GEOMYSORE SERVICES (INDIA) PVT. LTD.

REPORT ON MINERAL EXPLORATION CARRIED OUT IN THE 260 sq km, AREA RAMAGIRI RP BLOCK IN ANANTAPUR DISTRICT, ANDHRA PRADESH

1.0 INTRODUCTION

The **Ramagiri block**, granted to GMSI on RP, forms the southern half of the Ramagiri-Penkacherla greenstone belt. Ramagiri is located at 40km south southeast of Anantapur and 180km due north of Banagalore. It is accessible via motorable road deviating west from the national highway No.7 linking Bangalore-Hyderabad via Anantapur.

2.0 LITERATURE AND MAP COMPILATION

GMSI geologists have compiled the Geological map of the Reconnaissance Permit block from various published sources mainly from the Records of the Geological Survey of India, reports purchased from Government sources and from Reco field visits by our company geologists and consultants. The Geological Map was compiled on GIS format (Geographic Information System) by digitising each one of the rock units on different layers, adopting UTM projection and everest geoid after consulting Survey of India authorities. The digitised version is taken to Mapinfo environment for the final out put of the coloured version as presented in **Annexure-1.**

GMSI **has** completed digitisation of the drainage system from topographic sheets 57F/7, 57F/8, 57F/11 and 57 F/12 for creating a base for undertaking stream Geochem sampling and for follow up detailed geological mapping and geophysical surveys of the anomalous sectors.

Compilation of Reports on the Geology of the Ramagiri greenstone belt, mainly the southern part which is covered by the RP grant was completed. The sources of information included Records of the Geological Survey of India and papers published on the Ramagiri belt in various earth science publications and also from personal knowledge of the geologists and consultants of the GMSI and AIR.

Compilation of information on the present status of exploration in the region of old gold mine workings and prospects at Ramagiri and Boksampalle at west of Penukonda and the area which was held earlier under an ML by the BGML.

A comprehensive research of both published and unpublished works on the project area was completed, resulting in an extensive bibliographical compilation of work on the geology and mineral resources in the area of interest.

As part of the exploration programme GMSI Geologists have carried out reco-geological mapping, detailed geochem rock-chip and stream sediment sampling. These works were carried out using modern GPS equipment. The maps thus produced forms the basis for carrying out detailed ground Geophysical Surveys, trenching and drilling under Prospecting Licence we have sought for from the Government.

The Geology and feature of gold mineralization compiled by us on the basis of the literature survey, field visits, map compilation and geochemical sampling during the 3 years tenure of the Ramagiri RP block are presented in the following:

3.0 REGIONAL GEOLOGICAL SETTING

The Ramagiri greenstone belt is part of a 400km long linear greenstone belt extending from Penukonda in the south to Hungund in the northwest. It is one of the important gold-bearing greenstone belts of the Eastern Dharwar Craton (EDC). Till recently there were producing mines operated by the Bharat Gold Mines Ltd. The EDC is composed of a Late Archaean, anatectic and juvenile, calc-alkaline plutonic complex dominated by granites, granodiorites and monzonites. This complex is now known by the term 'Dharwar Batholith'. The plutonic rocks were emplaced in steep, NW-SE linear tracts and are bounded by Late Archaean, ductile shear zones (high-strain gneisses and mylonites) and steep, narrow tracts of volcanic and sedimentary rocks (the schist belts or the greenstone belts). One such belt is the Ramagiri greenstone belt and it has much in common lithologically with the gold-bearing Kolar, Veligallu and Hutti greenstone belts.

3.1 GEOLOGY OF THE RP BLOCK

The outcrop in the area is generally good. The geology of the belt comprises metabasalt with pillow structures in places, metavolcanic amphibolite, felsic volcanics, volcaniclastics, Banded Iron Formation, a variety of phyllites, quartz-carbonate-chlorite schists and quartzite, talcose ultrabasic rock and meta gabbro both minor units, granites/granodiorites emplaced as pre-, syn- and post-tectonic bodies and abundant dykes and quartz veins and quartz-breccia marking the margins of the belt **(Annexure-1)**. The syntectonic granites are involved in shearing and mylonitisation along the belt margin and within the belt. Based on trace element signatures of the metabasalts, Zachariah et al. (1990) suggested that the belt rocks may have formed in an island arc tectonic setting.

