

## **Ajmer Region**

### **REPORT ON REGIONAL MINING GEOLOGICAL STUDY FOR CHINA CLAY MINE OF NAGOUR & PALI –DISTRICTS, RAJASTHAN**

**Programme Year – 2013 -14.**

#### **SUMMARY**

Regional Mineral Development study on reassessment of clay resources under ML/PL has been assigned to mining geologist of Indian Bureau of Mines in the Annual Program of for the year 2013-14. The main thrust of the study was in three areas via (i) Inspections under MCDR 1988 (ii) Generating data and reassess clay mineral/low-grade clay mineral in the mining lease area including Low-grade clay mineral under UNFC and (iii) Preparation of comprehensive report in respect of group of mines as per Programme. Accordingly in Nagaur and Pali district of Rajasthan clay mining leases area has been selected during the annual program 2013-14. The present study will help in identifying clay Resources within the leases of Nagaur & Pali district. The study will help in re-assessing grade wise resources of clay in the State. It will also help to find out lease wise availability of sub grade mineral and its suitable use.

Rajasthan is located in the northwestern part of the Indian subcontinent. It is bounded on the west and northwest by Pakistan, on the north and northeast by the states of Punjab, Haryana, and Uttar Pradesh, on the east and southeast by the states of Uttar Pradesh and Madhya Pradesh, and on the southwest by the state of Gujarat. The Tropic of Cancer passes through its southern tip in the Banswara district. The state has an area of (132,140 square miles) 342,239 square kilometer. About 79 types of minerals are found of which 60 types are commercially produced. Important of them are : i) Metallic (Lead, Zinc, Silver, Cadmium, Copper, Iron Ore, gold, Manganese ore etc.); ii) Non-Metallic (Limestone, Dolomite, Rock Phosphate, Ochres, Gypsum, Soapstone, Calcite, Clay, Quartz, Feldspar, Wollastonite, Barytes etc. ); iii) Fuel Minerals (Lignite, Crude Oil/Natural Gas etc.); & iv) Decorative & Dimensional Stones (Agate, Jasper, Marble, Granite, Kota Stone, Sandstone, Phyllite/ Slate/Schist/Serpentine)

#### **CONCLUSION AND RECOMMENDATION:**

##### **1.0 SUGGESTIONS / RECOMMENDATION TO LESSEES:**

- 1.1 All the Lessees have to carry beneficiation study to improve the value of the siliceous clay. In Indawar(1/07) of M/S Parvati Minerals, Village Indawar, mine the silica sand has occurred below the clay band, it has to be assessed and used with proper beneficiations.
- 1.2 It is also observed that the lessees are not maintaining the records properly at mine site i.e. mining plan , Development, production, dispatch register, appointment register, wages register etc . The lessees are advised to keep all records at mine office.
- 1.3 The statutory appointment of Mining Engineer and Geologist is verified during the inspection and it was found that except in few mines Mining engineer and Geologist were not appointed in the mines, and Form-I is also not submitted to IBM. Therefore, it is suggested to adhere all the statutory provisions of MCDR, 88.



- 1.4 Presently the detailed chemical and physical analysis of clay sample are being carried out by lessees through various agencies like Central Glass and Ceramic Institute etc. It is also understood that there is a lot of scope of getting such analyses done from RODL, Indian Bureau of Mines, Ajmer.
- 1.5 It has been observed that mine owners in general do not carry out adequate exploration work in their lease holds. It is suggested that mine owners should carry out exploration work in their mineralized portion of the leaseholds by putting boreholes of 30-40 m deep at regular grid interval of 50m to 100m. as per guideline under 27(4) MCR. This should be included while approval of Mining Plan /Mining Scheme

## **2.0 SUGGESTIONS / RECOMMENDATION TO INDIAN BUREAU OF MINES:**

- 2.1 Exploration undertaken in the mining leases and estimation of reserves are not corroborating norms of UNFC. To avoid obtaining repeated clearances higher rate of production is envisaged in the MP/MS for which reserves should be brought under Proved and Probable categories. Due to non-availability of core drilling machines, higher cost, and slow progress the lessees opt / deploy DTH or water well drilling machines for exploration. True ore body configuration is not deciphered in most of the mines for want of exploratory drilling data to establish ore-body bottom. Under the circumstances the following suggestions/ recommendations are given:
- 2.2 Regional exploration covering group of mines by contributory basis may be taken up under the aegis of Central or State Government department.
- 2.3 To accelerate exploration; proposals given in the MP/MS should be computerized and monitored monthly basis instead of monitoring the same during the next inspection.
- 2.4 Guidelines given for processing mining plans suggest reserves estimated under proved and probable category should at least meet five years production proposals. MCR indicate incidence of mineral occurrence is sufficient for applying mining lease. Mining leases are granted without prior PL. Exploration cannot be undertaken without PL or ML. Under the circumstances reserves are estimated extrapolating data, which may not correct in all instances. Therefore, direct grant of ML should be discouraged, as far as possible further, to comply the UNFC norms the mining leases should be granted only through PL route .

## **3.0 SUGGESTIONS/ RECOMMENDATION TO GEOLOGICAL SURVEY OF INDIA:**

- 3.1 Geological Survey of India may take up the exploration and detailed study in the Nagaur and pali clay basin, in free hold areas .

## **4.0 SUGGESTIONS/ RECOMMENDATION TO DIRECTORATE OF MINES AND GEOLOGY, GOVT. OF RAJASTHAN:**

- 4.1 Directorate of Mines and Geology, Rajasthan should initiate to assign a study to an agency or undertake to know regional capacity of infrastructure facilities available in each mining sector to handle quantum of ore reserves. Accordingly production scheduled may be regularized.
- 4.2 It is observed that the mine owners are operating at small scale and they are not capable of taking up deep bore hole drilling it is known that three clay bands are occurring at different depths. It is



therefore, suggested that State DMG should take up borehole deep drilling at 200m grid interval to assess the different clay bands up to 50m depth in leaseholds on promotional basis. This will help dumping of waste in non mineralized areas and boost up the reclamation of mined out areas in negative proven area and further mine planning at greater depth in positive proven areas.

