

# ASMARA GEOCONGRESS JOURNAL

## 2011



- Facts on Eritrea
- A message from His Excellency the Minister
- About the Ministry of Energy and Mines
- Highlights of 2010-2011
- Mining Law
- Geology of Eritrea
- Mineral potential of Eritrea
- Current mining activities and future investment opportunities



## A Message From The Minister



Dear Reader,

On behalf of my Ministry and the Government of Eritrea, it gives me great pleasure to welcome you to the 2011 geocongress.

Eritrea is an attractive venue for investment in the Mineral sector for, but not limited to, the following reasons stated below:

As part of the Arabian Nubian shield, 60% of the Eritrean territory is covered by Greenstone volcano sedimentary rocks known to be favorable hosts to several metallic Minerals. Again the Arabian Nubian shield is known for its ancient and Modern world class deposits, to name a few Sukeri in Egypt, Hassai in Sudan, Bisha in Eritrea, Maaden and Gebel-Said in Saudi Arabia.

Apart from these types of rocks, Eritrea also offers favorable geology for industrial and construction minerals of which the recent discovery of Large Potash deposit in the Northern Red Sea region makes it even more apparent. On top of this Eritrea has developed a coherent and attractive policy in the mineral sector as is portrayed in it's Mining Law. The Mining Law which is based on the Western Australia Mining Code and is clear, simple and transparent. The Government is seriously committed to develop this sector so as to play its positive

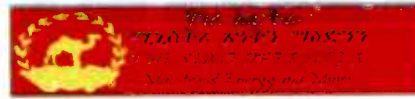
role in the development of the economy side by side with the other sectors.

Eritrea has a very enthusiastic work force keen to learn and adapt to the dynamism of this sector. These coupled with the positive role played by regional and local administration and the public at large make this country one of the top destinations for investment in the mineral sector.

Eritrea is far from being fully explored, there are still virgin but prospective areas out there awaiting to be looked at. For this and other reasons, Eritrea is an attractive venue for investment in the mineral sector.

It is my belief that the upcoming geocongress will offer a unique opportunity to highlight Eritrea's mineral potential and gain new partners in the development of the sector for mutual benefit. Industry leaders will have an opportunity to share experiences and discuss strategies to scale up investments.

Ahmed Haj Ali  
Minister of Energy and Mines



Produced by:-

Ministry of Energy and Mines  
© 2011 Ministry of Energy and Mines

For further information contact:-

Ministry of Energy and Mines  
P.O.Box 5285  
Asmara, Eritrea  
Tel:- +291 1 116872/127944  
Fax:- +291 1 127652  
www.moem.gov.er

Department of Mines  
P.O.Box 272  
Asmara, Eritrea  
Tel: +291-1-202889  
+291-1-202843/44  
Fax: +291-1-124509

To find other Useful in formation on Eritrea, please check these websites:-

www.shabait.com  
www.ecss-online.com  
www.dehai.org

### Contents:-

Country Profile.....	3
The Ministry of Energy and Mines.....	3
Mining law.....	4
Geology of Eritrea.....	5
Mineral potential of Eritrea.....	6
Geothermal potential.....	8
Mining and Exploration Activities.....	8
Investment Opportunities.....	10
Company Profiles.....	11

# Country Profile

Eritrea joined the world community of independent states in May 1993 following a thirty year war for liberation ending in May 1991. A UN supervised referendum held in April 1993 enabled the Eritrean people to express unequivocally to the world their desire for freedom and independence.

Soon after independence, the govern-



ment of Eritrea has been engaged in rehabilitating the war-torn economy and improving the standard of living of the people. It created a conducive environment for the active participation of local and foreign private investors. However, since May 1998 the development of this young state has been severely curtailed by the border dispute with neighbouring Ethiopia. Despite this, the Eritrean people and Government are as resolute as ever in their commitment and endeavors to work together to rebuild their country's economy, and to secure social and economic progress. The outcome of the hard work is now being realized by the emergence of a prospective country in the region.

This young state is located in the north-eastern part of Africa with the Red Sea on its east coast, Sudan to the west and north, and Ethiopia and Djibouti to the south. Eritrea, with a land surface area of about 125,000 square kilometers, including hundreds of coral islands in the Red Sea, has a population of about four million people. The country is home to nine ethnic groups, all with a strong

sense of Eritrean national unity. Tigrinya and Tigre are the most widely spoken indigenous languages. English and Arabic are also widely used.

The topography of Eritrea is exceptionally varied, from the 1,200 kilometer long coastal plain only a few meters above sea level, through the central highlands ranging up to 2,500 meters above sea level, to the low lying western

and south western areas of the country. Rugged mountain chains run from the central plateau to the extreme north of the country. The climate in these different terrains correspondingly varies from arid, to semi-arid, to temperate. The mean annual rainfall in the coastal areas is less than 300 mm per year, whilst in the highlands and the western lowlands rainfall ranges between 500 and 1,000 mm.

Eritrea's infrastructure is centered 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. Telecommunication facilities have also been renovated and developed, and mobile phones are now a common sight.

## The Ministry of Energy and Mines

The Ministry of Energy and Mines is the authorized Licensing Agency and is responsible for the administration, regulation and coordination of all types of mining operations in Eritrea. The Department of Mines within the Ministry encompasses, amongst other functions, the Geological Survey, Mine Resources Development and the Mines Administration Divisions, and is also itself actively engaged in mapping and exploration activities.

There are now five 1:250,000 scale geologic maps some of which are not published. 1:1,000,000 scale geologic map covering the whole country, has recently been prepared. The Eritrean mining sector has shown rapid development over the past few years since the Ministry of Energy and Mines started issuing licenses in 1997.

Since then, several exploration companies have been involved in assessing and exploring the mineral potential of the country. In the successive years additional licenses have been issued. The Ministry has also been developing a national minerals database. The Ministry has a responsibility to provide preliminary information to exploration companies interested in conducting detailed investigations in Eritrea, and to make contribution towards enriching the geological database of the country. As part of its routine works, the Department of Mines of the Ministry, through the Mineral Resources Management Division issues licenses to mining companies, local miners, and controls and supervises exploration and mining activities so that they are in line with the directives of the Ministry and are environmentally compliant. In addition, the Department of Mines, through its research wing, the Geological Survey, has been working, together with foreign governmental agencies and international organizations, to carry out geological mapping and mineral exploration programs.

Some of the activities conducted in 2010 and in the last few years include:

- Following applications by several exploration companies, evaluation was done and licenses were granted. At this time about Twenty one companies are

actively engaged in activities of mining, mine development, in advanced and preliminary exploration operations. Some of these companies are in joint venture with the Eritrean state owned mining corporation ENAMCO (Eritrean National Mining Corporation), but there are also Canadian, Australian, British and Chinese



Central Highlands

companies. As the rate of success of most companies is high, more and more companies are expected to apply and join the Industry.

- The Eritrean Geological Survey in collaboration with the Geological survey of Iceland conducted a detailed geophysical survey consisting of Magnetotelluric (MT) and transient Electromagnetic (TEM) over the Alid geothermal prospect. The results of this survey indicate a good geothermal potential in the area.

-The first draft of Regional Geological Map of Eritrea, on 1:1,000,000 scale is finalized and is ready for distribution. In addition other geological maps on 1:250,000 scale were also produced on specific areas.

- By agreement with the China Geological Survey, geochemical exploration and mapping work have been conducted in southern Eritrea.

## Mining law

The legal framework governing the conduct of all mining and related operations within the territory of Eritrea is embodied in a Mining Law comprising: Minerals Proclamation No 68/1995, Mineral Proclamation 165/2011, Mining Income Tax Proclamation No. 69/1995

and Regulations on Mining Operations Legal Notice No. 19/1995. Key Policy issues upon which the Mining Law is based include:

- All mineral resources in Eritrea are public property. The State has a duty to ensure the conservation and sustainable

development of these resources for the benefit of the people;

- The intention is to create a favourable atmosphere for foreign investment in 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 the capital intensive, long term, and risky nature of mining investments;

- The necessity for formulating regulations which ensure protection of the natural environment, together with sustainable development of the country's mineral resources, in accordance 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 license;
- 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 license;

- A simple and fair taxation system which recognises the risky nature of mining investments, and hence allows:

- \* Accelerated depreciation (straight line method over 4 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);
- \* No dividend tax
- \* A nominal rate of import duty (0.5%) on all inputs necessary for mining operations;
- \* Normal royalty rates as well as an option for the reduction, suspension or waiver of the royalty 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;
- \* Maintenance of foreign currency accounts in banks in Eritrea.

- A simple "one-stop" licensing system enabling all the formalities for all types of licenses for mining operations to be completed by a single Government agency, the Ministry of Energy and Mines.

## The mineral licensing system

The Mining Law permits the following types of licenses:

- Prospecting License, valid for one year and nonrenewable;
- Exploration License, valid for an initial period of three years, but which may be renewed twice for additional terms of one year each, with an option for further renewals in appropriate circumstances; and
- Mining License, valid for a period of 20 years with optional 10-year renewals.

All of these licenses are exclusive and grant their holders an automatic right to obtain an Exploration License from within a Prospecting License and a Mining License from an Exploration License, subject to the fulfillment of the obligations under the preceding license.

Although the maximum area that a sin-

gle license can cover is fixed at 100km<sup>2</sup> for a Prospecting License, 50 km<sup>2</sup> for an Exploration License and 10km<sup>2</sup> for a Mining License, simultaneous possession of multiple contiguous licenses is permitted.

Applications for any of these licenses may be made by individuals or legal entities of any nationality. All applications are to be 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 nonrefundable processing (registration) fee of US\$1 per page of each application and the supporting documentation presented. Successful applicants are also subject to a payment of license fees and the first year's rental upon the issue of a license. The rate of these fees is governed by Regulation and is at present as follows:

License	License Fee (per license) US\$(approx.)	Annual rentals (per km <sup>2</sup> ) US\$(approx.)
Prospecting	80	8
Exploration	240	32
Mining	960	96

## The Geology of Eritrea

The geological set up of Eritrea is made up of Precambrian basement rocks that are overlain unconformably by predominantly Mesozoic sedimentary rocks and Tertiary to Quaternary volcanic and sedimentary rocks.

