



Asmara Geocongress
2010 September 22-27

Anyone interested in attending the Asmara GeoCongress 2010 in Eritrea and requiring assistance with air flights, hotel bookings or Visas should contact the GeoCongress Administrator (Betty Tesfay) for further details at: info@emec.yahoo.com. We look forward to welcoming you to Eritrea.

# Hot spot in the Arabian Nubian Shield



The people and government of Eritrea are resolute in their endeavour to rebuild the country's economy, and to secure social and economic progress

RITREA joined the world community of independent states in May 1993 following a 30-year war for liberation ending in May 1991.A UN-supervised referendum, held in April 1993, enabled the Eritrean people to state unequivocally to the world their strong choice for freedom and independence.

Since immediately after independence, the government of Eritrea has been engaged in rehabilitating the war-torn economy and improving the standard of life of the people. This was effective in taking the annual growth rate of the economy to 7% until it was curtailed by the border dispute with

neighbouring Ethiopia which started in May 1998.

Located in the north-eastern part of Africa, Eritrea is bounded by Sudan to the west and north, and Ethiopia and Djibouti to the south, with the Red Sea on its east coast. Eritrea covers a land surface area of about 125,000km², including hundreds of coral islands in the Red Sea, and has a population of about four million people. The country is home to nine ethnic groups, all with a strong sense of national unity. Tigrinya and Tigre are the most widely spoken indigenous languages. English is commonly used in the business community, while Arabic and Italian are also frequently encountered.

The topography of Eritrea is exceptionally varied: the 1,200km-long coastal plain, which is only a few metres above sea level; the escarpment, which rises steeply to the central highlands at more than 2,500m above sea level; the low-lying western and southwestern parts of the country, which lie at less than 500m above sea level; and the rugged mountain chains that run from the central plateau to the extreme north of the country.

The climate in these different terrains varies from arid, through semi-arid, to temperate. The mean annual rainfall in the coastal areas is less than 300mm per year, while, in the highlands and the western lowlands, rainfall ranges between 500 and 1,000mm.

Eritrea's infrastructure is centred on a well-developed communications network linking the capital city, Asmara, to the regions of the country, including the two main sea ports of Massawa and Assab, and to the neighbouring countries. Asmara and Massawa have international airports, which also serve internal flights.

Inevitably, the ravages of war have left their mark on the infrastructure, and the reconstruction of the prime facilities has been a high priority. Part of the railway has been rebuilt after years of abandonment, and it is now functional from Asmara to the port of Massawa. Telecommunications facilities have also been renovated and developed, and mobile phones are now widely used in and around the major towns.

**ERITREA'S GEOLOGY AND** 

The geology of Eritrea comprisess Precambrian basement rocks overlain unconformably by predominantly Mesozoic sedimentary rocks, and by Tertiary to

Quaternary volcanic and sedimentary rocks.

Basement rocks in Eritrea underlie more than 60% of

the country's surface. The basement rocks of Eritrea

form part of the Arabian Nubian Shield (ANS), exposed

in north-east Africa (Egypt, Sudan, Eritrea and Ethiopia)

and in Saudi Arabia, northern and north-western parts

shield is believed to represent a 'mega-suture' between

Achaean and Paleoproterozoic continental crustal

of Yemen, and parts of the western Middle East. The

Precambrian basement rocks

**MINERAL POTENTIAL** 

## Message from Ahmed Haj Ali, Minister of Energy and Mines

N BEHALF of my ministry and the government of Eritrea, I am pleased to welcome you to this supplement from *Mining Journal*, which will give you background information on Eritrea and the investment opportunities in the minerals sector, including profiles of the exploration and mining companies operating in the country.

Geological works and recent remote-sensing investigations proved that Eritrea possesses favourable geological settings.

The greenstone belt of Eritrea, which hosts precious and base metals, covers 70% of the country. The discovery of the Bisha high-grade zinc-copper-gold deposit, and subsequent announcements made by several other exploration companies operating in Eritrea, have demonstrated the potential the nation possesses for major mineral deposits.

A liberal economic policy with competitive tax regimes, full guarantees and protection of investments, untapped geological terrains, highly motivated, disciplined and hard-working people, an

Ministry of Energy and Mines Asmara, Maekel Eritrea 5285

**Tel:** +291 | 120089 **Fax:** +291 | 127652 www.moem.gov.er

administration free from corruption, a safe and free country, make Eritrea an ideal destination for investors. The incentives provided to investors will be

briefly spelt out in this supplement.

The Eritrean mining law provides simple procedures for the submission and processing of licence applications.

I sincerely hope that this supplement, although not exhaustive, will guide you and enable you to make some meaningful decision on how to invest in the Eritrean minerals sector. You are always welcome to contact us for further enquiries.

Hon Minister of Energy and Mines Ahmed Haj Ali

#### CONTENTS



#### Published in August 2010 by:

Aspermont UK Albert House, I Singer Street London EC2A 4BQ Tel: +44 (0)20 7216 6060 Fax: +44 (0)20 7216 6050

E-mail: editorial@mining-journal.com Website: www.mining-journal.com Supplement author: Mebrahtu Ogbazghi, of the Ministry of Energy and Mines of Eritrea

of the Ministry of Energy and Mines of Eritrea Supplement editor: Chris Hinde Design and production: Tim Peters

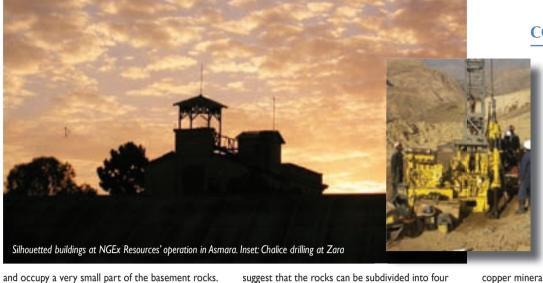
Printed by Stephens & George Merthyr Tydfil, UK



rocks make up the older components of the shield

the ancient east and west Gondwana.

#### **COUNTRY OVERVIEW**



"Eritrea possesses a

geological setting that is favourable for both

precious-metals and

base-metal

mineralisation"

and occupy a very small part of the basement rocks. The major part of the shield consists of Neoproterozoic (c 870-670Ma) continental-marginal and juvenile intraoceanic magmatic-arc rocks.

In Eritrea, the basement rocks have not been well studied despite their high mineral potential. The two geological maps so far completed cover the western part of the country (Geology of Gash River Area) and the southern part of the country (Geology of Mai Dima/Kohain Area). Compilation of geological maps at a scale of 1:250,000 has

recently been completed for four map sheets.

Other studies, based largely on satellite image interpretation aided by limited ground controls,

tectonic blocks or segments, separated by tectonic boundaries. Three of these blocks - the western, central and eastern segments - underlie northern and

> central Eritrea, while the fourth, the Danakil segment, occurs in the south-eastern part of the country.

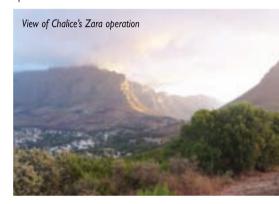
The western segment, the Barka Terrane, is exposed in the north-west and underlies the Barka lowlands. It comprises amphibolite, amphibolite-facies pelitic schists containing kyanite and staurolite, quartzites and marhle

The central segment, known as the Hagar Terrane, extends from the Barka River to the Adobha Abi valley in the east, and comprises several large elliptical bodies of various tectonic units dominantly composed of oceanic and accretionary wedge materials.

Occasionally, layered sequences of chloritic schists are seen, inter-layered with epidotic and chloritic metabasalts, occasional thin and discontinuous marbles, and manganiferous and ferruginous cherts. The Hagar Terrane displays an east verging thrust contact with the adjacent segment to the east. The Hagar Terrane is known to be prospective for chromite, platinumgroup elements, nickel, gold and

copper mineralisation.

The eastern segment, the Nakfa Terrane, is bounded by the Adobha Abi valley in the west and by the Red Sea escarpment to the east. It is made up of calc-alkaline volcanic and volcaniclastic rocks



#### Mining law and the licensing procedure

The legal framework governing the conduct of all mining and related operations within the territory of Eritrea is embodied in the mining law, which comprises the Minerals Proclamation (No68/1995), the Mining Income Tax Proclamation (No69/1995) and Regulations on Mining Operations (Legal Notice No 19/1995), all of which were promulgated in March

The mining law was prepared to satisfy the key policy which is that all mineral resources in Eritrea are public property, and hence the State has a duty to ensure the conservation and sustainable development of these resources for the benefit of the people. It also provides a favourable environment for foreign direct investment into the mining sector.

Due recognition is made of the significant role that foreign investment and skills can play in the development of this sector, and of the capital intensive, long-term, and risky nature of mining investments. The law also recognises the importance of regulations to ensure the proper protection of the natural environment, and strongly urges operators to comply with sound principles of resource management and land use.

