**GOVERNMNET OF ANDHRA PRADESH**
**FOREST DEPARTMENT**

From
Sri Y.Madhusudhana Reddy, IFS.,
Principal Chief Conservator of Forests &
Head of Forest Force (FAC),
Andhra Pradesh,
K.M.Munshi Road,
Guntur – 522 004.

To
The Spl.Chief Secretary to the Government,
Environment, Forests, Science & Technology Department,
A.P Secretariat,
Velagapudi,
Amaravati - 522 503.

Sir,

**Ref.no.EFS02-15029/8/2018-FCA SEC-PCCF/FCA-1, dt.20/04/2023.**

Sub:-APFD – F(C) Act, 1980 - Diversion of 2.03 ha of forest land falling in Compartment no.594, Mutchukota RF, Gooty Range, Ananthapuramu Division for grant of quarry lease for Steatite and Dolomite in favour of the Proprietor, M/s. Rama Minerals, Tadipatri, Ananthapuramu District – Proposal submitted – Reg.

Ref:-
1. Director of Mines and Geology, A.P, Ibrahimpatnam in Lr.no.31281/R4-1/2017, dt.12.03.2018.
2. CCF (FAC), Ananthapuramu Circle, Ananthapuramu, Rc.no.988/2019/TO, dt.17.08.2022, 26.08.2022 & 08.11.2022.
3. Representation of the Proprietrix: B.Ramadevi, M/s Rama Minerals, dt.09.12.2022.
4. CCF, Ananthapuramu Circle, Ananthapuramu, Rc.no.988/2019-TO, dt.20.03.2023.

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It is submitted that, in the reference 1st cited, the Director of Mines and Geology, A.P, Ibrahimpatnam has forwarded proposal for diversion of 2.03 ha of forest land falling in Compartment no.594, Mutchukota RF, Gooty Range, Ananthapuramu Division for grant of quarry lease for Steatite and Dolomite in favour of the Proprietor, M/s. Rama Minerals, Tadipatri, Ananthapuramu District.

While forwarding the application, the Director of Mines and Geology, A.P, Ibrahimpatnam has furnished the following information.

1. The Steatite and Dolomite mineral available in Mutchukota RF has its own technical specificity and has extensive industrial importance and this kind of mineral is nowhere available in the entire State of Andhra Pradesh nor in Southern India either in non-forest land or forest areas.
2. It is a fresh grant of quarry lease.
3. Approach road is existing for the past 100 years which leads to Tabujula and it starts from Tadipatri to Mutchukota forest on the Tadipatri-Ananthapuramu BT road upto a distance of about 18 km from Tadipatri and from their, taking right diversion towards north on the existing cart track at a distance of 3 km leads to the applied area where the adjoining leases are existing and are using the same road for approachability and transport of the mineral. Further, stated that the present applied area is adjoining the

existing road there is no need for further road construction.

4. Details of mineral availability, annual production etc in the State of Andhra Pradesh is as follows.

| Name of the Mineral | No.of existing leases | Capacity of Mines (M.T) | Average annual production | Future requirement of this mineral | Present requirement |
|---|---|---|---|---|---|
| Dolomite | 33 | 698273 | 232757 | 1.35 MT | 8,79,000 M.T |
| Steatite /Talc | 25 | 57752 | 19250 | | |

With the above information, the Director of Mines and Geology, A.P, Ibrahimpatnam has requested to process the above mentioned proposal for forest clearance.

Subsequently, Smt.B.Ramadevi, Proprietrix, M/s. Rama Minerals, Ananthapuramu has initiated a proposal in the PARIVESH portal on 06.02.2022 for diversion of 2.03 ha of forest land falling in Compartment no.594, Mutchukota RF, Gooty Range, Ananthapuramu Division for grant of quarry lease for Steatite and Dolomite. The proposal has been registered with Unique proposal no.FP/AP/QRY/152052/2022.

The proposal was forwarded to the Divisional Forest Officer, Ananthapuramu on 29.04.2022 in the PARIVESH portal for processing the proposal as per the Forest Conservation Rules, 2003 and the guidelines issued by GoI, MoEF&CC, New Delhi under the Forest (Conservation) Act, 1980.

The Chief Conservator of Forests, Ananthapuramu Circle, Ananthapuramu in the reference 2nd and 4th cited, has processed the proposal and submitted Part-II&III information.

The details of the proposal are as follows;

**The User Agency has furnished the following information in Part-I:**

- For locating the project in forest area, the User Agency has justified that, application has been filed for grant of quarry lease for Steatite and Dolomite as two minerals are associated minerals. In India Steatite is rare mineral available in two States i.e., Rajasthan and Andhra Pradesh. Even in Andhra Pradesh good quality of Steatite & Dolomite with good chemical specification is scarcely available and hence there is no alternative except to locate the project in the forest area to the barest minimum extent possible. Hence, disturbance to forest area is very minimal with almost no loss of trees. Further, she has justified that the available Steatite and Dolomite deposits in the subject area is of high quality. The quality of high grade Steatite mineral available in the proposed forest area, is not available sufficiently outside the forest area. The high grade Steatite available here has its own applications in paper, paints, plastic, detergents, rubber, pharmaceuticals, ceramics etc and it has much demand in the present industry. The present demand will not only meet market demand but also generate employment to the surrounding local villagers. Hence, it is essential to grant mining lease for Steatite and Dolomite in the interest of mineral development and industrial requirements.

- The user Agency has furnished the DGPS authenticated maps for the area proposed for diversion and CA land respectively.

Statement showing the details of forest area involved:

**Area Statement:**

| Sl.no. | Purpose | Area in ha. |
|---|---|---|
| 1 | Mining area | 1.48 |
| 2 | Safety zone area | 0.55 |
| | **Total:** | **2.03** |

- There will be no displacement of people due to this project.
- The User Agency has submitted that the employment likely to be generated due to this project is 30 number of persons (Permanent) and 10,000 number of person-days (Temporary)
- The user agency has indicated the safety zone area inside the mining lease area for the proposed mining project separately in the authenticated DGPS map.
- The User Agency has submitted undertakings to bear the cost of raising and maintenance of compensatory afforestation in the identified CA land, payment of N.P.V., cost of tree extraction charges as decided by the Forest Department. And also to bear the cost of protection and regeneration of safety zone area and also to bear cost of afforestation the degraded forest land one and half times of forest area under safety zone.
- The user agency has identified non-forest land over an extent of 2.15 ha in two Bits (Bit-1 – 0.75 ha and Bit-2 – 1.40 ha) ha in Sy.no.582-4, 582-5 and 584 of Godduvelagala Village, Gandalapenta Mandal, Ananthapuramu Division, Sri Satya Sai District, for compensatory afforestation purpose.
- RoFR certificate in Form-II as prescribed under the Forest (Conservation) Act, 1980, issued by the District Collector, Ananthapuramu.
- Mining plan approved by the Deputy Director of Mines & Geology (FAC), Ananthapuramu in Lr.no.692/MP-TDP/2022, dt.20.05.2022.

**The Divisional Forest Officer, Ananthapuramu has furnished the following information in part-II:**

- Site inspection was conducted by the DFO, Ananthapuramu on 02.06.2022.
- Area of the forest land proposed for diversion is as follows.

**Area statement:**

| Sl.no. | Purpose | Area in ha. |
|---|---|---|
| 1 | Mining | 0.81 |
| 2 | Dumping | 0.30 |
| 3 | Area for stock yard | 0.10 |
| 4 | Area for internal roads | 0.15 |
| 5 | Area of Temporary shed/Magazine | 0.02 |
| 6 | Area for plantation | 0.10 |
| 7 | Area for safety zone | 0.55 |
| | **Total:** | **2.03** |

- MutchukotaRF was notified as RF under Section 16 of Madras Forest Act,

dt.20.08.1895.

- Density of vegetation is 0.1 to 0.2 (Eco-Class-III – Open Forest).
- 850 nos.trees to be felled in the proposed diversion area.
- Flora existing in the proposed diversion area are *Hardwickia binate* (Narepi), *Grewiarotundi folia* (Jana), *Terminalia arjuna* (Maddi), *Anogeissus latifolia* (Chirumaanu), *Morinda citrifolia* (Maddichekka), *Acacia planifrons* etc.
- The RF area proposed is vulnerable to erosion.
- The proposed quarry lease area is at a distance of 2.00 km from RF boundary.
- The proposed area for diversion does not form part of National park, Wildlife Sanctuary, Biosphere Reserve, Tiger Reserve and elephant corridor etc.,
- There are no rare / endangered / unique species of flora and fauna found in the proposed diversion area.
- There are no protected archaeological/heritage site/defense establishments or any other important monuments are located in the area.
- The forest land required for diversion is the barest minimum.
- No violations have taken place in the proposed quarry lease area.
- The user agency has identified non-forest land over an extent of 2.15 ha in two bits (Bit-1 – 0.75 ha and Bit-2 – 1.40 ha) in Sy.nos.582-4, 582-5 and 584 of Godduvelagala Village, Gundlapental Mandal, Ananthapuram Division, Sri Satyasai District. The CA area is adjacent to Compartment no.97 of Godduvelagala RF, Kadiri Range, Ananthapuramu Division.
- Compensatory Afforestation scheme has been prepared with an outlay of 21.150 lakh for raising plantations over an extent of 1.50 ha for period of 12 years from 2023- 24 to 2034-35.
- Scheme for fencing, protection, regeneration of safety zone area and for raising and maintenance of enrichment plantation over an extent of 0.830 ha in degraded forest area in Compartment no.632, Molakathall RF, Gooty Range, Ananthpauramu Division in lieu of safety zone area of 0.55 ha, has been prepared with an outlay of Rs.3.60 lakh.
- NPV to be charged based on surface strain predicted by 3-D subsidence prediction model (more than 20 mm/m). Accordingly, NPV is calculated as Rs. 19.44293 lakh (2.03 X 9.57780).

Regarding road to be utilized by the user agency for transportation of mineral from the mining site, the District Forest Officer, Ananthapuramu has submitted that, the proposed mining area is situated towards north-west of Mutchukota Village and it is adjacent to the existing road having a width of 5.5 m. (6 yards) connects from Tabjula Village to Ananthapuramu-Tadipatri main road passing through Mutchukota RF i.e., starting point is 14.85599, 77.82866 and ending point is 14.82716 & 77.84449 (4.40 km). The user agency has furnished Survey of India map of the year 1976, based on the survey of 1970. This map shows the existence of the proposed road depicting Tabjula to Ananthapur-Tadipatri BT road existing prior to 1980.

Further, the user agency has stated that, mining is existing in this area since the Second world War i.e., between 1939-1945 and mining leases area also mentioned in the report of Sri R.N.Prasad & E.B.Prasannan, Geologist (Jr), Geological Survey of India in September, 1970 (Pages nos. 23 & 26).