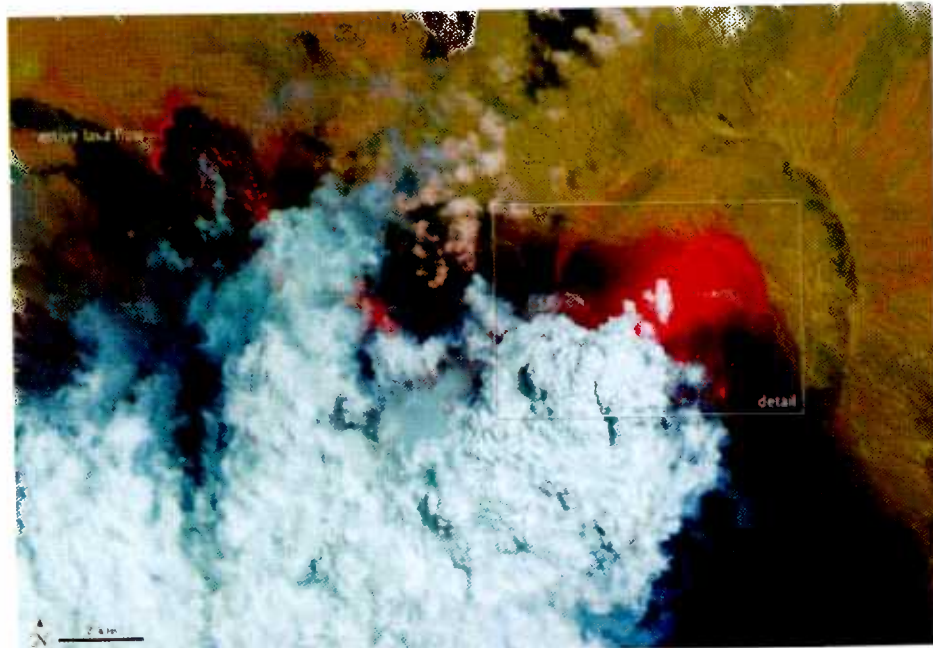
### Precambrian Basement Rocks

Basement rocks in Eritrea cover more than 60% of the surface of the country. The basement rocks of Eritrea are part of the Arabian Nubian Shield (ANS) which are exposed in north east Africa (Egypt, Sudan, Eritrea, and Ethiopia) and in Saudi Arabia, northern and north-western parts of Yemen and part of the western Middle East.

The shield is believed to represent a mega suture between East and West Gondwana. Archean and Paleoproterozoic continental crust rocks make the older components of the shield and occupy a very small part of the basement rocks and the major part of the shield consists of Neoproterozoic (c. 870-670

Ma) continental-marginal and juvenile intraoceanic magmatic-arc rocks.

In Eritrea, the basement rocks are not 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



Nabro volcanic eruption June 2011

Area) and the southern part of the country (Geology of Mai Dima/Kohain Area). Compilation of geologic maps at 1:250,000 scale has recently been completed for four map sheets. Other study, based largely on satellite image interpretation aided by limited ground controls, suggest that the rocks can be subdivided into four tectonic blocks or segments, separated by tectonic boundaries. Three of these blocks, the western, central and eastern segments, underlie northern and central Eritrea, whilst the fourth, the Danakil segment, occurs in the south-eastern part of the country.

The western segment, the Barka Terrain is exposed in the north-western part of the country and underlies the Barka lowlands. It is made up of amphibolite, amphibolite-facies pelitic schists containing kyanite and staurolite, quartzites and marble.

The central segment, referred to as the Hagar Terrain, extends from the Barka River up to the Adobha Abi valley in the east, and comprises several large elliptical bodies of various tectonic units that are 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 manganese and ferruginous cherts. The Hagar Terrain displays an east verging thrust contact with the adjacent segment to the east. The Hagar Terrain is known to be prospective for chromite, platinum group elements,

nickel, gold and copper mineralization.

The eastern segment, the Nakfa Terrain, 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 volcanoclastic rocks 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 Terrain is considered to represent a relict island arc assemblage. Several VMS (Volcanogenic Massive Sulphide) base metal occurrences and gold showings are associated with this tectonic unit.

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

- (1) migmatitic hornblende biotite gneisses;
- (2) a phyllitic formation consisting of schists, conglomeratic phyllites, crystalline limestones, and graphitic

schists; and  
(3) post-tectonic granitoids.

Recently compiled geologic map of the whole country at 1:1,000,000 scale has divided the Precambrian basement rocks into 7 domains, 5 groups and 3 formations. It is rather a more 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 southern part of the country 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 have 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. Alternations of quartzitic layers are present in the lower part, whilst towards the upper part the sequence becomes mainly gypsiferous to dolomitic. The Upper Sandstone forms pockets of sandstones that have been preserved from erosion. Commonly this sandstone is medium to coarse grained, light coloured, and dominantly quartzitic but partly conglomeratic.

### Tertiary Volcanics and Sediments

The Tertiary volcanics can be divided into three units:

- (1) 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 that are usually found intercalated with sediments of the Danakil Formation; and
- (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 currently actively exploited for aggregates.

### The Tertiary Sediments

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 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 fresh water sediments occupies the southern part of the coast.

### Quaternary Sediments

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

## Mineral potential of Eritrea

Eritrea has a long history of mining. Despite this modern mining began at the beginning of the 20th century following the Italian colonization of the country. After the Second World War, mining and related operations continued throughout the country, although intermittently. In the early seventies this resulted in the development of the short-lived modern mine at Debarwa, before the independence struggle forced its closure.

Eritrea is now known to host significant VMS deposits as well as shear-

hosted gold deposits. The first modern mine, Bisha VMS deposit, has started production. Koka project has completed feasibility work and there are other advanced projects and many exploration operations underway. Considering much of the country remains unexplored, these discoveries indicate the high mineral potential of the country. The potential for shear hosted gold deposits is also demonstrated from the recent, gold discovery in Zara, situated along a major shear zone that runs across the country. The country is not well explored. There are many prospective areas still to be discovered.

Eritrea possesses a geological setting that is favourable for both precious metals and base metal mineralization, as well as for industrial minerals. The range of identified potential deposits covers gold and other precious metals, polymetallic massive sulphide types and quartz vein and quartz stockwork type of deposits. There is an indication for the occurrence of Nickel and chromite deposits associated to the ultrabasic rocks in the far north of the country.

Occurrences of minable potash and sulphur evaporates in the Danakil depression, has now become apparent, and a variety of construction materials, including marble, granite and others in several parts of the country is also well known.

### Gold

Recent exploration activities have proved that gold occurrences are very widespread in many parts of Eritrea and the country has 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 so called Hamasien gold field), those of Shillalo (in south-western lowlands) area, and those of southern Eritrea, exploration activity in the last decade has shown the presence of economic gold deposits in the western lowlands and also in the northern part of the country.

The average head grades in most of the historic vein gold mines that were active during the Italian colonial time up to the late 1950s, were reported to be as high as 25 - 45 g/t, with reasonably good recoveries. Eritrea's gold mineralization is usually hosted in quartz veins and stockworks, and in particular in shear zones associated with felsic volcanic rocks, dioritic intrusions and in various 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 recent additional discoveries of gold in Debarwa and Adi Nefas (in the central highlands), and at Bisha and Harena (in the western lowlands).

## Base Metal Deposits

NNW to NNE-trending belt of gossans, exhalative cherts and altered felsic rocks that are indicators of massive sulphide mineralization are recorded in many parts of Eritrea. The ores of these massive sulphide deposits are predominantly chalcocite, pyrite with minor amounts of sphalerite, chalcopyrite and bornite. A major belt of massive sulphide deposit with gold and base metal mineralization passes through Asmara and includes Debarwa, Adi Nefas, Embaderho and many other localities roughly within a 50 km wide belt over a strike length of 250 km, extending from, more than 50 km north of Asmara up to the Eritrean border to the south. The belt that includes the Bisha high-grade zinc-copper-gold VMS deposit and Harena VMS deposits in the Western Low lands has already proved the presence of world class deposits and is also being explored for additional discoveries.

There are indications of similar VMS base metal deposits farther north of Kerkebet, Harabsuit and possibly

surrounding areas. There is a belt of copper mineralization in Raba-Semait area, sulphide-rich gossanous rock in Mt Tullului(Bedeho) in Sahel, northern Eritrea and in Mt Seccar and Sheib areas in the Eastern Lowlands.

At Bisha, a world class deposit of precious and base metal VMS deposit has been found. Exploration in Adi Nefas VMS shows 9.0 metres grading 11.91 g/t Au, 285 g/t Ag, 3.18% Cu and 11.05% Zn and in another test drill NG-043-D – 5.25 metres grading 10.81 g/t Au, 239.8 g/t Ag, 6.77 % Cu and 6.77% Zn has been obtained. Reserve estimation made recently has shown that minable zinc, copper and associated gold is present in Adi Nefas. Embaderho is now emerging as a large base metals (Cu-Zn) deposit with some associated gold. Resource estimation is still going on, however at this stage it is confirmed that it is a big base metal deposit.

Overall in terms of mineral potential assessment and geological work, much of the country remains unexplored, despite the several discoveries that are being made.

## Industrial Minerals

Potash, sylvite and gypsum-bearing evaporates occur at Colluli, south of Bada. South Boulder Mining Ltd, a company looking for Potash deposit in the southeastern margin of the evaporate deposits in Dankalia, have shown their hope to discover Potash deposit in billions of tones. Substantial deposits of gypsum occur at 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, which has been exploited for glass manufacturing. In addition, deposits of silica sand with feldspar occur at various wadis of Eritrea. High purity feldspars occur in pegmatites at Lahazen, 35 kms south of Massawa. Sub economic deposits of mica, which was once exported by the

Italians, are found south east of Lahazen. 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 are found at Adailo, close to Tio with all the constituents including limestone, marl, clay and gypsum close together. Barite occurrences have been identified around the Heneb, Meter and Gharsa wadis to the 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.

## Construction Materials

Large deposits of marble occur as belts running north-northeast from Adi Ibrhim south to Gerenfit areas. However, there are few quarries of Marble in Gogne and Goranda area which are situated at the middle of the belt. Similar belt also occurs further west and runs from Alebu southwards to Guluji.

Far, in northern Eritrea, a belt of marble occurs in Adobha Valley 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 gray marble deposits occur south of Decamhare and have been exploited for a long time. Recrystallised limestone deposits with variegated colours occur at Dichinema area, in the southwest of Eritrea.

Granites of various colours and textures



are exposed over large areas. Granites of dimension stone quality, which are currently being exploited, occur at Geleb (pink granite), and in the Arato, Korbaria, and Tukul areas (grey granite). The Maimine 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. Im-mense deposits of limestone occur in the Adailo-Aitosh area south-west of Tio.

## Geothermal Potential

Economic exploitation of geothermal heat for power generation appears possible in rift-related volcanic rocks in the Red Sea Rift areas. Alid, Nebro, and Dubi areas are the main targets as geothermal activity in these areas is known to be intensive. Lower temperature activity also occurs at Mai Wuui, 30 kms west of Massawa.

Geothermal activity, evidenced by fumaroles and hot springs with extensive alteration on the ground, are abundant in the Alid geothermal field. Studies carried out so far in this area indicate the presence of a possible sub-surface high temperature reservoir.