The Eritrean mining law is up to date, attractive and competitive, as it provides considerable benefits and incentives to investors. For example, the law provides for:

- The right to exploit any commercial discoveries made pursuant to a valid exploration licence.
- The right to sell locally or export, free of all

- duties and taxes and without being required to obtain any other authorisation or permission from any other government agency, all minerals produced pursuant to a mining licence.
- A simple and fair taxation system which recognises the risky nature of mining investments, and hence allows:
  - accelerated depreciation (straight line method over four years) of all capital and preproduction costs; write-offs of exploration expenditure incurred anywhere in the country;
  - the carrying forward of losses;
  - a generous reinvestment deduction (5% of gross income); and no dividend tax;
  - a nominal rate of import duty (0.5%) on machinery, equipment and spare parts necessary for mining operations; and
  - low royalty rates as well as an option for the reduction, suspension or waiver of the royalties in appropriate circumstances.
- Equitable foreign exchange regulations, permitting; free and unrestricted repatriation of earnings; retention of a portion of foreign currency earnings abroad in external accounts; and maintenance of foreign currency accounts in banks in Eritrea.
- A simple 'one-stop' licensing system enabling all the formalities for all types of licences for mining operations to be completed by a single government agency (the Department of Mines within the Ministry of Energy and Mines).

- The mining law permits these licence types:
- Prospecting Licence, valid for one year and non-renewable.
- Exploration Licence, valid for an initial three years, but which may be renewed twice for additional terms of one year each, with an option for further renewals in appropriate circumstances.
- Mining Licence, valid for 20 years with optional 10-year renewals.

Licences are exclusive and grant their holders an automatic right to obtain an Exploration Licence from within a Prospecting Licence, and a Mining Licence from an Exploration Licence, subject to the fulfilment of the obligations under the preceding licence. Although the maximum area that a single licence can cover is fixed at 100km2 for a Prospecting Licence, 50km<sup>2</sup> for an Exploration Licence and 10km<sup>2</sup> for a Mining Licence, simultaneous possession of multiple contiguous licences is permitted.

Applications for licences may be made by individuals or legal entities of any nationality and are made on specified forms that can be obtained from the Department of Mines of the Ministry of Energy and Mines, and must be accompanied by a non-refundable processing (registration) fee and supporting documents. Successful applicants are also subject to a payment of licence fees and the first year's rental upon the issue of a licence. The rate of these fees is governed by regulation.

#### **COUNTRY OVERVIEW**

conformably overlain by a metasedimentary sequence of chlorite schists, grits and polymict conglomerates with occasional pelitic sericite schists and carbonates. The metavolcanic rocks are intruded by variably deformed plutonic to hypabyssal calc-alkaline bodies. The sequence is cut in places by post-kinematic granites and gabbros and is also transected by several narrow shear zones sub-parallel to the regional strike.

The Nakfa Terrane is considered to represent a relict island arc assemblage. Several VMS (Volcanogenic Massive Sulphide) base-metal deposits and gold showings are associated with this tectonic unit.

The southern segment, the Danakil Terrane, is composed of metamorphic rocks, which may be grouped into three formations:

- I. Migmatitic hornblende biotite gneisses.
- A phyllitic formation consisting of schists, conglomeratic phyllites, crystalline limestones and graphitic schists.
- 3. Post-tectonic granitoids.

The recently compiled geological map of the whole country at 1:1,000,000 has divided the Precambrian basement rocks into seven domains, five groups and three formations, and represents a detailed presentation of the rock units of the country.

#### **Mesozoic Sediments**

The lower Mesozoic sediments are represented by the Merbet (Adigrat) sandstone which outcrops in the south and in the Danakil area, and is commonly intercalated with siltstones and haematitic layers. It lies unconformably over thin layers of conglomeratic sandstones which, in places, appear to possess the characteristics of a glacial deposit.

Overlying the sandstone is the Jurassic Adailo (Antalo) limestone. This unit is exposed over a large area in the Danakil and is made up of limestones that are compact, partly shelly, fossiliferous and layered. Intercalations of quartzitic layers are present in the lower part, while towards the upper part the sequence becomes mainly gypsiferous to dolomitic.

The upper sandstone forms pockets of sandstones preserved from erosion. Commonly, this sandstone is medium to coarse-grained but partly conglomeratic, light-coloured, and dominantly quartzitic.

#### **Tertiary Volcanics and Sediments**

The Tertiary volcanics can be split into three units:

I.The plateau-forming Tertiary basalts that are predominantly olivine basalts with intercalations of intermediate lavas and tuffs.

- 2.The lower Afar stratified basalts composed of basaltic lava flows and tuffs usually found intercalated with sediments of the Danakil formation.
- 3.The Afar basalts composed of recent lava flows and volcanic cones, with minor acid to intermediate volcanics, mainly trachytes, rhyolites and ignimbrites. The Tertiary basalts are actively exploited for aggregates.

The Tertiary sediments lie along the Rift escarpment and in central Afar. Three sedimentary formations have been identified: the Danakil, Dogali and Desset formations. The Danakil and Dogali formations are of late Tertiary age and are composed mainly of limestones intercalated with conglomeratic sandstones and siltstones. They are overlain by calcareous sands with coral reefs, partly consisting of



Nevsun Resources' Bisha property

pebbles of volcanic origin, and gravels with sand, silt and clay horizons. The Desset formation comprises sandstones, clays and fine beds of anhydrite and halite unconformably overlying the Dogali formation in the northern part of the coast, while the Red Series containing coarse clastic freshwater sediments occupies the southern part of the coast.

#### **Quaternary sediments**

A thick evaporite formation of bedded halite, gypsum, anhydrite, potassium and magnesium salts, with shell material, fills the basin in the Danakil Depression. Deposits of sheet-flood terraces, silt, sand and gravel are present in some places occasionally covered by wind-blown sands. Basaltic flows and related spatter cones represent Quaternary volcanic activity in the Danakil region.

#### **ERITREA'S MINERAL POTENTIAL**

Although Eritrea has a long history of mining, modern mining only began at the start of the 20th century following the Italian colonisation of the country.

Following the Second World War, mining and related operations continued,

although intermittently.

In the early 1970s, this resulted in the development of the short-lived modern mine at Debarwa, before the independence struggle forced its closure. Overall, in terms of mineral potential assessments and geological work, much of the country remains unexplored, despite the several recent discoveries already made.

Eritrea has demonstrated potential to host significant VMS deposits after the discovery of the Bisha, Bisha

North West, Harena and Hambok massive sulphide deposits in the western lowlands, and Koken in the north-western lowland. The recent progress at Emba Derho, Adi Nefas and Debarwa in the central highlands are additional examples, along with the Seroa and Harab Suit areas.

The potential for shear-hosted gold deposits is also shown from the gold discovery in Zara (at the Koka prospect), where exploration work was conducted over a small area along a major shear zone. The country is not well explored and it is widely expected that there are many economic mineral deposits in different prospective areas still to be discovered.

Eritrea possesses a geological setting that is favourable for both precious-metals and base-metal mineralisation. Industrial minerals are also found in



various parts. The range of identified potential deposits covers gold and other precious metals, polymetallic massive sulphide types and quartz-vein and quartz-stockwork types of deposits. There is an indication of the occurrence of nickel and chromite mineralisation associated with the ultrabasic rocks in the far north.

Occurrences of potash and sulphur evaporates have been recorded in the past in the Danakil depression near the east coast, south of Massawa. Various construction materials, including marble and granite, are found in several parts.

#### Gold

"Eritrea has

demonstrated potential

to host significant VMS

deposits after the

discovery of the Bisha,

Bisha North West.

Harena and Hambok

massive sulphide

deposits in the western

lowlands"

Recent exploration activities have proved that gold occurrences are widespread in many parts and the country hosts a great potential for developing more gold deposits. In addition to the previously known areas of primary gold occurrence in the central highlands (which includes the Hamasien gold field) and those of Shillalo in the south-western lowlands, as

well as those of southern Eritrea, exploration activity in the last decade has shown the presence of potentially economic gold deposits in the western lowlands and in the northern part.

Gold is often associated with base metals, as at Bisha, and at the gold showings in the Haykota area. There are also examples in the south-east at Tesseney, and in northern Eritrea (represented by the demonstration of about IMoz gold at Zara).

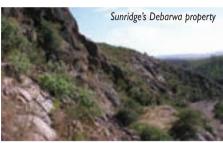
The average head grades in most of the historic vein

gold mines active during the Italian colonial period (up to the late 1950s), were reported to be as high as 25-45g/t, with reasonably good recoveries.

Eritrea's gold mineralisation is usually hosted in quartz veins and stockworks, and in particular in shear zones associated with felsic volcanic rocks, dioritic intrusions and in schists that are frequently sub-parallel to the strike of the pronounced cleavage of the host rocks.