- 4.3 Considering the continuity of good quality of china clay and its scientific exploitation with proper mineral conservation, the State Govt. should grant larger lease area to a single lessee instead of small area of less than 5.0 hect.
- 4.4 It is suggested considering small size of the lease area and non-availability of infrastructure with lessee regional exploration covering group of mines on contributory basis (private, public partnership basis) may be taken up by an agency of Central or State Government.
- 4.5 A subsidy or certain amount of exemption in the Royalty may be introduced for the those lessees who carry out exploration by deep borehole drilling
- 4.6 It is observed that the transportation of the mineral is carried out in big trucks/ trolleys of 20-25 tonnes capacity, so transit pass should be issued as per the size of the transporting vehicle instead of fixing it as 10 tonnes per truck. There should not be more than 10% variation of actual weight, as it has a bearing on the royalty calculation .
- 4.7 During the study it was examined that for fresh grant of mining lease, the State DMG is being issued LOI without having any P.L nor any proved exploration data. As a result the reserve estimation under UNFC becomes difficult, because as per the revised guidelines/instructions under Rule 27(3) of MCR, 1960 the area should be adequately explored and reserve estimation should be akin with UNFC. Therefore, DMG, Rajasthan should ensure for its adequacy of exploration before issue of any LOI for clay and put condition in lease deed agreement under rule 27(3) for detailed exploration as per UNFC Norms.
- 4.8 A Geo-referenced Cadastral map showing the survey numbers of the lease hold is to be enclosed with the Mining Plan/Scheme of Mining and the boundary pillars of the area/mine are to be fixed precisely. Each boundary pillar should be surveyed by using DGPS (at least 2 hours observation) for its ground position through an agency recognized by the state government in compliance of CCOM's Circular No. 2/2010. In this connection State Government of Rajasthan has not appointed any such agency, resulting the Mining Plans/Scheme of Mining are being approved conditionally for only a period of six months. The DMG of State Govt. may take steps in this regard.
- 4.9 DMG Rajasthan should promote value addition of mineral while granting lease as no clay based industries have come up in this area in spite of large number of working mines.
- 4.10 State government should give more focus for development of infrastructure facilities in this belt for attracting value addition industries and providing employment to local people.



## Dehradun Region

### Report on Regional Mineral Development Study of Soapstone Mines of Bageshwar district of Uttarakhand

Programme year 2013-14

#### 1.0 Abstract

- (i) The present Study has been assigned vide Chief Controller of Mines letter no. K-11011/1 2013-14- CCOM dated 25.02.2013. In the current Study a total number of 21 mines have been covered out of total 74 mines of the district as per the approved annual programme for the year 2013-14. The study report has been prepared based on the Guidelines received from Chief Mining Geologist vide letter number B-283(1) GMMMC/2013 dated 06/12/2012. All these mines are located in very difficult hilly terrain. While preparing the RMDS report MGS report of Rima block of district Bageshwar for the year 2007-08, RMGS report of district Bageshwar for the year 2012-13, book on Kumaon Lesser Himalayas of Dr. K.S. Valdia, annual returns of the mines, mine files, approved mining plans & schemes of mining and previous RMGS, SIS reports were referred.
- (ii) The highest and lowest point of 1703mRL and 957mRL are located in mine of Ghulam Pargarh Mine of Shri M.S. Papola and Dhapoli mine of M/S Ram Bharat Mines respectively. The land use of the mining leases by and large comprises of agriculture fields, which are normally spread over the slopes in terraced form.
- (iii) Mining leases for soapstone in Uttarakhand State have been granted mostly over a small area on steep hills slopes. The mining lease area ranges from 0.68 hectare to 139.37 hectares. Soapstone occurs normally under 0.5 to 3m-soil cover, 70-90% of M.L. areas comprise of agriculture fields. In the mining leases covered under the present study exploration has been proposed by putting trial pits of 3-5m x 3-5m x 3-5m dimension as per geological condition. In Pokhari Mine of Smt. Nirmala Dafoti two auger drill holes ADH 1 & ADH 2 have been proposed for the year 2013-14 but the same have not been drilled so far. In most of the mining leases proposals have not been implemented. No additional exploration in the soapstone mines of the area has been carried out. However, most of the mines are worked extensively. Wherever such deviations or violations were observed, the same have been pointed as per rule 13(1) of MCDR'88. Soapstone mining leases of the area have been worked extensively by putting a number of pits up to maximum depth of 20m.
- (iv) On the perusal of the table no.5 has revealed that there are three mines i.e. Odiyar(Shikhar) mine of Sh.D.S.Papola, Pokhari Mine of Smt. Nirmala Dafoti & Bakhet Mine of Smt. Khimuli Devi where reserves/resources have been increased by about 38.29-189.89%. The reserves have been increased as depth for categories under UNFC has been considered more than the earlier approved MP/SOM. Details of reserves/resources are given in Table 5.
- (v) A total reserves of soapstone have been estimated of the order 9551431, 5190420 and 7924885 tonnes under UNFC reserves/resource 111,121/122, and 333 categories in respect of mines covered in the present study on the basis of field observations and approved mining plan / scheme of mining after depleting the production of the previous years.
- (vi) In most of the mining leases proposals have not been implemented. Exploration & working also affected due to non-availability of private land falling in the ML area. The major land use of the mining leases by and large (ranges from 70%-90%) comprises of agriculture. The agriculture fields are not vacated at particular period time for exploration mining, thus these proposals are affected. However, these mines are granted mostly over small area ranging from 0.68-



## 2.0 Suggestions /Recommendations to the Department

- (i) Occurrence of soapstone is observed up to the pit bottom and geological evidences are clearly indicative that the soapstone still persists beyond the pits in depth. But mining is done generally up to 15m depth barring few mines where it has gone upto 18m. Lessees may be advised to explore the depth continuity further below the existing pit bottoms by putting trial pits bore holes & worked the deposit if technically & economically feasible.
- (ii) The mine waste, which comprises of soil, Phyllites, low grade magnesite and dolomite, is generated during the mining operations. Lessees may be advised to keep the proper record of the soil and waste generation. Soil and dolomitic waste should be stacked separately. After back filling the mining pits with waste material, the soil may be utilized for carpeting the area so as to reclaim back to its original use of agriculture.
- (iii) Dumping of waste material needs more attention in some mines where substantial quantity of waste material is dumped near the nalas/streams. Waste material should be stacked systematically at the approved sites of mining plan/scheme of mining and dead dumps located in area should be properly terraced and stabilized by afforestation of local varieties. Adequate number of wire crated retaining walls, toe walls & check dams etc may be constructed at vital points to check the further rolling of mine waste to down slope. Regular check on quality of water of streams may also be kept and water analysis may be carried out periodically and submitted to RCOM OIC, IBM Dehradun.
- (iv) It is seen in many cases the leases are granted in small area & in irregular shape, for systematic mining and optimum recovery of soapstone as the mineral is continuing at depth, it should be granted in larger area and wherever possible in regular shape.