The geothermal manifestations at Nebro and Dubbi are also promising, but further study will be required to estimate the reservoir temperature.

## MINING AND EXPLORATION ACTIVITIES IN ERITREA

Eritrea is becoming the focus of mining and exploration activities as can be seen from the increasing number of companies actively operating in the country. Recently a number of companies agreed to conduct airborne geophysical survey and the survey is still underway. Preliminary results are indicating that a number of targets are being generated for further follow ups in different conses-sion areas.

## Mining and Development-Stage Companies:-

### Bisha Mining Share Co (BMSC)

is a mining and Exploration Company owned in joint-venture between Eritrea's National Mining Corp. (ENAMCO) and Canada's Nexsun Resources Ltd. BMSC managed to make the first modern mine in Eritrea. After commissioning in the end of 2010, and starting of commercial production in February 2011, mining continues with strong operational and safety performance. Bisha is a high grade, low cost mine with 28 million tonnes @ 1.78 g/t gold, 38.9 g/t silver, 1.6% copper and 3.15 % zinc and indicated and inferred resource of 10.6 million tonnes @ 0.67 g/t Au, 47.78 g/t Ag, 0.91 percent Cu and 5.67 percent Zn.

Aiming to expand the reserve, the company is conducting detail exploration programs involving infill drilling in Bisha main, drilling-assisted exploration in Bisha Northwest, in the Hanging wall zone and in Harena deposits. There are clear indications not only for the potential increase of the reserve at the Bisha mine but also for additional feed of the Mine from the latter deposits.

**Chalice Gold Mines Ltd.** is an Australian gold exploration company which owns the high grade, open-pittable Koka Gold Deposit and a substantial, largely unexplored, land package in Eritrea. The Koka deposit is estimated to host around five-million tons of ore, grading at 5.3 g/t gold, for 840 000 contained ounces. The deposit further hosts a probable ore reserve of 4.6-million tons, at 5.1 g/t gold for the 760 000 contained ounces.

The Company is focused on developing the Koka Gold Deposit into a low cost gold mine which is expected to produce 104,000 ounces of gold per year over a 7 year mine life at an average cash cost of US\$ 338/oz gold. Chalice also holds a substantial strategic ground position of 1.437 km<sup>2</sup> consisting of licenses along strike of the Koka Gold Deposit, and proximal to Nexsun's Bisha Mine.

### Sunridge Gold Corp.(SGC/TSX)

is a Canadian, mineral exploration and development company engaged in exploration and development of base and precious metal deposits on the Asmara

Project, located around Asmara area. It has been actively conducting exploration works around Asmara since it took it over from Sub-Sahara Resources in 2003.

The work thus far done by Sunridge, has resulted in the definition of four NI 43-101 compliant resources on the Asmara Project with total combined metal content of 1.3 billion pounds of copper, 2.5 billion pounds of zinc, 1.1 million ounces of gold and 32 million ounces of silver. The largest deposit is the 63 million tonne Emba Derho copper-zinc-gold VMS deposit that is located just 12 kilometers from Asmara.

Sunridge is working to advance all its projects within its three licenses. In continuation of its prefeasibility studies, it has conducted a number of resources and geotech drilling, and environmental studies in Debarwa, Embaderho and Adi Nefas VMS and Gupo deposits. These will enable it to submit feasibility report for Debarwa and prefeasibility report for Embaderho, Adi Nefas VMS and Gupo deposits.

**South Boulder Mines Ltd.** is a junior Australian exploration company engaged in exploration for potash resources in Danakil area. The company is progressing well with discovering a very significant potash deposit at shallow depth in Culloli area. The company has completed resource definition studies and has come up with the following resource of potash at Colluli: JORC Resource of; 33.39 million tonnes at 18.56% KCl of Measured Resources, 173.37 million tonnes at 18.57% KCl of Indicated Resources and 340.86 million tonnes at 18.58% KCl of Inferred Resources. The total is 547.62 million tonnes at 18.58% KCl, for total contained potash of 101.73 million tonnes.

Currently the company is conducting an engineering scoping study into open pit mining and processing to produce up to 10 million tones annually of potash and it is targeting 1.5 billion tones of potash @20% KCl, which has an in ground value of about USD\$ 150 billion.

**NGEx/Sanu Resources Inc.** is a Canadian exploration company, looking for gold and base metals in Mograib and Kerkebet exploration properties in western Eritrea and holds Lelit and Shikula areas of exploration license in



northwestern Eritrea. Reverently the company conducted detail exploration work at I: 5,000, including airborne VTEM survey target visiting, reinterpretation of geophysical data in Mograib area where Hambok deposit is located. Hambok deposit has an NI43-101-compliant indicated resource (@0.75% zinc cutoff) of 10.7 million tonnes grading 0.98% copper, 2.25% zinc, 6.84 g/t silver, 0.20g/t gold and an additional inferred resource (@0.75% zinc cutoff) of 17.0 million tonnes of 0.85% copper, 1.74% zinc, 5.89g/t silver, 0.19 g/t gold. Aradaib Prospect, in Kerkebet license is reporting interesting results on the initial drilling works such as 13m of 3.3 % copper, 5.6% zinc, 1.8 g/t gold, 46 g/t silver. The company is also conducting exploration works in Letit and Shikula exploration license areas.

### *Exploration Companies:-*

**Sub-Sahara Resources (Eritrea)** has been actively exploring in Eritrea for the past 11 years. The initial properties that Sub-Sahara secured contained the volcanogenic massive sulphide (VMS) prospects surrounding the capital city of Asmara. The Debarwa Cu/Zn/Au/Ag deposit was successfully advanced to a 'Scoping Study' for mining before the entire land package was sold to joint venture partner Sunridge Gold Corp in 2007. During 2007, Sub Sahara accelerated exploration activities on its Zara Gold Project (in the north-west of the country) and was rewarded with definition of a +1moz gold deposit (Koka) grading 6.31g/t, in early 2008. The Koka Gold Deposit is now owned by Chalice Gold Mines. Sub-Sahara is now conducting exploration activities in the Zara North and Zara South exploration properties.

**Andiamo Exploration Ltd.** is a junior UK based exploration company that has been granted 723 km<sup>2</sup> exploration property in Haykota area in 2009. As southern extension of Bisha deposit, the area has indications for shear hosted gold and VMS-style mineralization.

Andiamo has done significant regional, as well as detailed geologic mapping, image interpretation, soil sampling and ground gravity surveys. During this regional and follow-up exploration programs, the company has come up with different targets that are now ready for drill-testing.

**Beijing Donia Resources Co.** is a Chinese exploration company that is engaged in exploration for gold and base metal deposit in its Kenatib exploration license area. Since it acquired the area, it has conducted geologic mapping, gravity and IP survey and is waiting for interpretations.

**Land Energy** is a Chinese exploration company that is looking for gold and base metal deposits in Haykota area, south of Bisha mine. The rocks of the area are southern extension of Bisha. Currently the company is waiting for the assay it has drilled before few months. The core and trench samples have been sent for analysis to China.

**China Africa Huakan Investment Co.** has been exploring for gold and base metal in Seroa, north of Keren, and in Mensura area. Drill testing in Seroa was not encouraging, but sample assay results are awaiting. Prospecting work in Mensura has been transferred into exploration license.

### **Zhong Chang Mining Co.**

**Ltd.** is a Chinese company granted exploration license in Mai-Mine area. The Company has been doing geological mapping and grab sampling and trenching to define targets for drilling. It is looking to conduct high precision magnetic survey over selected targets after assay are made available.

**London Africa Ltd.** is a London based junior exploration company that has been mapping, stream sediment and soil sampling and channel rock chip sampling in areas of some indications of mineralization. Very high values of gold have been obtained from some rock samples and the area appears to be of some potential.

**Sahar Minerals Ltd.** is an Australia-based privately held exploration company established in early 2009. It has been actively evaluating and exploring the two properties (Augaro and Harab Suit) it secured. Augaro property is in joint venture with ECEM, an Eritran-Chinese

Share Company while Harab Suit is a 379 Km<sup>2</sup> exploration license property Sahar acquired from the Ministry in 2010. It has reassessed the earlier geological maps and conducted soil sampling aimed at generating targets.

### **Adobha Resources (Eritrea) Pty**

**Ltd.** a wholly owned subsidiary of Gibb-land Ltd, is an Australian junior exploration company holding three prospecting and one exploration properties in the northern part of the country. Following LandSat assessment of the areas, the company has been conducting regional geological mapping and helicopter-assisted reconnaissance surveys.

**Thani-Ashanti Eritrea Ltd.** is an exploration company formed by joint venture of an Emirates and South African AngloGold Ashanti, having two exploration properties in western Eritrea, Akordat North (in Anseba Region) and Kerkasha (South of Barentu), making a total of 1863 km<sup>2</sup>. The company has conducted airborne geophysical surveys over its properties and is currently do-



Agreement Signing

ing review and interpretation works for Kerkasha and exploration for Akordat North area.

### **Beijing Sinoma mining invest-**

**ment Ltd** is a Chinese exploration company looking for potash deposit in its 455 Km<sup>2</sup> exploration property in Dankalia area in between areas belonging to South Boulder and Bada Potash.

**Bada Potash Ltd.** is a young Canadian exploration company focusing on exploration for potash deposit in Bada area Dankalia, not far from the property of South Boulder Mines. Since it acquired

the property in late 2010, it has been conducting compilation and review of earlier data, image interpretation and updating regional geological and ground magnetic surveying over the entire license area and has also completed some gravity survey. The company is now starting drilling to outline the basin for shallow potash mineralization.

**Eri-Lib Mining Share Company** is an Eritrean and Libyan joint-venture exploration and mining company. It is actively exploring for gold and base metals in two separately located properties it acquired in 2009. The Nefasit exploration license 1,636 km<sup>2</sup> area in the eastern escarpment while the 1,151 km<sup>2</sup> exploration license area is in the south western low lands of Eritrea.

**Eritrea-China Exploration and Mining Share Company (ECEM)**, is a joint exploration and mining company between an Eritrean ENAMCO and a Chinese company and has been conducting exploration and detail drilling works

in 1000km<sup>2</sup> area in Augaro. The company is now (since Feb. 2010) working in joint venture with Sahar Minerals, an Australian Exploration company focusing on gold and base metal potential mines.

The following small exploration companies, Keren Mining Ltd in Mograib North and Hurum exploration licenses, newly added Chinese companies Shandong Mining Development that acquired 2600 km<sup>2</sup> prospecting license in Dekemhare - Mendefera area and Min-Metals Exploration and Development Ltd holding a prospecting license area around Adi keyih, are also active.