Further, *the DFO, Ananthapuramu has submitted that, the proposed Tabjula-BT road is not mentioned in the gazette notification. However, a reference can*

*be seen about a forest road in Gazette notification in "the cart track from Ananthapuramu-Tadipatri road near Nagireddy vani kunta to Julakava" . This cart track 6 yards wide branches from Ananthapur-Tadipatri road near Nagireddivanikunta runs west for nearly 6 furlongs and joints the existing forest road inside RF. This existing forest road however was not mentioned in the gazette notification.* This Tabjula-BT road is running along the compartment boundaries. In fact, this road acts as compartment boundary between Compt.nos.594-591, 594-592, 594-593 and 590-591 of Mutchukota RF of Gooty Range.

Further, the District Forest Officer, Ananthapuramu has submitted that, two more additional admitted RoWs are also adjacent to the proposed mining area;

1. Nayanipalli-Tabjula Road:
   The existence of this road is mentioned in the gazette notification in page no.6 of Board of Revenue (Land Revenue) 13th July, 1895, Forest No.431, extract of Gazette notification. This Nayanipalli-Tabjula road adjoins the proposed mining area, hence mined material can also be transported upto Nanyipalli where it connects Ananthapur – Tadpatri road.

2. Muddalapalli to Tabjula Raod:
   Clami no 254 of Page 61 of Board of Revenue (Land Revenue) 13th July 1895, Forest No.431: This road also adjoins to the proposed mining area; hence the mined material can also be transported upto Muddanaplli where it connects to Ananthapur to Tadipatri road.

In view of the above, the DFO, Ananthapuramu has submitted that, the user agency can transport the mined minerals through admitted RoWs either towards south leading to Ananthapuramu-Tadipatri road (through Nanyanapalli or Muddalapalli) or towards north leading to the Tabjula.

Further, the DFO, Ananthapuramu has also reported that, **all the existing mining lease holders i.e., M/s Sreenivasa Minerals, M/s White Field Minerals, M/s AVSR Minerals and M/s Sri Nagaligeswara Mines & Minerals sanctioned by the GoI,MoEF&CC.New Delhi are utilizing the forest road from Tabjula to BT road for transportation of mined materials**

The District Forest Officer, Ananthapuramu has recommended the proposal in part-II. The Chief Conservator of Forests, Ananthapuramu Circle, Ananthapuramu has agreed with the information given in part-II by the District Forest Officer, Ananthapuramu and also recommended the proposal in part-III.

Further, it is submitted that, the existing road claimed for usage of transporting by the present user agency is the forest road formed prior to 1980 , which is also being used by the other existing mining owners M/s Sreenivasa Minerals, M/s White Field Minerals, M/s AVSR Minerals and M/s Sri Nagaligeswara Mines & Minerals sanctioned by the GoI,MoEF&CC.New Delhi as reported by the DFO, Anantapur, following additional conditions may be imposed by the Government of India in Stage-I approval subject to compliance of these additional conditions by existing mining leases in cluster also in this RF in addition to the present proposal, in the interest of revenue to the State Forest Department as was done earlier in case of cluster mining in favour of 8 different applicants in East Godavari district in G.O.Ms.no.63, EFS&T (For.I) Dept, dt.24.07.2013.

(i) User charges equivalent to the cost of permit charges at Rs.10/- per metric tons as fixed by the State Government in G.O.Ms.No.35 EFS&T (For.I) Department Dated. 6-2-2010 for the permits issued for transportation of Steatite and Dolomite on quarterly basis shall be paid through DD in favour of the District Forest Officer, Anantapuramu for using the existing forest road.

(ii) Administrative cost at the rate of Rs.10/- per metric tonne of steatite and dolomite transported shall be paid by the user agency on quarterly basis for meeting the administrative expenses like maintenance of records, conveyance and communication charges,supervision and monitoring charges etc. to the District Forest Officer, Anantapur;

Further, it is submitted that, as per the decision taken by the Government during the meeting held on 05.09.2022 in the AP. Secretariat, it is recommended to insist the user agency to deposit Rs.2.50 lakh per hectare to ensure reclamation of mined area once the mines are exhausted for minerals. It may be incorporated as one of the condition in Stage-I approval to be accorded by the GoI, MoEF&CC.

The proposals in (4) sets duly recommending in Part-IV along with necessary enclosures is submitted herewith.

The Government are requested to consider the proposal and forward the proposal to the GoI, MoEF&CC, IRO, Vijayawada for taking necessary action under the Forest (Conservation) Act, 1980.

Yours faithfully,
**Y Madhusudhana Reddy Ifs**
Principal Chief Conservator of Forests &
Head of Forest Force (FAC)

Encl:- As above.

Copy to the Chief Conservator of Forests, Ananthapuramu Circle, Ananthapuramu for information.
Copy to the District Forest Officer, Ananthapruamu for information.
Copy to the Proprietor, M/s. Rama Minerals, B7, BikkalaRamadevi, #16/819/2/1, Nandalapadu, Tadipatri Town, Ananthapuramu- 515411 for information.

## PART-IV

Diversion of 2.03 ha of forest land falling in Compartment no.594, Mutchukota RF, Gooty Range, Ananthapuramu Division for grant of quarry lease for Steatite and Dolomite in favour of the Proprietor, M/s. Rama Minerals, Tadipatri, Ananthapuramu District

| | | |
|---|---|---|
| 17 | Detailed opinion and specific recommendations of the State Forest Department for acceptance or otherwise of the proposal with remarks (while giving opinion, the adverse comments made by concerned Conservator of Forests or Deputy Conservator of Forests should be categorically reviewed and critically commented upon) | Recommended. |

Date:**20/04/2023.**

Place : Guntur.

Signature

Name: **Anand Kumar Jha.**

Office Seal: **#ApprovedByDesignation#.**

A.K. JHA
Principal Chief Conservator
of Forests (FCA) & Nodal Officer

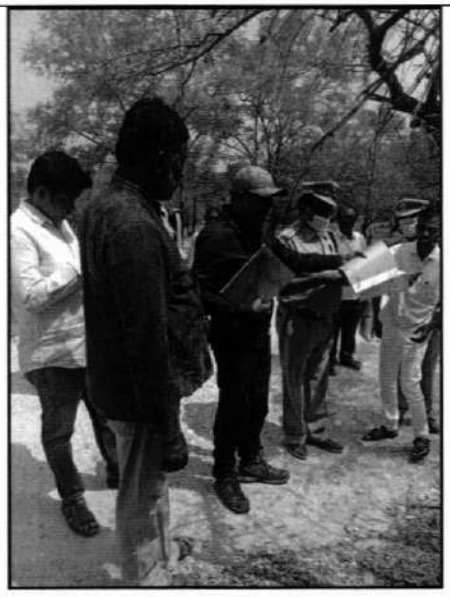
A.K. JHA
Principal Chief Conservator
of Forests (FCA) & Nodal Officer

6295892/2022/FCA -PCCF

**Site Inspection Report of District Forest Officer, Ananthapuramu in Compt. No. 594/p of Mutchukota R.F. of Mutchukota (North) Beat of Mutchukota Section, Gooty Range on 02.06.2022 in connection with the Diversion of 2.03 ha of forest land for grant of Quarry Lease for extraction of Steatite and Dolomite in favour of M/s Rama Minerals, Tadipatri (Proprietor: Smt. B. Ramadevi)**

Inspected the quarry lease area of 2.03 ha applied by M/s Rama Minerals, (Proprietor : Smt. B. Ramadevi), Tadipatri for grant of quarry lease in Compt. No. 594/p of Mutchukota R.F. of Mutchukota (North) Beat of Mutchukota Section, Gooty Range along with the Forest Range Officer, Gooty on 02.06.2022. Entire area of 2.03 ha has been surveyed and demarcated and the proposed lease area is having 11 stations which are numbered serially.

The Species of *Hardwickia binata* (Narepi), *Grewia rotundifolia* (Jana) and *Terminalia arjuna* (Maddi), *Anogeissus latifolia* (Chirumaanu), Morinda *citrifolia* (Maddichekka), *Acacia planifrons*, etc., are existing in the proposed lease area. While interacting with the local people and forest staff movement of wild animals like Wild boars, Indian hares and Jackals etc., are occasionally seen in the area.

| | |
|---|---|
| The density of the vegetation is about to 0.10 to 0.20. The said area is prone to soil erosion.<br><br>The proposed area is not a part of National park, Wildlife sanctuary, Bio-sphere reserve, tiger reserve or elephant corridor etc. No rare / Endangered / unique species of flora and fauna are found the area. |  |

The proposed diversion of area will not cause any adverse impact on the natural eco-system of the area and vegetation including wildlife. There is no much vegetation in the proposed area for diversion.

No protected archaeological heritage site/ defense establishment or any other important monument is located in the area. The forest area of 2.03 ha proposed for grant of quarry lease in Mutchukota RF as required by the user agency is unavoidable for the project. No work was carried out in violation of Forest (Conservation) Act, 1980.

**District Forest Officer,**
**Ananthapuramu.**

**6730922/2022/FCA -PCCF**

Date: 09.12.2022.

To
The Prl.Chief Conservator of Forests &
Head of Forest Force (FAC),
Andhra Pradesh, A.P, Guntur.

Respected Sir,

Sub:- Diversion of 2.03 ha of forest land falling in Compartment no.594, Mutchukota RF, Gooty Range, Ananthapuramu Division for grant of quarry lease for Steatite and Dolomite in favour of the Proprietor, M/s. Rama Minerals, Tadipatri, Ananthapuramu District – Clarification submitted regarding approach road - Reg.

Ref:- CCF, Ananthpuramu Rc.no.988-2019-TO, dt.17.08.2022, 26.08.2022 & 08.11.2022.

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I submit that, I have initiated a proposal (no. FP/AP/QRY/152052/2022) on 06.02.2022 for Diversion of 2.03 ha of forest land falling in Compartment no.594, Mutchukota RF, Gooty Range, Ananthapuramu Division for grant of quarry lease for Steatite and Dolomite in favour of the Proprietor, M/s. Rama Minerals, Tadipatri, Ananthapuramu District.

In the reference cited, the Chief Conservator of Forests, Ananthapuramu Circle, Ananthapuramu has submitted to the proposal and the additional information to the PCCF (HoFF), A.P, Guntur for consideration and forward my proposal to the State Government.

In this regard, I am herewith submitting additional documents / details regarding existence of Tabjula BT road since 1976 i.e., prior to enactment of the Forest (Conservation) Act, 1980.

(1) Survey of India map published in 1976 based on the survey conducted in 1970.
(2) GSI Report regarding the existence of the mining activity Mutchukota RF since IInd World War.
(3) Survey of India map of 2005-06 series issued on the basis of survey conducted 1974-75.

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Further, it is submitted that, the Tabjula BT road is being utilized by the following mining lease companies for transportation of their mined mineral from their mining areas, where the GoI, MoEF&CC had accorded Stage-II approval.

(1) M/s. White Field Minerals, Dhone.
(2) M/s. Sri Nagalingeswara Mines & Minerals, Julakalava
(3) M/s. Srinivasa Mineral Company, Ananthapuramu.

Hence, it is requested to kindly consider my proposal with reference to the additional documents submitted and forward my proposal to the State Government for their consideration.

Encl:- As above.

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Yours faithfully,

B. Ramadevi

M/s. Rama Minerals,
Proprietrix: B. Ramadevi

Copy communicated to the Chief Conservator of Forests, Ananthapruam and the District Forest Officer, Ananthapuramu for information and necessary action.