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**A REPORT ON REGIONAL MINERAL DEVELOPMENT STUDY OF BAUXITE MINING  
LEASES IN DISTRICT DEVBHUMI & DWARAKA, GUJARAT**

(PROGRAM YEAR 2013-14)  
UDAIPUR REGION

## **0.00 SUMMARY**

The present mining geological study covers 25 lease holds (area 790.3635 ha) out of 137 MLs during the RMGS 2013-14. in the bauxite mining belt at Jamnagar district of Gujarat State. The stratigraphy of the area established by the previous workers of GSI showing distribution of bauxite deposit below the Gaj beds in Kalyanpur, Taluka, Jamnagar district. Bauxite deposits of Jamnagar district occur as lenticular pocket concentration within lateritic sheets of relatively smaller extensions upto depth ranging from 2 to 6m and OB upto 1.5m. Bauxite mine sections revealed following 3 different zones. (1) Hard massive zone (2) Nodular or concretionary zone (3) Pisolitic & Oolitic Zone Powdery/Clayey or earthy zone. In the approved documents, proposal for certain trial pits and Boreholes were made, but proposed exploration could not be taken up as almost all the mines are closed due to the policy of state government. During inspection, necessity of more exploration by trial pits and Boreholes were observed. Total reserves as on 1/04/2013 are 38830131 tonnes of proved category, 4150683 tonnes probable and 10635513 tonnes of possible category in 25 ML areas of Jamnagar district. The total insitu reserves are 53616327 tonnes. Insitu bauxite is mixed grade. High and low grades in the ratio of 10:90 developed after sizing and sorting during the mining process. The production pattern indicates sudden slump from 2007-08 in Gujarat state from 11.9 million tonnes to 9 lacs tonnes in 2011-12. During 2012-13 the production is increased considerably upto 3272707 tonnes as the government of Gujarat has started giving royalty passes and also permission for export, which were almost banned for the last 3-4 years. Jamnagar district contributes over 90% of the state production. The cost of production of low grade ranges from Rs 140 to 392/ tonne and high grade Bauxite ranges from Rs 414 to 530/tonne.

Forest area, marine national park, marine sanctuary falling within the CRZ boundary are the major points to be given due attention while giving clearances in the villages of Jamnagar district. The violations of Rule 12(3) were pointed out in 3 cases, 13(1) in 19 cases, 15(1) in 2, 23(B) (3) in 2, 23(E)(2) in 15, 24(1) in 2, 42(1)(C) in 17, 45(5)(a) in 4, 45(5)(b) in 14 cases. Out of these violations very few violations were complied so far, as most of the inspections were carried out in mid January 2014 and violations were pointed out in mid February.



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About all the mines covered under study are closed for the last 3 to 4 years before 2012-13. Few mines have shown the production during the last year 2012-13 as the state government have started giving royalty passes and also the permission to export the low grade bauxite.

## 5.6 CONCLUSIONS AND RECOMMENDATIONS-

Forest area, marine national park, marine sanctuary falling within the CRZ boundary are the major aspects to be given due attention while granting mining leases in Virpur, Mewasa, villages.

Bauxite is not utilized in the Gujarat state for the production of aluminum metal except alumina for abrasive, refractory & low grade for cement industries etc. Gujarat is the main supplier of high grade bauxite for abrasive, refractory and chemical grades.

GMDC has planned to set up a 0.75 million tpy alumina plant and a company, namely, Gujarat Alumina & Bauxite Ltd. has been formed. The final decision regarding the selection of the joint venture partner is pending with the Government of Gujarat. The feasibility report of the project has been prepared and formalities for acquiring land are in progress. This requires an early expedition.



**REPORT ON REGIONAL MINERAL DEVELOPMENT STUDY OF ELEVEN IRON ORE  
MINES IN GONDIA, & CHANDRAPUR DISTRICTS OF MAHARASHTRA & BALOD  
DISTRICT OF CHHATTISGARH STATE**

**(PROGRAME YEAR 2013-14)**

**NAGPUR REGION**

Regional Mineral Development Study (RMDS) was performed in 11 iron ore mines in Maharashtra & Chhattisgarh during the year 2013-14. The individual iron ore lease hold areas are ranging from 4.040 hectare to 1522.670 hectare. The iron ore mines in of Gondia and Chandrapur districts of Maharashtra are mainly Titano-Vanadium-Magnetite & mostly hematite in nature respectively. Whereas the iron ore in Balod district of Chhattisgarh are hematite.

Lack of **systematic detailed exploration** and improper **sub-grade ore management** is distinctively observed. Exploration in the periphery areas particularly for leases of M/s BSP (of SAIL) of Balod district, CG should be given priority. **Information about the presence of ore or sub-grade ore in terms of reserves, below the active and old waste dump** is an important issue immerging out after this RMDS study.

After carrying out exploration in the periphery and below the pit, systematic **subsurface 3D ore body modeling** may give a better picture for mine planning, scheduling including blending of sub-grade ore which will lead to sustainable development of the mines. Ultimately this will increase the life of the mine, intern proper utilization of ores of various grades including sug-grade ore.

**Beneficiation study especially of Ti-V bearing magnetite** of Gondia district (MS) and low grade iron ore (including BHQ) of Balod district (CG) needs to be done in a organized manner.



In case of larger iron ore deposits re-handling of waste dump in near future may be a major concern for iron ore mining industries.

