SECTOR PROFILE ON MINING

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A: LEGAL FRAMEWORK COVERING MINING IN KENYA

Mineral exploration and exploitation are currently carried under the auspices of the Mining Act, CAP.306 of the Laws of Kenya, and is administered by the Department of Mines and Geology, Ministry of Environment and Natural Resources. The Department has the responsibility of undertaking geological surveys, geoscientific research, coordination and regulation of the activities of the mining sector.

All un-extracted minerals under or upon any land, as per the Mining Act, are vested in the Government, subject to any rights which under the Act, have been granted to any other person. The following licences can be granted under the Mining Act.

1. Mining Location Licences

This is mostly granted to small scale miners. The conditions attached to this licence are onerous than in the case of other licences. A location consists of a block of not more than 10 claims. A claim is an area of:

20,000 square metres in the case of precious metal i.e. gold, silver, etc., and precious stones (ruby, emerald, opal etc.)50,000 square metres for all other minerals (copper, lead, graphite, baryte, etc.

2. Exclusive Prospecting Licence:

It is granted over an area selected by the applicant who has a valid prospecting right, has deposited a sum of Kshs.2,000.00 with the Provincial Commissioner of the Province in the area over which the application made is situated, has written consent from the relevant local authorities, has a written consent from land owners etc.

3. Mining Lease:

This is granted for the exploitation of a mineral deposit which has been discovered following successful prospecting and exploration.

Mineral exploration, exploitation and trade are presently carried out under the auspices of the Mining Act, Cap,.306, the Trading in Unwrought Precious Metals Act, Cap.309, and the Diamond Industry Protection Act, Cap.310, of the Laws of Kenya.

The Mining Act, Cap.306 has provisions for the protection of the environment. However the Environmental Management and Coordination Act of 1999 provides for legal framework for the management of environments and all related matters.

The law provides that royalties are paid for all minerals. The rates of royalties are negotiated within the Commonwealth countries' rates. Currently, royalties are paid for soda ash and carbon dioxide only. They are based on a certain rate per ton of soda ash sold and per kilogramme of carbon dioxide produced. Other companies with mining leases are currently negotiating their rates.

B: MINERAL SECTOR OVERVIEW:

Geological overview:

The geology of Kenya may generally be grouped into the following five major geological successions: Archean (Nyanzian and Kavirondian), Proterozoic (Mozambique Belt and Bukoban) Palaeozoic/Mesozoic sediments, Tertiary/Quaternary volcanics and TertiaryQuternary sediments.

Quaternary:

Soils, alluvial beach sands, evaporates, fossil coral reefs and sandstones at the coast: alluvial and lacustrine sediments of the Rift Valley. There are also volcanic rocks of the rift valley from the younger volcanoes.

Tertiary:

Coastal sediments, Late Miocene and Pliocene volcanics,Terrestria and lacustrine inland sediments. There are Early Tertiary formations not represented at surface.

Palaeozoic/Mesozoic (Cretaceous, Jurassic, Triassic, Permian and Carboniferous):

The Karroo formations of the coastal hinterland, including the basal sedimentary formation in north-east Kenya.

Proterozoic:

Kisii series (Bukoban system):
Volcanics with sediments Mozambique Belt: quartzites, biotite/hornblende gneisses, schist, granitoid gneisses, amphibolites, migmatites.

Intrusives: syntectonic granites.

Archean: Kavirondian system: Mudstones, Sandstones, Conglomerates, Granitic Intrusions

Nyanzian system: Shales, cherts, ironstones, Pyroclastics, Rhyolites, Andesites, Basalts.

1. The Nyanzian Shield

The Nyanzian and Kavirondian systems forming the Nyanza Craton are the oldest rocks in the country with ages of over 2,500 million years.

The Nyanzian system is mainly composed of lavas and pyroclastics with minor sediments and banded ironstones. The Kavirondian, which rests uncomfortably on the Nyanzian, consists of grits, sandstones, greywackes and conglomerates. Both the Nyanzian and Kavirondian systems are isoclinally folded about axes that have an east-westerly trend. Kavirondian is only slightly younger than Nyanzian but folding in the two systems, has similar orientation. Numerous granitic bosses and batholiths have intruded the Nyanzian and Kavirondian. The Kavirondian intrusions were more but the pre-Kavirondian were also widespread and the two systems are discernible.

