market for vermiculite changed radically with the discovery of asbestos in vermiculite produced by the mine in Montana in the U.S.A. that supplied the North American market. The mine was obliged to close. The vermiculite currently worked in Uganda is free from asbestos and is remarkable for the large size of the flakes (see photograph). These characteristics command a premium price in the market.

A bi-product of the vermiculite mining consists of a fine vermiculite mixed with phosphatic soil that is being well-received locally as a soil additive.

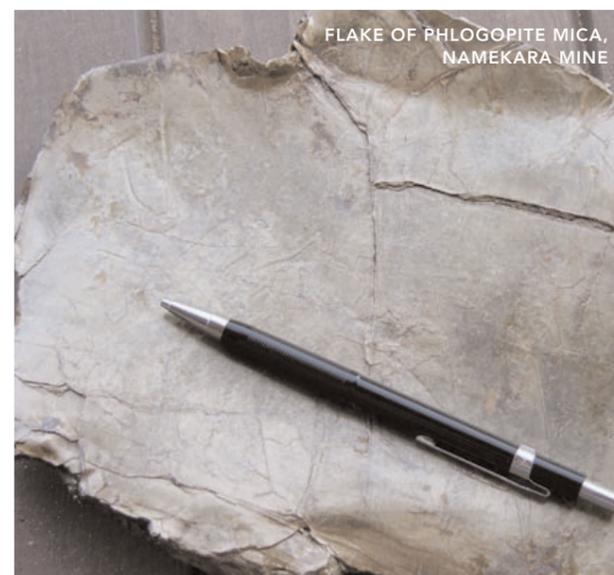
In May 2003, there was one mining lease issued for vermiculite at Namekara in Mbale District.

### MICA

Mica occurs in both size and quantities of commercial interest in certain bodies of pegmatite and quartz veins in gneiss. Bodies containing mica of interest and measuring 0.6 to 15.2 metres wide and up to 800 metres long are reported from the Labwor Hills in Kotido District). A total of 15,000 kg of cut mica was produced during the nineteen forties from this site. Other pegmatite bodies in the same area as well as elsewhere could be equally productive.

### GRAPHITE

Graphite occurs in beds measuring from 15.4 to 17.8 cm thickness within quartzite at Mubuku River in Kasese and Hoima Districts. Thin bodies of graphite occur within shear zones in the Karamoja District. No measurements of the physical properties of these occurrences are recorded.



FLAKE OF PHLOGOPITE MICA,  
NAMEKARA MINE

### DIATOMITE

Diatomite occurs at Panyango, Atar, and Alui in Nebbi District in beds within the sediments filling the Rift Valley. About 100,000 tons of low to good quality material are estimated to be present at Alui. No estimates are available for the other locations. With the present rapid expansion of the local beverage and food processing industries, both of which use diatomite for filtering, these deposits will likely assume commercial significance.

### SAND, GRAVEL, AND SILICA SAND

Sand and gravel, the principle constituents of aggregate are widely distributed throughout the country either as deposits along rivers and around lakes or in large quantities as filling of the Rift Valley.

Sand deposits of high silica content occur along the shores of Lake Victoria and as beaches around some of the islands in that lake. Removal of large volumes of material from some sites will have an environmental impact. Important amounts of high silica sand occur at Diimu, Bukakata, Kome Island and Nalumuli Bay where there is an estimated resource of several million tonnes of high quality material with a silica content of over the 99% needed for glass manufacture.

### CLAYS

The extensive clay deposits found in Uganda are exploited for many purposes, including brick making, and pottery. Clay at Kajansi near Kampala has been exploited for about sixty years. The material is used for bricks, tiles and pottery. Estimated tonnage of brick clay at Namanve exceeds one million tonnes. Mining of ball clay at Mukono has continued for many years.

Occurrences of kaolin are widespread. Some are the result of alternation in place of rocks whilst others are in sedimentary form. No utilisation of any consequence is recorded.

The continued expansion of the construction industry in Uganda, and especially around Kampala favours development of the clay industry.

### DIMENSION STONE AND CEMENT

Dimension stone in the form of dolomitic marble occurs in Karamoja near Moroto. Various forms of gneiss, granite and igneous rocks of basic composition suitable for building use occupy a wide area in Mubende, Toro and elsewhere. In April 2005, there were five mining leases and four special mining licences issued for limestone as well as four location licences and seven exploration licences. One of the exploration licences was for sandstone.

There are several established resources of limestone in two main areas. Limestone and travertine occur close to Lake George where they are related spatially to the Western Rift Fault, whilst dolomitic marble and limestone occur in sedimentary successions with the Precambrian rocks.

The Geological survey has investigated three important deposits of limestone in western Uganda.

- 1 The Hima deposit lies 15 km northeast of Kasese and has reserves of 18 million tonnes. The deposit supplies limestone to the Hima cement factory that has an installed annual capacity of 300,000 tonnes.
- 2 The Dura deposit lies 18 km from Kasese has a measured reserve of 1.5 million tonnes of high-grade material.
- 3 The Muhokya deposit lies 13 km south Kasese with reserves of 250,000 tonnes and has been worked intermittently for many years for the manufacture of lime.