SRO_GSI_3042

GEOLOGICAL SURVEY OF INDIA

PROGRESS REPORT FOR THE FIELD SEASON 1969-70

# GEOLOGY OF KARNAPUDI - MUTSSUKOTA - TABJULA AREA, ANANTAPUR DISTRICT IN CUDDAPAH BASIN, ANDHRA PRADESH, AND INVESTIGATION FOR STEATITE - ASBESTOS - BARYTES DEPOSITS.

By

R.N. Prasad & E.B. Prasannan,
Geologists (Jr.),
Geological Survey of India.

(September, 1970)

SRO_GSI_3042

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By
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## ABSTRACT


| | | |
|---|---|---|
| Subject of the report | : | Geology of Karnapudi-Mutssukota-Tabjula area, Anantapur district in Cuddapah Basin, Andhra Pradesh, and investigation for Steatite, Asbestos-Barytes deposits. Mapping on aerial photographs on the scale 1:31,680 in parts of Tadpatri, Anantapur and Gooty taluqs of Anantapur district and large scale mapping of the Steatite deposits near Mutssukote, karnapudi and Tabjula. |
| Location | : | Between latitudes $14^0$45'00" to $15^0$08'30" longitude $77^0$45' to $77^0$55'. Toposheet Nos. 57 F/13 and E/16 |
| Scale of mapping | : | 1:31,680 on aerial photographs. 1:1000 by plane Table Mapping. |
| Work done | : | 335.00 sq. km. on 1:31,680 on aerial photographs. 1.2 sq. km. on 1:1000 by large scale plane table mapping. |
| Name of Investigators | : | R.N. Prasad, Geologist, and E.B. Prasannan, Geologist. |
| Number of days spent in field | : | R.N. Prasad -- 183 days<br>E.B. Prasannan -- 173 days. |

**Synopsis:**

Aerial photo mapping was carried out in parts of Anantapur district with a view to trace the dolerite sill and associated zones of serpentinisation, asbestos formation and staeatitisation and also to study the controls of steatite, barytes and asbestos deposits. The area is occupied by the lower Cuddapah formations and the mapping has brought out the continuation of the dolerite sill as disconnected outcrops upto Ananthapur-kurnool district border. Serpentinisation and asbestos mineralisation on minor scale are noticed at a few places. Extensive steatite mineralisation is marked in the area south of the Penner river. From a detailed study of the steatite pits and

mines, after large scale mapping of the more promising deposits, a preliminary estimate of the reserves of steatite has been calculated at about 2.9 lakh tonnes (Probable) and 6.0 lakh tonnes (Possible) reserves. Barytes mineralisation is noticed along major shear zones and faults.

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PROGRESS REPORT FOR THE FIELD SEASON 1969-70

# GEOLOGY OF KARNAPUDI - MUTSSUKOTA - TABJULA AREA, ANANTAPUR DISTRICT IN CUDDAPAH BASIN, ANDHRA PRADESH, AND INVESTIGATION FOR STEATITE - ASBESTOS - BARYTES DEPOSITS.

By
R.N. Prasad & E.B. Prasannan,
Geologists (Jr.),
Geological Survey of India.

## INTRODUCTION

In pursuance of the field programme item No: NM/ME/25 on page No.118 of the field programme for Andhra Pradesh Circle, G.S.I., the authors took up aerial photo mapping in parts of Tadpatri, Anartapur and Gooty taluqs of Anantapur district on the scale 1:31,680 and also carried out investigation for steatite and other minerals present therein. This work is in continuation of the napping carried out during the previous field season (1968-69) to the south of the present area. The area in Pulivendla taluq of Cuddapah district, further to the south is known for asbestos deposits where detailed exploration is being carried-out for the past few years. Besided regional mapping, large scale mapping of the steatite deposit in the area was carried out during the field season.

A total area of 335 sq.km, was mapped on aerial photographs on the scale 1:31,680 between Karnapudi ($14^0 45' : 77^0 51'$; 57F/13) in Tadpatri taluq and Boyanapalli ($15^0 09' : 77^0 49'$; 57 E/16) in Gooty taluq of Anantanur district bounded by lat. $14^0 45' 00''$ to $15^0 08' 30''$ and long. $77^0 45'$ to $77^0 55'$ (Toposheets 57 E/16 & F/13). Large scale mapping was carried out in the most promising Steatite deposits near Mutssukota, Tabjula and Karnapudi covering an aggregate area of 1.22 sq. km. On the scale 1:1000. The work in the area was started on 16-11-1969 and continued up to 17-5-1970. The aim of the work was to map the area in detail laying more emphasis on the tracing of the probable continuity of the dolerite sill which is found to occur almost continuously from Brahmanapalli in Pulivendla taluq of Cuddapah district to the south of Karnapudi at the southern end of the present area and to study the mineralisation of asbestos, steatite and barytes. The mapping had brought out the presence of the dolerite sill through detached exposures for a total distance of nearly 40 km. much of which is being recorded for the first time. Structural details like faults

and shear zones have also been brought out by the mapping. Large scale mapping has helped in revealing the nature and extent of the steatite deposits.

## Physiography:

The area has an undulating topography with parallel ridges composed of gently dipping quartzites, dolomites and shales extending along the whole area in a general NNW-SSE direction swerving gradually to N.S and beyond Rayalcheruvu to NNE-SSW direction. The hill ranges are continuous from Karnapudi in the south to Tabjula and again beyond Penner river from Chinna Yekkaluru to Lakshmmpalle. In between the ridges, there are narrow valleys. The general elevation of the area is 300 m. above mean sea level and the highest attitude attained is 560 m. to the north of Timmapuram ($15^0$05'45": $77^0$46'; Toposheet No. 57 E/16).

The Penner flowing in the ENE direction is the major river in the area. Two seasonal nalas, Mar vanka and Kotta vanka join the Penner near Ulikallu. There are several smaller seasonal nalas which feed the small tanks during the rainy season. One such nala south of Krishtipadu and another from Dayyaiamadugu feed the big tank west of Rayalcheruvu.

The vegetation is shurb by in most part of the area except for an occasional patch of thick growth of trees at places. To the east of Rayalcheruvu, palm trees can be seen along the banks of small nalas.

## Location and Accessibility:

The area mapped is bounded by lat. $14^0$45'00"and $15^0$08'30"and long. $77^0$45'and $77^0$55' in Toposheet No. 57 E/13 & 57 E /16. The Bombay-Madras broad gauge main line of the Southern Railway passes through the northern part of the area, Rayalcheruvu being the nearest railhead. For the area south of Penner river, the nearest railhead is Tadpatri, about 12 km. from Mutssukota. Anantapur railway station on the Secunderabad-Bangalore metre-guage section of the Southern Railway is only 28 km to the west of the area. Excellent road facilities are available connecting Anantapur, the district headquarters and Tadpatri, taluq headquarters Tadipatri, Anantapur road passes through the southern part of the area. Another road from Tadpatri to Anantapur via Gooty passes through Rayalcheruvu. Regular buses ply on all these routes.

## Previous Work:

After the pioneering work of King (1872), Foote and Oldham in 1872, A.L. Coulson (1932) conducted geological investigation for asbestos and barite deposits in the area and his two Memoirs give an exhaustive account of the asbestos and barite occurrences of Vempalle formation. He was rather pessimistic about the possibility of finding asbestos in Anantapur district. Between Chitravati and Penner rivers, Coulson did not notice any dolerite sill except one small plug near Tabjula ($14^0$54': $77^0$49'; 57 F/13). As such he says, "The absence of dolerite sill in the Vaimpallis is a striking change from their prevalence in these rocks in the Cuddapah district. Thus the large strech of Vaimpallis between these rivers need not be prospected for asbestos". To the north of Penner river, however, dolerite was noticed at Cherlopalle ($14^0$56': $77^0$48'; 57 F/13) and with intervals upto Vengannapalle ($14^0$58': <48'; 57 F/13) where King (1872) noted the occurrence of serpentine in the Vaimpallis. The serpentine was found to be pale green or whitish, semi-translucent, brittle material being used by the workmen at Rayalcheruvu for carving ornaments. Coulson also examined the contact region thoroughly and found the stratigraphical condition very similar to those of Brahmanapalle and Lopatanutala, but no asbestos fibre development was seen by him. He says that "no asbestos could be seen at the contact nor it is thought that further search will be profitable". Balasundaram (1953) made a systematic examination of the Vempalle belt of limestones in 1944-45 and gave a detailed note on the Geology of the Vempalle Limestone Belt. Thiagarajan (1955-56) studied the area for steatite and gave an account of the steatite workings. He noted the occurrences of a basis Igneous rock it Singnaguttapalle and near some of the workings north of Penner river and assessed a reserve of 60,000 tons of steatite for the area. The asbestos occurrence in the Vempalle belt in Cuddapah district has been under detailed exploration sines 1961 by Krishnamurthy, Jhanwar and Rajurkar (1961-64). Large scale mapping, pitting and trenchingaad drilling have been carried out in the main mineralized belt between Brahmanapalle and Velidandla in Pulivendla taluq of Cuddapah district by Banerjee, Krishnamurthy and Prasannan (1965-68). The area to the west and north of Velidandla beyond the Chitravati river was examined by the present authors in 1968-69 field season. Daring the occurs of aerial photo napping the dolerite sill, thought to be responsible for asbestos and steatite mineralisation, was located for the first time and successfully traced from near Velidandla to south of Karnapudi as disconnected patches and lenses. Serpentinisation and steatitisation at the contact of the dolerite sill was also noticed in some of the areas between Parnapalle ($14^0$34': $77^0$58'; 57 F/14) and Karnapudi ($14^0$46': $77^0$52'; 57 F/ 13).

## Scope of the present work:

The present work is the continuation of the work done in the previous field season. During the course of the present work aerial photo mapping was carried out in the area with special, emphasis on locating the dolerite sill and tracing it beyond Karnapudi in the taluqs of Tadpatri, Anantapur and Gooty in-Anantapur district and to study its.,- effects on the Vempalle dolomites. The authors have been successful in locating the sill for the first time between Pulasalanutalapalle and Singanaguttapalle and tracing it in patches right upto Anantapur-Kurnool district boundary for a distance of about 25 km. Though seen in disconnected patches in almost completely soil covered country, the sill has been traced continuously from south of Karnapudi to the north of Maddalapalle, from east of Julakalava to the west of Mutssukota and to the south of Singanaguttapalle on the southern side of Penner river. To the north of Penner river, the sill was traced from Chinna Yekkaluru to Kondampalle and again from north-west of Rayalcheruvu to Boyanapalle on the Anantapur-Kurnool district boundary, Serpentinization and Steatitization of the Vempalli dolomite and dolomitic limestone have been noticed along the contact of the dolerite sill in several localities. Asbestos mineralisation is, however, noticed only near Singanaguttapallle and in Cherlopalle Vengannapalle area. The steatite deposits of Mutssukota - Karnapudi and Tabjula are fairly extensive and have been studied in detail by carrying out large scale mapping by Plane Table on the scale 1:1,000. Representative samples of the steatite have been collected from different localities and tests conducted for the determination of 'lava grade' steatite from the area. Machinability tests of steatite are also being carried out.