Occurrences of gold within exhalative VMS deposits, and in the weathered and supergene zones overlying them, are becoming more evident with the recent additional discoveries of gold in Debarwa and Adi Nefas, and nearby in Gupo and Adi Rasi (in the central highlands), and at Bisha and Harena (in the western lowlands).





#### **Base-metal deposits**

NNW to NNE-trending horizons of gossans, exhalative cherts and altered felsic rocks that are indicators of massive sulphide mineralisation are recorded in many parts. The ore minerals of these massive sulphide deposits are predominantly chalcocite in the supergene zones, with predominant pyrite with lesser amounts of sphalerite, chalcopyrite and bornite in the underlying sulphide zones.

A major belt of massive sulphide deposits with gold and base-metal mineralisation passes through Asmara. It includes, as well as the historically known Debarwa, the newly discovered Adi Nefas, Emba Derho and many other localities. These lie within a roughly 50km-wide belt over a strike length of 250km, extending for over 50km north of Asmara to the Ethiopian border to the south. Emba Derho is emerging as a large but low-grade copper-zinc deposit with some associated gold, and a mineral resource has been established, possibly amenable to large-scale open-pit mining. Extensive drilling has defined NI43-101-compliant resources at Debarwa and Adi Nefas.

The belt that includes the Bisha, Bisha North West, Harena and Hambok VMS deposits in the western lowlands has already demonstrated the presence of a potential world-class deposit, but is also being actively explored for further discoveries.

Other evident and similar indications lie further north and south of these. A belt of copper mineralisation is in the Raba-Semait area, sulphide-rich gossanous outcrops at Mount Tullului (Bedeho) in Sahel, northern Eritrea and in the Mt Seccar and Sheib areas in the eastern lowlands. The most notable is, of course, the Bisha high-grade zinc-copper-gold deposit. This volcanogenic massive sulphide deposit is expected to yield a total of 1.06Moz gold, 9.4Moz silver, 734Mlb copper and 1,075Mlb zinc.

#### **Industrial minerals**

Evaporite sequences outcrop at Colluli, south of Bada in the Danakil Depression, containing potash, sylvite and gypsum. Substantial deposits of the latter are also found in the Desset area, north-west of Massawa. Large deposits of common salt also occur at several

places along the Red Sea coast.

Considerable quantities of high-quality silica are found at Merbet, already exploited for glass manufacture. In addition, deposits of silica sand with feldspar occur in various wadis of Eritrea. High-purity feldspars occur in pegmatites at Lahazen, 35km south of Massawa. Sub-economic deposits of mica, once exported by the Italians, are found south-east of Lahazien.

Large deposits of kaolin occur in the lateritic horizon in parts of Teraimni, at Adi Koteio close to Adi Kwala, Adi Keih, Zeghib, Adi Hawusha, Adi Ahderom and west and south-west areas of Himbirti. Extensive deposits of the raw materials for cement manufacture occur close together at Adailo, near Tio, with all the constituents being present, including limestone, marl, clay and gypsum.

Barite occurrences have been identified around the Heneb, Meter and Gharsa wadis north-west of Mersa Gulbub. Barite veins also occur associated with faults in the sediments of the Dogali and Desset Formations. Other barite deposits of economic significance, with reported grades of 95-97%, are known to exist at Debarwa and Ketina. Gypsum deposits are also found in the Desset plains.

#### **Construction materials**

Large deposits of marble occur as belts running north-northeast in the Gogne area extending from Gogne to Goranda, and in the Adobha area. Other significant marble deposits occur at Afhimbol, Amberbeb and Mt Kuruku (in the upper valley of Barka). The Kertse-Komte and Debri black and grey marble deposits occur south of Decamhare and have been previously exploited over many years. Recrystallised limestone deposits with variegated colours occur in the Dichinema area, in the south west.

Granites of various colours and textures are exposed over large areas. Granites of dimension stone quality, currently being exploited, occur at Geleb (pink granite), and in the Arato, Korbaria and Tukul areas (grey granite). The Mai-mine granite and Elabered granite are also suitable candidates for dimension stone. A narrow outcrop of coral limestone extends along the coast from the headland of Ras Kassar to the coastline of Tio. Immense deposits of limestone occur in the Adailo-Aitosh area south-west of Tio.

#### Geothermal potential

The possibility of the economic exploitation of geothermal heat for power generation occurs in the rift area, associated with volcanic activity. Alid, Nebro and Dubi are the main target sites where geothermal activity is known to be intense. Lower-temperature activity also occurs at Mai Wuui, 30km west of Massawa. Geothermal activity, evidenced by fumaroles and hot springs with extensive alteration of the adjacent ground, are abundant in the Alid geothermal field.

Studies so far in this area indicate the possible presence of a high-temperature reservoir below the surface. The geothermal manifestations at Nebro and Dubbi are also promising, but further study will be needed to estimate the reservoir temperature.

#### Oil and gas

Even though the oil and gas potential in Eritrea is not well-defined, the opportunity to make a discovery appears to be high, particularly within the pre-salt formations. An Italian company began exploration for

### **Exploration** and mining

Exploration started in liberated Eritrea in 1996 straight after the promulgation of the Mining Law. The level of participation by foreign companies has increased significantly following the discovery of the high-grade VMS deposit at Bisha. There are 16 mining and exploration companies operating in Eritrea from Australia, Bermuda, Canada, China, Libya, the United Arab Emirates and the UK.

These companies collectively operate 34 projects. They include some advanced exploration sites (where mineral resources have been established, and, in some cases, where scoping-level and feasibility studies are completed) to early-stage prospecting projects (where reconnaissance mapping is being carried out).

The total area covered by exploration and mining activites is near 14,000km<sup>2</sup>. As a result of exploration during the past ten years, mineral resources have been identified containing over 3Moz gold, 41Moz silver, 1,600Mlb copper and 4,200Mlb zinc.

In addition to these resources, the level of interest to secure new ground by existing as well as newcomers is increasing.

Recently, for example, Newmont Ventures Ltd, a subsidiary of Newmont Mining Corp, has shown interest (through an agreement in principle with Chalice Gold Mines Ltd) to enter into a regional venture to explore for gold in Eritrea. The area applied for which the subject of the venture covers about 24,000km², and is subject to applications for grant from the Eritrean government. Under the proposed venture, Newmont would fund an initial US\$1 million reconnaissance exploration programme using its proprietary exploration techniques.

oil and gas in 1921 in the Dahlak Islands. Extensive geological investigations were conducted and eleven shallow holes were drilled by Agip in the area between 1935 and 1940.

In the early 1960s, Mobil, Gulf Oil, Shell and others carried out seismic surveys and drilled eight holes. Following Eritrea's independence, four deep wells were drilled which confirmed oil and gas indications. Three were drilled by Anadarko in the late 1990s in partnership with Agip and Burlington Resources. Limited seismic work and the exploration drilling of a single well was carried out by Perenco and KNOC (Korea National Oil Corp) in 2005.



#### **DEVELOPMENT-STAGE COMPANIES**

The number of companies that have reached the development stage have increased in recent years as investor confidence returns.

#### Bisha Mining Share Co (BMSC)

BMSC is a joint-venture company owned by Eritrea's National Mining Corp (ENAMCO) and Canada's Nevsun Resources Ltd. Its main mineral properties include the Bisha property in the west. Bisha contains a high-grade gold, copper and zinc deposit and other satellite deposits. The Bisha mining licence was granted to BMSC in January 2008 after exploration, which started in 2002, and which produced a positive feasibility study. The project is positioned to become the country's first modern mine, with production projected to return payable metals of 1.06Moz gold, 9.4Moz silver, 734Mlb (333,000t) of copper and 1,075Mlb (488,000t) zinc.

The milestones achieved in constructing plant and other facilities, which at the time of writing are more than 60% complete, suggest the project continues to be on schedule and on budget. Bisha is advancing well towards plant commissioning phase late in 2010. The ball and SAG mills have been assembled and full installation is expected to be complete soon.

Structural steel and plate-work; power generation and pipe lying; pre-strip mining and ore stockpiling are due to be complete within the third quarter.

The construction of the tailings facility started in late 2009 and installation of the impermeable liner should be completed in the last quarter this year. After a short commissioning process and after reaching commercial production, the company expects to produce over 100,000oz of gold each quarter at a cash cost of less than US\$250/oz.

With over 95% of procurement completed, the actual capital cost is expected to be within the budget of about US\$260 million. With these low operating costs, Bisha is anticipated to have a much higher-than-average industry profitability and cash flow, and the mine is expected to generate significant cash flow for the company and for the government.

In February, BMSC decided to fund the project by equity instead of debt financing, and this has enhanced the estimated cash flow by eliminating finance costs and debt repayment. Nevsun's financial position, along with ENAMCO's financial contribution, will carry the project through to positive cash flow in the first quarter of 2011. The Bisha mine will be a low-cost gold producer for the first two years and a low-cost, high-grade copper and zinc producer for the remaining ten-year mine life. Further resource potential exists at depth and from nearby discoveries within the company's licensed areas.