Within the RP block the proportion of the different lithio units are as follows; Amphibolite 63 sqkm, Metabasalt 32 sqkm, quartz-carbonate-chlorite schists and quartzite 7.5 sqkm, felsic volcanic/pyroclastic1.9 sq.km, banded Iron Formation 0.70sqkm, talcose-serpentinised u/m 0.065sq.km, Cherlopalle granitoid dome 25 sqkm, internal thin granite sheets 20 sqkm, external intrusive granites 96 sqkm and dykes 7sqkm.

3.2 QUARTZ BODIES

Quartz bodies of different types and of several generations occur in the phyllites. The main three types are: (i) gray, fine-grained and dull type, (ii) gray, coarse-grained and greasy type, and (iii) white, coarse-grained type. The quartz bodies occur mostly in the form of reefs, pods, veinlets, and stringers aligned along the foliation planes, and arranged in en echelon pattern, except for the ones that occur as fracture filling or in the shear folded cross-veins. These bodies are mostly confined to the light-gray phyllite, though they are in some cases found in the dark-gray phyllites and also within chlorite-carbonate rocks.

3.3 STRUCTURE

The schist belt as a whole has a linear upright, broadly cuspate structure with the major litho units in tectonic contact with each other. The contacts are marked by intense shearing, phyllonitization, mylonitization and syntectonic sheets of granites. These structure are a consequence of craton-wide Late Archaean NE-SW shortening and sinistral transcurrent

shearing along in N-S trending high-strain zones. The bedding in BIF and foliation or schistosity in ductile units are steeply dipping. Major N-S trending brittle-ductile shear/mylonite zone has been traced along the margins of the belt and also within the belt. These zones probably mark steepened thrusts.

The prominent folded features in the area are, (i) a south plunging anticline around Cherlopalle village (the Cherlopalle Anticline) (ii) another south plunging anticline with its axial trace from Elakunta to Ramagiri (the Ramagiri Anticline). The cores of these two anticlines are occupied by granitic rocks. The greenstones are pinched in between the granites (the two anticlines) as synformal keels or as thrust sheets. The main synformal structure beween the two anticlines can be designated as Gold Field Synform as it localises the main gold mineralization and all the old gold mines. Folds are steeply plunging (+60°) and the axial planes are subvertical. Sheets of sheared granites occur along shear or fault zones at the margins of the belt. Thin sheets of coarse leucocratic granites within the greenstones up to Boksampalle.

3.4 GOLD MINERALIZATION IN THE RP BLOCK

At the present status of our knowledge on gold mineralization in this part of the Ramagiri belt, there are three separate zones of gold mineralization namely;

(1) Jibutil-Ramagiri-Chinnabhavi well known in the literature as the **Ramagiri Gold Field;**

(2) Western belt margin zone at west of Ramagiri and;

(3) Penukonda-Boksampalle zone in the south.

The Ramagiri Gold Field has a history of gold mining dating back to ancient times. These old workings, which follow the richer gold-quartz veins are mostly narrow, about a meter or less wide and extend for variable lengths up to about 45 meters. Some are oval in outline and follow down the ore shoots of similar shape. These workings reached up to an average depth of 30 meters, but some of them extend up to about 75 meters. The ancient miners had removed the gold-bearing quartz bodies so thoroughly that no such body with significant value is now exposed at the surface.

The Ramagiri Gold Fields is a north-south trending narrow belt of chlorite-sericite schists, carbonaceous phyllite and cherts confined to the contact region between acid and basic volcanics. The gold mineralisation extends over a length of **15 km** from Buruju in the north, via the Ramagiri Mine in the middle to the South Jibutil Mine in the south. Structurally, the mineralisation is controlled by stacked shear zones within phyllites.