## Acknowledgements:

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# GEOLOGY

The sequence of rock formations met with in the area is as follows:

| | | |
|---|---|---|
| Lower Cuddapah System | Cheyair Series | Tadpatri Shales |
| | | Pulivendla quartzite |
| | Disconformity | |
| | Papaghni Series | Vempalle dolemite & dolomite Limestone and purple Shale with intrusive dolerite sills |
| | | Gulcheru quartzite |
| ----------Unconformity---------- | | |

Archaean- Crystalline rooks - Gneisses and granites.

## Gulcheru quartzite:

The oldest rocks of the Guddapah System exposed in the area are the Gulcheru quartzites resting unconformably over the crystallines (gneisses and granites) of Archaean age. The Gulcheru consist of conglomerates, grits and quartzites with intercalated shale bands. The basal conglomerate is thick bedded, coarse grained and brown to reddish in colour. The pebbles in the conglomerate consist of vein quartz. Jasper and variegated chert. To the east of Korivipalle ($14^0$52': $77^0$47'; 57 F/13), some epidotized granite pebbles are also seen in the basal conglomerate. In addition to the basal conglomerate, two to three intraformational conglomerates are also seen. The quartzites are usually ferruginous and reddish in colour, Sedimentary structures like ripple marks and current bedding are seen. In grain size, the quartzite varies from medium to coarse grained gritty types. The Gulcherus are followed by the Vempalle dolomite and limestone and the contact is generally conformable all along. The formation is dislocated by a fault near Korivipalle with a down throw to the west.

## Vempalle dolemites and limestones:

The Vempalle consist of dolomitic limestones and dolomites, often cherty, with intercalated purple shales and thin beds of chert. The dolomites are well bedded, with the individual) beds occasionally measuring upto a metre. The colour varies from white to grey, bluish grey, and when shaly, purple. On weathering the rock usually gives rise to a dark soil. The rock is compact and dense and has a sachha-roidal texture. The chert bands stand out in relief on the weathered surface in cherty dolomites. Occasionally, concretionary structures of chert resembling stromatolites

(described by K.N. Prasad and K.K. Verma-Stromatolites from Vempalle formation of Cuddapah, A.P. Jour. Ind. Geoscience. Association, Vol.7) consisting of alternating layers of chert and dolomite, are seen in the area.

The shales are typically purple in colour, hut may also be red. They are well bedded and compact, with increasing carbonate content, they pass into dolomites through calcareous shales and shaly dolomites. To the south of Penner river, the outcrop width of the Vempalles varies from 6 to 7 km. but narrows down slightly to the north of the river where it averages about 4 to 5 km. in width. To the south of Kondampalle ($15^0$02'30": $77^0$02'; 57 E/16), the width is reduced to about 3 km. perhaps due to a block faulting in the Pulivendla quartzite resulting in the quartzite being thrown towards the west. A small inlier of Vempalle dolomite is seen at this place within the faulted block of Pulivendla quartzite.

As revealed by chemical analysis by Coulson, Balasundaram and others, the Vempalle dolomites and limestones may be described as dolomite, dolomitic limestone, magnesian limestone and rarely limestone. Recently Jhanwar, Rajurkar and Phadtare (1964) have concluded that the majority of the rocks of Vempalles are dolomites in composition. Chemical analyses carried out during the present investigation from the selected localities of Mutssukota, Rayalcheruvu and Songa-naguttapalle are given in Table-I below.

Table-I - Chemical Analysis of Dolomites

| **Locality** | **No** | **$SiO_2$** | **$Fe_2O_3$** | **$Al_2O_3$** | **CaO** | **MgO** | **Loss** |
|---|---|---|---|---|---|---|---|
| Rayalcheruvu | B5 | 31.42 | 0.24 | 0.26 | 25.76 | 17.6 | 23.98 |
| | B6 | 34.50 | 0.9 | 1.2 | 27.27 | 13.9 | 20.92 |
| | B10 | 1.04 | 0.52 | 0.12 | 29.39 | 22.50 | 46.00 |
| Singaguttapalle | S2 | 0.14 | 0.1 | 0.9 | 29.42 | 22.45 | 46.40 |
| | S4 | 0.8 | 0.1 | 0.1 | 29.92 | 22.23 | 46.24 |

From the above, it is seen that the rock near Rayalcheruvu is a siliceous dolomite, while at Singanaguttapalle it is a pure dolomite with varying percentages of silica.

In, thin sections, the rock is essentially composed of carbonates with minor amount of rounded grains of quartz. In one case (slide No. C/8, Locality-Chintalacheruvu), two small rounded grains of microcline are also seen. Recrystallination of the dolomite close to the contact of dolerite is noticed about 3 km. south of Tabjula. Under the microscope, crystals of the carbonate are seen to be well developed with prominent twin lamellae. No calc-silicates are seen in the rock.

Serpentinisation and steatitisation of the dolomites close to the dolerite contact is frequently noticed. Along with the steatite, there are some thin beds of highly calcic powdery tock locally called "white shale".

## Dolerite:

The Vempalle beds are intruded by sills and occasionally a few small dykes of basic igneous rock, mainly dolerite. Unlike the Pulivendla- belt in the south-eastern part of the Cuddapah where the sills and traps are more numerous and fairly continuous, in the present area these intrusives occur as disconnected lenticular bodies,. Though the intrusive is in general concordant with the stratification of the Vempalle dolomites and as such should he called a sill, field evidences as seen, in a well- section 1.5 km. north of Maddalapalle indicate 'chat the dolerite has crossed the beds at a very low angle.

South of the Penner river, the dolerite sill has been traced continuously (1) for a length of 8 km, from couth of Karnapudi to north of Nayanipalle with some gaps in (2) for about 500 m. east of Julakalava, (3) west of Muts- sukota and for about 3 km. from 3 km. S15$^0$E of Tabjula to north of Singanaguttapalle. To the north of the Penner river, the exposures are seen for about 100 m, at Chinna Yekkaluru, for about 1 km. near Kondapuram, for nearly 3 km north of Cherlopalle to NE of Vengannapalle, for 0.8 km. north of Yengannaphlhe to Kondampalle with some unexposed gaps, for about 700 m. 3 km, N 15$^0$ E. of Krishtipadu, for about 500 m. ESE of Dayyalamadugu., and for about 3.5 km. from north of Kesavanayanipeta to Boyanapalle. In general definite outcrops of the dolerite sill are rarely seen except close to Singanaguttapalle on the southern bunk of Penner river and 1.5 km. south of Karnapudi village and a few more localities to the north of the Penner river, as for example, at chinna Yekkaluru, lakshumpalle and south of Boyanapalle where narrow outcrops are seen on the hill slopes. Due to the covered nature of the terrain elsewhere, the presence of dolerite is made cut only from well sections, canal cuttings or from the preponderance of dolerite pebbles strewn in the fields. The narrow sill of dolerites appears to be characteristically prone to weathering and occupy the lowest ground in. the valley with the dolomites forming hills on both sides. Sometimes, serpentinization of the dolomites observed On the slopes have provided the clue-for the presence of dolerite in the valley and further search has revealed pebbles of dolerite in the cultivated fields or in situ rock in well sections.

Near Karnapudi, the dolerite is found to be associated with the steatite workings and its extension was confirmed in a well section in the village. The extent of the dolerite to near Karnapudi is about 2km with a width of 100 m to 200m. Further

north for about 1 km no outcrop in seen, after which it is again exposed in a Canal cutting for 1.5 km showing good serpentinization on the lower contact. From south of Venkatampalle to NNE of Nayanipalle, the dolerite in exposed for 3.5 km., the width of the sill being 100 to 150 m. with a slight thickening to the south of Venkatapalle. Well= /m sections in this area provide the only clue to the presence of the rock below. About 2 km. east of Julakalava, the sill is exposed for about 400 m. Further north, in the steatite belt west of Mutssukota, the sill is exposed in a ventilation shaft of the main steatite mine (Photo: 4 Regd. No: 1400) Close to that, some weathered dolerite is also exposed in the nala close by. Further north-east, some pebbles of the rock are seen but the sill cound not be traced continuously perhaps-due to the folding in the dolomite. To the south-east of Singanaguttapalle, the dolerite is seen to outcrop as boulders in the plain ground. This occurrence has been traced for about 3 km. in a NW-SE direction from the preponderance of pebbles and the presence of serpentinization in dolomites. Two minor occurrences are seen close to the steatite workings about 3.5 km. S15$^0$E of Tabjula. A small occurrence of dolerite sill (for about 300 m. in length) is seen on the western side of the hillock close to China Yekkuluru. The occurrence near Kondapuram is seen associated with steatite working. There are good outcrops or bouldery dolerite for about 400 m. east of Venganaapalle. The sill here is faulted with a throw to the west, where it occurs on the southern and western slopes of the hillock about 2 km. north of Vengannapalle. There are three disconnected exposures of dolerite in the cultivated fields between Ravuldiki to Kondampalle. They show different trends obviously due to the block faulting observed to the SE of Kondampalle. Steatite mineralization is associated with these occurrences. About 3 km. N15$^0$ E of Krishtipadu and to the east of Dayyalamadugu, the steatite and white "shale" workings closely follow the dolerite sill inferred along the cultivated fields. Sporadic serpentinization is noticed along the contact of the dolerite sill from north of Kesavanayanipeta to Boyanapalle.

The dolerite is medium to fine grained in texture and greenish black in colour. In thin sections, it essentially shows ophitic to subophitic texture with laths of plagioclase enclosed in a fine textured integranular matrix of pyroxene granules. Sometimes (Slide No. N3 from Maddalapalle the feldspar laths are arranged in stellate manner. The pyroxene is mostly augite, at times titaniferous (Slide No: L1 & 12 from Singanaguttapalle and Lakshumapalle) altering to chlorite and serpentine, with dusty granules of released magnetite. The calcic plagioclase is usually saussuritized resulting in an assemblage of epidote, calcite and quartz. The accessories are quartz, magnetite, rarely ilmenite altered to leucoxene and small grains of sphene (Slide No. K/1 Kesavanayanapeta). The Slide N/15 from near Bogalkatta shows a fine grained rock containing microlites of saussuritized feldspar arranged in flow pattern, highly

altered pyroxene, colorless epidote, released quartz grains and accessory iron ores. Slide No. L1 from north of lakshumapalle shows glass as a result of chilling at the contact of the dolomite. No olivine is seen in any of the slides, but minor amounts of quartz are found in most of the slides. In Slide No. N1 from Maddalapalle, quartz occurs both as grains and in granophyric intergrowth with feldspar and the rock should be called a quartz dolerite. The dolerite from Karnapudi does not contain any quartz.

## Serpentinisation and Steatitisation:

As in the Pulivendla taluq and also in the southern part of Tadpatri taluq to the north of the Chitravati river, the Vempalle dolomites and limestones in this part of the area are also found to be serpentinised and steatised generally along the upper contact of the dolerite sill. This invariable association of serpentine (also asbestos) and steatite with the dolerite indicates that the dolerite sill is in some way responsible for the formation of serpentine and steatite in the Vempalle dolomite near the contact of the sill.