Metal production within the first two years is estimated at 900,000oz of payable gold, followed by over 500Mlb of payable copper in years 3-5 and an additional 1,000Mlb of payable zinc and 200Mlb of copper for the remaining projected life of the mine.

BMSC has entered into metal sales contracts for its future gold and copper production. Pricing for all metals will be fixed at spot rates at the time of delivery. Gold will be refined in Switzerland and Canada by two major international companies, while the copper concentrate will be shipped to major smelters in Europe and India. The metal sales contracts are considered to be a milestone and to be another vote of confidence in the project and Eritrea.

Recent exploration by Nevsun has focused on the Harena deposit, which is one of the other two VMS deposits identified, and which lies 9.5km south-west from the Bisha Main deposit. Harena is contained within Nevsun's exploration licence, contiguous to the mining licence.

In late 2009, 17 infill diamond drill-holes were completed to confirm the previously identified discovery. Harena was originally chosen as a potential exploration target based on an alteration anomaly defined from Landsat imagery. A subsequent airborne EM survey defined a moderate conductor over a limited strike length on what was interpreted as the same stratigraphic horizon as the Bisha Main deposit.

Diamond drilling in 2005 intersected various widths of oxide and sulphide mineralisation over a strike length of 400m confirming the presence of a satellite VMS deposit. As a result of the company's efforts to advance the Bisha Main zone through feasibility and development, the Harena area was left until late 2009 for further exploration. BMSC views the Harena deposit as a likely source of supplemental feed for the processing plant at Bisha, and it will probably provide valuable cash flow as an extension to the life of mine, without having to absorb start-up capital expenses.



Sunridge Gold is a junior Canadian mineral exploration and development company which holds three contiguous exploration licences – namely Medrizien, Debarwa and Adi Nefas. The licences partially surround Asmara and hence collectively are known as the Asmara project. The work so far by Sunridge has resulted in the definition of four NI43-101-compliant resources on the Asmara project with total combined metal content of 1,280Mlb copper, 2,500Mlb zinc, 1.05Moz gold and 31.8Moz silver.

The largest deposit is the 63Mt Emba Derho copper-zinc-gold VMS deposit located 12km north-west of Asmara. An independent positive preliminary economic assessment study was completed in June 2009. This shows the deposit has the potential to become a large open-pit mine, producing 60Mlb (27,000t) of copper, 133Mlb (60,000t) zinc and 21,000oz gold per year.

Recently, Sunridge, with the aid of PEG Mining Consultants Inc, has produced a strategic production study with the aim of defining methods of developing all four deposits together. These deposits include: the low-grade Emba Derho; the high-grade Debarwa (30km south of Asmara); and the high-grade Adi Nefas VMS deposit, along with the Gupo gold discovery immediately north of Asmara.

From a metallurgical perspective, this study has attempted to describe the processing options available for several mineralisation types from each of the Asmara project deposits.

The Debarwa deposit is believed to have excellent prospects, with the option of low-capital direct shipping ore (DSO) providing early returns, along with a longer-term (nine-year) production scenario improving the economics further. However, this study will need to be carefully reviewed and approved by regulators.

As well as the above-mentioned development areas, Sunridge possesses a large area with many as-yet undrilled targets warranting further exploration work. In October 2009, Sunridge signed a joint-venture exploration funding agreement with a leading copper producer, Antofagasta Minerals SA.

According to the agreement, the latter committed itself to inject US\$10 million into exploration over a five-year period to earn a 60% interest in part of the company's Asmara project, now known as the Exploration Areas.

The development areas (including the four already-defined resource areas) are excluded from this agreement, and Sunridge will advance them to production on its own. Since this was signed, several targets have been assessed and some drill-tested.

The Daero Paulos drilling programme, consisting of 12 widely-spaced diamond drill-holes, returned only a few narrow zones of mineralisation. The other target is the Adi Rassi copper-gold prospect, about 8km south-east of its Debarwa high-grade copper-gold VMS deposit. The drill programme consisted of at least four holes totalling 1,200m of diamond drilling.

As well as the above drilling programmes, a regional target-generation programme is under way covering all parts of the Exploration Areas defined in the agreement with Antofagasta. Stream geochemical sampling, satellite imagery analysis and local geological mapping are the main tools being used and it is hoped that this work will result in the generation of new drill targets over the next few weeks.







#### ■ Chalice Gold/Sub-Sahara Resources

A prospecting licence was originally granted in 1998 to Dragon Mining in a locality known as Zara in the north west. After a one-year regional reconnaissance, the licence was converted to an exploration type. Since then, all operation and management has been assigned to Australia's Sub-Sahara Resources, which has been actively exploring in Eritrea for the past nine years. The initial properties that Sub-Sahara secured contained the VMS prospects surrounding Asmara but this entire land package was sold to joint-venture partner Sunridge in 2007.

Since then, Sub-Sahara has focused on the Zara project, and was rewarded with definition of over 1.0Moz of gold at the Koka prospect with an average grade of 6.31g/t gold. During the credit crunch, the company had to halt all operations for almost a year

Koka open pit				
Item	Quantity			
Total waste	41.93Mt			
Total ore	3.39Mt			
Strip ratio (LOM)	12.4			
LOM grade (Au)	6.53g/t			
Total gold mined	712,000oz			
Total mining cost	US\$154.6 million			
Total cost (mined)	US\$3.41/t			

and reduce its employees. Sub-Sahara was then taken over by Chalice Gold Mines Ltd, which now funds the project completely.

A scoping study has been completed for the Koka gold prospect. Underground mining by sub-level caving was considered but rejected in favour of open-pit mining on the basis of operating cash flow. The open-pit option arose from the nature of the mineralisation and the additional dilution introduced by the underground mining method. Some of the parameters that define the open pit are shown in the table above.

The company recently announced it has completed the feasibility study for the Koka deposit. This document, with a Social and Environmental Impact Assessment (SEIA) and Environmental Management Plan (EMP), will be submitted soon to the ministry.

The findings of all studies are planned to be

presented at a workshop organised by the company in Asmara. All main stakeholders will be invited to discuss the results.

#### ■ NGEx/Sanu Resources Inc

Based on previous exploration works, Sanu continues its exploration activities in the Kerkebet and Mogoraib exploration licences targeting VMS deposits.

Generally, most of the work Sanu has accomplished are database entry, geological mapping and map compilation, and some follow-up and prospecting works in the Kerkebet and Mogoraib licences. The most notable achievement is the discovery of the Hambok deposit in the Mogoraib licence area immediately south-west of Bisha, along with promising drill intersections in Aradaib at the Kerkebet licence area and north of Bisha.

The Hambok project has initial NI43-101 measured and indicated resources containing 69,000oz gold, 231Mlb copper and 531Mlb zinc, as well as inferred resources containing 104,000oz gold, 319Mlb copper and 652Mlb zinc.

Moreover, prospecting and further work includes detailed mapping, a detailed magnetometer survey and diamond drilling carried out covering about 350km² south-west of Koken, Aradaib and Serarat, and south of Halay in the Kerkebet licence area. Sanu also holds two prospecting licences, to be converted to exploration. After the rainy season, the company plans to fly an airborne geophysics over all its properties in collaboration with Thani-Ashanti.





#### **EXPLORATION COMPANIES**

The Ministry has received applications covering a total surface of about 30,000km<sup>2</sup>. This is a clear indication that Eritrea is becoming an exploration hot spot.

#### Andiamo Exploration Ltd

Andiamo is a UK junior exploration company; still a private company. Andiamo was granted a 723km² exploration licence in the Haykota area in July 2009, having already identified targets from satellite images and from previous work in the area in 1998 by BRGM/La Source. Andiamo started work on the ground two days after receiving the licence.

The area lies immediately south-west, and on strike, with Bisha, and is adjacent to NGEx/Sanu's Mogoraib exploration licence to the north, and to Erilib's area to the south. It is considered to be highly prospective for shear-hosted gold and for VMS-type mineralisation, and already several substantial gossans along an exhalite horizon have yielded encouraging assay values for gold and base metals.

Andiamo has been very active on the ground since the granting of the Haykota exploration licence, undertaking regional and detailed geological mapping, extensive geochemical sampling and geophysical surveys. A small drill rig has been mobilised recently to site to test some of the geophysical and geochemical anomalies. This first programme aims to consist of shallow 'aircore' (which is smaller-diameter reverse-circulation) boreholes to provide indications as to whether more extensive drilling is merited.

Regional programmes covering the entire licence area will continue, including further geochemistry, geological mapping and geophysics.