## Investment Opportunities

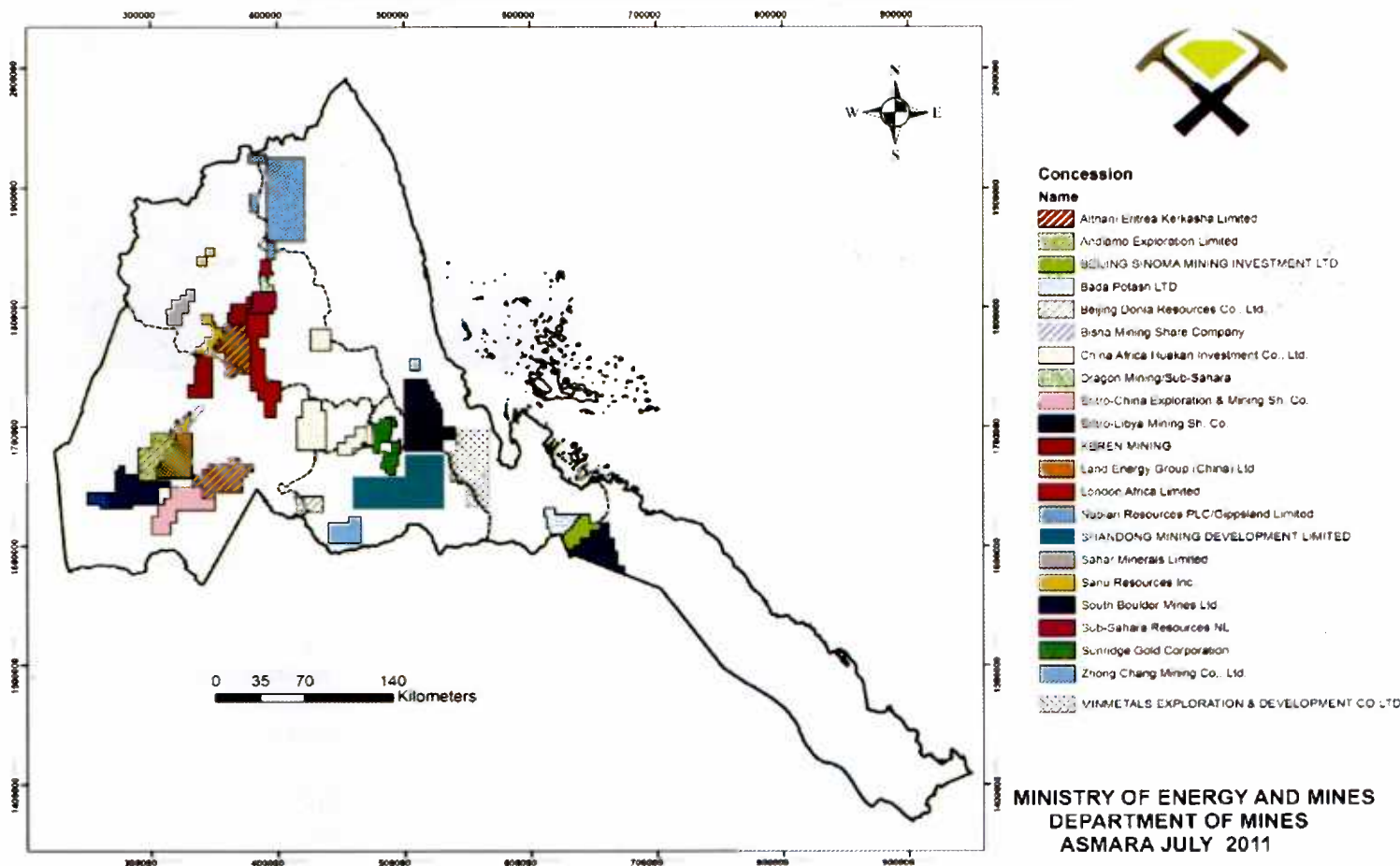
Eritrea is a country where rocks belonging to the prospective Arabian Nubian Shield make more than 60 % of the country. A Vast area of the country still remains unexplored. An ever increasing area cover by Artisanal mining activity is an indication that there are still many

deposits to be discovered. The prospective geology, the recent major VMS discoveries of Bisha and Emba Derho and a number of shear hosted deposits like Koka(Zara) and the presence of numerous old prospects most of which are not evaluated makes Eritrea a country of high gold and base metal potential. Airborne geophysical survey that has covered large area and is still underway in the properties of some of the companies is already generating many targets few of which could be deposits.

Epithermal gold potential associated with recent volcanic rocks has not been assessed yet. The recent discovery of potash deposit associated with the evaporate beds also indicates the potential of the evaporate beds in the Eritrean part of the basin.

The prospective geology and the attractive and competitive investment regime makes Eritrea one of the most attractive and rewarding mining investment opportunities. The future of Eritrea's mining industry appears bright.

## MINERAL CONCESSION OF ERITREA



# Bisha Mine: The First Modern Mining Project

## Project Overview

The Bisha Project is a large precious and base metal-rich volcanogenic massive sulphide (VMS) deposit located 150km west of Asmara, Eritrea, East Africa. Mineralization consists of gold and silver contained in oxide ore, in addition to copper and zinc massive sulphides. The project benefits from the strong support of the Government of Eritrea and good local road and port infrastructure.

The Bisha Mine began construction in September 2008 and declared commercial production in February 2011.

Up to the end of June 2011 Bisha had produced 168,000 ounces of gold.

A workforce of 660 employees, including 60 expatriates, run the operation



on a 24 hour 7 day per week basis. All activities including mining are owner operated and maintained with the exception of the 19.5MW power generation plant.

The Bisha Mine is expected to produce 1.14 million ounces of gold, 11.9 million ounces of silver, 821 million pounds of copper and over one billion pounds of zinc to a mining depth of 240m. The orebody is open below this and high grade zinc intersections have been obtained at 350m below surface. Bisha's mining and exploration licenses cover a contiguous area of 92 km<sup>2</sup>. The Bisha Main and North West zone are both located within the 16.5 km<sup>2</sup> mining license. Within the exploration license

there is a satellite deposit, Harena and several other geophysical anomalies that have yet to be tested. Nevsun, through its Eritrean subsidiary, Bisha Mining Share Company (BMSC), holds the Licenses. The State of Eritrea has a free carried 10% interest plus an additional 30% paid participating interest for a total of 40% interest in Bisha. The interest will be paid over time, out of Bisha cash distributions.



of 0.65.

The BMSC OH&S Department is managed by an experienced mining professional and, apart from normal duties, is currently involved in training an Emergency Response Team from volunteer Bisha employees.

## Bisha Phase 2 - Copper Concentrator

Phase 2 of the Bisha Project involves the construction of a copper flotation plant which will produce a concentrate containing approximately 30% copper together with gold and silver as by-products. Power generation, crushing, milling, services and tailings disposal infrastructure from the Phase 1 CIL plant will be common to the copper plant.

Annual concentrate production of approximately 260,000tpa will be transported by road to a new port at Massawa and shipped in bulk to overseas

## Training

Mining is a completely new industry in Eritrea and as such, appropriate skills in the Mining and Processing fields are rare. A dedicated training department is responsible for identifying and coordinating the training requirements of the Eritrean workforce. Expatriates currently account for just under 10% of the permanent workforce and are recruited in order to provide local employees with the specialized skills required to operate a world class mining operation.

Training matrixes have been prepared for all local employees to ensure that

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	<b>Oxides</b>		<b>Supergene</b>			<b>Primary</b>					
	<i>Oxide Processing</i>										
<b>Gold</b>	919,000 oz		90,000 oz							127,000 oz	
<b>Silver</b>	1,590,000 oz		3,775,000 oz							7,166,000 oz	
	<i>Sulphide Processing</i>										
<b>Copper</b>			538,000,000 lbs							283,000,000 lbs	
<b>Zinc</b>										1,373,000,000 lbs	

## Commercial Production Schedule

they receive the necessary training to become fully competent in their individual roles. Succession planning is in place to ensure an orderly transfer from expatriate to local positions within a realistic timeframe.

smelters. The Phase 2 Concentrator and associated infrastructure are scheduled for completion during 2013. Engineering, procurement and construction commenced in early 2011.

## Occupational Health & Safety

Bisha management considers that there is nothing more important than preventing injuries within its workforce. This is achieved through the implementation of training programs, safe work procedures, hazard identification and risk assessments. The success of this program is illustrated by the current BMSC 12 monthly Lost Time Injury Frequency Rate

## Company Address and contact details

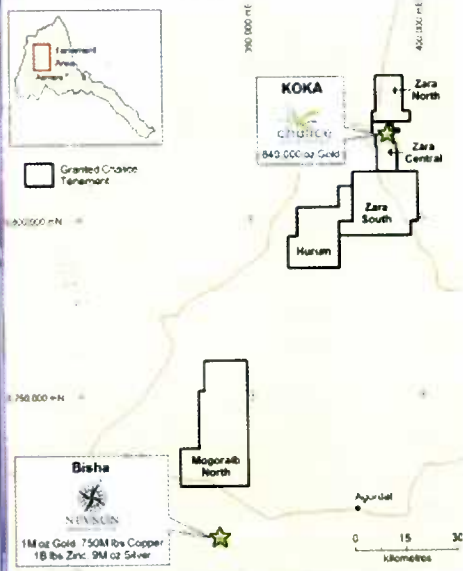
Bisha Mining Sh. Co.  
61, Mariam Gimby,  
P.O.Box 4276  
Asmara, Eritrea  
Tel. +291 1 124941  
www.bishamining.com



## Chalice Gold: Developing East Africa's Next Gold Mine

Chalice Gold Mines Limited (ASX: CHN; TSX: CXN) is focused on gold mine development and exploration in Eritrea, East Africa, where it is developing the high-grade Koka Gold Deposit as an open pit gold mine.

The Koka Gold Deposit hosts a JORC



and NI 43-101 compliant Probable Mineral Reserve of 4.6 million tonnes grading 5.1 g/t gold, containing 760,000 ounces. This reserve is included within an Indicated Resource of 5.0 million tonnes grading 5.3 g/t gold, containing 840,000 ounces of gold.

The Company recently finalised a Shareholders' Agreement with the Eritrean National Mining Corporation (ENAMCO) under which ENAMCO will pay US\$32 million to Chalice for a 30% participating interest in the 547 sq km Zara Licences. This interest, together with a 10% carried interest, will be held via an operating company, Zara Mining Share Co ("ZMSC").

The remaining 60% of ZMSC will be held by Chalice. ZMSC will own, explore, develop and operate the Koka Gold Mine and the surrounding Zara Licences. Chalice, together with its partner ENAMCO, is currently working to secure the granting of a Mining Licence and hopes to commence development of the Koka Gold Mine in early 2012 with production slated for late 2013.