The mineralised zone is 500m wide and comprises quartz veins of three types viz. (i) white to blue quartz veins, (ii) white brecciated quartz veins, and (iii) black brecciated quartz veins, localised along narrow bands of phyllite. The latter two types are reported to carry much of the gold mineralisation. Individual quartz veins are 30-100m in length and vary in thickness from a few millimeters to 3 metres. About 500m east of the main zone, another quartz vein of quartz ankerite association extends for a considerable distance. The vein zone is 15–28m wide but no details on its gold tenor are known. East of the quartz ankerite zone three bands of gossans occur with a few shallow pits. No details of their gold tenor are known.

The modern mining operations were carried out during the period 1905-25, by companies managed by John Taylor & Sons., London.

The Ramagiri Gold Fields comprises the following mines from north to south.

Chennabhavi Mine
Om Pratima Mine
Yeppamana Mine
Ramagiri Mine
Gantalappa Mine
Power house Mine
Jibutil Mine

Only the mines from Om Pratima southwards fall with in the RP block granted to GMSI.

The North Anantapur Gold Mines Ltd. produced 221,001 tons of ore from their Chennabhavi Mines in the north, which yielded 136,633 ounces of gold the average yield being 12.37 dwt per ton. In the south the Jibutil Gold Mines Ltd. produced 140,570 tons of ore that yielded 39,116 ounces of gold, the average yield being 5.5 dwt per ton. In the central part of the gold field, exploratory shafts were sunk and some development was done at a number of points. Mining operation in this field was suspended due to the First World War.

The operations of the ancients were quite extensive but confined to shallow depths seldom exceeding 45 meters. The ancient workings can by and large be considered to be reliable guides to ore as past and present developments below the ancient workings show that all the major ore shoots found in depth are essentially those manifested at surface as ancient workings.

As stated earlier, gold of economic interest is concentrated in the quartz bodies. A significant concentration of gold is also present in the fine stringers of quartz found along foliation planes of some phyllites, specially near the lager quartz bodies. **The ore boundaries are ill-defined and irregular, and are, in fact, assay boundaries.** Gold mineralization is scattered all over the phyllite tracts, but its major concentration is in the form of shoots.

The ore shoots are generally tongue-shaped with the longest axes having very steep, mostly northerly pitches. The axis of an ore shoot is always at a slight angle with the attitude of foliation due to en echelon arrangment of the quartz bodies, which themselves occur generally along foliation planes. The maximum strike length of the ore shoots opened up at the 60 m level of Yeppamana mine is around 135 m and the maximum thickness about 15 m. some of the shoots are quite small. **The largest ore shoot mined in the old Chennabhavi mine** at the northern end of the field showed the maximum strike length of about 140 m and the thickness of 11 m. The downward extension of this shoot, which is fully developed at the surface level, continues for 250m along the northerly pitch of about 80°.

Sulfides in the form of dissemination of euhedral pyrite, minor chalcopyrite and arsenopyrite are found in phyllite and gray quartz bodies along the ore zone. The sulfide grains show evidences of post-tectonic crystallization and are concentrated along foliation or shear planes. Sulfide concentration is not directly related to gold concentration.

Production resulted from only the northern and southern parts of the field, whereas in other parts only exploration and development were done. A mine in the northern part (Chennabhavi Mines) developed to a depth of 350 meters, and two mines in the southern part (Jibutil Gold Mines) developed to depths of 335 meters and 215 meters largely accounted for the production. The development elsewhere was confined to depths of less than 120 metres.

The operations of the period 1905-25 were not as extensive as ancient workings but were localised to a few selected spots where ancient workings were found promising. They covered only a small fraction of the total length of the field and the fraction is still smaller in relation to aggregate length of different parallel lodes in the field.

Further, a lot of ground between one mine and another remains unexplored underground.

3.5 RESERVES AND GRADE IN RAMAGIRI GOLD FIELDS (COMPILED FROM LITERATURE)

Block	No. of lodes/shoots	Strike length (m)	Depth (m)	Reserves (m.t.)	Grade (g/t)
Chennabhavi Mine	2	45-63	50	0.138	1.45
Ramagiri South shaft area	3	30-46	150	0.082	4.85
Yerappa-Gantalappa Yerrappa sector	3	275	60	0.257	1.91
Gantalappa (i)	1	200	60	0.106	2.38
Gantalappa (ii)	1	65	95	0.019	5.64

BGML operated the gold mine in Yerrappa-Gantalappa block.