#### ■ Beijing Donia Resources Co

Donia and its affiliate Zhong Chang Mining Co Ltd (also from China) hold multiple licences, including four for iron ore and three for base metals. Exploration work has included geological mapping, geochemical sampling, trenching and a magnetic survey. Investigation for iron ore, however, produced poor results and, after a thorough review of all projects by a new management team, the company decided to relinquish those licences. The precious- and base-metal prospects have been retained and further exploration is committed.

#### China Africa Huakan Investment Co and Land Energy Group (China) Ltd

Both companies are newly arrived from China, and were granted exploration licences in late 2009. Huakan holds ground at a locality known as Seroa, north-west of Keren (capital of the Anseba region), historically known for its gold occurrences.

Land Energy, on the other hand, has been issued with an exploration licence on a highly prospective area west of Barentu, capital of Gash Barka region. The area is contiguous with, and to the east of, Andiamo's exploration licence. The town of Gogne is situated at the centre of the licence. Both companies have focused on collecting stream sediment and soil samples from the entire licence area.

The samples were sent to China for laboratory analysis. Both companies have also applied for more ground in Eritrea. Land Energy has shown interest in potash mineralisation alongside South Boulder's area, and Huakan is looking for two more precious- and base-metal prospects.

#### Eritrea-China Exploration and Mining Share Co (ECEM)

ECEM is a joint venture between a Chinese company and the Eritrean ENAMCO. The principal property of ECEM is the Augaro exploration licence, which covers I,000km². The licence area is named after the Augaro deposit, recognised as the biggest gold mine during the Italian colonial period.

Previously, the licence was briefly held by Anmercosa, the exploration wing of Anglo American plc, and then by Nevsun Resources before it was abandoned. ECEM has conducted detailed geological mapping and drilling in the Augaro exploration licence area. Unfortunately, no promising results have been produced and ECEM has opted to bring in Sahar Minerals from Bermuda as a joint-venture partner to take over exploration of the licence area.

#### ■ Eritrea Libya Mining Share Co

Eritrea Libya Mining (Erilib) is a special joint-venture arrangement between Eritrean and Libyan companies formed early in 2009 and issued with two exploration licences in June 2009. The Nefasit exploration licence covers 1,636km² and lies east of Asmara at the top of the escarpment. The Fanco-Guluj licence is in the west of the country and covers 1,151km².

On both properties, Erilib has identified multiple targets based on previous works and extensive regional investigations consisting of geological mapping, geochemical sampling and geophysical surveys. Follow-up work continues and target areas for drilling are being identified.

#### London Africa Ltd

This is a London-based private company and was granted a prospecting licensee in June last year known as AK I-II. The area covered by this licence is I,555km² and lies in the Anseba and Gash Barka regions. During the one-year prospecting period, London Africa was able to identify multiple targets that warrant further exploration. According to the law, the licence has been converted to an exploration one, which will permit London Africa to assess the property, initially for three more years until renewal.

#### ■ Nubian Resources plc/Gippsland Ltd

Recognised as Gippsland by the ministry, the company holds prospecting licences at the Adobha valley in northern Eritrea. Interesting results from two fast reconnaissance sampling programmes, the first one of which was aided by helicopter, have led the company to generate target areas for further investigations.

The rock types found in the project area are consistent with those expected in a volcanogenic

massive sulphide (VMS) environment and are similar to the geological setting of the large Bisha Cu-Pb-Zn-Au-Ag deposit 200km along strike to the south. The presence of widespread copper mineralisation, combined with some high lead values in bedrock samples, significantly upgrades the prospectivity of Gippsland's Adobha tenements. Accordingly, Gippsland applied to convert them to an Exploration Licence, and has formally requested more prospecting ground. These applications have been processed and approved.

#### Sahar Minerals Ltd

Sahar is a Bermuda-based privately held exploration company established in early 2009. After an extensive evaluation process, the company secured two properties in Eritrea in February 2010, namely the Augaro gold-base metal project (held in a JV structure) and the Harab Suit gold-base metal project, which is 100% held in an exploration licence area.

Exploration programmes have begun on both projects subsequent to the licence agreement. The management is looking forward to fast-track drilling on both properties.



#### South Boulder Mines Ltd

South Boulder is an Australian exploration company looking for potash in the Danakil depression near the border with Ethiopia. The depression and its surroundings are believed to host several evaporate-hosted mineralisation types. After the necessary preparatory works, such as upgrading of road and other infrastructure, and establishment of a camp, the company started a drilling programme in late June. This is a significant milestone for South Boulder, and represents the first drilling programme undertaken on the prospect in 42 years.

The four to five drill-hole programme is designed to confirm historic shallow potash drilling intercepts and to provide data to enable an initial JORC resource calculation to be made. The first hole intercepted the upper portion of a potash layer starting at about 65m vertical depth. White carnallite potash mineralisation has been identified from visual and physical field tests. The full chemical composition of the mineralised intervals will be determined from laboratory chemical analyses.

#### Thani Eritrea Ltd

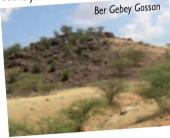
Thani Eritrea is a new partner in the exploration ventures of Eritrea, coming from the Emirates and South Africa (through Anglogold Ashanti's interest in the joint-venture agreement). It holds 1,863km² of exploration ground in two localities, namely Kerkasha in Gash Barka (immediately south of Barentu) and Akordat North in the Anseba region (sandwiched between London Africa and Sanu). Exploration on the ground has not yet started but the company is planning to run airborne geophysics over the entire area.

## Andiamo in Haykota – elephant country

#### Exploration is focused around the targets of Ber Gebey and Yacob Dewar

HE Haykota area is quite literally
elephant country, being home to
Africa's most northerly migratory herd
of elephants. But, this is also mining
'elephant country'.

The 723km²
Haykota exploration licence is located some 45km southwest along-strike from the Bisha mine, and appears to be underlain by similar geology.
Andiamo's principals have been well aware of



the region's potential for some 15 years, and finally secured the exploration licence in July 2009.

In the first year, work focused on the two known VMS prospects of the gossans at Ber Gebey and Yacob Dewer, which lie 3.4km apart and are directly on strike. Careful geological mapping has been following the exhalative horizon and further targets are emerging as the local detailed geological map develops.

It is also fortunate that this area was covered by the valuable geological map of the Eritrean-Norwegian joint project. Andiamo particularly values meticulous geological observations made on the ground.

The Haykota area has attracted considerable attention in the past, with some valuable work carried out by, for example, BRGM for La Source Développement in 1998.

Recent results of geochemical soil sampling for

gold, copper and zinc are compelling, and include high barium and lead values indicating close proximity to an ancient exhalative centre. These are backed up by gravity anomalies, together with consistent mineralisa-



tion from surface sample assays.

The Haykota area now benefits from good infrastructure, including: the sealed road from the licence all the way to Asmara; excellent field camp facilities; new bridges, providing easy access to the southern area; and mobile phone communications. The regional capital of Barentu is a short drive away to the east. There is expected to be ample groundwater to provide process water.

The licence area is prospective for both of the common mineralisation styles in Eritrea: VMS deposits and later orogenic gold deposits. Stream sediment geochemistry and recent outcrop sampling indicates that the southern part of the licence area holds the highest potential for gold deposits, while the northern part is clearly a target for outcropping and buried VMS mineralisation, including gold-enriched near-surface mineralisation.

The geology underlying the licence area is of felsic to mafic volcanic sequences, including flows and tuffs, with a distinctive marble horizon identifying the western margin of the Bisha belt. A strong regional foliation strikes

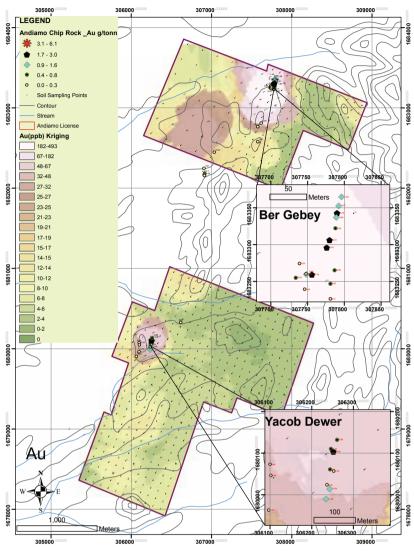
north-north-east across the area. Contemporary and later intrusives are present, and traversing the licence is a distinctive shear zone, which appears to be mineralised. Large numbers of artisan miners have been active in the area in the past and their workings are very evident at some locations.

#### **FUTURE WORK**

Work is continuing in two ways: an intensive exploration programme around the identified targets of Ber Gebey and Yacob Dewar; and a regional effort to identify further targets, both for VMS mineralisation and for gold. The same proven techniques will be used, but probably supplemented with airborne or ground EM, magnetometer and radiometric surveys.

#### STRONG MANAGEMENT

Very experienced and respected geologists run Andiamo, with extensive knowledge of both Eritrean geology and VMS-style mineralisation. The team also has many years of experience of the global capital markets for junior exploration companies.