In the present area, the serpentine formation is best seen on the upper contact of the sill about 3 km. SSE of Kondampalle near a quarry for steatite. The zone of serpentine consisting of both massive and banded serpentine is about 6 to 7 m. wide. Sporadic serpentinisation, at places for about 10 m width, is seen in the belt between 1.2 km. SE of Vengannapalle and 0.5 km. NE of Cherlopalle. Asbestos fibre development is also seen in this serpentine zone.

Serpentinisation with asbestos fibre development is also noticed on both the contacts of the dolerite sill for about 400 m. to the south-east of Singanaguttapalle, in the canal- cutting to the south-east of Venkatampalle (where serpentinisation is seen for about 300 m. width on the lower contact of the sill) and a minor occurrence about 1 .5 km. NNE of Nayanipalle. Minor bands of serpentine are also seen in between the bands of steatite in the steatite workings at Karnapudi and as a thin band of serpentinised dolomite near the upper contact of the dolerite at Mutssukota. The detached occurrence of serpentine only in the above localities is due perhaps to the fact that the major portion of the contact of dolerite and dolomite along the belt is concealed.

In the majority of the cases, serpentine is found in the immediate vicinity of the dolerite, followed by steatite a little farther a warn But this is not the general rule, as the dolomite is at places only serpentinised or only steatitised. Intense steatitisation is found in the area about 4 km, west of Mutssukota where there are numerous

working steatite mines. Other good areas of steatitisation are at Tabjula and Karnapudi. In these areas, a number of bands of the dolomite are found to ‘be steatitised alternating with unaltered bands of dolomite.

North of the Penner river, steatitisation is noticed(1) on the western slope of the hill adjacent Kondapuram (200 m.) a little above the serpentine horizon, (2) in the area between 0.5 km. NE of Cherlopalle and 1.5 km, SE of Vengannapalle, (3) 2 km, north of Vengannapalle, (4) 3 km. SSE of Kondampalle, (for 400), (5) for about 0.5 km. at about 3 km NNE of Krislitipadu where extensive mining is carried out, (6) 3 km. NW of Chandana (300 m.), and (7) 0.5 km, north of Kesavanayanapeta. In these cases steatitisation is rather feeble as compared to the southern part of the area only one or two bands of steatite are seen in the pits and mining is mainly carried cut to obtain a white friable clayey rock locally called "white shale" containing a high percentage of lime and silica and low magnesia. Some thin bands of steatite also occur beyond the main steatite horizon, but they are not of much importance.

## Dolerite Dykes:

Dolerite dykes are of very minor importance in the Vempalles; they had practically no influence on the dolomites. The main occurrences of dolerite dykes are: (1) 1 km. south of Nayanipalle where some dykes are traced for about 200 m. length in N.75 W. direction across the Gulcheru quartzite and Vempalle dolomite along suspected fault zones, (2) about 2 km. east of Korivipalle where a medium to coarse grained weathered dolerite dyke has intruded along a shear zone in N.$75^0$B.-S.$75^0$W direction for about 0.5 km. (3) where a dyke traverses the Vempalles in E-W direction for about 150 m. along a fault plane in the area about 2 km. WSW of Bogalkatta, and (4) on the eastern slope of the hill just north of Ravuldiki, where a 100 m. long E-W dyke traverses the dolomites.

These dykes, similar in appearance to the dolerite sill, are seen in thin sections to consist of altered pyroxene, saussuritised plagioclase, sphene, leucoxene and magnetite grains with accessory quartz.

The dykes do not show any significant contact effect on the Vempalles. Their general localisation along faults and shear planes, suggests that, they are probably later to the sills.

## Pulivendla quartzites:

The Vempalles are succeeded by the Pulivendla quartzites with disconformity. These quartzites form a persistent horizon of varying thickness. The outcrops of Pulivendla quartzites are about 2 km. South of Mutssukota are over 2km wide. To the west of Chadana and SE of Kondampalle, the outcrop is between 1 and 2 km. To the west of Garladinne, the outcrop is more than 1 km wide. To the north of Mutssukota, the quartzite is quite thin (200 to 300 m wide) and is on often hidden under soil cover between Chikkepalle and Chinnapappuru and between Kammavaripalle and Ravuldiki. Besides the regular horizon of the formation, numerous outliers of Pulivendla quartzite are also seen capping the Vempalle dolomites between Karnapudi and Mutssukota and between Ravuldiki and Chandana. The outliers are numerous in the area between Venkatampalle and Sanjivapuram where some of the exposures are as far as 3 to 3.5 km away from the nearest main horizon of Pulivendla quartzite. The outlier capping the hills to the NNE of Kondampalle is also about 2km from the main outcrop.

The Pulivendla consist of conglomerates and quartzites with thin intercalations of ferruginous shale. She conglomerate consist of pebbles of quartzite, vein quartz, chert and rarely cherty dolomite in a ferruginous matrix as in the areas to the south of Mutssukota. Besides the basal conglomerates, thin bands of intraformational conglomerate also are seen. The quartzites are hard and compact with a ferruginous matrix. The quartzites exhibit sedimentary structures such as ripple marks and current bedding throughout the area.

# STRUCTURE

The main structural features of the area are disturbances of various nature. The strata south of the Penner river are more disturbed in comparison with those north of the river. Shear zones and faults are prominent features and have served as loci for barytes mineralisation. Those are accompanied by shear folds which seem to have helped the steatite mineralization. It is noteworthy that the shear zones are confined to the upper Vempalles and the contact zone with the Pulivendla quartzite. The shear zones and fault are of various magnitude and are usually indicated on the surface by silicification with ochre and limonite coatings. In general, they trend along East-West direction. The shear folds are generally observed in the steatite workings along the valleys.

The strike of the beds vary from NW-SE in the southern part of the area to North-South in the middle and $N10^0E$-$S10^0W$ in the northern part, following the general configuration of the basin. In general, the beds dip at $20^0$ towards the NE, East and ESE, but slightly higher dips are encountered in the folded and faulted areas.

As already mentioned, faults and shear zones are more common to the South of Penner river and are confined to the upper Vempalles and Pulivendla quartzite, the Gulcherus being affected only to a lesser extent. The main faults mapped are briefly described below:

(1) Just east of Korivipalle the Gulcherus have been thrown towards the west by an E-W fault. Close to the Gulcherus, there is a wide zone of shearing in the lower Vempalles which extends for several kilometers to the south of Venkatampalle.

(2) The major fault of the area across the upper Vempalles and Pulivendla quartzites passes through Peddapappuru and Chinnapappuru, displacing the Pulivendla quartzites laterally over a distance of over 4 km. from north of Chinnapappuru to east of Chagallu. The sudden bend of the Penner river course at this point seems to have been influenced by this fault.

(3) About 2 km, south .of Mutssukota, the outcrop of Pulivendla quartzite has thickened due to block faulting by two parallel ENE-WSW faults.

(4) Another block faulting is observed about 3.5 km. southwest of Rayalacheruvu where there are seen two almost parallel ESE-WNW faults, The Pulivendla quartzite-has an outcrop width of 3 km. at this place and there is seen a small fault inlier ox Vempalle dolomite in the faulted block.

(5) The outcrop of Pulivendla quartzite to the south-west of Kammavaripalle also has thickened due to faultings

(6) Faults of smaller type mostly in E-W direction are noticed to the south of Dosaledu village, some of them carrying barytes mineralisation.

(7) To the south of Boyanapalle, a block of Pulivendla quartzite and the dolerite sill have been caught up and displaced between two converging faults trending $N50^0W$-$S50^0E$ and $N70^0E$-$S70^0W$.

(8) Just south of Chikkepally a fault is traced for 2 km. marked by fault breccia.

(9) Another small fault just south of Chikkepalle trends $N80^0E$-$S80^0W$.

(10) A fault trending NW-SE has been noticed about 2.5 km. north-west of Chandana village.

(11) The dolerite sill noticed to the north-east of Vengannapalle has been cut abruptly by an E-W fault and thrown to the west.

Shear zones are fairly prominent in the area particularly south of the Penner river. Dykes of basic igneous rook have been found to traverse the Vempalle dolomites and Gulcheru quartzite along these shear zones. The shear zones have also provided the channel wages for barytes mineralization in the area. These zones trend roughly in an E-W direction. The following are the main shear zones mapped.

(1) A major shear gone extending for over 5 km in $N85^0E$-$S85^0W$ direction is traced from 2 km. east of Venkatampalle to near Obulapuram traversing the major portion of the Vempalle dolomite and Pulivendla quartzite. Some of the important barytes mines are located along this zone- close to Venkatampalle.

(2) To the north of this zone, two more shear-zones trending in the same direction are traceable. The first zone 1 km. north of the main shear zone can be traced for about 2 km. and the second zone at about 1.5 km. away from the main zone can be traced for 4 km. In both these zones barytes mineralization is noticed close to the contact of the Vempalle dolomite and Pulivendla quartzites.

(3) About 3 km. SSW of Mutssukota, a shear zone is noticed for over 2 km. following $N80^0E$-$S80^0W$ direction. Good barytes mineralization is associated with this zone as seen from the extensive workings for the mineral.

(4) There is a shear zone to the east of Karnapudi, but no mineralization was noticed.

(5) A strong shear zone running in N75$^0$E-S75$^0$W direction can be traced for over 3.5 km. to the east of Korivipalle along which a coarse grained (altered) dyke has intruded.

(6) To the south of Dosaledu barytes mineralization is noticed along a shear zone striking E-W for about 0.8 km. parallel to which two more shear planes exist.

(7) Another shear zone for about 400 m. is seen at about 2.5 km. east of Julakalava close to a dolerite intrusion. Snow white barytes is associated with this zone.

(8) Minor parallel shear planes are also observed about 2 km. north-west of Chikkepalle.

In the area north of Penner river, the shear zones are not so prominent. The more important ones mapped are described below:

(1) A shear zone traced for 300 m. carrying barytes mineralization is noticed about 2km. south-west of Kondampalle. This seems to be the continuation of a fault affecting the Vempalle dolomites, Pulivendla quartzites and perhaps dislocating the dolerite sill also.

(2) In the area 0.75 km. WSW of Bogalkatta, shear zones showing cross-cutting relationship are seen. The major one trends in E-W direction and is traced for a distance of 1.5 km. A dyke of dolerite is seen along this zone for a short distance. Another discontinuous zone with a trend of N60$^0$W-S60$^0$E is traced at the contact of the outlier of Pulivendla quartzite and dolomite.

(3) In the area NW of lakshumpalle near the Anantapur-Kurnool border, a major shear zone is traced for a distance of 1.25 km. There are minor shear planes parallel to this main zone, numerous prospecting pits for barytes are observed in this zone

(4) In the area west of Dayyalamadugu, a shear zone with good formation of ochre is seen at the contact of the Pulivendla quartzite outlier and the dolomite.