3.6 BRIEF DESCRIPTION OF THE DIFFERENT MINING BLOCKS IN THE RAMAGIRI GOLD FIELDS

3.6.1 Buruju Block

This sector contains 7 shafts of which Nos 4 & 5 formed the production shafts. The workings reached a depth of 355m in No 5 shaft. The total development consists of 9296ft with lateral development of 975ft strike length on the 450ft level. The orebody petered out at 975ft level. According to M/s John Taylor & Sons, the mine yielded 13,6522oz of gold.

3.6.2 Kottapalli Block

South of the Buruju mine, the sector contains a few old workings confined over 1220m of strike length. No development mining activity or exploratory drilling has been carried out in this sector.

3.6.3 Ramagiri Block

In this sector, three areas of workings are known. At the northern end at Om Partima three shafts are known, one of which was developed to 90m. The Yeppamana mine consists of two shafts. Three principal ore shoots are known namely A, B & G on the Yeppamana lode and are found on the 2nd and 3rd levels. The mineralisation is associated with quartz carbonate in shear zones in phyllite. These were explored in some detail by the Indian Bureau of Mines/Geological Survey of India (IBM/GSI) during the 1960s and 1970s. Subsequently BGML started mining operations here in 1984. The mining lease covers an area of 168.42 hectares (1.68 sq. km. 1.9 kilometers length x 0.7 kilometers width.). The mine has been developed upto VI level (180 meters depth).

The gold is fine grained and associated with sulphides, mostly pyrite. One of the ore shoots, BG has an average width of 6 meters.

3.6.4 North Jibutil Block

This sector contains the Gantlappa mine, PowerHouse mine and Yerrappa mine. The Gantlappa mine was developed to the 700ft level by a shaft of 130m and winzes. The mine produced 12,000t of ore at 8g/t from the 4 th and 5 th levels. From the records of John Taylor & Sons, it is inferred that out of 13,000t of 17.6g/t of ore, 12,000t of ore was stoped out leaving the balance of 1,000t of ore at 17.6g/t in the mine. Detailed exploration drilling by IBM/GSI in the late 70s reported the presence of two ore shoots comprising the northerly extensions of the ore shoots from the Gantalappa shaft workings. An inferred resource of 1.5Mt of ore at 6-7g/t to a depth of 300m has been estimated.

The Power House Mine located to the south of the Gantalappa mine, has been developed by 3 shafts, 6 trial pits. About 4000t of ore with 17.6g/t is reported to have been produced from the mine. IBM/GSI tested this mine with 12 diamond drill holes, which reported narrow widths of 0.18–0.29m having grades of 8.4 to 52.7g/t. No details are available on the Yerrapa Mine.

3.6.5 South Jibutil Sector

Further south of Power House Mine several shafts exist. The main reef in the North shaft was developed to a depth of 12m below the adit level, which yielded 13.6–37.5g/t. Further south in No3 shaft, development reached a depth of 91m. Two levels had been driven at 100 and 200ft on a rich lode with a width of 1.2 to 1.5m. On the Jibutil lode, the south shaft has reached a depth of 335m. There are two ore shoots, which join near the 800m level. The ore stoped out is of the order of 60,000t of 11.2g/t and 6,500t of 35.2g/t. This mine has contributed the main production from this sector.

3.7 EXPLORATION CONDUCTED BY MECL:

MECL (report in NGRI publication 1996) has conducted detailed exploration for gold in the Chennabhavi mine block Ramagiri South shaft, Yerrappa-Gantalappa and Gantalappa block in this belt. The quantum of physical exploration of MECL in the different is summarised in the following table.