#### CONTACTS

#### Andiamo

Dr Tim Williams London, UK

**E-mail:** tim@andiamoexploration.com

**Tel:** +44 (0)20 7790 5543 **Mobile:** +44 (0)7952 778702

Dr Seife Berhe Asmara, Eritrea

 $\textbf{E-mail:} \ seife@andiamoexploration.com$ 

**Tel:** +291 | 184662 **Mobile:** +291 713 2049

Bill Fisher

Toronto, Canada

E-mail: bill@andiamoexploration.com

**Tel:** +1 416 690 0232 **Mobile:** +1 647 271 4505

Website: www.andiamoexploration.com

# Bisha mine start-up eagerly anticipated

Eritreans expect the Bisha gold oxide mine to herald a significant boost to their national economy

ISHA Mining Share Co (BMSC) is an Eritrean company formed to develop and operate the Bisha mine in western Eritrea. The company is owned by Nevsun Resources Ltd (60%) and Eritrean National Mining Corp (40%).

Nevsun expects positive net cash flow during the first quarter of next year, and the strong government support is reflected in its independent purchase of a 30% contributing interest in the project.

Eritreans consider the Bisha mine as something special, and keenly await the start of production (due before year-end). This will be the first significant mine in the country for at least 75 years, and is considered the vanguard for a swiftly developing mining industry.

The open-pit mining operation, which lies 150km west of the Eritrean capital, Asmara, has been likened to a layered cake. The gold oxide layer at the top will, over a two-year period, provide a 900,000oz boost to project economics. Thereafter the underlying





supergene copper and copper-zinc sulphide layers will supply eight years of economic benefit.

The total expected production is 1.06Moz of gold, 9.4Moz silver, 734Mlb copper and over 1,000Mlb of zinc. A contiguous exploration licence gives room for future discoveries within an area of over 133km<sup>2</sup>.

#### TRAINING IN PLACE

Caterpillar has been providing training to the Eritrean mining staff. The equipment manufacturer has supplied the off-road mining trucks and excavators and is using both simulators and real-time input. Similarly, Atlas Copco, the supplier of the mine's production-drilling rigs, has been involved in training the drillers. Courses for the process plant operational staff will be start soon.

This large volcanogenic massive sulphide (VMS) deposit, rich in base and precious metals, is being









mined by in-house staff using open-pit methods; there is some potential to go underground after perhaps seven years. The uppermost layer, containing gold oxide, will be processed by a conventional gold recovery plant, consisting of a primary crushing circuit, two-stage milling plant, CIP leach train, Anglo American Research Laboratories (AARL) elution circuit and a tailings-storage facility. Oxide ore from the open pit will be stored on a run-of-mine pad before being crushed and milled at a rate of 2.0Mt/y, or 167.000t/mnth.

A Phase II construction programme will begin in 2011, when a flotation section will be added to the process plant for copper production. Another flotation plant will be added later for zinc sulphide production. In later years, copper-zinc sulphide concentrates will be transported by road to the port of Massawa where a US\$30 million storage and ship-loading facility is due to be constructed soon.

The Bisha project is based on an excellent resource for which the mining and extraction methods employed are industry standard. It would be difficult for it not to achieve a financial success. What makes this project of greater interest relates to its interaction with the State and people of Eritrea.

#### **DEVELOPING TRUST**

To start up in a country lacking a mining industry required a development of trust and understanding with respect to the commerce of mining. From this can come agreements, policies and codes of practice that are acceptable to all parties.

The formation of BMSC as the mining vehicle from the exploration success of Nevsun, and the introduction of Eritrean National Mining Corp, has been a great success.

Demands for funding and agreements on international standards for social and environmental requirements have been met. The future looks good for the expansion of BMSC's business in Eritrea.

#### **CONTACTS**

#### **Bisha Mining Share Co**

61, Mariam Gimby, Asmara Eritrea PO Box 4276 **Tel:** +291 112 4941



#### **Nevsun Resources Ltd (Head Office)**

Suite 800, 1075 West Georgia Street Vancouver, BC,V6E 3C9, Canada **Tel:** +1 604 623 4700 **Fax:** +1 604 623-4701

Toll Free: +1 888 600 2200

#### The Eritrean National Mining Corp

PO Box 918, Green Building, Dembe Sembel, Asmara. Eritrea **Tel:** +291 | 151441

# The location of the Koka deposit and Zara project in Eritrea

HALICE Gold Mines Ltd (CHN: ASX) is an aggressive exploration and development company dedicated to building shareholder value through focused exploration, discovery and development of high-quality gold and base-metal projects in Africa and Australia.

The company is recognised as having been one of the 'first movers' in Eritrea, and is on track to development of its Zara gold project. Chalice has also recently completed a positive feasibility study for the high-grade Koka deposit, and is undertaking an aggressive exploration programme for gold and base metals to expand its existing resource base in the underexplored Arabian Nubian Shield.

A combination of a robust gold resource at the Koka deposit, and the potential for further gold and base-metal discoveries within the Zara tenement block, places Chalice in an excellent position for rapid future growth.

#### AGGRESSIVE EXPLORATION

Based in Western Australia, Chalice owns a 100% interest in the strategically positioned 615km<sup>2</sup> Zara gold district, which remains virtually untouched by modern exploration. The district contains numerous artisanal gold-mining sites and gold geochemical anomalies which present high-priority targets for immediate follow-up. Based on these sites, and other targets being generated through continuing exploration, Chalice expects to build on its existing Koka gold resource quickly to maximise the project's economic potential.

Chalice is well funded, with sufficient financial resources to carry out an aggressive exploration programme. This is further supported by a Board of Directors and management with a wealth of expertise in the mining and exploration sectors, both in Africa and Australia.



# **Chalice Gold: 'first** mover' advantage

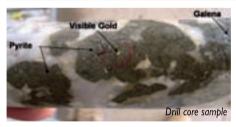
The potential of the Koka deposit and Zara project place Chalice in a strong position for fast growth

Koka: 100% Project Finance (US\$m)\* (Unleveraged)

	Gold price (US\$/oz)			
	900	1,200	1,500	
Life-of-mine EBITDA	381	589	797	
Average annual EBITDA	54	84	114	
NVP(5%) after-tax cash flows	99	196	293	
IRR after tax	22%	35%	45%	
Payback period (years)	2.8	2.1	1.8	
*The Fritrean government has a statutory 10% non-contributing interest with its share of bre-broduction and				

capital expenditure being repaid from production cash flow





#### **KOKA GOLD PROJECT**

The mineral resource and ore reserve estimate (June 1, 2010) for the Koka deposit has been calculated in accordance with the JORC Code by AMC Consultants Pty Ltd, using a 1.2g/t gold cut-off (see below).

Category	Mt G		Contained
		grade (g/t)	gold ('000 oz)
Indicated Resource	5.0	5.3	840
Probable Reserve	4.6	5.1	760

Chalice recently delivered a positive independent feasibility study for the Koka deposit; permitting is scheduled to be complete in the first half of 2011, to be subsequently followed by development. In parallel, the company is looking to grow its gold resource base through aggressive exploration of its extensive land

#### **EXPLORATION POTENTIAL**

The Zara project lies within an auriferous province that was virtually unexplored before 1998, when the first prospects were located by artisanal miners. Since then, numerous other gold prospects have been identified and several have seen considerable past and present artisanal mining activity. Exploration to date has focused on the Koka deposit largely, with very limited drilling at satellite and regional targets, offering significant exploration upside in the unexplored tenement block of 615km<sup>2</sup> surrounding Koka.

A programme of geological mapping, rock chip sampling and bulk-leachable extractable gold (BLEG) stream sediment sampling undertaken over the original Zara tenements has identified several previously unknown areas of interest that will require priority follow-up. Recently completed extensions of these surveys to the equally prospective northern and southern tenements has identified further areas of strong gold anomalism.

An extensive drill programme is under way on the Konate prospect, a Koka-style microgranite-hosted quartz stockwork deposit 5km south of Koka.

#### **CONTACTS**

#### **Chalice Gold Mines Ltd**

Dr Doug Jones, Managing Director Level 2, 1292 Hay Street West Perth, WA 6005 PO Box 2890 Perth 6001

Tel: +61 (0)8 9322 3960 Fax: +61 (0)8 9322 5800



#### **North American IR contact:**

Dr Toni Davies

Mobile: +1 (416) 566 4378 E-mail: tdavies@chalice.com

E-mail: info@chalicegold.com Website: www.chalicegold.com

# **Encouraging exploration results**

Eritrean-Libyan Mining Share Co is capitalising on its two exploration licences, granted just over a year ago

STABLISHED in February 2007,
Eritrean-Libyan Mining Share Co (Eri-Lib)
is owned equally by Eritrean National
Mining Corp (ENAMCO), representing
the Eritrean State, and Libyan African
Investment Co (LAICO), representing the Libyan
State. The company's main aim is to promote and
develop Eritrea's mineral resources.