Shear folds are best exhibited in the steatite workings north of Karnapudi. The beds of steatite aid unaltered dolomite are highly folded along NW-SE axis with a general plunge towards N45$^0$E. (Photo No.2). Smaller folds seen in the sane in the same pit show N-S axis and plunge towards the north. The multiplicity of folds in this area has made mining of steatite difficult. However, on the eastern wall of the pit the

beds are net much folded and dip gently towards the east. Shear folds are more intense and wide-spread in the main steatite belt 4 km. west of Mutssukota. Repeated folding of the strata here has facilitated intense steatitisation of the dolomites and has caused the steatite bands to appear at different horizons. The beds are also often cross-folded. The fold axis in this area is generally along $N40^0W$-$S40^0E$, direction with plunge towards $N40^0W$. In some of the pits, tight folding is also seen with overturned limbs. Zones of such tight folding are observed between Karnapudi and Tabjula usually occupy the valley portions and can be seen mostly in the dugout portions of the pits. This is perhaps due to the fact that such folded areas are more prone to weathering and valley formation.

## ECONOMIC GEOLOGY

The purpose of the present detailed mapping was to trace the dolerite sill and serpentinised zones in Vempalle dolomites and to make a detailed study of the occurrences of asbestos and steatite mineralisation in the area, in addition to locating the zones of barytes mineralization for future detailed investigation. An intensive search was made to study the contact effects of the dolerite sill on the Vempalle dolomites. Since the dolerite sill is itself discontinuous and covered in most part of the area, the contact effects on the dolomites could not be seen everywhere and the study was, therefore, limited to the exposed contacts on the surface and in the existing pits and old abandoned workings for asbestos and steatite. As already mentioned, serpentinization of the Vempalle dolomites close to the contact of the dolerite sill wherever exposed, is a common: phenomenon but asbestos mineralisation i, noticed only at two places in the area (1) near Singanaguttapalle and (2) in Cherlopalle - Vengannapalle areas. But even here the asbestos fibres are found to be somewhat brittle. Steatization of the Vempalle dolomites is how, ever, very common at a number of places and extensive mining is being carried out in some areas. Barytes mineralization is also common along faults and shear zones and the mineral is being mined at a number of places. The prospects of steatite and barytes deposits in the area are quite promising, but the asbestos occurrences observed only in two localities are not so encouraging. Further prospecting work by pitting and trenching is necessary to ascertain the extent, thickness, depth continuity and grade of the asbestos fibre zones along the strike and dip in these localities. A detailed account of the serpentinized zones, asbestos occurrences, steatite and barytes deposits is given in the following sections.

## Serpentine:

Serpentinization is noticed in the following localities:

i) 6 to 7 m. wide massive and banded serpentine of green colour on the upper contact of dolerite sill about 3 km. SSE of Kondampalle below an old working for steatite.

ii) Sporadic serpentinized zones, about 10 m. wide, in the area between 1.2 km. SE of Vengannapalle and 0.5 km. NE of Cherlopalle, Asbestos fibre veins are found on minor scale at places along this serpentine zone.

iii) Serpentinisation for about 400 meters on the upper and partly on lower contacts in the area SE of Singanaguttapalle. Minor asbestos fibre veins are noticed on both the contacts at places.

iv) Serpentinization on the lower contact of the dolerite sill exposed in a canal-cutting to the SE of Venkatampalle.

v) Small occurrence 1.5 km. NNE of Nayanipalle. Minor bands of serpentine are also seen in the steatite working near Karnapudi and also near the steatite workings of Mutssukota area.

vi) Serpentinization close to the steatite workings of Rayalcheruvu, but no dolerite is seen.

## Asbestos:

The asbestos fibre development noticed within the serpentine zones enumerated above, which deserves further investigation are the following:

i) About 1.5 km. N5$^0$E from Cherlopalle, asbestos fibre veins are seen on the western slope of the hill at the upper contact of the dolerite sill with dolomite. Three to four thin veins of chrysotile asbestos having a cumulative thickness of 1.00 cm. in exposed here. Two prospect inclines are seen here for 6 to 7 m down the dip. The quality of asbestos is inferior with the fibres somewhat brittle. The working is closed due to the poor quality of the fibre and low recovery.

ii) 1 km. east of Vengannapalle one old prospecting pit reveals the presence of 1 cm. thick asbestos fibre veins of yellowish colour on the lower contact of the dolerite sill with dolomitic rock.

iii) 1.6 km. north of Vengannapalle on the southern slope of the hill, asbestos fibre veins are noticed close to the upper contact of the dolerite sill with the dolomites. Two zones of asbestos exist here, (1) a lower zone at the contact of the dolerite with 1.2 cm. thickness of asbestos along which a few prospect inclines have been put down, and (2) an upper zone with 16 cm. thickness, containing 16 thin veins of asbestos having a cumulative thickness of 20 mm. The asbestos is low grade, somewhat brittle in nature and with poor recovery.

iv) Asbestos vein of average thickness 1 cm. is found in a pit put down by a prospector from Tadpatri on the lower contact of the dolerite sill. The fibres are whitish in colour and show some slippage. The grade seems better than in other localities mentioned above. Further work like pitting and trenching, is necessary to ascertain the strike and dip wise extension of the veins.

Very thin veins of asbestos are also suspected for about 300 m. along the upper contact of the dolerite sill. The fields being under cultivation, the veins are not seen "in situ", but small boulders of the serpentinized dolomite used for the construction of the field boundaries show thin veins of asbestos.

## Steatite:

Steatitisation of the Vempalle dolomites is more common in the present area close to the contact of the dolerite, preferably the upper contact. The steatite occurs in the form of bands usually alternating with unaltered massive dolomite or sometimes in the form of nodules within the dolomite. As already remarked, the development of steatite is more pronounced south of the Penner river between Karnapudi, Mutssukota and Tabjula, the Mutssukota area being the most extensive. To the north of the Penner river, steatitisation is seen at Kondampuram, Kondampalle, north of Krishtipadu (near Rayalcheruvu), north west of Chandana and north of lakshumpalle, but the mineralization is less intense and patchy. Only one or two bands of steatite occur in these areas and the workings are sustained by recovering mainly "white shale" bands which are found over the steatite bands and sometimes in between. The steatite is also often associated with serpentine or serpentinised dolomite, which usually occurs between the steatite bands and the dolerite sill, thereby suggesting that serpentinization perhaps proceeded steatitisation. This is also observed at Singanaguttapalle where a band of serpentinized dolomite comes between the dolerite sill and a zone of nodular steatite. In the main steatite area of Mutssukota, Karnapudi and Tabjula, little or no serpentine is noticed close to the dolerite contact. Due to intense steatitization here the serpentine was perhaps completely replaced by steatite. Thin serpentinized dolomite is also observed between the bands of steatite in the

Karnapudi Workings. The main deposits of steatite mapped and investigated are described below.

1) Mutssukota area: Locality about 4 km. West of Mutssukota.

i) **Adinarayana mine**: This is the only underground mine in the area Worked by the South India Mining Co., Betamcherla. The total thickness of steatite in 2 major bands separated by dolomite and shale is 1.6 m. The workings are in two levels each about 180 m. in length and 80 m. down-dip. The steatite from the lower band (0.75 m thickness) is being sold as Lava grade steatite. Strike $N45^0E$ dip $30^0SE$.

ii) **Other pits of South India Mining Co**: These include several pits worked earlier during the Second World War. Taken together the pits extend for 680 m. along the strike. The dip-wise extent is not possible to determine and may be taken to be the same as in the adjoining Adinarayana Mine. The average thickness of the steatite is 0.75 m. The bands of steatite and dolomite are usually folded with a plunge towards $S40^0W$ and the dip varies from $30^0$to$40^0$.

iii) **Sheshasai Mining Co. (Top):** The Strike of the bands is N-S and the dip $20^0$to $40^0$. The thickness of the steatite bands (5 nos.) is 1.16 m. alternating with dolomite and shale bands. The strike length is about 200 and the dip-wise extension 80 m. The strata are folded into a syncline.

iv) **P. Krishnamurthy ( Top Section):** The workings are situated in a semicircular fashion around the slopes of a hill. The strike varies from $N70^0W$ to N-S and $N20^0E$ with the dips converging towards east ($19^0$ to $30^0$). The strike length is 180m and the dip-wise extension 30 m. The thickness of the Steatite bands if 60cm.

**v) P. Krishnamurthy ( Bottom Section):** The-workings have been started recently. The strike of the steatite bands varies from $N70^0E$ to N-S and the dip from $12^0$ to $30^0$ towards north and east.

2. Karnapudi area:

The Strata are highly folded with folds plunging in $N45^0E$ direction. Two major pits are seen in the area with 7 to 9 steatite bands having a cumulative thickness of 2.4 to 2.5m. The total strike length of the zone is about 155 m.

3. Tabjula area:

The strata are folded with high dips (average $40^0$). The thickness of steatite bands is 1.15 to 1.30 m. A faults is traced between' the two workings resulting in a reversal of dips.

Steatite from Mutssukota area is greenish, bluish and whitish in colour semi-translucent, massive and usually free from impurities. The steatite from Tabjula workings is usually white or yellowish and in some of the bands contain unaltered dolomite. The steatite from Karnapudi is white to bluish in colour and some of the bands contain iron impurities. In all the areas one of the upper bands is cleaved and is reddish in colour due to staining by iron- oxide. The specific gravity of the steatite determined for samples from different areas varies from 2.71 (M/21) in Mutssukota to 2.75, (T/2) from Tabjula and 2.76 (K/24) from Karnapudi.

In general, the steatite is a dense, compact rock with a parting parallel to the bedding in-some cases. Some of the bands show shaly appearance due to development of cleavage in folded areas. It is not uncommon to find massive dolomite band in between two cleaved bands of steatite. In thin sections, the rock is seen to be composed of thin flakes of talc arranged in stellate fashion or without any orientation. The specimens from near Rayalcheruvu (B/1 and B/4) appear to be sheared.

The results of chemical analysis of steatite samples are collected from different areas are given below:

Table-II Chemical Analysis of Steatite Samples:

| Sample No | Loss on Ignition | $SiO_2$ % | $Fe_2O_3$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | Locality |
|---|---|---|---|---|---|---|---|---|---|
| B/4 | 5.9 | 59.36 | 0.6 | 1.3 | 1.1 | 31.17 | 0.26 | 0.21 | Rayalacheruvu |
| M/10 | 5.58 | 60.86 | 0.2 | 0.1 | 1.10 | 32.18 | 0.15 | 0.26 | Mutssukota |
| T/13 | 5.47 | 61.40 | 0.5 | 0.1 | 0.83 | 31.82 | 0.09 | 0.19 | Tabjula |
| K/23 | 5.28 | 61.26 | 0.68 | 0.07 | 0.83 | 31.72 | 0.15 | 0.21 | Karnapudi |
| ** B/9 | 39.01 | 7.86 | 0.6 | 0.4 | 39.07 | 12.32 | 0.09 | 0.64 | Rayalacheruvu |
| ** S/1 | 25.33 | 28.36 | 0.2 | 0.1 | 29.09 | 16.33 | 0.13 | 0.11 | Singanaguttapalle |

$H_2O$ could not be determined as penfilled tubes were no available.

Analysis done in Chemical Laboratory, Southern Region, G.S.I., Hyderabad.