After completion of the total exploration programme including periphery area & below the existing pit, ultimate pit limit needs to be re-drawn. Consequently, planning can be done for **future land acquisition**, if necessary, adjacent to the lease areas for better exploitation of insitu ore.

**Conclusion & Recommendation:**

- Detailed exploration of the iron ore mining leases in Gondia, Chandrapur and Balod district are essential for clear picture of the mineral reserve of the individual mines.
- After completion of the detailed exploration it is expected that ore below the old & active dump ore would be found out and for extraction of that ore huge quantity waste may be re-handled.



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- Proper sub-grade ore management especially for the mines of M/s BSP needs serious intervention.
  - Emphasis to be given to beneficiate sub-grade ore and banded hematite quartzite (BHQ) from all the iron ore mines. Pilot project may be taken up for separation Vanadium & Titanium from the iron ore deposit in Gondia district, MS.
  - 3D modeling of the larger deposits (of M/s BSP) is required for better understanding of the sub surface disposition of the ore body and better planning & scheduling.
  - Instead of small iron leases larger lease may be given to reduce the chances of ore blockage within the leases.
  - More trees may be planted as a part of environment protection along with proper care to increase the survival rate of the saplings.
  - Sustainable development and developing the indigenous population surrounding the mining areas may lead to the best practice model for the nation.

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# A REPORT ON REGIONAL MINERAL DEVELOPMENT STUDY OF IRON ORE MINES OF JABALPUR DISTRICT (M.P.)

(PROGRAM YEAR 2013-14)  
JABALPUR REGION

## 1.0 EXECUTIVE SUMMARY:-

Under the Annual programme 2013-14, this Regional Mining Geological Study of 25 Iron Ore mines in a cluster in Jabalpur district of Madhya Pradesh (M.P.) were taken up for the set objectives. Stratigraphically the Iron Ore of this district is overlain by ferruginous clay/laterite and soil. Iron ore is found as a pocket/bedded deposit associated with manganese, ochre, laterite and occasionally clay. Exploratory work has been done by owners itself by putting trial pits/ trenches B.H. and ultimately mineralized area has been converted into working pits. Total 14 samples were collected from different mines to know mineral assemblages, if any, besides its grade. There are 5 large scale beneficiation plants of iron ore/blue dust wherein iron ore is upgraded from 44% Fe to 58-60% which is sold to iron and steel industries. Iron Ore deposit of this district falls in Mahakoshal Group of rock belonging to Middle to Lower Proterozoic.

1) To review and high light all problems and prospects in the mining belt which impede the optimal development of belt with respect to the present status of exploration and development of belt and gaps therein with respect to monitoring and implementation of mining plans/ schemes.

It is revealed from the study that The mining leases for iron ore are granted having low to medium grade . Iron Ore mines of this area is mostly of pellet, iron& steel grade. Iron ore is in the form of blue dust, generally found along the foot hill side and has nearly sub-vertical dip which requires more handling of waste as compare to massive and hard ore. Most of the leases are having small area so in those cases; there is problem of waste handling and dumping. So some of the owners have stacked ore and waste outside the lease area by taking appropriate permission from concerned authorities. There are no adequate infrastructe facilities in the vicinity of the Iron Ore mines i.e Raoads and power supply.

2) To review the reserves position in the belt and identify the gaps of exploration while estimating the reserves/ resources under UNFC.

In the mines covered under the study,

During the inspection, it is seen there is not any significant gap in exploration. The detail ear-marking of reserves and grade has been done and given in a tabular form under chapter 7.00 as per the UNFC code.

The present production level of Iron Ore mines for the last five years has been given in detail under chapter 9.2. This table shows the deviation between the



possibility of up gradation of low grade iron ore by means of beneficiation process, to collect the samples for chemical analysis and to know the mineral assemblages if any in this belt. There are associated minerals like manganese, laterite, ochre, clay etc. whose occurrence is uncertainty in the mining belt of iron ore. Manganese, ochre and clay minerals generally found in form of pocket. Occurrence of these minerals is erratic in nature.

In the some leases, granted for laterite, iron ore has been found to be associated. Likewise in leases granted for iron ore, manganese has been found to be associated or vice-versa. Latter on inclusion of associated minerals has been done. In some mines iron ore and manganese are so fused/mixed together that it is difficult to separate them from each other which creates problem in grading i.e. Mansakra mine of M/S suryavansam Mining & Mineral, Darshanin mine of M/S Kamal Lime Industries etc. These associated minerals may be found on the surface, sub surface or in-depth i.e. in Keolari mine of M/S Shobha Mineral, manganese is found at a depth of nearly 10m in eastern side of lease found as a pocket type of deposit.

A variety of rock types ranging in age from Archaean to Pleistocene subrecent period are exposed in Jabalpur district. The older metamorphic rocks comprising of granite gneisses with enclaves of amphibolite and schist are exposed in the east central part of the district. The ENE-WSW trending volcano-sedimentary sequence of Mahakoshal Group consisting of metavolcanic rocks, chemical precipitates and turbidites is exposed in the central and south western parts. Dolerite and carbonatite dykes, amphibolites, granites and vein quartz intrude these rocks. The dykes exhibit a predominant ESE-WSW trend. The intrusive Madanmahal granite occurs in the form of inselbergs and conical hills near Jabalpur. Jungel Group of rocks consisting of sandstone and conglomerate occurring as small and thin bands in the central part of the district unconformably overlie the Mahakoshal Group.

Tight folding of the Mahakoshals, intense deformation of the Vindhayans along its contact with Mahakoshals and an overall broad shallow synclinal structure of the Vindhayans are the main structural features of the area. The contact between the Mahakoshals and the Vindhayans is faulted all along.

A number of minor faults and micro lineaments trending NNW-SSE to NW-SE have been identified.

Jabalpur district is endowed with plenty of economic minerals which include limestone, bauxite, copper, lead-zinc, gold, iron, china clay, refractory clay, soapstone and dimension stones such as marble, granite, sandstone and limestone. Cement grade limestone is being mined in the northern part of the district. Gondwana clay is quarried around Jabalpur for the manufacture of refractory bricks, tiles and potteries. Soapstone pockets are quarried near Bhedaghat for decorative or ornamental purpose. Granite, basalt and sandstone are extensively quarried as aggregate and blocks for construction purposes.