Eri-Lib's two exploration licences (Fanco-Guluj and

Nefasit) were granted in June 2009. The Fanco-Guluj licence area covers 1,424km² and Nefasit 1,636km². Both properties are being explored, and several gold and volcanogenic massive sulphide (VMS) exploration targets have already been identified.

#### **TWO MINERALISED AREAS**

#### I. Fanco-Guluj licence area

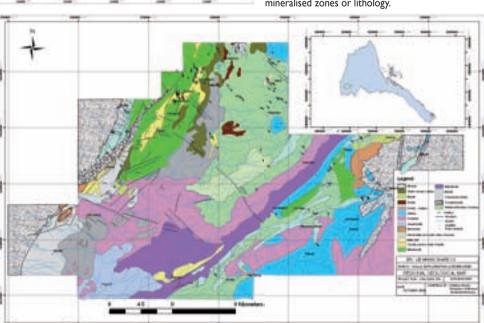
The Fanco-Guluj licence area is on strike with the Bisha volcanic belt and has similar geology and indications of VMS mineralisation. There are also extensive artisanal mining activities within the prospect areas.

The Fanco-Guluj area comprises meta-volcanic and meta-sedimentary rock assemblages, which are cut by syn- to post-tectonic intrusives. The major structural trend strikes NE-SW, and dip generally to the SE. There are numerous strike-slip shear zones with dextral sense of movement, which trend N-S.

Sericitisation, silicification, carbonitisation and propilytic alteration is pervasive, especially within the metabasalts and the foliated quartz porphyry granitic rocks. Gold occurs both as placer and primary gold in quartz veins, floats and in sheared gabbro areas. However, gold in gabbro seems to be associated with the alteration zones, mainly sericite, and quartz chlorite schists.

The presence of abundant carbonates, sericite and silica suggests that hydrothermal fluids rich in  $CO_2$  and  $H_2O$  have infiltrated into the gabbroic and metabasaltic rocks. Exhalatives are common in the project area which are indications of possible VMS occurrences.

The geochemical results show good gold values at 0.3-4.2ppm. Geophysical surveys (gravity and magnetic) were conducted at Melhoy, Assuna and Meriet. The results show high-gravity anomalous zones, which could be related to linear structures, mineralised zones or lithology.





Location map of the licence areas

#### 2. Nefasit licence area

The Nefasit licence area lies east of the Asmara VMS belt, which hosts the Debarwa, Adi Nefas and Emba Derho ore deposits. There may be similar VMS mineralisation present within the Nefasit property.

The geology of the Nefasit concession area is composed of syntectonic granitoids, low-grade volcano-sedimentary rocks, gabbros and diorites, overlain by recent volcanic rocks, laterites and Quaternary alluvial-colluvial sediments.

The area is one of the most tectonically active regions of Eritrea, which is manifested by major step faults, horsts and grabens related to the opening of the Red Sea.

Following the assessment of Rift Resources and Rudis reports, Eri-Lib launched regional mapping and also conducted detailed geological mapping at some prospect areas.

The presence of major shear zones and related quartz veins,was found to carry gold values ranging from 2.87-11.18g/t. It is also believed that the shear zones host epithermal gold mineralisation. Extensive artisanal mining activities are continuing at Ayet.

The main copper mineralisation at Mt Seker is expressed by malachite-stained outcrops that range from a few per cent to about 40% of the outcrop. It is also affected by abundant vuggy and fractured quartz veins. Results from Mt Seker have shown anomalous values of copper (2.0-5.9%) and zinc (171-612ppm).

Similarly, rock-chip assay results show that the Asus-Metkel Abyet malachite occurrences are rich in Fe, Cu and Zn mineralisation.

There is good correlation of the geophysical anomaly with the geochemical anomaly at the southwestern part of the survey area.



# London Africa turns prospects to

exploration

ONDON Africa Ltd is a private company (registered in England and Wales) set up in 2005 to apply for prospecting and exploration licences in Eritrea. The company, with offices in London and Asmara, is focused predominantly on the country's gold and base-metals potential.

In June 2009, the company was granted prospecting licences totalling 1,562km² in the Akordat-Orota region of central Eritrea. These licences were the first awarded to any foreign mining company in almost four years, and were the first to be awarded to a British company.

The company's prospecting licences were selected

A number of gold and base-metal prospects are now the focus of London Africa's work

based on a detailed interpretation of numerous ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) images. These highlighted a number of possible clay alteration zones associated with mineralisation.

Follow-up up work by London Africa on these targets has resulted in some interesting gold and basemetal prospects, which are now the focus of the company's exploration work.

In July 2010, in accordance with the Eritrean Mining Law, London Africa converted its prospecting licences



Signing the exploration licences (July 2010)

to exploration licences, dropping 25% of its original land position (to 1,168km²), yet retaining all its precious- and base-metals prospects.

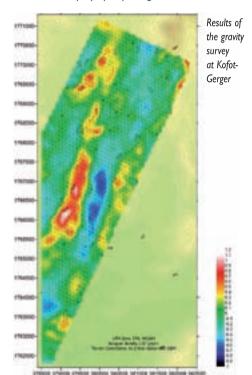
#### **KOFOT-GERGER VMS TREND**

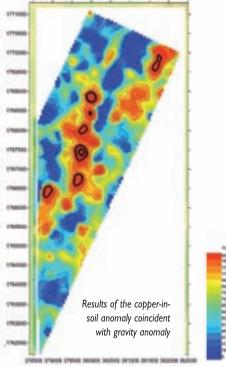
The prospects in this Volcanic Massive Sulphide trend display both VMS and skarn-like features:

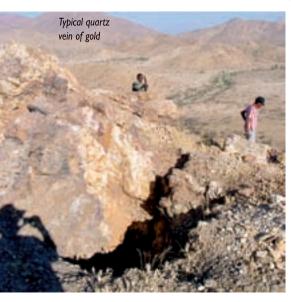
- Copper and gold are anomalous in malachite-rich gossans and gossanous zones.
- 3.2km continuous copper anomaly in soil samples (200m spacing) with coincident >0.5mgal, I.7km long residual, ground-based, gravity anomaly.
- Rock-chip samples from the outcropping gossans have returned grades up to 4% Cu and 4.58g/t Au.

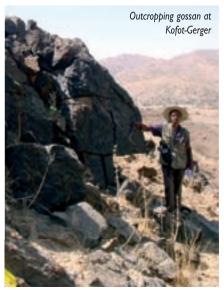
#### **GOLD VEIN SYSTEMS**

- Yakare: Polymetallic gold anomaly. Visible pyrite, galena and malachite associated with the gold mineralisation. Vein samples have returned grades of up to 2.56g/t Au.
- Tanenay: Extensive auriferous quartz vein system, up to 3km strike length and more than 20m-wide vein system in a regional structure. Vein samples have returned grades of 55g/t, 15g/t, 11g/t, 4.39g/t, 2.99g/t and 1.16g/t Au.
- Hawagu: Hosted near a major regional structure, along cross faults and openings parallel to the main structure. Best sample results have been up to 5 g/t Au.
- **Tablet:** Hosted along the same major structure. High-grade gold anomaly. Up to 23 lg/t Au from quartz vein sample.
- Engerne: Low sulphide gold vein. Up to 100g/t Au from rock-chip sampling. Results from 25 samples include: 100.91g/t, 25.93g/t, 13g/t, 7.99g/t and 2.77g/t Au.









#### CONTACTS

#### London Africa Ltd

5th Floor, 23 King Street St James House London, SWIY 6QY, UK **Tel:** +44 (0)20 7389 0581



#### London Africa (Eritrea) Ltd

Room 403, 4th Floor SA Building, Warsai Street Asmara, Eritrea **Tel:** +291 (1)11 1165

**E-mail:** info@londonafrica.co.uk **Website:** www.londonafrica.co.uk

# Potash success highlights potential

Progress by South Boulder at its core potash project in Eritrea has brought the junior to the attention of investors across the globe

ECENT success by South Boulder at its core potash project in Eritrea has brought the junior to the attention of investors across the globe The next 12 months should be exciting for South Boulder Mines Ltd, with exploration stepping up a gear in Eritrea and at its Duketon nickel and gold projects north of Laverton in Western Australia.

South Boulder's work in Eritrea has highlighted some of the untapped mineral potential. The company applied in May 2008 for an exploration licence at the wholly-owned Colluli project to explore for potash. The tenement was granted in July 2009.

As an early mover on Eritrea's potash potential, South Boulder could secure 906km² of highly prospective ground in the buried evaporite sequences of the Danakil Depression (a remnant of the Red Sea).

The potash-bearing evaporite sequences formed when part of the Red Sea flooded the depression and the sea later evaporated when the basin was cut off due to volcanic activity. This process continued many times over a 5-15 million-year period, resulting in a build-up of evaporite rocks to over 800m in places.