** White friable rock locally called "white shale" widely mined in the area and used as a base in insecticide industry.

## Reserves:

During the course of preliminary investigation for steatite in the area in 1956, Thiagarajan (1956) estimated probable reserve of 60,000 tons of steatite from the area between Jangamreddipalle and Kondampalle on the assumption that the bands of steatite extend strike- wise for 100 to 400 ft. and dip wise from 20 to 100 ft. The reserves were calculated pit=wise. Later prospecting and mining activity by private parties has indicated that the mineralization is more persistent along the strike and also down-dip. In the Adinarayana mine of South India Mining Co., the dip-wise extension of the steatite hands has been proved so far upto 80 m. As exposed in the Karnapudi pits, the cumulative thickness of the steatite bands of all grades goes upto 2.5 m. For the present calculation the specific gravity of steatite has been taken as 2.7. Reserves of all grades of steatite have been calculated under two categories (1) Probable (indicated) reserves based on the data from existing workings, and (2) additional possible (inferred) reserves on the assumption of persistence of the existing bands in depth further down-dip below the existing workings. The details of calculation of reserves are shown in Table II. The total reserves of steatite in the belt are of the order of about 2,90,000 tonnes of Probable (Indicated) Reserves to assumed depths of 15-80 m. down-dip, and about 6,00,000 of Possible (Inferred) Reserves to assumed further depths of 50-100 m. down-dip.

Table-III Calculation of Reserves of Steatite

| Locality | Probable (Indicated) Reserves | | | | Cumulative thickness of bands (in m) | Strike length (in m) | Further dipwise extenssion assumed. | Reserve (in tonnes) |
|---|---|---|---|---|---|---|---|---|
| | Cumulative thickness of bands (in m) | Strike length (in m) | Dipwise extension indicated (in m) | Reserve (in tonnes) | | | | |
| **I. Mutssukota** | | | | | | | | |
| 1. Adinarayana mine (Julakalava steatite mine) | 1.5 | 200 | 80 | 65,00 | 1.5 | 200 | 100 | 81,000 |
| 2. South India Mining Co, extension quarries | 0.75 | 680 | 80 | 1,10,000 | 0.75 | 680 | 100 | 1,40,000 |
| 3. Sheshasai Mine (top) | 1.16 | 200 | 80 | 50,000 | 1.16 | 200 | 100 | 62,000 |
| 4. P. Krishnamurthy (top) | 0.60 | 160 | 40 | 10,000 | 0.60 | 160 | 100 | 26,000 |
| 5. -do- (bottom) | 0.60 | 120 | 20 | 4,000 | 0.60 | 120 | 100 | 20,000 |
| **II. Karnapudi** | 2.50 | 155 | 30 | 31,000 | 2.50 | 300 | 100 | 2,00,000 |
| **III. Tabjula (a)** | 1.30 | 150 | 15 | 8,000 | 1.3 | 150 | 50 | 26,000 |
| **" (b)** | 1.30 | 300 | 30 | 32,000 | 1.3 | 300 | 50 | 52,000 |
| | | **Total** | 3,10,000 | | | | **Total** | 6,07,000 |
| | | *** Deduct steatite already mined..** | 20,000 | | | | | |
| | | **Nett..** | 2,90,000 | | | | | |

* A total amount of 20,000 tonnes of steatite has been recovered from the above mentioned area as per record of Indian Institute of foreign t rade in its Interim Report of Export potential Survey of Andhra Pradesh.

## Mode of Origin of Steatite:

The close proximity of the dolerite sill with the steatite deposit suggests that steatitisation, like serpentinisation, is also connected with the intrusion of the dolerite sill. The occurrences at Tabjula, Singanaguttapalle, Kondampalle, Kondapuram, Rayalcheruvu and Chandana area adjacent to the contact of the intrusive, more commonly towards the upper contact. Even in the main steatite zone west of Mutssukota and near Karnapudi, where the mineralization is at the maximum, the presence of dolerite has been established after a detailed search. As already mentioned, dolerite is seen in a ventilation shaft of the main steatite mine of S.I. Mining Co., to the West of Mutssukota. Highly altered basic rock is also seen at the bottom of the main pit near Karnapudi and is also seen in the outcrop nearby. As such for the silication of the dolomite and access of water for the formation of steatite it is thought that the source is probably the dolerite and the accompanying solutions. Thiagarajan (1956) has assigned hydrothermal solutions accompanying the intrusion of dolerite sill for the formation of steatite. In the Death Valley, Kingstone Range, California, talc occurs as tabular masses in the/lower part of the mildly metamorphosed dolomite (meta-dolomite) in contact with an underlying diabase sill. In places, however, the silication of the dolomite has not been strong enough to produce workable deposits (Wright, 1957). The talc deposits of St. Lawrence Country, New York, occurs in contact-metamorphosed, Grenville limestones cut by granite in a zone of tremolite and enstatite; the tremolite has been altered to talc (Bateman, 1954). In California, irregular bodies of white talc and associated tremolite and serpentine occur at a diorite-limestone contact and in altered dolomite or magnetite in Washington. In the Modoc district, Ontario, massive white talc occurs as lenses in the contact-metamorphosed Grenville dolomite near a granite intrusion.

In the pit about 3 km. SSE of Tabjula, it is seen that the dolomite band nearest to the dolerite sill has been recrystallised and carry a few flakes of talc (slide No. T/1 Tabjula). As such, the dolerite might have caused mild-contact metamorphism of the dolomite by inducing a temperature gradient. The main ingredients, silica and water, for the formation of steatite must have been brought about during hydrothermal action accompanying the intrusion. Connate water and silica could be also available for this purpose. In the majority of the workings, the steatite bands are seen to alternate with unaltered dolomite bands. Samples of dolomite undergoing alteration to steatite and unaltered dolomite have been analysed (Table I & II). A final Conclusion has not yet been arrived at, but it is seen that selectivity of steatite mineralization is compositional, the pure magnesian rock (dolomite) free from impurities like silica etc. is more amenable to alteration than the impure cherty dolomite having high silica content.

1. Thiagarajan R (1956) Report on Barite & Steatite occurrences to Anantapur district, A.P. (Report for the E.S. 1955-56 - unpublished)

2. Wright - 1957 - California - Div. Mines. Bill-176 P-625 referred to by Bates in Geology of Industrial rocks and minerals, pp. 354-36.

3. Bateman (1954) Economic mineral deposits, pp.760-761.

It is seen that the average cumulative thickness of steatite in undisturbed areas north of the Penner river is 20 cm. to 40 cm. in one or two bands, whereas in the Mutssukota-Karnapudi areas which are highly folded, the cumulative thickness of steatite bands varies from 0.95 cm. to 1.6 m. at Mutssukota to 2.49 m. at Karnapudi, and the number of steatite bands also vary from 4 to 7. This was possibly brought about by contemporaneous deformation of the rock resulting in folding of the beds due to which the mineralising solutions had an easy access to higher beds, thus bringing about more intense mineralisation.

## Barytes:

Barytes mineralization in the area is usually found associated with &hear zones and faults in the Vempalle dolomites or in Pulivendla quartzites close to the contact of the dolomite. This is in conformity with the observations of Coulson (1934). In the highly sheared area west of Sanjivapuram, barytes mineralization is also seen at the base of the outlier of the Pulivendla quartzite over the Vempalles, This contact is crushed and veins of barytes are seen in an ochreous mass. The barytes occurs generally as veins and fissure fillings. The important occurrences of barytes in the area are briefly described below.

1) A mineralized barytes zone, about 1 km. in length and 30 m. in maximum width containing several veins of barytes is seen about 2.25 km, east of Venkatampalle along a $N85^0E$-$S85^0W$ shear zone extending from near Venkatampalle to north of Obulapuram. The barytes are being mined at present in this zone. There are also two more parallel zones 1 km. and 1.5 km. away carrying small deposits of barytes close to the contact of the dolomite and Pulivendla quartzite. Just south of the Main zone, there is also another occurrence near the dolomite-quartzite contact.

2) About 3 km. SSW of Mutssukota, barytes mineralization is seen in a zone 1.5 km. in length over a width of 30 m. This deposit which was worked by several parties in the past is now abandoned.

The other occurrences in the area are the following:

1) Along an E-W shear zone for 300 m. on the northern and eastern slopes of a hillock south of the Mutssukota- Anantapur road, about 3.5 km. WSW of Mutssukota

2) Along a N45$^0$E shear zone for 500 m. about 205 km. east of Julakalava close to a dolerite intrusion.

3) Along an FW shear zone to the south of Dosaledu village.

4) At the contact of quartzite and dolomite in the main outcrop and outlier west of Sanjivapuram.

In addition to the above prominent zones, minor occurrences are also noticed at a few other places in the dolomite.

The mining of the barytes near Venkatampalle is carried out in long trenches extending for over 30 m. in depth. The barytes vein seems to be persist in depth. The occurrences south of Mutssukota had also been worked in trenches along the veins upto a depth of over 30 m. Underground mining had also been attempted in this area but abandoned due to poor roof conditions. The working east of Julakalava is narrow, about A 4 to 5 m. wide, but the barytes produced is of white colour. The colour of barytes, from the other workings is mostly off-colour.

## SUMMARY AND CONCLUSIONS

The following are the main conclusions that may be drawn from the observations made during detailed mapping in the area:

i) The presence and continuity of the dolerite sill has been clearly established for the first time beyond Karnapudi upto the border of Anantapur-Kurnool districts, Though gaps do exist and the dolerite appears as detached lenses, its continuity is proved by the fact that it occupies almost the same strati graphical horizon with identical physical appearance and mineral assemblage.

ii) A zone of serpentinisation is observed on both the contacts of the dolerite sill followed by a zone of steatitisation,

iii) Along with serpentine, asbestos fibre development is seen near Singanaguttapalle and in Cherlopalle Vengannapalle area. Asbestos fibre veins at the lower contact at Singanaguttapalle are over 1 cm. thick as seen in a small pit. A number of veins have been found in Cherlopalle and Vengannapalle areas. Further investigation by trenching followed by test drilling is necessary to ascertain the intensity of the veins and workability.

iv) Steatitisation of the Vempalle dolomites close to the dolerite sill is a common feature in the area. Fairly intensive mining for steatite is being carried cut in the Mutssukota area. Mining has been abandoned in Karnapudi area, although there are a number of bonds with a total thickness of over 2.49 m. The bands can be easily worked slightly away from the main fold-axis on the eastern side of the pit where the dip is gentle and the beds are not disturbed, as shown by the small working adjacent to the main pit. The bands should be further traced along the strike and underground mining may be attempted. Further, about 2 km south of the Karnapudi village close to the contact of the dolerite sill, the dolomites are seen to be steatitized. Prospecting in this area may be rewarding. In Tabjula area (3.5 km. S.15 E. from Tabjula) 1.30 m. thick zones of steatite exist in the abandoned workings which deserve further prospecting also.

North of the Penner river, the prospects for steatite are not high since only one or two bands are seen in the existing workings which are mostly worked for white shale.

v) Barytes mineralization in the form of veins and fissure fillings occur along the shear zones in the area. Mining for barytes is carried cut at present near Venkatampalle, but the other workings are abandoned. It is planned to carry

out large- scale mapping and detailed investigation for barytes, including intensive search along the shear zones and faults traversing the Vempalle dolomites and Pulivendla quartzites, especially along the contact zone of dolomite and quartzite. A programme of pitting and trenching and if feasible geophysical prospecting is necessary to assess the barytes deposits of the area.