### KOKA GOLD PROJECT

Chalice completed a Feasibility Study in July 2010 which found that the Koka Gold Deposit could be developed as a robust open pit operation with a forecast

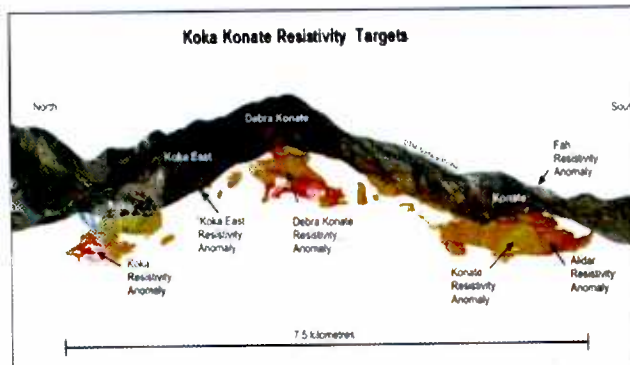
gold, placing the project in the lowest quartile of global gold mine production costs.

Planned mine production will average 104,000 ounces of gold per year over a seven year mine life based on an expected milling rate of 600,000 to 700,00 tonnes per annum. Capital costs for the mine development are forecast at US\$122 million and the Project has an NPV using a 5% discount rate of US\$293 million at a gold price of \$1,500 per ounce (see below).

### EXPLORATION POTENTIAL

The Koka Gold Deposit lies within the 547 square kilometre Zara block of Exploration Licences, where Chalice currently has an active drilling program underway to test IP resistivity targets in the vicinity of the Koka deposit. These targets have been defined over a strike length of 7.5 km within the heavily mineralised 'Koka-Konate Corridor' and are interpreted to represent possible silicification associated with gold mineralisation. Drilling has also been directed to target potential extensions of the Koka deposit both at depth and along strike to the south.

Elsewhere on the Zara licences, Chalice has defined extensive zones of stream



sediment gold anomalism which have been followed up by systematic soil and rock chip sampling. This work has identified several high priority targets such as the Debre Tsacda and Hammid Keir prospects that will be investigated during future drilling programs.

The Zara tenements have also been covered by heli-borne aeromagnetic and radiometric surveys which have defined the regional litho-structural architecture in great detail. These geophysical data have been integrated with the geochemical data and are being used to rank explo-

Chalice also holds a 100% interest in a further 825 square kilometres of exploration ground consisting of the Hurum Exploration Licence, located along strike from the Zara licences, and the Mogaib North Exploration Licence, located just north of Nevsun's world-class Bisha Mine.

This extensive exploration package is believed to hold potential for both structurally-controlled gold mineralisation similar to Koka and volcanic-hosted massive sulphide (VHMS) base metal (+ gold) mineralisation similar to Bisha.

On the Mogaib North Licence, Chalice has just completed an airborne VTEM survey combined with magnetics and radiometrics. The VTEM system is designed specifically to define bedrock conductors potentially indicative of massive sulphide deposits. Preliminary interpretation of the VTEM data has confirmed the presence of several promising targets which are being further refined prior to drilling later in 2011.

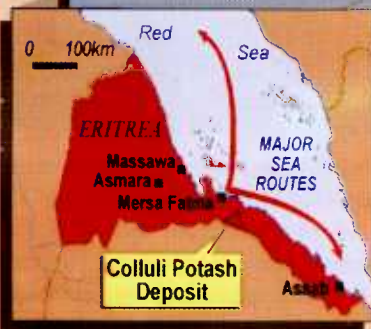
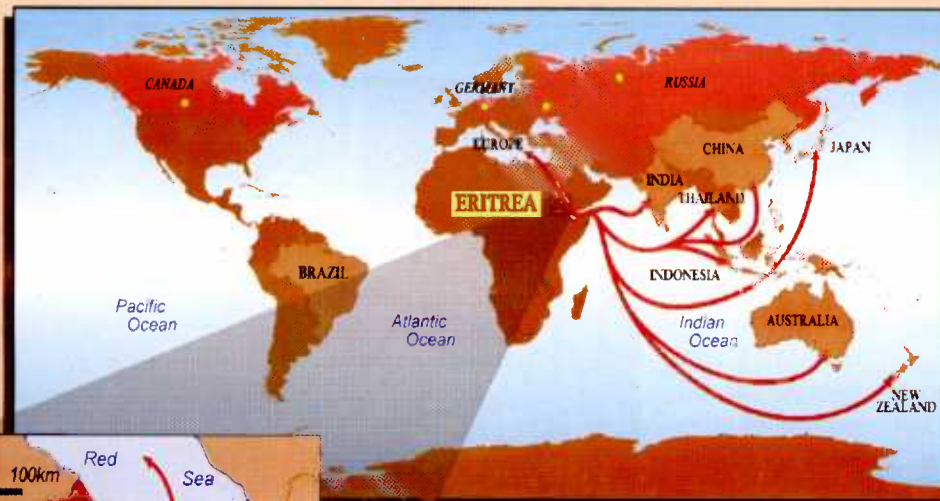
On the Hurum Licence, Chalice has completed a heli-borne magnetic and radiometric survey as well as stream sediment and soil geochemical sampling. This work has highlighted potentially significant gold mineralisation at the Babtono prospect where artisanal miners have worked gold-bearing vein systems over a strike length of several hundred metres. This and other geochemically anomalous zones will be explored in more detail over the next 12 months.

The combination of a robust gold resource at the Koka deposit, which is moving towards development, and the potential for further gold and base-metal discoveries within its extensive tenement block, puts Chalice Gold in an excellent position for rapid growth.

### Company Address and contact details

Chalice Gold Mines Ltd  
Level 2, 1292 Hay Street  
West Perth, Western Australia 6005  
PO Box 2890 Perth 6001  
Western Australia  
Tel: +618 9322 3960

## THE NEXT GLOBALLY SIGNIFICANT PRODUCER



- Close to ports, markets and major shipping routes  
- 70km to coast
- Low cost open pit potash mine  
- Potash from 16m depth
- Resource expansion  
- Massive deposits, huge mine lives
- MOP and SOP production potential  
- All minerals have been mined and processed to produce potash
- Large energy saving potential  
- Solar and geothermal energy solutions
- No known significant environmental issues

**South Boulder Mines Limited** (ASX: STB, South Boulder) is an Australian based exploration and mining company developing the world class Colluli Potash Project in Eritrea. The company anticipates the production of 1-2Mt of potash via open pit mining methods in 2016 or sooner.

The Colluli Project is situated in a uniquely young and shallow evaporite basin called the Danakil Depression which straddles the Eritrean and Ethiopian border in the south eastern coastal region of Eritrea. A number of resource companies are conducting aggressive resource definition and extension programs in the basin for the first time since 1968. Since June 2010 South Boulder has defined a substantial mineral resource and has been conducting feasibility study activities into mining the world's first open cut potash. High grade potash mineralisation has been discovered from depths as shallow as 16m. This shallow depth is the key to the project economics, and sets it apart from all known potash resources. In addition the mineralisation is located some 70km from the Red Sea coast which provides many suitable options for export of the final product.

The current JORC/43-101 Compliant Mineral Resource Estimate comprises 548Mt @ 19%, including 119Mt @ 23%

KCl. Potash minerals include sylvinite, carnallite and kainite. It is anticipated that the resource will grow substantially with further drilling and there is a current Exploration Target of 1.25 – 1.75 billion tonnes @ 18-20% KCl which is all located above 100m vertical depth. An estimated 90% of global potash produc-



tion comes from underground mines as deep as 1,000m below surface.

South Boulder is currently focused on feasibility study activities including:

- Resource extension and open pit mine design;
- Metallurgical test work;
- Hydrogeological and geotechnical assessment;
- Infrastructure assessment;
- Environmental, social impact studies and mine approvals.

The Colluli Project will demonstrate some of the lowest operating costs and cheap start-up capital costs relative to the industry, primarily due to the chal-

low mineralisation and good infrastructure location. Further to this there is potential to expand on the initial 1-2Mt p.a production rates comparatively cheaply. South Boulder expects to be able to mine the lowest cut-off grades from a conventional mine in the world and to convert a much larger proportion of resources to mining reserve than the industry average.

In addition, South Boulder has high quality nickel sulphide and gold targets at the Duketon Greenstone Projects in Western Australia. The Duketon Nickel JV is fully funded through to Bankable Feasibility Study whereby Independence Group NL (ASX: IGO) is earning 70% of Ni-Cu-PGE mineralisation and associated gold. The Project has had recent success at The Rosie and C2 Nickel sulphide prospects

where drilling has defined intercepts of 5.20m @ 9.13% Ni, 1.09% Cu, 0.21% Co and 7.09g/t PGE's at Rosie and 50m @ 0.92% Ni, including 37m @ 1.05% Ni at C2.

Significant resource definition drilling has been completed at the project with an initial JORC Compliant Mineral Resource Estimate due in 2011. An engineering scoping study into an open pit and underground mine to exploit the resource is underway. South

Boulder owns 100% of the gold rights to the Duketon Nickel JV tenure and a 1,500km<sup>2</sup> land package surrounding it.

### Company Address and contact details

South Boulder  
S.A. Building 7th Floor,  
189 Warsay Street  
tel: +291 1 111463  
fax: +291 1 111464,  
Asmara, Eritrea

Website:-  
[www.southbouldermines.com](http://www.southbouldermines.com)

E-mail:-  
[krudd@southbouldermines.com.au](mailto:krudd@southbouldermines.com.au)  
[zleake@southbouldermines.com.au](mailto:zleake@southbouldermines.com.au)

## Sunridge Gold: The Asmara Projects

Sunridge Gold Corp (SGC/TSX-V) is a Canadian junior mining company that has been focused on exploration and development of base-metal and gold deposits on the Asmara Project in Eritrea since 2003. The Asmara Project currently covers about 600 square kilometers in central Eritrea and is located north, west, and south of the capital city of Asmara. The infrastructure on the project is excellent, with roads, power, and water available throughout the project area and access to the port of Massawa is only 120 km away by road and rail.

Sunridge has defined four mineral deposits on the Asmara Project and is currently conducting a full feasibility study on the Debarwa copper-gold-silver-zinc VMS deposit and a prefeasibility study on the Asmara North deposits, which include the large EmbaDerho copper-zinc-gold-silver VMS deposit, the AdiNefas zinc-copper-gold-silver VMS deposit, and the Gupo Gold deposit.

The three VMS deposits have a total (NI 43-101) Indicated resource containing:

- 1.3Blbs copper
- 2.5Blbs zinc
- 1.0Moz gold; and
- 31.7Moz silver

In addition, the Gupo Gold deposit has an (NI 43-101) Inferred resource containing 189,000oz of gold.

