

# RUNGTA MINES LTD.

## FINAL REPORT ON R.P (NO-108) OVER 1818.627 Km<sup>2</sup> AREA IN KEONJHAR & MAYURBHANJ DISTRICTS, ORISSA FOR GOLD, SILVER & PLATINUM.

(For the period 20.04.2007 to 19.10.2010)

### 1. INTRODUCTION

M/S Rungta Mines Limited started as a mining based company registered under Company's Act 1956 with its registered office at Kolkata and corporate office at Chaibasa, West Singhbhum, Jharkhand. The company was basically engaged in mining of iron & manganese ores, limestone, etc and ventured out through production of sponge iron and steel. It has now entered the field of exploration for diamond, precious metals & base metals in different parts of the country.

M/S Rungta Mines Limited was granted R.P (No 108) over 1818.627 Sq. Km area in Keonjhar & Mayurbhanj districts, Orissa vide Govt. order No. IV (GD) SM-4/06 2980/SM dated 17.03.07. The deed was executed under rule 7A of MCR, 1960, on 20.04.07 at Bhubaneswar.

### 2. LOCATION AND ACCESSIBILITY

The R.P. area lies in the Survey of India Topo-Sheet numbers 73G/14, 15 and 73K/2 and 3 and is bounded by Lat 21<sup>0</sup> 15' and 21<sup>0</sup> 45' N and Long 85<sup>0</sup> 50' and 86<sup>0</sup> 10' E. The area lies in Anandpur and Karanjia sub divisions of Keonjhar and Mayurbhanj districts respectively. Nodal points of the area are given in Table 1.

TABLE - 1

NODAL POINTS	LATITUDE	LONGITUDE
A	21 <sup>0</sup> 15' 00"	85 <sup>0</sup> 50' 00"
B	21 <sup>0</sup> 45' 00"	85 <sup>0</sup> 50' 00"
C	21 <sup>0</sup> 45' 00"	86 <sup>0</sup> 04' 00"
D	21 <sup>0</sup> 36' 28"	86 <sup>0</sup> 10' 00"
E	21 <sup>0</sup> 15' 45"	86 <sup>0</sup> 10' 00"
F	21 <sup>0</sup> 15' 00"	86 <sup>0</sup> 08' 25"

The area is well connected by road with the state capital Bhubaneswar, and falls by the side of NH 215. Anandpur is about 180 Km from Bhubaneswar. The western and eastern margins of the R.P. area at Ghatgaon & Thakurmunda are approachable via Anandpur

through NH 215 and state high way respectively. Good network of roads is available in the northern and north eastern part of the area. Connectivity in southern part of the area is poor.

### 3. PHYSIOGRAPHY

Regionally the area is divisible into several physiographic components, namely,

- (i) Baitarani upland in the central part of the RP area developed over Singhbhum Granite. It is a low lying erosional surface in between Simlipal plateau in the east and Keonjhar plateau in the west. The level difference between Baitarani upland and the neighboring highland is as much as 200 to 450 m. This terrain shows an interlacing network of dolerite dykes which stand out as low linear ridges turning over long distances. The general height of this upland varies from 300 to 400 m above MSL Baitarani river flows through this upland.
- ii) Keonjhar plateau area. It extends southeastward from Keonjhar up to Daitari – Tomka and is characterized by flat surfaces with abrupt descent at the margins. The average elevation of the plateau is 600 m. The plateau carries bauxite duricrust.
- iii) Similipal plateau extends in north-eastern part of the area. The hill tops lie between 700 & 800m above MSL and is surrounded by flat land occupying heights of 300-400m above MSL. The plateau is of dissected nature and carries laterite duricrust.

The R.P. area covers a distinct physiographic domain in the Baitarani upland and runs from NNW to SSE with an average elevation of 300m. The area represents a mature topography having hills Medra pahar (520m), Cherangar (540) in NE, Baigundi Huri (340m), Pathaberi (400m) etc. in the SE and Ghorabhanga Pahar (320m) in the SW. Only a small portion of the north-eastern part is occupied by Similipal plateau.

The area is drained by several major and minor rivers. The river Baitarani is the major one which bisects the area. This flows from NNW to SSE. Its main tributaries are Kantamull Nadi, Sim Nadi, and Deo Nadi in the north-eastern part. Kathpakka Nadi, Tambel Nadi and Mushala Nadi run from west to east.