	Blocks			
Item of work	**Chennabhavi**	**Ramagiri**	**Yerrappa - Gantalappa**	**Gantalappa**
1. Geology & Survey - Surface geological mapping (m^2) - U/g geol. mapping (m)	1.1	0.30	0.38 1670	0.25
2. Exploratory drilling (m) - Surface - Underground	5607 -	3455 -	- 406	2538 -
3. Exploratory Mining				

	(m)	-	-	109	-
-	Shaft sinking/aditing	-	-	1375	-
-	Driving/ X-cuts	-	-	22	-
-	Winze/ Raise	-	-	372	-
-	Reclamation				

3.8 GEOPHYSICAL SURVEYS (GSI REC122. 1989. P. 397)

Geophysical surveys employing IP, SP and magnetic methods were carried out in Jubitil, Kothapalle and Chinnabhavi areas of Ramagiri Gold Fields, Anantapur district for assessment of auriferous lodes and their extension.

Seventeen traverses in Jubitil block for detailed surveys, two regional traverses - one each in Kothapalle and Chinabhavi areas and two test traverses in Mustikovila area were covered by IP-cum-resistivity, magnetic and SP surveys. The results of these surveys are discussed below.

In Jubitil block detailed IP, SP and magnetic surveys were carried out (from Tr. S600 to N770) with traverse interval of 100 m and station interval of 10 m. The traverses were laid in E-W directions cutting across the schist belt. The IP surveys employing 10 m and 40 m electrode separations (3 electrode array) brought out two significant IP anomaly zones. In the zone-1, the magnitude of the chargeability anomaly is of the order of 6 mv/v. Three trenches put in this area have exposed sericite schist with carbonate, grey quartz, pyrite specks chlorite schists; fissile greenstones and thin quartz veins. The samples from one of the trenches has given an assay value of 3.4 g/t and less than 0.1 g/t. In zone-II, the order of IP anomaly varies from 6 to 8 mv/v. Some of those trenches have exposed carbonatised sericite schist with quartz veins and sulphides, chlorite schist with quartz veins; fissile greenstone with specks of pyrite and carbonatised chlorite schist with grey quartz, ankerite and streaks of carbon phyllites at places. A Channel taken across borehole J-21, where a chargeability anomaly of the order of 4 mv/v corresponds to the lode zone with gold values of 1.95 g/t, 2.8 g/t and 9.9 g/t respectively.

4.0 GEOCHEM SAMPLING CARRIED OUT BY GMSI

4.1 ORIENTATION SOIL SAMPLING

An orientation soil sampling program was completed south of BGML Ramagiri Mine to establish parameters for soil sampling follow up program in the RP Block. The location of the line of samples is given in **Fig, Annexure-2.**

A total of 50 samples on a single traverse were collected from shallow pits as two separate fractions, which included a course fraction of –2.0, +0.5 mesh and –80 mesh. Samples were analysed at Analabs Australia. Details of samples are provided in a **table, Annexure-3.**

Discussion of Results: All **50 samples** were analysed for Au by fire assay and a range of indicator elements Cu, Pb, Zn, As, Ag, Fe, Mn by ICP method. All data is summarized in enclosed **Table, Annexure-3.**

A preliminary statistical analysis of the data has been completed. There is a sympathetic relationship between Au, Ag, As, elements in both the mesh sizes. However, correlation of high gold with both As and Ag is more elevated in the coarser fraction.

The orientation soil sampling program was successful in delineating anomalous zones of mineralization. This cost effective technique could be fruitfully used in covering all areas of interest in the granted R.P. More importantly arsenic in soil should be used initially as a guide to identify areas of interest, followed by detailed follow up with gold in soils.

4.2 SOIL SAMPLING, NORTH OF BOKSAMPALEL

Forty eight soil samples were collected across a tabular vein quartz body. This sampling programme was prompted after obtaining highly anomalous gold in some rock-chip samples by GMSI geologists. A total of 48 soil samples were collected. Only three smapels gave anomalous 1024 ppb gold with 944 As; 982 ppb gold with 1154 As and 903 ppb gold with 204 As. On the whole the programme did not reveal any thing more than the exposed mineralized quartz vein. The location (line) of soil samples is shown in **Fig, Annexure-2** and the analytical data are given in **Table, Annexure-4.**

4.3 STREAM SEDIMENT SAMPLING

210 stream sediment samples were collected. The locations of these samples are shown in **Fig, Annexure-2.** The analytical data are presented in **Table, Annexure-5.** Out of the **210 samples, 59 samples** are above 50 ppb (upto 999 ppb).