2. Mozambique Belt:

The Mozambique belt is a structural unit within which a wide variety of meta-sedimentary and meta-igneous rocks are found showing a broad concordance of structural style and metamorphic history. In most of these rocks, the degree of deformation is intense and is of high metamorphic grades. They were thus referred to earlier in literature as the basement system rocks due to high degree of metamorphism and deformation.

Recent work on the Mozambique Belt has shown that rocks can be sub-divided into groups of contrasting lithology, structure and composition of igneous rocks content. These groups are being studies in greater detail in order to come up with proper chronostratigraphic terminology.

Within the Mozambique Belt basic igneous complexes are found and range in size from bosses to small dykes. They occur both east and west of the Rift Valley. Some of the

older basic intrusions have undergone deformation and metamorphism to give ortho-amphibolites and charnockitic gneisses.

Basic and granitic intrusions are know in the Mozambique Belt. The most characteristic feature of the Mozambique belt is its structural trend which is more or less north-south in its entire belt.

Variations of the northerly trend are minor and when observed can be explained and are localised. The majority of Mozambique rocks have been placed in upper Precambrian (Proterozoic).

3. Palaeozoic and Mesozoic Formations

Palaeozoic and Mesozoic formations in Kenya are found near the coast and in north-eastern Kenya. The earliest of these rocks are Permo-Carboniferous which are mostly sandstones and shales that form the Duruma series. This is equivalent to the Karroo system in Southern Africa. The local formations are Taru; Maji-ya-Chumvi; Mariakani and the Mazeras. They extend for about 100 kilometres from Taru to Mazeras, west of Mombasa. The rocks dip very gently towards the ocean and are heavily faulted in places.

Mesozoic rocks occur in two separate areas, in the north-east part of Kenya and along the Coast belt. The sratigraphy and fossils in the two areas are very distinct and it is likely that the sedimentary basins in the two areas were connected. Revision mapping in the area has come up with interesting lithological units that have revised lithological names.

4. Tertiary and Quaternary Volcanics:

Volcanic rocks cover the central parts of the country from south to north, occurring in the floor of the Rift Valley and on the peneplains west and east of the valley.

The oldest of the volcanics are of Lower Miocene age and comprise the eroded lavas and pyroclastic piles of South Nyanza. Late in Miocene times, Kapiti and Yatta phonolites were erupted and flowed to great lengths.

Further eruptions accompanied by faulting persisted and also gave rise to the Rift Valley and the volcanic piles of Mounts Kenya, Elgon and Kilimanjaro.

Quaternary volcanism was mostly within the Rift Valley and has given rise to the craters and cider cones that are found in the floor of the valley e.g. Longonot, Menengai and Suswa.

5. Tertiary and Quaternary Sediments:

There are many deposits of sediments in various parts of Kenya. They usually occur at the base of volcanic succession, intercalated with it or occurring in tectonic troughs

The repeated faulting of the Rift Valley floor and the numerous volcanic eruptions created many short-lived basins of internal drainage in which lacustrine and fluviatile sediments accumulated. Most of these sediments are unfossiliferous, but a few are of interest as they contain deposits that bear artefacts and interesting fossils that have been studies extensively.

The more important sediments of middle Pleistocene are the Olorgesaillie lakebeds, a lacustrine series with much diatomite, mammalian fossils and artefacts. This is also comparable to the Kariandusi sediments near Gilgil and the Kanjera Beds in the Kavirondo Gulf off Lake Victoria. Olorgesaillie beds and Kariandusi sediments are in the Rift Valley.

A wide range of minerals, metallic and industrial, is known to occur in the country. These include barite, gypsum, gold, silver, lead, talc, titanium, salt, a variety of gemstones, (mainly ruby and several varieties of garnets) dimension stones, silica sand, heavy mineral sands, manganese, zinc, wollastonite, graphite, kaolin, copper, nickel, chromite, pyrite, various clays, rare earth elements and pyrochlore.

The Geological environments for the mineralization can be summarised as follows:

(a) Archean Nyanzian craton area of Western Kenya where metallic mineralisation of base and precious metals are know to occur: gold, copper and silver have been mined in the past. They are also potential for ferrous and no-ferrous metals. Kimberlitic bodies have also been reported.