Nearly 70% of the area is covered by different reserve forests like Singra RF, Hatisalbara RF, Bispur RF, Santoshpur RF, Khumthan RF, Purnapani RF, Patna RF, Ghatgaon RF etc.

### 4. GEOLOGY

#### 4.1 REGIONAL GEOLOGY

Regionally rocks of the North Orissa and adjoining Singhbhum of Jharkhand state constitute a significant cratonic block bounded by major faults/ thrusts along its peripheries

e.g. Singhbhum thrust on the north west, north & north east; the North Orissa Boundary Fault on the south and the Kamakhyanagar - Nilgiri fault on the southeast.

A review of literature shows that the North Orissa-Singhbhum craton consists of several major lithologic groups of sedimentary and igneous origin ranging in age from Archaean to Proterozoic. The important aspect of the Craton is its association with several low grade metamorphic rocks and Banded Iron Formation interwoven with several granite intrusions like Singhbhum granite, Bonai granite, Nilgiri granite, Mayurbhanj granite etc. Several volcano-sedimentary sequences (as at Simlipal plateau and Keonjhar plateau) are also observed in close association with the BIF.

#### 4.2 LOCAL GEOLOGY

Singhbhum granite (Phase-I) and Simlipal Group of rocks are exposed in the northern part of the area. It is also exposed in the western part as well as in the southwestern corner of the area. Banded hematite - quartzite, amphibolite, quartzite and mica schist bands occur within the granite here. Lenses and lenticular bands of gabbro/ anorthosite are noted in the north eastern part of the area. Simlipal Group of rocks is limited to the north eastern corner of the RP area and include isolated exposures of gabbro/ anorthosite and bands of quartzite and ultramafics. Isolated small bodies of gabbro and quartzite are also exposed in rest of the area, particularly near Ranibahal and Kumurabari.

The south, southeastern and central part of the area is occupied by the Singhbhum granite (Phase II) which is basically porphyritic in nature.

The eastern part of the Baitarani highland is mainly composed of granite and granitoid, locally intruded by pegmatite, aplite and quartz veins. No sulphide is seen in them. These rocks trend in NW-SE direction. The area is traversed by innumerable intersecting dolerite and basalt dykes trending in NNE-SSW and WNW-ESE directions. Massive, milky white quartz veins are also developed at number of places. These veins do not show any sulphide or ferruginisation. Laterite is developed as isolated small patches in the area, particularly in its north western part. The laterite is reddish brown in colour and show pisolitic texture at places.

### **4.3 TECTONIC SET-UP**

The area belongs to North Orissa – Singhbhum Craton. The rocks of North –Orissa Craton have undergone varying degree of metamorphism in different geological formations. Structure and metamorphism in North Orissa – Singhbhum Craton shows several fold systems, faults, shear zones and lineaments. The newer dolerite dykes in Singhbhum Granite represents two major lineaments trending NE-SW and NW-SE. The central and southern part of RP area are marked by several lineaments mostly running NW-SE and a few trending NE-SW. In the northern part of the RP area only two lineaments have been found; one which runs NW-SE passes through south of anomaly zone-1 and the second one runs NNE-SSW, passes through the west of anomaly zone-18 and disappears just before touching the northern end of anomaly zone-19. In the eastern part two separate lineaments pass through anomaly zone-12 and 13 respectively. Another lineament runs NW-SE and cut across NE-SW elongated anomaly zone-5. These lineaments could be correlated with the available poly phase fold system, faults and other deformation symbols found within the aforesaid anomaly zones, during ground checking. Major litho-units and its chronology as reflected through the interpretation of land sat imagery has been recorded in Table-3. North-eastern part seems to be most promising in respect to mineral potentiality which could be correlated with the litho-geo-chronology of the area.

### **5. MINERALISATION.**

The greenstone belts of the Singhbhum Craton are host to several well documented gold deposits located to the north of present area such as Kundrekochoa, Lawa etc. However most of these deposits are very small. Within the present RP area and its immediate environs no such gold prospects are reported.

### **6. Interpretation of Satellite Imagery**

Indian Remote Sensing satellite (IRS) – P6-LISS III geo-coded data of the four toposheets 73 G/14, G/15, K/2 & K/3 of path – 106 and row – 057, acquired on 16/04/2008 was used for interpretation. It is a multi-spectral data with 23 m. spatial resolution.

Major part of the study area is a vast pediplain with a few isolated hills. The area is criss- crossed by a number of linear ridges. North eastern part of the area is occupied by

high arcuate hill ranges. The study area is drained by Baitarani River and its major tributaries like Tel nadi, Sim Nadi, Bhirala River and Kalinjar Nadi.