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proposed and actual production. During the five years, some of the mines were marked for excess production of the Iron Ore, for which the appropriate action has been initiated.

There are total 25 Iron Ore mines in Jabalpur, district of Madhya Pradesh (M.P.) out of which few mines have recently closed due to falling under forest area as notice given by the Forest Dept. Although most of the mines were also closed due to so many reasons and if all of them start working, it will certainly help in the growth of the wealth of the Nation.

3) To review the total generation of low grade and sub grade ore and waste as per the present market and supply scenario.

No sub grade is generated in any of the mines covered under the study. Because screening and sizing to get the different grade and fines is sold to cement plant. It is also beneficiated by cyclone hydraulic method thus silica, siliceous and other unwanted material is separated.

4) To identify the problems related to scientific development of mines.

Iron Ore mines of this area is mostly of pellet, iron & steel grade. Iron ore which is in the form of blue dust, is generally found along the foot hill side and has nearly sub-vertical dip which requires more handling of waste as compare to massive and hard ore. Most of the leases are having small area so in those cases; there is problem of waste handling and dumping. So some of the owners have stacked ore and waste outside the lease area by taking appropriate permission from concerned authorities.

6) Violation and compliance position:

The violation and show cause notices were already issued to the party, some of which has been complied also. The details has been given in a table in chapter -8

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SUGGESTIONS & RECOMMENDATION TO THE DEPARTMENT:

1. Iron ore is in the form of blue dust, generally found along the foot hill side and has nearly sub-vertical dip which requires more handling of waste as compare to massive and hard ore. Most of the leases are having small area so in those cases; there is problem of waste handling and dumping& working of full depth of the deposit. Therefore, it is recommended that the shape & size of the lease areas to be granted in future may commensurate with depth of the iron deposit in interest of mineral conservation & scientific development.
  
2. Exploration may be undertaken near by areas adjoining to Gandhigram, Dhamki, Gosalpur, Dubiyara, Tikariya, Pratappur , Jhiti, Hirdāynagar, Darshini, Mansakara, Agariya, Keolari, Jhansi silua villages. Because, no exploration in free hold areas adjoining to mining leases of Iron Ore has been undertaken by any agency. In intrest of scientific & systemetic mineral development, exploration in the gap areas is essential by the exploration agencies of the government.
  
3. It is recommended in the interest of mineral conservation and scientific development of the Jabalpur Iron Ore deposit that the infrastructure facilities i.e. Aproch Roads and power lines and land bank for putting benificeation plants may be developed in the vicinity of the Iron Ore deposit.



**A REPORT ON REGIONAL MINERAL DEVELOPMENT STUDY OF BAUXITE BELT IN  
DISTT. LOHARDAGA & GUMLA IN JHARKHAND STATE**

(PROGRAM YEAR – 2013-14)  
RANCHI REGION

**0.0 SUMMARY:**

**1.0 1.00 GENERAL:**

The Bauxite ( $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$  /  $\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$ ) is one of the most important minerals in Jharkhand and the occurrences of the mineral in Jharkhand state are predominantly located on the plateau tops along the Western and South- Western geographical confinement of Lohardaga, Gumla and Latehar districts of Jharkhand state. The total area of this plateau region is about 5000 sq. km out of which 0.22% sq. km is covered with Laterite and within this Laterite zone 50 sq. km area is under mining leases. The significant bauxite/laterite bearing deposits of Jharkhand state occur in high plateaus of Lohardaga, Gumla and Latehar districts covering over a total area of about 4950 sq. km bounded by latitude  $23^\circ 00'$  &  $23^\circ 40'$  N and longitude  $83^\circ 55'$  &  $84^\circ 45'$  E But mining activity has so far remained confined to about 50 sq. km. The large scales systematic mining started in this region around 1940 with the setting up of Alumina plant at Muri located in Ranchi district of Jharkhand state perhaps the first in the country. In general bauxite contains hydrous aluminum oxide minerals mixed with impurities such as Silica, Iron, Phosphorous, and Titanium. Commercial Bauxite contains 40 to 45% alumina and less than 7% Silica. The Jharkhand state is the 2nd largest producer of Bauxite next to Orissa. Aluminum is considered as a versatile metal in view of its qualities like considerable lightness, tenacity, ductility, malleability and the ease with which it forms alloys with a variety of metals. It is therefore called as miracle metals of present century. Bauxite is the



cheapest and most abundant natural source of Aluminum metal. Mineralogically the term Bauxite refers to a rock comprising chiefly the following hydrated aluminous oxides: The bauxite occurring in the area though rich in Alumina generally above 45% has high/marginal silica values and iron oxide content which is rather analogous when compared to some other bauxite deposits of the country.

(i) Gibbsite  $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$  Aluminous oxide tri hydrate.

(ii) Boehmite  $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$  Aluminous oxide mono hydrate

(iii) Diaspore  $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$  Aluminous oxide mono hydrate

The Bauxite is not a distinct mineral but is regarded as a rock because it contains various hydrated oxides of Aluminum & Iron in various proportions with Titanium oxide.

The mineral impurities present in Bauxite may include the minerals of hydrated iron oxide, titanium, Clay and Silica. Silica occurs, both in the form of Clay or in the form of free silica. Bauxite is closely related to the residual ferruginous rock Laterite with its comparable mineral assemblage and close genetic association. These two rocks contain various elements in traces like Chromium, Vanadium, Gallium, Copper, Cobalt and Tin. The Bauxite deposits are the prime source for sustaining two Alumina extraction plants located at Renukoot in Sonbhadra district of Uttar Pradesh and Muri in Ranchi district of Jharkhand state.



## 9.00 CONCLUSION AND RECOMMENDATION:

### 9.01 Conclusion:

The significant bauxite/laterite bearing deposits of Jharkhand state occur in high plateaus of Lohardaga, Gumla and Latehar districts covering over a total area of about 500sq. km. But mining activity has so far remained confined to about 50 sq. km. Thus a major part of deposit is still untapped.

The detailed exploration work including the reassessment of reserve/resource, low grade bauxite as per U N F C code may be carried out in the gap areas of bauxite bearing plateaus of this region keeping in view with state of art technology for manufacture of alumina, utilization of low grade bauxite and extraction of valuable metals like Vanadium, Ti and Ga.