(b) The Proterozoic Mozambique Belt that is most extensive in Central Kenya north to South in which minerals such as Kyanite, corundum, graphite, wollastonite, marble, asbestos, fluorspar, magnesite, kaolin and a variety of gemstones are found together with minerals associatd with basic and granitic rocks.

(c) The sedimentary rocks of Palaeozoic to Quaternary are widespread. These rocks are sources and hosts of limestones, gypsum, clays, manganese and construction materials and possibly hydrocarbons. Base metal mineralisation, lead-zinc-barite and copper are known to occur in the sedimentary basin along the coastal belt.

Heavy mineral sands also occur along the coastal beach sands and Recent deposits of about 3.2 billion tons have been discovered.

(d) The volcanic rocks associated with rift system host a variety of minerals and construction materials. The volcano-sedimentary accumulations have deposits of clays, evaporites, trona (soda ash), diatomite, natural carbon dioxide, kunkar and gypsum. Gem quality rubies has recently been discovered.

The geothermal fields are found in the area and some have been exploited currently producing 57 MW of power to the national grid.

Carbonatites are known to be host of several minerals found in the Nyanzian shield area, around Lake Victoria shores and in the southern part of the coastal

sedimentary basin. Mrima, one of the carbonatites known for potential of niobium and rare earth elements (REE) is found in the coastal basin, south of Mombasa.

C: CURENT MINING ACTIVITIES:

The Kenya Mining Industry is dominated by production of non-metallic minerals which are mainly: - soda ash (trona), flourspar, diatomite, vermiculite, natural carbon dioxide, kaolin, barytes, a variety of gemstones, limestone and lime products including various construction materials.

In the case of metallic minerals, some quantities of gold are being produced. Iron ore is produced from localised small deposit and is utilised in the manufacture of cement in the country. Below are the mining activities that took place between 1998 and 2001.

Mineral Production During 1998 – 2001 was as follows: -

Commodity	Unit	1998	1999	2000	2001
Soda ash	Tonnes	242,910	245,680	238,190	297,780
Flourspar	Tonnes	60,854	93,602	100,102	118,850
Diatomite	Tonnes	3,400	3,587	3,634	3,500
Cement**	Tonnes	1,050,000	1,000,000	980,000	950,000
Salt Crude**	Tonnes	21,742	44,886	16,359	15,000
Vermiculite	Tonnes	2,120	1,640	1,240	-

COMMODITY	UNIT	1998	1999	2000	2001
Kaolin	Tonnes	54	192	793	700
Limestone products*	Tonnes	31,000	32,100	32,000	31,000
Corundum	Kg	4,001	4,488	5,896	5,862
Carbon dioxide	Tonnes	8.,998	10,006	7,744	5,645
Gold	Kg	388	990	1,243	1,545

Source: Ministry of Environment and Natural Resources

* - Excludes limestone products used in Cement Manufacture

** - Provisional

Mineral Products

Soda ash is produced from the mineral trona that occurs at late Magadi which is situated within the Great Rift Valley. The commodity is produced by the Magadi Soda Company Limited in one of the biggest known natural sources of trona in the world. The bulk of the soda as is exported but a good deal of the commodity is used in various local industries.

Trona occurs together with common salt and Lake Magadi is also a major source of crude salt.

Flourspar is mined to the east of the town of Eldoret within the rift Valley system. The mine is operated by Kenya Flourspar Company Limited. The mine produces acid grade flourspar of which the bulk is for export.

Diatomite is produced at Gilgil within the rift Valley, but it is known to occur in a number of localities within the Rift Valley system. The commodity is produced for both export and local markets. Its potential is large.

Vermiculite is produced from Lodosoit which, is in the northern central part of the Rift Valley Province within the pre-Cambrian rocks of Mozambique belt.

Limestone and Lime Products are produced for the manufacture of cement and other industrial products. Cement and construction industries take the bulk of the limestone mined and quarried. Limestone marbles and dolomites are widely occurring in the country and a large tonnage of the commodity is known to exist. Along the coastal belt, Bamburi, Portland Cement Company Limited exploits kunkar and crystalline limestone in the vicinity.

The three cement factories, Athi River, Bamburi and East Africa Portland produce over 1.5 million tonnes of cement to meet local needs.