Data from the four geo-coded satellite products have been mosaiced and the study area demarcated. It has been interpreted online for extracting geological information. Available 1:50000 geological maps from the Geological Survey of India were used for working out the stratigraphy.

Singhbhum granite covers the vast pediplain and is the dominant rock type in the study area. It is intruded by a number of WNW-ESE and NNE – SSW trending dolerite dykes.

In the hilly region in the northeast gabbro, anorthosite, quartzite and spilitic lava of the Simlipal group (Proterozoic) have been delineated. The quartzite occurs as sharp linear ridge. Spillite is capped by laterite of Cainozoic age.

A number of lineaments have been marked based on imagery interpretation. The prominent trends are WNW – ESE and NNE – SSW.

## 7. Geochemical Stream Sediment Survey

The regional geochemical stream sediment surveys for gold and associated elements covering the entire project area of 1818.627 sq. km. were completed by collecting 1212 samples at an average density of one sample per 1.5 sq.km area. Every effort was made to collect representative samples from all the drainage basins. However, due to difficult terrain conditions and poor accessibility a uniform sampling density could not be maintained. The drainage and sample locations are shown in Map-4.

A 2-3 kg sample consisting of silt /clay fractions of stream sediment was collected from each locality in plastic bags using stainless steel scoops. All the samples thus collected were sun-dried and de-lumped by pounding with wooden pestle. The pounded samples were sieved through 80 mesh size nylon cloth held by stainless steel frame. Two sets of - 80mesh samples, 150 gm each, were collected and packed in polythene bags. One set was sent for analyses while the other set was retained as duplicate sample. All the samples were analysed for Au, pt, Pd, Ag, As, Cd, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Se, Th, Ti, U, W and Zn. Gold was determined up to 1 ppb level by lead fire assay followed by AAS/ICPMS estimations, while other elements were estimated by ICPOES method after suitable digestions. Analytical results of all the samples are enclosed as Table-2.

### 7.1 Evaluation of Geochemical Data

#### Gold:

Incidence of gold in the project area is scanty and values are low. The gold values in these samples range between < 1 ppb and 70 ppb. Perusal of the analytical data shows that 479 samples show Au values below 1 ppb, 683 samples show Au between 1 and 10 ppb, 10 samples show Au between 11 and 20 ppb, 2 samples between 21 and 30 ppb, 2 samples between 31 and 40 ppb and only 6 samples show above 40 ppb, the maximum

being 70 ppb. Gold values shown by the top 2.5% samples has been taken as anomalous, Thus 10 ppb was considered to be significant for further follow up work.

Based on the above ranges, a total of 21 anomalous zones have been identified. Out of these, two anomalous zones, An-2 and An-11 merit evaluation because of anomalous Cu, Pb, Zn and Ni contents in the samples despite low gold values.

#### **Arsenic:**

The arsenic dispersion in the secondary environment is subdued and the values in the sediment samples range between <5 and 48ppm. A total of 1048 samples show As value up to 10 ppm, 110 samples show between 11 and 20 ppm, and only 11 samples show As above 20 ppm, maximum being 48 ppm. However, As concentration does not show positive correlation with gold.

#### **Copper:**

The copper dispersion in the secondary environment is generally subdued. The copper values range between < 5 and 101 ppm. A total of 823 samples have analysed up to 20 ppm Cu, 284 samples show between 21 and 40 ppm, 29 samples show between 41 and 60 ppm and only 8 samples show 61 – 80 ppm Cu. A solitary sample shows 101 ppm copper.

#### **Lead and Zinc:**

Lead and zinc dispersions are also relatively low and range between <5 – 107ppm and <5 - 120 ppm respectively. Lead is more than 80 ppm in only 3 samples. Being relatively less mobile in the secondary environment, it is not of much significance in identifying new anomalous zones.

The zinc values range from <5 to 40 ppm in 738 samples, 40 to 80 ppm in 384 samples and 81 to 120 ppm in 11 samples. However, lead and zinc do not show positive correlation with gold.

#### **Nickel:**

Nickel values, which range between 1 and 455 ppm, are generally low reflecting the nature of the lithologies in the RP area. In all, 687 samples show 1 – 40 ppm Ni, 335 samples show 41 – 80 ppm, 74 samples show 81 – 120 ppm and 17 samples show 121 to 160 ppm Ni. Only 13 samples show more than 160 ppm Ni. Nickel contents in the gold anomaly zones range between 9 and 86 ppm.