The bauxite deposits of some plateaus occur in the form of small boulders or segregations in morrum and laterite hence it is difficult to win the ore by fully mechanized way of mining.

In majority of lease hold areas of private Lessees the mining operations has been discontinued due to non-availability of Environmental clearance.

The mineral containing Alumina less than 35% which is treated as reject material has presently finds its use as raw material in Cement industry.

The setting up of Alumina plant of 0.32 M T P A with bauxite consumption of 1.85 million tons involving Bayer's process for extracting of Alumina from bauxite may be considered.

The majority of bauxite mines the mining operations/production has been discontinued / suspended due to environmental clearance since July, 2012.



✓  
Similarly the exploration work being carried out by different exploratory agencies in the bauxite belt gets affected due to environmental clearance

The setting up of Alumina plant involving Bayer's process for extracting of Alumina from bauxite in view of the state of art technology and extraction of valuable metals like Titanium, Vanadium, Gallium as by product may be considered keeping in view with the reserve/resource of this bauxite belt.

The vast reserves/resources of China clay deposits should also be reassessed underlying the bauxite deposits occurring in particular at Bagru hill plateau as well as at Serangdag plateau in particular.

The geological mapping on regional base including five bore hole drilling (200 m x 200 m), pitting, trenching and sampling for presence/incidence of bauxite and availability of by product/accessories constituent such as Vanadium and Titanium within and outside the lease areas is in progress during the field season 2013-14 covering Ligerpat plateau over 400 sq km area.

The glaring problem of the bauxite belt in the state covering the districts of Lohardaga, Gumla and Latehar districts is law and order problem throughout the field due to intense insurgency activity in the area.

In addition to above M C D R inspection of twenty five Bauxite mines covered under study were carried out including pointing as well as follow up of its compliance and the preparation of M C D R report were also taken up (Table - 8)

### 3.1.2 RECOMMENDATION:

Since these bauxite/laterite bearing deposits of Jharkhand state occur in high plateaus of Lohardaga, Gumla and Latehar districts lack in infrastructure, power supply, a rail line existing up to Lohardaga only may be extended up to Banari at the foot of Netarhat Plateau. This rail line will be connecting all the



✓  
Three remaining Pakhar, Serangdag and Netarhat plateaus and shall serve as a source of transportation of mine and forest product including the benefit of public transport system.

A mono-cable Ariel rope way may also be installed at Pakhar, Serangdag and Netarhat plateaus extending up to proposed rail lines/railway sidings.

All the bauxite/laterite deposits of this belt may be considered for reassessment with cutoff grade 38% alumina so as to augment the resource of the state which may enhance the idea of setting up of new Alumina plant in the state.

The majority of non-captive mines under the study have discontinued mining operations/production during the period under review from their respective mines due to Environment non-clearance which is a time taking process at different stages.



## Hyderabad Region:

### REGIONAL MINERAL DEVELOPMENT STUDY OF BARYTES OF KADAPA AND KHAMAMM DISTRICTS OF ANDHRA PRADESH

Annual Programme year 2013-14

#### SUMMARY

Regional Mineral Development Study (RMDS) has been reintroduced from the programme year 2013-14 based on recommendations of the "Committee of the Review and Restructuring of the functions and role of IBM". RMDS has a multidisciplinary approach involving Mining Geologists, Mining Engineers and the Ore dressing officers of OD Division. In view of Sustainable Development the study not only covers the geological aspects of a mine or a group of mines but also mining, beneficiation, techno-economic and feasibility for setting mineral based industry. Under the study 21 mining leases from Kadapa district and 4 mining leaseholds from Khamamm district have been covered. The report covers the general geology and stratigraphy and structure of the area. Barytes occurring mainly as white colored barytes and buff coloured occur as veins in vemula, vempalle and Pullivendla belt. The Barytes occur as bedded deposit in Magampet deposit. Barytes occur as lenses in Khamamm district. In the study area in Mangampet Barytes Mine, regional scale and detailed exploration in form of core drilling have been carried out G.S.I. M/s APMDC has also carried out exploration by core drilling. In Mangampet barytes Mine, total 70 core drilling with depth range of 43 to 360 m and total meter age of 8900 m have been done. In Vemula, vempalle and Pullivendla area, geophysical prospecting has been carried out by M/s capstone in one of the mines by which mineral zone has been delineated. In the study area in Vemula, vempalle and Pullivendla belt, exploration in form of 32 trial pits, 3 trenches, 64 shafts sinking and 6 drives have been done. In Khamamm district, exploration in form of 25 trial pits have been done. The gaps in exploration have been identified by studying the strike length of veins covered by exploration and future exploration in form of core drilling of 180 core drills at a grid interval varying from 25 to 50m with depth ranging from 30 to 80m have been suggested. To estimate resources as per UNFC at depth, core drilling is essential. Therefore, it is suggested that exploration in form of geophysical prospecting or DTH drill holes should be carried out to at initial stage to clearly delineate the mineral zone. Once strike and dip extension of barites is ascertained through geo-physical method or by DTH drilling, core drilling should be carried out judiciously to meet the UNFC parameters for exploration. Approved Mining Plan and Scheme of Mining are considered as base for updation of resources. In most of the cases, the resources have been estimated by sectional area method in which resources have been estimated by following method:

Resources = sectional area x length of influence x specific x recovery factor

In most of the cases recovery factor has been taken as 90% with specific gravity varying from 1 to 4.3.

i) Resources of mining leaseholds in study area in Kadapa district:

UNFC code	Quantity (million tonnes)
111	44.115
121	9.391
122	27.502
222	4.23
333	0.109
Total	85.347



ii) Resources of mining leaseholds in study area of Khamamm district:

UNFC code	Quantity (million tonnes)
111	2.798
121	0.879
122	0.014
221	0.014
333	6.229
Total	9.434

In vemula Vempalle and Pullivendla area where Barytes occurs veins of varying strike length and width, mining operations by underground mining in form of shaft sinking has been carried out following the strike trend. Mining operations are carried out in unsystematic manner without provisions of dual entry, cross ventilation, support system and scientific study to determine the parting and pillar thickness. Most of the shaft sunk were found without ladder system. In Mangampet barytes Mine, quarry has been developed by opencast mining method with regular benches. In Khamamm district, mining has been carried out by opencast mining method. In study area, in most of mines, Barytes after removal from it insitu origin are subjected to manual sizing, chipping of gangue minerals like quartz, sorting and dry screening. In some cases the barites are further washed in small tanks prepared for this purpose. In the study area, earlier beneficiation work has been carried out by NML and IBM. During the study period, barytes samples from different mines have been collected and limited beneficiation study have been done.