#### **COLLULI POTENTIAL**

The Colluli project was originally explored in 1968 by Kaiser Aluminium and Chemical, which completed 21 holes intersecting two shallow potash-rich layers. One was a 1.7m-thick sylvite-rich zone only 25m deep with grades averaging 12.5%  $K_2O.$  The second was a 17m-thick carnallite-rich zone intersected at around 390m depth with grades of around 17%  $K_2O.$  At that time as there was a major campaign of drilling and mining activity at the Musley and Crescent potash deposits, about 15km south of Colluli.

South Boulder began its maiden mineralisationconfirmation drilling on June 24, and on July 6 announced early success, with diamond-core drilling intersecting potash mineralisation at 65m deep.

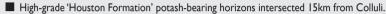
Two holes have been completed so far. Hole



#### Colluli potash

- 100%-owned, potentially 'world class' project.
- Diamond-drilling programme underway, first drilling since 1968.
- Historic results defined two shallow potash horizons, with grades up to 17% K<sub>2</sub>O, within 'Houston Formation'

sylvinite, carnallite and kainitite horizons.



- Potential to have low cap-ex and op-ex operation due to outstanding infrastructure location, solar evaporation and the potential to utilise solution mining methods.
- Recent drilling by Allana Potash confirmed shallow potash immediately south of the project area.

# Cycles to danif and republic Cycles to the and function Cycles to the and to the and Cycles to the and

#### Other projects (Australia)

#### **DUKETON GOLD**

- 100%-owned project in underexplored greenstone belt (1,500km²).
- New near-surface 'Terminator' prospect included 60m at 1.3g/t from 2m.
- Mineralisation defined over 400m of strike, and open in all directions.

Follow-up exploration under way to define and test Terminator and other regional targets.

#### **DUKETON NICKEL**

- The Bulge 'Rosie' and 'C2' nickel sulphide prospects, I 20km from Laverton.
- Massive high-grade Ni-Cu-PGE mineralisation at Rosie, including 5.2m at 9.13% Ni, 1.09% Cu, 0.21% Co and 7.09g/t 6PGEs.

Four rig follow-up drill programme under way to define initial resource, and mining lease applied for in May

Col-001 intercepted 6.0m of rock salt with sylvite from 59.2m, plus 10.1 of carnallitite from 83.2m and 10.1m of kainitite from 93.3m. Hole Col-002B, 2.5km north, intercepted 11.3m of carnallite from 56.6m plus 12.6m of kainitite from 67.9m. South Boulder believes the intercepts suggest the presence of a "significant shallow potash deposit".

South Boulder recently described itself as "very happy with the progress its Eritrean team has made in what have been "very trying conditions", noting that the government was "very supportive" of its activities.

South Boulder is completing a five-hole programme, and is expecting to drill around 2,000m. Drilling will continue to September, with a target of drilling enough holes to confirm the location and grade of some of the potash, complete a NI 43-101 geological resource model and run some 'back of the envelope' numbers.

South Boulder has gained confidence from work by Allana Potash Inc (AAA.V) and Sainik Coal Mining Pvt, which have defined (NI 43-101-compliant) resources at the Musley and Crescent deposits, less than 15km away from Colluli. South Boulder said it was "encouraged by the prospectivity of the basin demonstrated in the past, and by these two companies".

Colluli lies about 70km south of the coast, and the major shipping routes into Asia and Europe. The company also notes the potential to utilise the solar evaporation process (it is operating in one of the wrold's hottest places), which will be an advantage for the cost of potash processing. There is also potential to use the low-cost solution-mining techniques and to tap geothermal energy identified near the project.

#### **LOOKING AHEAD**

The Eritrean project is potentially very large, but there is only limited knowledge of potash in Australia. South Boulder notes most of the technical expertise lies in Europe, North America and Russia (all financial expertise is in North America). Thus, South Boulder is using technical consultants from Germany, and looking to tap the capital markets in Canada and Europe.

As well as its primary listing on the Australian Securities Exchange, South Boulder is listed in Frankfurt and Berlin. The company has US\$3.5 million in cash, and US\$2 million in listed investments. Managing director Lorry Hughes said: "We feel comfortable we have enough cash currently meaningfully to progress our potash project, as well as our gold and nickel projects in Western Australia."

He added: "We are at a very exciting stage, and very well leveraged to exploration success. We will have a very good understanding of how significant the potash and nickel deposits are within the next six months because we'll be drilling them both."

#### **CONTACTS**

#### **South Boulder Mines Ltd**

Australia Office:

133-135 Edward Street, Perth, WA 6000

PO Box 8355, Perth, WA 6849 Australia **Tel:** +61 8 9227 1144 **Fax:** +61 8 9328 8302

**Mobile:** +61 400 038 439

**E-mail:** lorry@southbouldermines.com.au **Website:** www.southbouldermines.com.au

Eritrea Office:

# Prefeasibility study announced

UNRIDGE Gold Corp (SGC/TSX-V) is a Canadian junior mining company that has been involved in exploration and development of base-metal and gold deposits in Eritrea since 2003.

Sunridge is focused on the polymetallic Asmara project, which covers about 1,000km² in central Eritrea, lying directly north, west and south of the capital city of Asmara. The infrastructure is excellent, with roads, power and water available throughout the project area, and access to the port of Massawa is only 120km away by road and railway.

Sunridge has so far successfully defined four mineral deposits at Asmara, and the company recently announced that it will proceed with prefeasibility studies on three of these deposits (Emba Derho, Adi Nefas and Debarwa). This was after considering the results of a study that examined the potential for co-developing the deposits. The study's author, PEG Mining Consultants, recommended a central plant for both base metals and gold at Emba Derho.

These three VMS deposits have a total (NI 43-101) Indicated resource that contains:

- 1,280Mlb (580,000t) copper;
- 2,500Mlb (1.13Mt) zinc;
- 1.05Moz gold; and
- 31.8Moz silver.

In addition, Sunridge and its strategic partner, Antofagasta Minerals SA, are continuing aggressively to explore and drill for new base-metal and gold deposits along known VMS trends on the Asmara project. Elsewhere, Sunridge's Gupo deposit contains 189,000oz of gold in the Inferred category.

#### **DEVELOPMENT STUDY**

The 'strategic production study' for the four deposits at Asmara examined the metallurgical characteristics of each deposit, and involved a high-level evaluation of the economics of combining development of the deposits. The Asmara project's four deposits are.

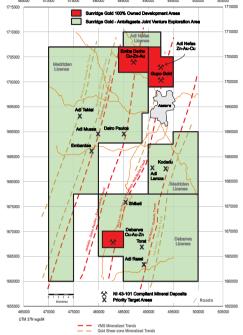
■ **Debarwa:** 4.5Mt (NI 43-101) Indicated copper-gold-zinc resource which includes a 1.4Mt super-gene copper zone averaging 5.36% Cu, 1.54g/t Au and 33.9g/t Ag. The recent study concluded that it is possible to selectively mine a high-grade portion (15-20% copper) of the super-gene zone for direct shipment to a smelter. This will be the focus of the prefeasibility/feasibility study to begin mining operations at Debarwa.

The polymetallic Asmara project hosts great potential for Sunridge Gold Corp, which is advancing its status



Core-handling facility at Debarwa

- Emba Derho: 62.5Mt (NI 43-101) Indicated copper-zinc-gold resource with a copper-rich zone containing 38.4Mt averaging 1.02% Cu and 0.99% Zn.A scoping study, completed in 2009, demonstrated strong economics and the company intends to begin prefeasibility studies in the December quarter this year which will include the satellite deposits Adi Nefas and Gupo Gold.
- Adi Nefas: 2.7Mt (NI 43-101) Indicated high-grade zinc-copper-gold resource which averages 8.38% Zn, 1.39% Cu, 2.85g/t Au and 99.3g/t Ag. Adi Nefas, which is only 6km from Emba Derho, will be part of the prefeasibility study.
- **Gupo Gold:** 4.5Mt (NI 43-101) Inferred gold resource which averages 2.99g/t Au. Gupo will be examined as part of the prefeasibility study at Emba Derho, and could potentially be combined with material from the gold-oxide cap at Emba Derho, located 6km away.



Asmara project map

#### **EXPLORATION POTENTIAL**

Since starting its exploration in Eritrea, Sunridge has enjoyed great success. This was boosted late last year when Sunridge entered into a strategic partnership with Antofagasta Minerals SA, whereby Antofagasta is now funding exploration on the Asmara project. Drill results are expected throughout 2010 from several high-priority base-metal and gold targets.





#### CONTACTS

#### **Sunridge Gold Corp**

Suite 1490 - 1075 W Georgia Street Vancouver, BC Canada V6E 3C9 **Tel:** +1 (604) 688 9478

Fax: +1 (604) 688 9458 E-mail: info@sunridgegold.com