### Debarwa Feasibility Study



The Debarwa copper-gold-silver-zinc deposit is currently being examined in a feasibility study being conducted by Senet (Pty) Ltd and AMC Consultants Pty Ltd and is expected to be complete by the end of 2011. The Debarwa deposit hosts a 3.3m tonne (NI43-101 Measured and Indicated) resource which includes a gold oxide zone, a supergene copper zone, and a primary copper and zinc zone. Within the copper supergene zone there is a zone of high-grade copper



estimated to contain 41 million pounds with an average grade of 16.0% copper, 3 g/t gold, and 77 g/t silver. The feasibility study is examining options to fast track this high-grade portion of the supergene zone to production by being operations by mining, crushing, and direct shipping directly to a smelter without the need for a concentrator.

### The Asmara North Deposits Prefeasibility Study



Snowden Mining Industry Consultants Inc and GBM Minerals Engineering Consultants Ltd are currently conducting a prefeasibility study of the Asmara North Deposits which include 3 deposits with 6 km of each other:

- EmbaDerho: 62.5 Mt (Ni43-101) Indicated copper-zinc-gold-silver resource with a copper-rich zone containing 38.4 Mt averaging 1.02% Cu and 0.99% Zn.
- AdiNefas: 2.7 Mt (Ni43-101) Indicated high grade zinc-copper-gold-silver which averages 8.38% Zn, 1.39% Cu, 2.85 g/t Au, and 99.3 g/t Ag.
- Gupo Gold: 4.5 Mt (NI 43-101) Inferred resource which averages 2.99 g/t Au.

### Exploration

Although Sunridge has had tremendous exploration success since 2003, the Asmara Project remains only partially explored and Sunridge geologists have identified several highly prospective exploration targets. Many of these are drill ready and Sunridge is planning further exploration drill programs for 2011.

### Company Address and contact details

Sunridge Gold Corp.  
Suite 1490 -W Georgia Street  
Vancouver, BC  
Canada V6E 3C9  
tel, +1(604) 688 9478  
fax: +1(604) 688 9458  
www.sunridgegold.com

## NGEx Resources Inc

NGEx, through its Eritrean subsidiary Sanu Resources, has been actively exploring Western Eritrea since 1998. Using exploration techniques ranging from



in-house processing of satellite imagery, airborne EM and magnetics, gravity, sampling, mapping, and prospecting, Sanu has defined new mineralized volcanic belts and drilled over 20km on 13 new gold and VMS prospects. In 2006 Sanu discovered the blind Hambok massive deposit and in early 2009 announced an NI43-101 compliant indicated

resource of 10.7Mt at 0.98% Cu, 2.25% Zn, 0.20g/t Au and 6.8g/t Ag. Hambok is hosted in similar lithology to the Bisha mine, 15kms to the north. In the coming exploration season, Sanu is planning follow-up drilling on its gold-rich Aradaib VMS prospect and reconnaissance holes on blind geophysical targets from the airborne survey flown earlier this season. The exploration of over 10,000km<sup>2</sup> in Western Eritrea has produced a huge volume of high-quality regional-to property-scale exploration data. Having relinquished over 90% of its original land holding, this data is now the property of the Government of Eritrea.

Potash deposits are the focus of NGEx subsidiary, Bada Potash, who is drilling in the Danakil Depression, 150km southeast of Asmara. After a six-month program of geological mapping, ground mag, and gravity profiling, NGEx is excited to be drilling the first ever holes in



the northern end of the Dallol evaporite basin. Shallow potash deposits have recently been discovered at Kolluli, 20kms south of Bada, and advanced exploration projects are underway on the historic Dallol basin potash deposits in Ethiopia.

### Company Address and contact details

NGEx Resources, Inc  
2101-885 West Georgia Street  
B.C., Canada V6C 3E8 Vancouver  
Tel: +1 604 689 1337  
Fax: +1 604 689 4250  
www.NGExresources.com

## Adobha Resources (Eritrea) Pty Ltd

Adobha Resources Eritrea (ARE) a wholly owned subsidiary of Gippsland limited, a publicly listed company based in Australia and listed in both Australian and Frankfurt Stock exchanges, is currently exploring two contiguous Exploration Licences located in the Adobha region of Northern Eritrea. The Adobha and Gerassi South ELs covers 2,200km<sup>2</sup> of the Nubian-Arabian Shield that is considered to be prospective for volcanogenic massive sulphide (VMS) deposits

Regional geological mapping combined with some detailed mapping in the northern and central part of the Project area confirms that the geological setting is consistent with that expected in a VMS environment and shows similarities with the geological setting of the large Bisha Au-Ag and Cu-Pb-Zn deposit 200km along strike to the south. The southern most of the Project area (Gerassi South EL) is similar to that of the structurally controlled Koka Gold Deposit which is hosted in veins within a micro granite some 16km to the south. The Koka hosting structural feature extends to the north into the ARE ground where it is represented by strongly shearing, sericite-hematite-limonite alteration with malachite, galena and

### Gerassi South EL

The southern part of the Gerassi South area includes structurally controlled, vein hosted gold mineralization which is interpreted as the extension of the structure which hosts the Koka gold deposit. Extensively sheared, intensely sericite altered and hematite oxidized felsic volcanic and sediments intruded by felsic dikes (micro-granite) are cut by mineralized quartz veins.

The mineralized quartz vein is vuggy bearing galena crystals and stringer, pyrite, in places malachite and other sulphide material with hematite and other sulphide oxidation. The host rock is moderately hematite oxidized and intensely sheared at the contact.

### Adobha EL

Geological mapping of the Adobha project area confirms that the geological setting of the area is consistent with that expected in areas where volcanogenic massive sulphide (VMS) deposits are known to occur. This is supported by heavy rare earth geochemistry which indicates that the region is prospective for VMS deposits. Regional drainage geochemical sampling followed-up with rock-chip sampling has located outcropping copper mineralization in the form of

### Geophysics

ARE is currently completing a large scale airborne VTEM and magnetic survey over six blocks selected on the basis of Thematic Mapper anomalies and geological interpreted structural sites.

### Future work

Geochemical sampling, geological mapping will be utilised to follow-up all of the geophysical targets. The more interesting of the airborne VTEM anomalies



will be followed by ground geophysical survey (IP and/or gravity).

### Company Address and contact details

S.A. Building 8th Floor, #802  
189 Warsay Street  
tel: +291 1 111469/70  
fax: +291 1 111468,  
PO Box 4076 Asmara, Eritrea

## London Africa generates drill targets

London Africa Ltd. is a private resources company registered in England and Wales, in 2005, to apply for prospecting license in Eritrea. The company was awarded 1562 km<sup>2</sup> prospecting license in the Akordat-Orota corridor area of Ghash Barka Zone, in Central Eritrea. Following a 12 month prospecting period, the company converted the ground into an exploration license in June 2010 reducing the overall size of the area to 1169 km<sup>2</sup>. Since then the company's exploration team has identified numerous gold and copper prospects.

### Kofot-Gerger Cu-Au-Fe prospect:

Located in the northern half of the license area, the Kofot-Gerger prospect lithological succession includes a number of units mapped as 'gossan' which have been sampled fairly extensively and have returned significant anomalous copper and gold grades of up to 4.5% Cu and 4.6g/t Au.

Geological setting and mineralization studies, show the presence of gossans, exhalites and banded rhyolites, that suggest a potential for VMS-style deposits.

although the low lead, zinc and barium in grab and soil samples seem not to favour that idea. The presence of garnets at Gerger and wollastonite in the main carbonate horizon, on the other side, is suggestive of a Cu-Au skarn or IOCG environment.

The company has completed detailed mapping, extensive soil sampling and a ground gravity survey of the area. All data is currently being integrated with the results of a helicopter-borne VTEM survey flown earlier this year with a view to identifying drill targets for drilling in Q4 2011.

### Taninay Au prospect:

Taninay Au prospect lies around 25 km. northeast of Akordat, and is characterized by a prominent NNW-trending quartz vein, that appears to have over 2km exposed length and an overall length of 10 km and 30-40 meters width.

Erratic gold grades are associated with limonite occurring in irregularly distributed aggregates in the quartz vein, which are probably derived from coarse

grained cubic pyrite. The Taninay vein is developed parallel to the foliation of the tuffaceous schists, dipping generally 40-60 degrees west and striking around 160-170 degrees. There is some evidence of shearing in the immediate wallrocks, but the vein itself appears to be un-sheared and of a single quartz generation, in contrast to the complex sheared veins typical of most mesothermal auriferous quartz-sulphide veins. The wallrock appears to be generally unmineralised and only weakly altered.

Grab sample grades of up to 55.5g/t Au have been recorded with other notable grab samples assaying at 15.18g/t Au and an average of over 4g/t Au. Preliminary channel samples are currently being completed and so far have returned results of 4.88g/t Au, 4.66g/t Au & 3.85g/t Au. Detailed mapping has been completed to 1:2000 scale. Channel sampling should be complete by September 2011 and drilling is expected to start in Q4 2011

### Company Address and contact details

London Africa(Eritrea) Ltd.  
S.A Building 4th Floor. Asmara, Eritrea  
Tel. +291 1 111165  
www.londonafrica.co.uk

## Sahar Minerals Ltd

Sahar Minerals Ltd is a privately registered Exploration Company out of Bermuda that was established in early 2009 to take advantage of undervalued assets in the Exploration/Mining Industry, that occurred as a result of the world wide 'Credit Crunch' in late 2008. The company is committed to a commodity focus on gold and base metals. After assessing opportunities in Kenya, Tanzania, Mozambique and Zimbabwe, Egypt, Sudan and Eritrea, Sahar identified 2 Projects in Eritrea for acquisition (Augaro & Harab Suit). The Augaro Joint Venture Agreement between Sahar and ECEM was signed on the 3rd February 2010 and the Harab Suit Exploration License Area was granted to Sahar (by the Ministry of Energy & Mines) on the 19th February 2010.

### HARAB SUIT

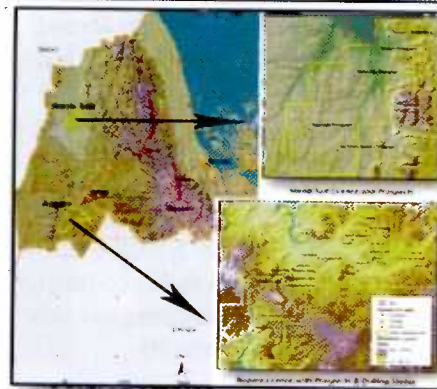
During the Italian colonial period (1891 – 1941), the Tamanti Gold Mine (located on the Harab Suit Project) was developed on a deposit discovered in ancient times. La Società Tamanti Company installed a Mill and worked the property between

1935 and 1939 with a reported production head grade of 11.4g/t gold from seven vertical work faces and three (3) Adits

Sahar's work in Augaro project, following independent SRK geologists' report, focused mainly on regional and prospect evaluation, database assessment and validation, regional soil sampling, and in promising areas rock chip sampling and detail geological mapping were undertaken. Following prospect evaluation, detail work and target generation 13,802 m was drilled by RC(Reverse Circulation).