#### **Iron and Manganese:**

The dispersion of iron indicates high values in the north eastern half of the area mostly underlain by mafic volcanics. The manganese dispersion pattern is also similar to that of iron. Some of the gold anomalous zones in the mafic-volcanics are associated with higher



concentrations of iron and manganese. Both these elements show positive correlation with copper.

### **Other elements:**

The stream sediment samples were also analysed for a number of other elements like silver, cadmium, uranium, platinum and palladium, selenium, thorium, titanium, chromium, molybdenum and tungsten. Most of the elements show very low concentration. Uranium and thorium are always near their detection limits. More than 300 ppm Cr is seen in 23 samples, mostly in the streams draining basic terrains. Silver and cadmium are also always near their detection limits. Selenium is up to 1 ppm in 1061 samples, between 2 and 5 ppm in 55 samples and between 6 and 22 ppm in 5 samples. Molybdenum is less than 0.5 ppm in 744 samples, 1-5 ppm in 339 samples, 6 – 10 ppm in 10 samples and between 11 and 20 ppm in 5 samples. Tungsten is below 0.5 ppm in 775 samples and between 0.5 and 5 ppm in 333 samples. In 5 samples it is above 100 ppm.

### **8. Location of anomaly zones:**

These 21 anomaly zones demarcated on the basis of results of first phase samples are distributed in all the topo-sheets representing the RP area. Out of these 10 nos. of anomaly zones fall in sheet no 73K/2, 4 each in 73G/14 and 73K/3 and 3nos of anomaly zones are located in topo-sheet no 73G/15. Details of these zones are given in Table 3.

Anomaly zones in the northern part is represented by Singhbhum granite of first phase where as the Anomaly zones in the southern part is covered by either Bonai granite or Singhbhum granite of 2<sup>nd</sup> phase. A small portion in the southeastern part of the area is covered by thick laterite. Several anomalies have been recorded in the north-eastern part, probably caused by the greenstone belt of the Similipal plateau.

### **9. Follow up survey:**

Geological and geochemical evaluation of 21 anomalous zones thus identified was taken up by undertaking detailed geological reconnaissance and follow up infill stream sediment and litho-geochemical sampling within these drainage sub basins and adjacent areas. Intense geological traverses indicated that favourable geology and structures are not present in the anomaly zones. In fact favourable geological units are present in the north eastern corner of topo sheet 73K/2 which are responsible for a number of anomalies in topo sheet 73K/2. But these horizons are not within our area. Some of the anomaly zones do show presence of small bands of quartzite and BIF.

Though no favourable geological evidences was visible. Detail infill stream sediment sampling was carried out to look for the favourable locations of gold mineralization. A

total of 104 infill stream sediment samples and seven heavy pan concentration samples were collected for assaying. Location details of the samples and gold assay value of the samples are given in table-4.

Following a comprehensive review of the analytical results of samples from 21 anomalous zones it was found that all the stream sediment samples showed very low gold values ranging from 1 to 6 ppb. The seven heavy pan concentrates collected from the high gold value anomaly zones also showed very low values (1 to 2 ppb).

## 10. CONCLUSION

The area, consisting of predominantly Singhbhum granite with a small patch of Simlipal greenstone rocks in the north eastern corner of the area, lies on the southern fringe of the Singhbhum Craton. The Singhbhum granite consists of small isolated enclaves of quartzite and quartz mica schist. The regional geochemical stream sediment surveys revealed 21 low gold anomalous zones. Dispersion of other elements like Ag, As, Pt, Pd, Cu, Pb, Zn, Co, Sb, Cd, Mo, W are generally low. The Fe, Mn and Ni dispersion mostly reflect the lithological variations in the RP area. The anomalies can be grouped into two groups, (1) anomalies derived from the Simlipal Group of rocks and (2) anomalies derived from laterite zones. The third group shows very low values and is probably from quartzite/ QPC enclaves. The anomalous zones were again traversed in detail and follow up in fill stream sediment sampling was done in all the anomalies and heavy pan concentrate sampling was done in 7 selected anomalies. The analytical results of these samples showed only 1 to 6 ppb gold. Therefore it was inferred that the area lacks economically interesting gold mineralisation. Further detailed sampling also did not show encouraging value.

The RP area is being surrendered because neither the geological milieu nor the geochemical results of the samples are encouraging for gold mineralisation.

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For RUNGTA MINES LTD.

  
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