4.4 ROCK-CHIP SAMPLING

Rock-chip sampling was carried out at **215 sites** in the Ramagiri, Jibutil, Boksampalle and Cherlopalle areas. Out of the **215 samples, 34 samples have shown anomalous** gold values in the range of 100 ppb to 999 ppb and **32 samples** are above 1 g/t (>1000 ppb). Sampling sites are shown in **Annexure-2** and the samples list showing gold, arsenic and other trace element content are presented in **Annexure-6.**

A perusal of the data shows that samples from Jibutil area are from a zone with good grades of mineralisation. Old shafts, adits, dumps and tailings in the area provide evidence for earlier mining activity in Jibutil area. According to Radhakrishna and Curtis (1999), in Jibutil, mineralisation has been traced over a strike length of 2300m. Rock-chip samples from old Jibutil mines and adits have brought forth samples which are of good grade. Mineralisation is principally in quartz and quartz carbonate veins emplaced in quartz sericite and quartz-sericite-chlorite schists. South of old adit upto the Main shaft, the quartz sericite-chlorite schist zone can be traced along N-S strike. This zone has been explored more closely by Channel sampling.

4.5 CHANNEL SAMPLING IN JIBUTIL AREA

A total of **90 channel rock-chip samples** were collected along 13 channels. Sampling was carried out along nine east-west channels (channel No. T-1 to T-9) across the inferred mineralized zone in quartz sericite chlorite schists between the Adit and Main Shaft. The position of the channel samples are shown in **Annexure-2.** The analyses of samples drawn from these Channels are presented in **Annexure-7.** Out of 90 samples 31 samples have shown anomalous gold in the range of 100 ppb to 999 ppb and 5 samples >1 g/t.

Along Channel No.T-1, only metabasalt was encountered, suggesting that the sericite quartz schist does not extend along strike very much beyond Channel-T2. Along Channel T-2 also the principal rock formation is chlorite schist (metabasalt) although chlorite-sericite schist with quartz-carbonate veins was noted in the eastern part of the Channel. Further north between T-2

and T-9 chlorite-sericite schsits with quartz and quartz-carbonate veins have been noted. They contain pyrite as an important sulphide mineral. Analyses of the samples from mineralized zone show gold values in the range of **0.02 to 1.15 ppm.**

Channels T-10 and 11 are across metabasalts invaded by quartz-carbonate veins with pyrite. Generally here also the gold values are low, although a 50 cm wide quartz vein with sulphides analysed **1.67 to 3.83 ppm of gold.**

Sampling Channels T-12 and T-13 are across chlorite-sericite schists with quartz-ankerite veins. Here gold content is found to be low in the samples.

Chloritic phyllites exposed NE of shaft No. 5 are intruded by quartz-ankerite veins consisting of sulphides. Rock-chip sample 20406 from this locality had analysed more than 2 ppm Au. Therefore Channel sampling was undertaken at this locality also. Two out of 5 samples from the Channel have yielded values greater than 1 pm indicating good mineralisation zone here.

Detailed prospecting is proposed to be undertaken in the Jibutil area in the light of encouraging results obtained from random and Channel rock-chip sample analyses.

4.6 WESTERN BELT-MARGIN ZONE AT WEST OF RAMAGIRI (FIG. ANNEXURE-8)

The western belt margin is a major shear/mylonite zone at the contact with intrusive granitoids. Therefore, several E-W traverses were taken all along the western margin of the schist belt from Boksampalle in the south to Kottapalle in the north. The area to the west of Ramagiri village was found interesting from the point of mineralization, hence detailed field outcrop observation was conducted in this part of the belt. The area is composed of steeply dipping rock units such as quartz-chlorite schist, quartzite, meta ultramafic rocks, amphibolite/metabasalt intruded by thin sheets of granites. There are several runs of quartz breccia traversed by vein quartz. The rocks are intensely schistose due to shearing and mylonitization. Several dolerite dykes cut the rock units at high angle. Interesting from the point of mineralization was the observation that the rocks are traversed by iron oxide bearing white to grayish blue quartz veins along two zones over a strike length of 10 km. The eastern zone roughly coincides with the quartz breccia zone and the western zone partially coincides with the quartz chlorite schists traversed by quartz veins.