Natural Carbon Dioxide associated with the rift system, is exploited in a number of places and has been marketed by Carbacid (Co2 Mfg) Limited for industrial purposes.

Other Industrial Minerals: exploited include gypsum which is mined in Tana Rier in th Coastal belt, Kajiado near Nairobi and in Turkana in North Western Kenya. Gypsum mined is supplied to local cement plants and some is exported to Uganda.

Gemstones: Kenya boasts of a wide range of coloured and ornamental stones which are mined in the country. These mainly include, in order of importance, ruby tsavorite, sapphire, various types of garnet, peridot, tourmaline, aquamarine and others.

Lead was being produced from galena, which was being mined in small quantities in the coastal belt, where it was smelted together with scrap lead to manufacturer lead batteries.

Gold is known to occur in a number of places in gold bearing greenstone rocks of Nyanzian Craton in Western Kenya. Areas with alluvial gold are being harvested by local miners through conventional panning in the northern part of the country.

Mineral commodities contributed about one per cent (less 1%) of the Gross Domestic product (GDP). However, there are tremendous minerals potential that await exploitation.

The country has the potential for minerals and with many other fiscal factors having been made favourable to attract investment in the country. Investors are expected to take the favourable opportunity to invest in mineral exploration and mining.

D: DATA BASE

Geological Information

About 90% of the country has been covered by geological mapping at reconnaissance and regional level. Some areas are covered by mapping of 1:50,000, 1:125,000 and 1:250,000 scales.

The reports and maps are available for sale at the Mines and Geological Department Library in, Nairobi, Kenya.

Other Maps are:

- Geological Map of Kenya (1:3,000,000) 1996 edition

- Geological Map of Kenya (1:1,000,000) 1983 edition with

(a) Structural contours
(b) Gravity line

- Geological Map of Kenya (1:1,000,000) 1987 Edition

- Kenya Mineral Deposits (1:300,000) 2000 Edition

(c) Tectonic Map 1:3,000,000

Geological mineral exploration and mining data, since the turn of the century to date, are available at the Mines and Geological Department's Archives and library, at the Headquarters in Nairobi. The information, is currently being computerized and digitised for easy retrieval.

Geophysical Data:

Since 1970's several areas have been covered by airborne geophysical surveys in search of minerals. Information on the main airborne surveys can be obtained from the Mines and Geology Department.

The available geophysical data will be of interest to the investors who wish to have test surveys prior to planning large scale exploration programmes. However, the existing geophysical data is not computerised.

Geochemical Data:

Geochemical exploration has been conducted in several parts of the country in varying degrees. All areas mapped after 1970 had reconnaissance geochemical survey conducted along with the mapping. This involved collection of stream sediments, heavy minerals and grid soil samples. Geochemistry has been conducted in areas of revision mapping and ground geophysical programmes. A large part of the country has been covered by this type of geochemical data and is available at the Department's Library and Archives.

Topographical Maps:

Maps of scale 1:250,000 cover the whole country while scale 1:100,000 and scale 1:50,000 are available for most parts of the country. Dates of publication do vary.

Aerial Maps:

Most part of the country is covered by aerial photographs of varying scales and dates of coverage.

Laboratory services and related Utilities:

- The Mines and Geological Department has facilitates for chemical analysis, mineralogical petrographic, fire assay and ore dressing at a nominal cost.
- The nuclear Centre at the University of Nairobi offers analytical facilities at a cost.
- Kenya Industrial Research Development Institute, (KIRDI), Nairobi, also offers analytical facilities

related to industrial uses especially on industrial minerals on commercial basis.

- The Mines and Geological Department offer drilling services at a cost. There are other companies in the country that offer drilling service on commercial basis.

E: MINERAL OPPORTUNITIES:

There exist high mineral potential areas i.e. the gold bearing greenstone belt of Western Kenya and Mozambique Belt in Central and Southern Kenya. Several exploration companies have been granted exploration licences to explore for gold and base metals in these areas. Some of the above high mineral areas have been staked by both local and foreign companies.

Investors may wish to enter into joint ventures with companies already holding exploration concessions.

Kenya has well developed transport and communications system which is progressively being improved and modernised to meet the need of the expanding economy. A well developed road and air network, sea ports, posts and telecommunication facilities provide back-up to industrial development.

Useful contacts

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