The investigation confirms that the rom lumps and fines samples are amenable for beneficiation by flotation separation while the mines reject sample is amenable for gravity separation. A full scale laboratory investigation may be sponsored for evolving complete flow sheet at optimised process parameters.

Techno-economics of the study area has been studied. A beneficiation plant for up-gradation of low grade barytes in Managampet Barytes Mine of M/s APMDC has been suggested. Feasibility of setting up beneficiation plant based on feasibility study carried out by M/s N.M.L. has been have been furnished.

## 2.0 CONCLUSION AND RECOMMENDATION:

### 2.01 Conclusion:

- (i) The report covers the general geology and stratigraphy and structure of the area.
- (ii) The status of exploration in the study area, gaps in exploration and future needs for exploration was suggested. In Mangampet barytes Mine, total 70 core drilling with depth range of 43 to 360 m and total meterage of 8900 m have been done. In Vemula, vempalle and Pullivendla area, geophysical prospecting has been carried out by M/s capstone in one of the mines by which mineral zone has been delineated. In the study area in Vemula, vempalle and Pullivendla belt, exploration in form of 32 trial pits, 3 trenches, 64 shafts sinking and 6 drives have been done. In Khamamm district, exploration in form of 25 trial pits have been done. The gaps in exploration have been identified by studying the strike length of veins covered by exploration and future exploration in form of core drilling of 180 core drills at a grid interval varying from 25 to 50m with depth ranging from 30 to 80m have been suggested. To estimate resources as per UNFC at depth, core drilling is essential. Therefore, it is suggested that exploration in form of geophysical prospecting or



DTH drill holes should be carried out to at initial stage to clearly delineate the mineral zone.

- (iii) The resources of the study area have been up-dated.

Resources of mining leaseholds in study area in Kadapa district:

UNFC code	Quantity (million tonnes)
111	44.115
121	9.391
122	27.502
222	4.23
333	0.109
Total	85.347

Resources of mining leaseholds in study area of Khamamm district:

UNFC code	Quantity (million tonnes)
111	2.798
121	0.879
122	0.014
221	0.014
Total	3.705

- (iv) The status of mining has been reviewed. In vemula Vempalle and Pullivendla area where Barytes occurs veins of varying strike length and width, mining operations by underground mining in form of shaft sinking has been carried out following the strike trend. Mining operations are carried out in unsystematic manner without provisions of dual entry, cross ventilation, support system and scientific study to determine the parting and pillar thickness. Most of the shaft sunk were found without ladder system. In Mangampet barytes Mine, quarry has been developed by opencast mining method with regular benches. In Khamamm district, mining has been carried out by opencast mining method.
- (v) In some cases the barites are further washed in small tanks prepared for this purpose. In the study area, earlier beneficiation work has been carried out by NML and IBM. During the study period, barytes samples from different mines have been collected and limited beneficiation study have been done.

The investigation confirms that the rom lumps and fines samples are amenable for beneficiation by flotation separation while the mines reject sample is amenable for gravity separation. A full scale laboratory investigation may be sponsored for evolving complete flow sheet at optimised process parameters.

- (vi) The techno-economic condition of both districts have been studied. The techno-economic condition and infrastructure facility of the study areas in both the districts have been studied. Feasibility of setting up a mineral based industry has been studied. The feasibility of beneficiation plant in mangampet area has been studied by NML, Jamshedpur. Based on the study, a beneficiation plant for up-gradation of low grade barytes have been suggested and details of feasibility study have been furnished.



## 2.02 Recommendations:

- i) In case of future renewal of lease holds or in the case of fresh lease allocation, care should be taken to avoid allocation of small holdings which deters entrepreneurs from carrying out systematic mining operations. The leases should be allocated with sufficient areas to carry out systematic mining with proper bench development by opencast mining. All fresh grant of lease should be aimed at avoiding fragmentation of leases into small holdings.
- ii) The existing leaseholds along same strike should take permission to work in 7.5m safety barrier zone and systematic single benches should be developed in four to mine so that mineral can be mined up to considerable depth.
- iii) For proper delineation of ore body along its strike and at depth, exploration in form of DTH drilling or geophysical survey should be undertaken to delineate the mineral strike and depth extension. Once mineral deposit delineated, core drilling should be carried out at a distance of 25 to 50m to cover the entire strike length of vein.
- iv) Proper demarcation of lease area should be carried out based on which permanent lease boundary pillars should be erected in leasehold which will prevent illegal mining.
- v) A beneficiation plant should be set up in Mangampet barytes mine of M/s APMDC to beneficiate the low grade barytes generated during the proves of mining.
- vi) A slope stability study of the high wall in Mangampet barytes Mine of M/s APMDC should be carried out.
- vii) No under ground mining permission should be accorded without proper level development, minimum two entries to facilitate cross ventilation, support system based on scientific study, lighting arrangement and statutory man power as per MMR, 1961.