This is a new zone confined to the western margin supracrustal unit west of Ramagiri village. It has a strike length of ~10 km. This zone was identified on the basis of stream sediment and rock chip sampling conducted by K. Bhimalingeshwara, Delhi University. 134 stream sediment samples were collected and assayed for gold and arsenic. 110 of the samples were anaysed in Analabs laboratory in Australia. 139 rock-chip samples were collected across the trend of the rock units on the western margin supracrustal unit. These samples were also analysed for gold and arsenic.

Anomalous gold values in the range of 0.02 to 0.72 ppm and arsenic in the range of 5 to 60 ppm were obtained. Based on the distribution of these values two parallel zones of anomalous gold have been identified over a strike length of 10 km. at west of Ramagiri village.

Detailed work has to be carried out to decipher whether there exist any physically definable mineralised zone in this area.

4.7 BOKSAMPALLE- PENUKONDA ZONE (ANNEXURE-9)

In the southernmost part of the Ramagiri belt at Penukonda, the GSI has explored the region by systematic mapping, geophysical surveys and drilling. As a result of the regional exploration work in the Penukonda area four zones have been discovered. No old mining activity is reported from this area. All four zones exhibit different geological set-ups. The Quartz vein lode is in a sheared granite. The assay values of surface samples ranged from 0.2 to 1.9 g/t over a cumulative strike length of more than 400m with widths varying from 1–10m. Recent drilling in one of the zones in the Boksampalle North section has reported some low-grade values of gold over wide intercepts. These included 6.29m at 2.54g/t between 76.35m and 83.15m and 9.18m at 1.20g/t between 70.65m to 80.60m depths. No bore hole numbers are available for these results. In bore hole BH-1 a series of quartz veins in sheared granite were reported with gold values of 26.92m at 0.47g/t between 95.90 and 128.65m.

The Ankerite zone has a width of 2 to 20m with a strike length of 600m with assay values ranging from 0.2 to 0.6g/t. The South lode is in the form of the sheared quartz vein located in chlorite schist and has a strike length of over 1,000m. Surface samples analysed up to 0.7g/t. The West lode is in muscovite granite. One spot sample analysed up to 1.5g/t.

The western one is in vein quartz traversing mylonitic and fractured intensely foliated granite. The eastern zone is associated with ankerite at the contact between quartz-chlorite schist and chlorite schists within metavolcanic amphibolite country rock.

4.8 GOLD IN MYLONITIC GRANITE 2.5 KM NNE OF BOKSAMPALLE

Mineralisation in the quartz vein zone, located 2.5 km NNE of Boksampalle village, appear to be relatively more significant. This zone is traceable over a strike length of 3 km with width varying from 2 to 48 m. The zone of importance is 250 m long. The predominant host rock is mylonitic porphyritic granite which has intruded into a package metavolcanics, chlorite schist and quartz-sericite schist. Sheared / brecciated and gossanised grayish white quartz veins traverse the granite.

The granite of Boksampalle is sheared over a broad zone wherein variation from fractured granite to protomylonite-microbreccia-cataclasite is noticed. The granite is medium grained and varies in composition from diorite to granodiorite to granite. It is made up of plagioclase, orthoclase / microcline, perthite, quartz and chlorite. They contain lenses and patches of graphic granite, myrmekitic granite with quartz void fillings. The contact of the granite with the adjoining schists (pillowed meta basalt) is sheared, carbonated and silicified. The silicified contacts and also the vein quartz show disseminated sulphides. The fractures in the granite are filled with calcite, quartz and chlorite.

Out of the 2 km strike length of the zone of sulphidic vein quartz in the Boksampalle west prospect, a 350 m strike length in its southern part **(Annexure-9)** has been explored by 10 boreholes by GSI drilled to test gold mineralisation at different levels. Seven of these indicated mineralisation with Au content ranging from 0.54 – 3.21 g/t (0.5 g/t cut-off) and a thickness ranging from 1.18 – 4.98 m. In the remaining part of 1.65 km length of the quartz vein zone in Boksampalle – North section, trench / bed rock samples at 25 m intervals analysed anomalous gold values upto 4.0 g/t but 25% of the samples analysed >1.0 g/t. Three boreholes (out of eight boreholes drilled) drilled in Boksampalle north section yielded gold values upto 1.50 g/t and thickness 6-10 m.