## FUELS AND HYDROCARBONS

Drilling in the sediments of the Albert Rift has recently yielded flows of natural gas mixed with carbon dioxide gas. Whilst the discovery is not in itself of commercial value, it is indicative of suitable conditions for the formation of hydrocarbons. Drilling continues. Several gas shows were known previously from observed eruptions in the lakes.

No occurrence of coal or peat is recorded.

Uganda is well-endowed with hydroelectric power and produces electricity for its own use and for export to adjoining countries. The country relies on imports for all hydrocarbon fuels.

The Department of Petroleum Exploration and Production has produced a promotional brochure on the hydrocarbon potential of the Albert Rift Valley.

## LAWS AND REGULATIONS AFFECTING FOREIGN INVESTMENT

NAME	AREA
<b>Mining</b>	
The Mining Act, 2003	Law governing all mining and mineral Matters
The Mining Regulations, 2004	Regulations supporting the Mining Act
<b>Investment</b>	
Investment Code Act (Cap 92) Laws of Uganda	Law governing investment 2000
<b>Trade, Taxation, Finance and Insurance</b>	
Companies Act (Cap 110) Laws of Uganda 2000	Law governing registration and operation of companies
Income Tax Act (Cap 340) Laws of Uganda 2000	Law governing taxation
Exchange Control Act (Cap 171) Laws of Uganda 2000	Law governing foreign exchange
Financial Institutions Act (Cap 54) Laws of Uganda 2000	Law governing financial institutions
Insurance Act (Cap 213) Laws of Uganda 2000	Law governing insurance
<b>Labour, Immigration and Citizenship</b>	
Employment Act (Cap 219) Laws of Uganda 2000	Law regulating employment
Immigration Act (Cap 63) Laws of Uganda 2000	Law governing immigration
Uganda Citizenship Act (Cap 65) Laws of Uganda 2000	Law governing citizenship
Uganda Citizenship and Immigration Control Act (Cap 66)	Law governing citizenship and laws of Uganda immigration
<b>The Environment and Land</b>	
The National Environment Act (Cap 153) Laws of Uganda 2000	Law governing environmental protection and natural resources
The Land Act 1998	Law governing the ownership of land
The Land Regulations Act, 2004	Regulations supporting the Land Act
Registration of Titles Act (Cap 230) Laws of Uganda 2000	Law governing Registration of Land
<b>Contracts and Arbitration</b>	
Contract Act (Cap 73) Laws of Uganda 2000	Law governing contracts
The Arbitration and Conciliation Act 2000	Law governing arbitration

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This listing is not complete but is presented here to help the reader comprehend the breadth and quantity of material available. The records of the Department of Geological Survey and Mines (DGSM) include all the unpublished reports made since inception of the organisation in 1919. Only some of these reports are listed below.

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## UGANDA AT A GLANCE

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Official Name	The Republic of Uganda
Political System	Directly elected President, with executive authority; Parliament elected on a non-party basis, with legislative authority
Head of state and Government	Yoweri Kaguta Museveni
Form of government	Unitary, with limited devolution to regions
Next election date	2006 (last presidential election held in March 2001)
Surface area	241,000 sq km (of which 44,000 sq km are covered by freshwater bodies)
Population	24.7 million Population density, 126 persons per sq km
Official Language	English
Religion	66% Christian, 16% Muslim, 18 % Others
GDP per capita	\$280, \$1,250 (current international \$, PPP)
Currency	Uganda Shillings (abbreviated "Ushs") Exchange rates (June 2004) \$1 = 1,815 Ushs, £ 1 = 2,224 Ushs, ¥ 100 = 1,635 Ushs
Time Zone	GMT + 3 hours

## LIST OF PUBLIC HOLIDAYS

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Name of Holiday	Date
New Year's Day	1 January
NRM Day	26 January
Eid-ul-hadj	flexible
Womens Day	8 March
Good Friday	flexible
Easter Monday	flexible
Labour Day	1 May
Martyrs Day	3 June
Heroes Day	9 June
Independence Day	9 October
Christmas	25 December
Eid-el-fitr	flexible

## MEMBERSHIP IN INTERNATIONAL ORGANIZATIONS

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Apart from the relevant provisions of national legislation, Uganda is a signatory to or a member of the following:

- The Multilateral investment Guarantee Agency (MIGA);
- The International Centre for the Settlement of Investment Disputes (ICSID);
- The Convention of the Recognition and Enforcement of Foreign Arbitration Awards;
- The Overseas Investment Insurance Corporation of the United Kingdom;
- The Overseas Private Investment Corporation of the United States;
- The Convention on the Settlement of Investment Disputes between States and Nationals of other States; and
- The African Trade Insurance Agency (ATI)

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**REPUBLIC OF UGANDA**

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