### AUGARO

The Augaro License Area covers most of the historical 'Augaro Gold Camp' that extends south-southwest for a distance of 70km, in a belt approximately 25km wide. The 'Gold Camp' was the largest producer of gold in Eritrea during the Italian occupation (1891 – 1941). A total of 930 kg of gold is reported to have been extracted from the Mines at Augaro and Damiscioba (the most productive in the 'Camp')



In Harab Suit Project also, after getting independent SRK geologists' report, regional geological mapping, stream sediment and soil sampling, and prospect scale mapping and rock chip sampling was undertaken. In Kolentite and Bajewab Prospects gravity survey was conducted and following target generation work 4,000m RC drilling in both Kolentite and Bajewab Prospects is planned.

### Company Address and contact details

Sahar Minerals Ltd .  
S.A. Building 5th Floor  
Warsay Avenue  
Asmara, Eritrea  
Tel: +291 1 110008



## THANI ASHANTI

Thani Ashanti is a recently-formed Strategic Alliance between AngloGold Ashanti and Thani Investments. AngloGold Ashanti is the world's third largest Au mining company and produced 4.52 Moz of Au in 2010 from 20 operations across four continents. It has a substantial project pipeline and an extensive, worldwide exploration program. Thani Investments has extensive knowledge of developing resource businesses in the Middle East and Africa, long standing and high level relationships with national governments and major industry players in the region.

Since inception in 2009, Thani Ashanti has quickly built up a portfolio of high quality projects in the MENA region. In Egypt, two concessions in the Red Sea desert are currently being explored from operational bases in Al Quseir

and Shalatyne. The 1,760 km<sup>2</sup> Hondine concession contains the historical Hutite orogenic Au deposit, which is currently being drilled with two diamond rigs. Initial results have been very encouraging, including 12m @ 3.6 g/t Au from 178m and 14m @ 2.9 g/t Au from 193m. Work at the 627 km<sup>2</sup> Wadi Kareem concession has involved extensive surface mapping and geochemical sampling and diamond drilling is expected to begin in late 2011.

In Eritrea, Thani Ashanti was granted the Akordat North and Kerkasha Exploration Licenses in March 2010. Since then, the company has set up an exploration office in Asmara, recruited expatriate and local staff and was instrumental in the importation of Geotech VTEM geophysical equipment into Eritrea. Thani Ashanti flew a 10,000 line Km VTEM survey at both ELs in early 2011 and since this

successful survey has interpreted the data and commenced follow-up sampling over the anomalies. Lease-wide stream sediment sampling will commence after the 2011 wet season.

In 2010, Thani Ashanti signed a binding Heads of Agreement with Stratex International to explore for low-sulphidation epithermal Au deposits in the Afar Depression of Ethiopia and Djibouti. The joint venture has a 2780km<sup>2</sup> of tenure in the afar depression and Thani can earn 51% of the projects after expenditure of \$3M over two years.

### Company Address and contact details

Thani Ashanti Asmara Office  
S.A. Building 6th Floor  
P.O. Box 7216 Asmara, Eritrea  
Warsay Avenue  
Tel: +291 1 111202

## Andiamo Exploration Ltd

The Haykota Exploration Licence is located some 45kms south west along strike from the Bisha mine, and appears to be underlain by similar geology. Since Andiamo secured the Exploration Licence in 07/2009 an aggressive exploration programme has been carried out. Geologically the Haykota project area

VMS gossan prospects at Yakob Dewar and Ber Gebey, about 2.4 kms apart and lying along strike.

By year two an airborne VTEM/magnetic/radiometric survey over the entire Haykota licence area was carried out during the period January to March 2011.

A preliminary set of 16 follow-up target areas (Zones 1-16) were identified and ranked. Currently the target areas are being exhaustively investigated, including detailed geological mapping, rock and chip sampling, trenching as well as ground magnetometry, Induced Polarisation, and gravity surveys. They are now being evaluated for the forthcoming drilling programme.

A ground based regional gravity survey covering an area of 335 km<sup>2</sup> has been conducted (Figure 1). Reinterpretation of the gravity data is also being done in light of detailed geological mapping and airborne geophysical surveys. A regional soil sampling programme on a grid of 400 x 400 m has been completed in the western lowland areas. An initial diamond drilling programme has been carried out in the Yacob Dewar and Ber Gebey prospect areas. The total length drilled is 4099 m.

copper enriched near-surface zones, and orogenic gold deposits and skarn-type gold mineralisation. The long and relatively narrow mineralized belt within the Felsic Volcanic Domain trends NNW-SSE, along which many of the gossans, exhalative units and other mineralized and oxidized zones are found. However the currently identified vein-hosted gold deposits are mainly concentrated in the Shambotai area along a linear belt of ductile to semi-brittle deformed volcano-sedimentary rocks. Large numbers of artisan miners are active in the Shambotai area, as well as Berkele.

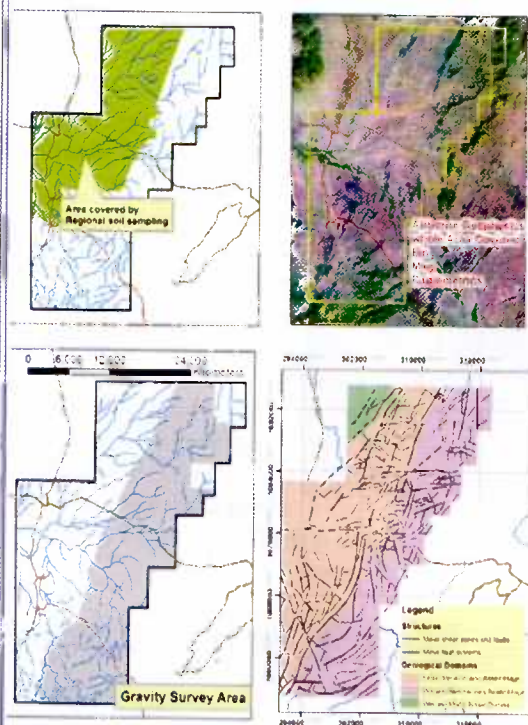
### Management

The management of Andiamo consists of very experienced and respected geologists, with extensive knowledge of both Eritrean geology and VMS style mineralisation. The team also has decades of experience in the global capital markets for financing junior exploration companies. It has also being Andiamo's company policy to employ the best consultants to ensure QA/QC standards are met or exceeded. Our objectives specifically include the training of appropriate Eritrean counterparts.

### Company Address and contact details

Andiamo Exploration LTD.  
Dr Tim Williams:  
tim@andiamoexploration.com  
002911-184662; P.O. Box 4588  
Asmara, Eritrea

### Geological and Geophysical Studies



is divided into three major geo-tectonic domains, which are separated by major shear zones.

Exploration work in the first year of the

The licence area is prospective both

## China Africa Huakan: Prospecting and Exploration activities underway

China-Africa Huakan Investment Co., Ltd. (CAHK) is a joint venture company between China Tianjin Huakan Co. Ltd and China-Africa Development Fund Co. (CAD Fund). In December 2009, the company acquired an exploration license, 288 km<sup>2</sup> in the Anseba Region, 35km north of Keren, called Seroa and in November 2010 it acquired two licenses, 334 km<sup>2</sup> Mensura prospect in the Gash Barka region and, Habella prospect 884 km<sup>2</sup> in the Central region.

### Seroa Exploration license

The mineralization at Seroa exploration area is mainly associated with large sized tectonic breccias and quartz stock works in intermediate plutonic rocks (diorites) and shear hosted quartz veins striking E-W and NE-SW. The Enjihai occurrence and its vicinities are the main potential sites accentuated by strong geochemical and geophysical results. The Enjihai prospect is marked by a series of high level intermediate intrusions along a major center of hydrothermal alteration controlled by the regional Anseba Valley Fault structure. The mineralization occurs at a

contact between the carbonate unit and quartz vein stock works bounded with tectonic breccia to west. The mineralization is mainly associated with pyrite-hematite +/- limonite-malachite +/- chalcopyrite +/- galena hydrothermal alterations within the quartz stock works and carbonate unit bounded by the breccia zone.

The company executed deep penetration IP survey and diamond core drilling in 2011 at Enjihai occurrence. The core from the first hole ZK67-1 showed a good zone of sulphides at ~120m depth: pyrites-chalcopyrite-galena. The drilling program terminated due to the rainy season in June after drilling one hole and will hopefully be commenced on October 2011.

### Mensura and Habella Prospects

Regional geological mapping and intensive geochemical sampling in Mensura area showed encouraging results that led to turn the prospect into exploration license. Three representative geophysical (IP) survey test lines are executed to have a broader understanding of the prospect for further exploration activities. The area is also marked by active

artisanal workings which strengthens the potential of the prospect. A collection of 60 samples in 2010, showed gold values >10ppb in the stream sediment sampling program with maximum gold value 841.85 ppb.

From the last season activities three target areas were selected as potential sites and intensive exploration activities, involving detail mapping, geochemical sampling and ca-2000 diamond core drilling are on schedule for the next work season in October.

On Habella prospect only reconnaissance geological mapping and geochemical sampling, that indicated its potential for VMS deposits, has been conducted (results are pending)

### Company Address and contact details

China-Africa Huakan Investment Co  
Fah Street  
House Number 8  
tel. + 291 1151571/185024  
huzhigangchina@yahoo.com

## Eritrean-Libyan Mining: Encouraging Prospect of the Fanco and Nefasit License Areas

Eritrean-Libyan Mining Share Co (Eri-Lib) has been actively engaged in mineral exploration in Fanco-Guluj (1,424km<sup>2</sup>) and Nefasit (1,636km<sup>2</sup>) license areas for the last 2 years. Exploration works conducted to date have identified several gold, and VMS deposits in both concession areas.

### Geology and Mineralization of Fanco-Guluj Concession area

The Fanco-Guluj area is the southern extension of Bisha Mineralized belt and has similar geology and gold and VMS mineralization. The existence of gold is manifested by the extensive on-going artisanal mining activities at several places within the concession areas.

The geology of the area comprises of NE-SW – trending Meta-volcanic and meta-sedimentary rock assemblages intruded by syn-to post-tectonic intrusions with numerous N-S trending, dextral shear zones.