Sampling by GMSI geologists revealed 3 parallel zones of vein quartz in fractured granite in a 58 m wide zone having 250 strike length. The quartz veins are mainly in granite but cuts through metabasalt in places. For most of its length it is easily traceable on the surface. The central quartz vein is 2-5m wide. About 1 km to the north the vein is intersected by a NNE trending cross-cutting vein.

Fresh sulphides (pyrite, arsenopyrite) are visible in the vein quartz in places. The vein is also gossanous and iron-stained.

Six randomly collected rock-chip samples collected by GMSI geologists from the different vein quartz assayed 0.23 g/t and 3.49 g/t **(see Annexure-9).**

GMSI has planned to reexamine the entire Boksampalle east and west prospects from the point of open-cut mining. It is proposed to carry out detailed grid sampling of soil and rock chips over a width of 2 km before undertaking shallow drilling.

4.9 RECONNAISSANCE MAPPING OF THE ANOMALOUS TRACT BETWEEN MUSHTIKOVILA AND BOKSAMPALLE

Rock chip and Stream sediment sampling has revealed a 8 km long gold anomalous zone between Mushtikovila and Boksampalle **(Figure, Annexure-9).** The zone is composed of metabasalt, phyllite, Banded Iron Formation and sheared granite. The schistosity and the contacts between rock units trend N-S to N5°W and have sub-vertical dips. The entire zone is sheared. The BIF is locally folded with fold axes plunging steep to north. The sheared granite is veined by quartz, carry sulphides (pyrite, chalcopyrite) and has reported anomalous gold.

This zone is considered as a new target, not known earlier.

1) The 8 km long gold anomalous zone identified between Mushtikovila and Boksampalle was taken up for systematic exploration including geological mapping, rock-chip sampling, Channel rock-chip sampling and stream sediment sampling.

2) A total of 70 rock-chip samples, 31 stream sediment samples and 90 channel rock-chip samples were collected.

3) The above sampling work has resulted in the identification of the following:

4) A 50 m long 3 m wide auriferous zone, galena bearing sheared cherty quartz, NW of Boksampalle. The gold assay values are upto 3 g/t. The cherty quartz was traced for a length of nearly 700 m to the south, but this tract remains to be sampled.

5) A 100 m long auriferous quartz vein with fine disseminations of pyrite (?) in sheared granite, located 6 km north of Boksampalle. The quartz vein has assayed gold upto 3g/t.

A 6 km long, 2 m wide highly altered and weathered BIF south of Mushitikovila village. Few samples collected from BIF as well as quartz vein associated with BIF have assayed gold values ranging from 1 g/t to 3 g/t. This requires detailed sampling in the coming months.

4.10 CONCLUSION

The mineralization so far identified in the Ramagiri belt is of high grade high grade narrow vein type fit for expensive underground mining. With the exception of a few ore shoots the grade of ore in general is low grade for underground mining ventures. Jibutil area appears to hold out hopes, but requires deep drilling. Jibutil area appears to hold out hopes, but requires deep drilling. Possibility of finding low grade open pit resource should be investigated.

All the ore shoots discovered in the Ramagiri Gold field by the old miners, including the recent BGML operations, were below the ancient workings. These cover only a portion of the total length of the field. There are several parallel lodes in the field. Much of the ground between the mines has largely remained unexplored. The areas which we consider as potential, besides the 15 km long Ramagiri Gold Field zone are the following.

(a) The 13 km. tract between the south of Jibutil Mine and the Boksampalle prospect. This tract contains a sheared/fractured granite sheet between two units of metabasalt.
(b) The western-margin geochemical anomaly zone and
(c) Boksampalle and the tract between Boksampalle and Penukonda.

GMSI has applied for 3 PL blocks within the RP block. A total of 161 gold anomalous locations have been identified covering an area of 55 sq km in 3 blocks **(See Annexure-8 & 9).**

****