## Chennai Region

### A REPORT ON REGIONAL MINERAL DEVELOPMENT STUDY OF QUARTZ AND ELDSPAR MINES IN DINDUGUL AND KARUR – DISTRICTS OF TAMILNADU STATE

( Programme Year 2013-14)

#### 1.0 SUMMARY

- 1.1 Quartz and Feldspar in Tamilnadu occurs in pegmatites mostly associated with peninsular gneisses. The study area forms part of Archean Super Complex of Peninsular India and covering Dindigul, and Karur District.
- 1.2 On an average Tamilnadu is contributing 10% and 6% of the country's total production of Quartz and Feldspar respectively
- 1.3 Pegmatite occurs in the form of veins, lenticular and pockets. It occurs as concordant bodies and in some cases as discordant as well. The general trend of the pegmatite varies from N-S to E-W with steep and vertical dips. The pegmatites are of heterogeneous nature and coarse to medium grained. The pegmatites that are occurring in the study area exhibit a property called Zoning wherein the Quartz and Feldspar occur in different zones. In total, 60 numbers of leaseholds have been covered during the study.
- 1.4 Of the total leases covered under RMDS only 4 leaseholds are captive ones in respect of Quartz owned by M/s. Chettinad MB F Hi Silica Private Ltd., which is having a plant capacity of 40,000 tonnes to produce high pure silica powder per annum.
- 1.5 The leaseholds covered under study are worked mostly by opencast manually / OTFM operated by forming regular benches height ranging from 1.5 to 3m. in hanging wall and foot wall. The drilling and blasting is done by Jack Hammer Drills. Only in limited cases the development work is done by wagon drill.
- 1.6 On an average, the mines covered under study, produced 10 tonnes of quartz and 05 tonnes of quartz as the lowest and highest averages per annum respectively for the last 5 years.
- 1.7 Approved mining plans are available in all the leaseholds covered under the study. In respect of schemes of mining, most of the leaseholds were due for submission, Hence at the time of inspection most of the mines are under suspension Rule 13(2).
- 1.8 "A" grade quartz from the area is mainly consumed in the High Pure Silica Powder plant of M/s. Chettinad MB F Hi Silica Private Limited and some quantities are exported. The "B" grade quartz is sold to Glass Factories in Chennai. High grade feldspar is sold to ceramic industries and for export. The low grade feldspar is sold to cleaning powder manufacturing industries.

#### 2.0 CONCLUSION:

- 2.1. All the quartz and feldspar mines covered under the study are opencast. Out of total 25 nos. of leaseholds covered under the study only 4 leaseholds are captive owned by M/s. Chettinad MB F Hi Silica Private Ltd., and its sister concerns, and the remaining by private parties. No problems are experienced in carrying out systematic development of the mines. Out of the total quantities of "A" grade quartz produced, major quantities are accepted by M/s. Chettinad MB F Hi Silica Pvt. Ltd., who in turn, produces high pure silica powder, a value added product



exported to Japan for utilizing in electronic industry, for the manufacture of semi-conductor chips used in computers and electronic equipments, etc. But, some quantities are also exported in raw form i.e quartz lumps.

- 2.2 During the study, it has been revealed that, the proposals committed in the mining plans, in respect of exploration programme have not been followed, in most of the mines and the miners are suspended due to non-submission of scheme of mining. But, it has been assured during inspections, to implement the same in due course.
- 2.3 It has been noticed that the production trends in most of the leaseholds for the past 5 years in succession could not be maintained uniformly due to erratic nature of mineralization and its unique property called zoning in pegmatite.
- 2.4 The geographical location of majority of leaseholds of quartz and feldspar gain significance as exporting of quartz and feldspar has been found to be conducive from the Port Chennai which is located at a distance of 350 to 400 Kms. From the mines. In addition, railway stations are also located at reasonable distance from the mines.
- 2.5 Out of the total lease area covered, only 6 and 4 per cent of the area has been degraded due to mining and covered by dumps, respectively. Hence, there is no significant impact of mining operations on environment.
- 2.6 Efforts to promote community development are not much satisfactory.
- 2.7 During the study, it has been concluded definite trends, shape and size of the quartz & Feldspar pegmatite vein with reference the major lineation and other structural events of regional scale to arrive these deposits are small/isolated by virtue of either origin or mode of emplacement or dislocation due to geological disturbances in the ambit of Rule 22D of MCDR 1960. So that issue is being faced in Regional on the nature of occurrence of quartz and feldspar deposits can be addressed scientifically in future deposit.

### 3.0 RECOMMENDATIONS

Based on the summary of RMDS presented herein and the conclusions drawn from the above, the following recommendations are offered:

- 3.1 It has been observed that mine owners in general do not carry out adequate exploration work in their leaseholds. It is suggested that mine owners should carry out exploration work in their mineralized portion of the leaseholds by putting boreholes of 10 m depth at grid interval of 100m. depth as per guideline under 27(4) MCR. This should be instructed at the time of inspection and approval of Mining Plan /Mining Scheme
- 3.2 It is observed that the mine owners are operating at small scale and they are not capable of taking up deep bore hole drilling. It is therefore, suggested that State DMG department may take up one deep borehole in each leasehold on promotional basis. This will boost up the reclamation of mined out areas in negative proven area and further mine planning at greater depth in positive proven areas.
- 3.3 It observed the lessee has not maintained the record i.e. mining plan, Development, production dispatch register the mine office, appointment register, wages register. The lessee has advice to keep all records at mine office and same has to produce to the inspecting officer at mines office.
- 3.4 During the study it was examined that for fresh grant of mining lease, the LOI is issued without having any neither P.L nor exploration data. As a result the reserve estimation under



UNFC becomes difficult, because as per the revised guidelines/instructions under Rule 27(3) of MCR, 1960 the area should be adequately explored and reserve estimation should be akin with UNFC. Therefore, DGM Tamilnadu should ensure for its minimum adequacy of exploration before issue of any LOI for Quartz & Feldspar.

- 3.5 The production dispatch register certified by the state official should strictly implemented by the state official, and material movement permit has to issue after verification of the stock, mined out pit. It will control the illegal mining.
- 3.6 A Geo-reference Cadastral map showing the survey numbers of the lease are is to be enclosed with the Mining Plan/Scheme of Mining and the boundary pillars of the area/mine are to be fixed precisely. Each boundary pillar should be surveyed by using DGPS (at least 2 hours observation) for its ground position through an agency recognized by the state government in compliance of CCOM's Circular No. 2/2010. In this connection State Government of Tamilnadu has not appointed any such agency, resulting the Mining Plans/Scheme of Mining are being approved conditionally for only a period of six months. The DMG of State Govt. may take steps in this regard.
- 3.7 Regional exploration covering group of mines by contributory basis may be taken up under the agency of Central or State Government department.
- 3.8 To accelerate exploration; proposals given in the MP/MS should be computerized and monitored monthly basis instead of monitoring the same during the next inspection.