Eri-lib carried detailed mineral exploration

the Fanco-Guluj Exploration License areas. Gossan outcrops with extensive alteration zones (haematite, and limonite) as well as extensive box works have been found at Wedi Keih.

Recently Eri-Lib commissioned airborne geophysical surveys consisting of electromagnetic (VTEM), magnetic and radiometric surveys over an area of 916 km<sup>2</sup> by Geotech Airborne Pty Ltd. The results are expected to arrive soon.

### Geology and Mineralization of Nefasit concession Area

The Nefasit concession, composed of low-grade volcano-sedimentary rocks intruded by syn-tectonic granitoids, gabbros and diorites, and is affected by major step faults, horsts and grabbens related to the opening of Red Sea. Eri-Lib launched regional geological mapping at a scale of 1:50,000 of the entire concess-



ing (1:5,000 scale), and carried out rock chip and soil sampling of the following prospective areas notably: Mt.Seker, Assus-Metkel Abyet, Ayet, Moggot, Adi Rosso and Leissa. Moreover, ground

geophysical survey consisting of gravity and MAG has been conducted over an area of 26.8km<sup>2</sup> at Mt Seker and Assus-Metkel Abyet areas and there is a good correlation of the geophysical with the geochemical anomalies. Four RC boreholes with a total depth of

200m were drilled at Mt. Seker copper prospect area.

### Company Address and contact details

Eritrean-Libyan Mining Share Co.  
P.O.Box 8980  
Asmara, Eritrea  
Tel. +291 1 180345/180358  
Fax. +291 1 180346  
www.erilibmining.com

## Global Resources Development and Management Consultants (GREDCO)

The Company was founded in Eritrea during 1995 primarily to provide guidance on integrated development programmes. Our mission is to contribute to the efforts of poverty reduction and sustainable development with participatory and integrated approaches using appropriate technology and expertise that enhances local ownership.

The company has teams of experts with complementary skills able to work on multidisciplinary studies, networked with a large group of associates based locally and internationally, who have unique experience of Africa.

### Services

We provide comprehensive, professional and high quality consultancy services, specifically tailored to suit the requirements of the client. The principal fields of expertise are the following:

- Environment
- Water resources
- Agriculture/natural resources
- Socio - economic studies
- Institutional development, and
- Geo- information services

### Experience

The company has worked with mining/exploration companies such as Bisha Mining Share Co/Nevsun Resources, Sunridge Gold Corp, Sub-Sahara Resources/ Chalice Gold Mines as well as Ministries / Public Sector Organisations, International Organisations and Non-governmental Organisations. Detailed career histories will be provided, on request, to potential clients during project design and contractual negotiations.

### GREDCO

3rd Floor, Saba Building  
Warsay Avenue

Asmara, Eritrea

Tel: 002911-186111; Fax: 002911-188190

Email: [ami@eol.com.er](mailto:ami@eol.com.er)

## ADEN Services

ADEN Services is an international leading provider of Integrated Support Services headquartered in Shanghai, China. With over 12,000 employees worldwide, the company serves over 500 clients in more than 750 locations.

Through a network of 32 branches across Asia, Middle-East and Africa, ADEN Services offers its clients:

- Remote Site Management
- Maintenance
- Security
- Cleaning
- Foodservice

ADEN Services Remote Site Division specializes in supporting remote site operations for the oil and gas, mining, construction and heavy industry sectors. The company provides life support services for projects in these sectors including technical assistance, audit and consulting, logistics, manpower placement and procurement as well as full camp management services, which include foodservice, cleaning and housekeeping, laundry, maintenance, landscaping, waste management and social entertainment.

**ADEN** Beside you  
**SERVICES** wherever you are

<http://remotesite.adenservices.com>

[ram@adenservices.com](mailto:ram@adenservices.com)

## GENALYSIS

Setting the standards for quality and customer service.

With over 1,000 laboratories and offices globally and more than 30,000 employees Intertek is a leading provider of quality and safety solutions serving a wide range of industries around the world.

Our network of Mineral laboratory facilities offer a wide range of services including:

- Sample Preparation
- Fire Assay and Precious Metal Analysis
- Exploration Geochemistry
- Environmental Services
- Mine-Site Laboratories
- Consulting Services
- Minerals Inspections
- Robotic and Automated Laboratory Systems
- Coal Testing and Inspections

Genalysis Laboratory Services, an integral part of the Intertek Minerals Group, has been servicing the mining and exploration industries for over 30 years and is the partner of choice for clients across the globe. Since 2003 Genalysis has had an alliance with African Horn Testing Services in Asmara, Eritrea. Recently an agreement was reached between the two parties for Intertek Genalysis to acquire the assets of African Horn Testing Services. Intertek Genalysis has submitted a business license application to the Ministry of Energy and Mines. Samples prepared in our Eritrean facility will be sent to the Perth Mineral Laboratory for analysis.

Further strengthening our footprint in Africa, Intertek also has established laboratories in Johannesburg, Ghana and soon to be Guinea and regional sample preparation facilities in Namibia, Madagascar and Cote d'Ivoire. In addition to these facilities Intertek also own and operate an onsite base metal laboratory for a client in Ndola, Zambia.



## General Exploration Drilling (Cyprus Ltd Eritrea Branch)

From a humble beginning in 2005, Rod Trigwell and his team of professional fellow workers have molded General Exploration Drilling Cyprus Ltd Eritrea Branch into the largest multipurpose drilling contractor operating in Eritrea, with operations in North East Africa.

General Exploration Drilling Cyprus Ltd Eritrea Branch provides services in all drilling techniques including reverse circulation, grade control drilling, RAB drilling, Geotec drilling, diamond drilling and de-watering bores using the most up to date drilling, sampling methods and equipment available.

The fleet of 11 rigs ranges from small scout portable drills with a diamond drilling capacity of 250 meters, to large multipurpose tracked rigs equipped with separate high pressure 900 CFM X 350 Psi compressors for reverse circulation drilling with, track mounted diamond drilling rigs with capacity to 600 meters.

Administration and field support are provided by efficient and well coordinated personnel operating from modern office and workshop facilities. A large supply of drilling spare parts and drilling consumables are available for immediate dispatch to keep the field operations running smoothly.

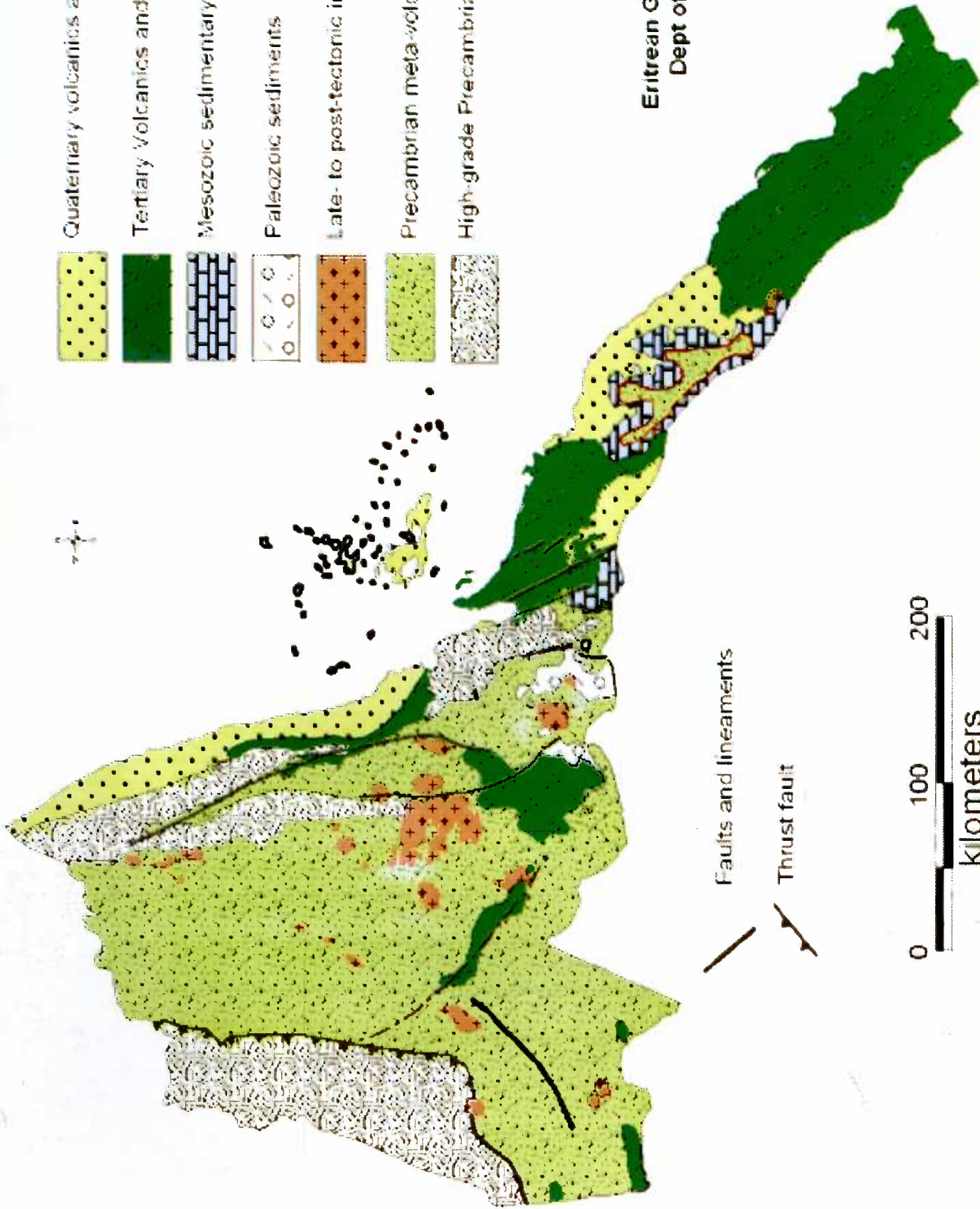
General Exploration Drilling Cyprus Ltd Eritrea Branch aims to continue upgrading and modernizing their fleet of rigs and equipment to provide mining and exploration companies with the most professional and efficient service available.



Eritro-German Building  
Floor 5 office No.1  
Tel/Fax: +291 1125829  
[gedltd@gemel.com.er](mailto:gedltd@gemel.com.er)  
Asmara, Eritrea

Eritrean Geological Survey,  
Dept of Mines, MOEM

- Quaternary volcanics and sediments
- Tertiary Volcanics and sediments
- Mesozoic sedimentary deposits
- Paleozoic sediments
- Late- to post-tectonic intrusives
- Precambrian meta-volcano-sediments
- High-grade Precambrian rocks



Faults and lineaments

Thrust fault



kilometers