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# LOCALITY INDEX

| LOCATION | LATITUDE | | | | LONGITUDE | | | T.S. No. |
|---|---|---|---|---|---|---|---|---|
| Boyanapalle | 15 | 09 | 00 | | 77 | 49 | 00 | 57 E/16 |
| Bogalkotta | 15 | 00 | 00 | | 77 | 49 | 00 | 57 F/13 |
| Chandana | 15 | 05 | 00 | | 77 | 47 | 00 | 57 E/16 |
| Cherlopalle | 14 | 57 | 00 | | 77 | 48 | 00 | 57 F/13 |
| Chagallu | 14 | 55 | 00 | | 77 | 50 | 00 | 57 F/13 |
| Chinna Yekkaluru | 14 | 55 | 00 | | 77 | 48 | 00 | 57 F/13 |
| Chirnapappuru | 14 | 56 | 00 | | 77 | 52 | 00 | 57 F/13 |
| Chikkapalle | 14 | 53 | 00 | | 77 | 52 | 00 | 57 F/13 |
| Dayyalamadugu | 15 | 06 | 00 | | 77 | 47 | 00 | 57 E/16 |
| Dosaledu | 14 | 47 | 00 | | 77 | 54 | 00 | 57 F/13 |
| Gangaram | 14 | 56 | 00 | | 77 | 46 | 00 | 57 F/13 |
| Julakalava | 14 | 50 | 00 | | 77 | 48 | 00 | 57 F/13 |
| Kondapuram | 14 | 56 | 00 | | 77 | 48 | 00 | 57 F/13 |
| Kammavaripalle | 14 | 58 | 00 | | 77 | 50 | 00 | 57 F/13 |
| Kondampalle | 15 | 02 | 00 | | 77 | 47 | 00 | 57 E/16 |
| Karnapudi | 14 | 45 | 00 | | 77 | 51 | 00 | 57 F/13 |
| Korivipalle | 14 | 52 | 00 | | 77 | 47 | 00 | 57 F/13 |
| Kesavanayanipeta | 15 | 06 | 00 | | 77 | 48 | 00 | 57 E/16 |
| Lakshumpalle | 15 | 07 | 00 | | 77 | 49 | 00 | 57 E/16 |
| Maddalapalle | 14 | 48 | 00 | | 77 | 49 | 00 | 57 F/13 |
| Mutssukota | 14 | 51 | 00 | | 77 | 52 | 30 | 57 F/13 |
| Nayanipalle | 14 | 48 | 00 | | 77 | 49 | 00 | 57 F/13 |
| Obulapuram | 14 | 47 | 00 | | 77 | 54 | 00 | 57 F/13 |
| Peddapappur | 14 | 56 | 00 | | 77 | 52 | 00 | 57 F/13 |
| Ratsavanipalle | 15 | 08 | 00 | | 77 | 45 | 00 | 57 E/16 |
| Ravuldiki | 15 | 00 | 00 | | 77 | 48 | 00 | 57 E/16 |
| Rayalcheruvu | 15 | 03 | 00 | | 77 | 49 | 00 | 57 E/16 |
| Reddipalle | 14 | 55 | 00 | | 77 | 47 | 00 | 57 F/13 |
| Singanaguttapalle | 14 | 54 | 00 | | 77 | 49 | 00 | 57 F/13 |
| Tabjula | 14 | 54 | 00 | | 77 | 49 | 00 | 57 F/13 |
| Tmmapuram | 15 | 05 | 00 | | 77 | 46 | 00 | 57 F/13 |
| Vengannapalle | 14 | 58 | 00 | | 77 | 48 | 00 | 57 F/13 |

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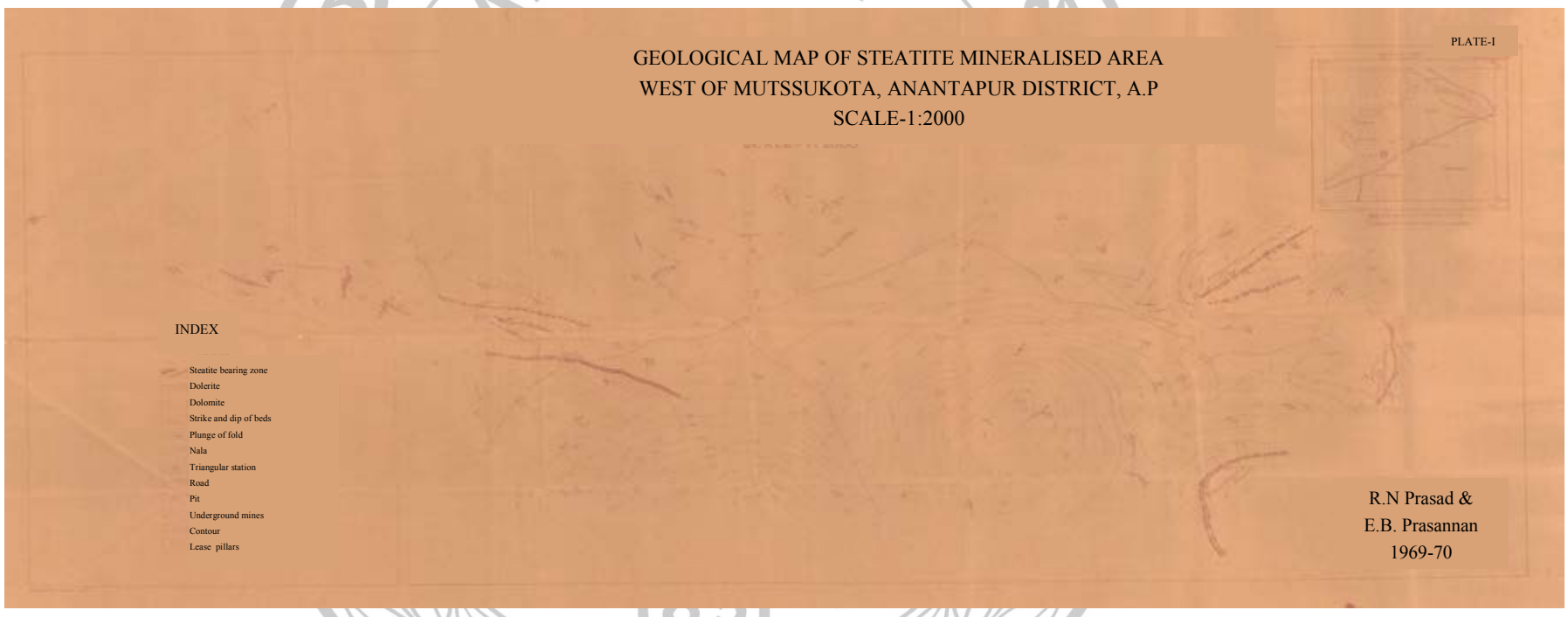
# LIST OF PLATES:

## PLATE I: GEOLOGICAL MAP OF STEATITE MINERALIZED AREA WEST OF MUTSSUKOTA AREA, ANANTAPUR DISTRICT (SCALE 1:2000)



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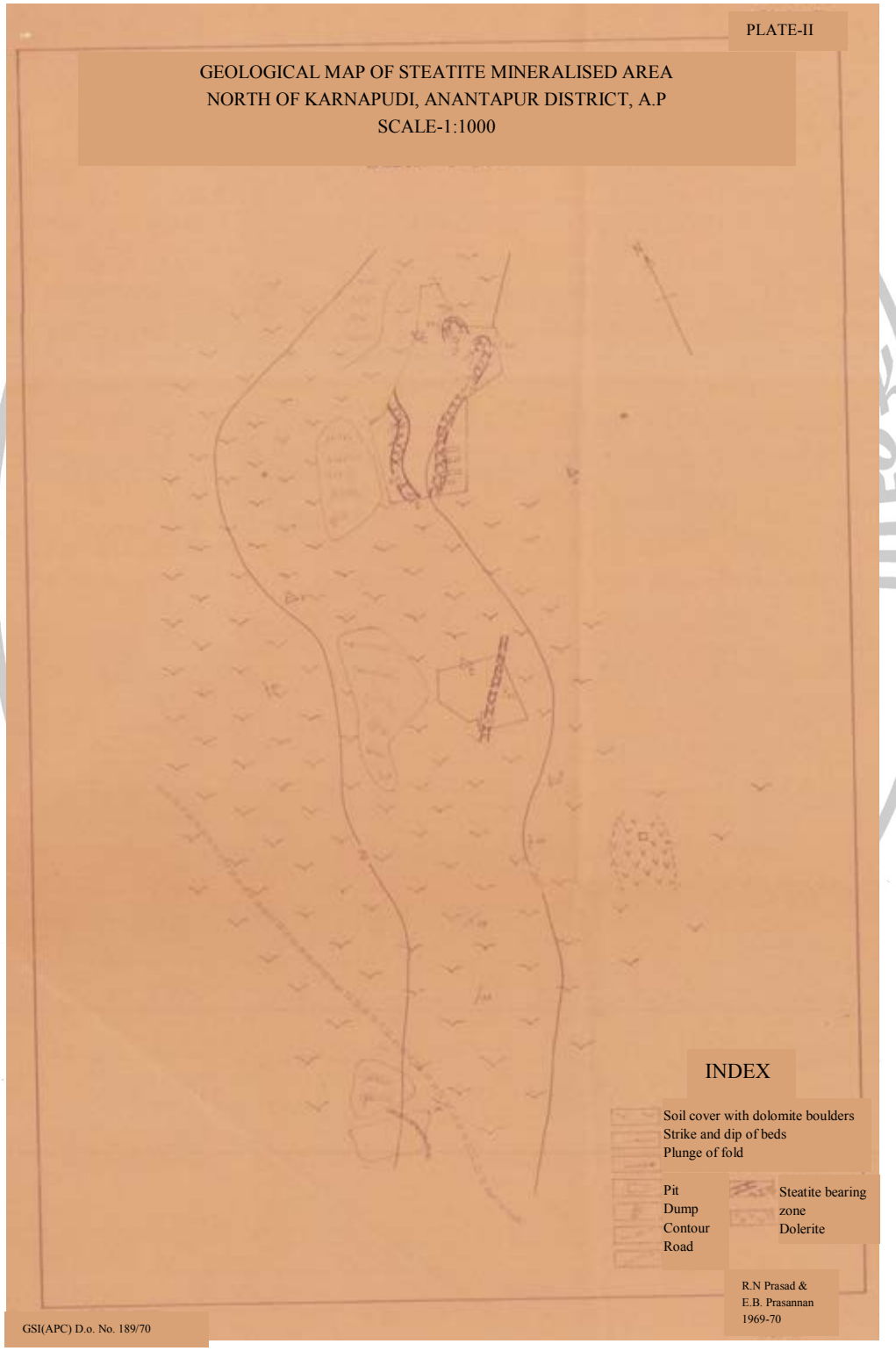
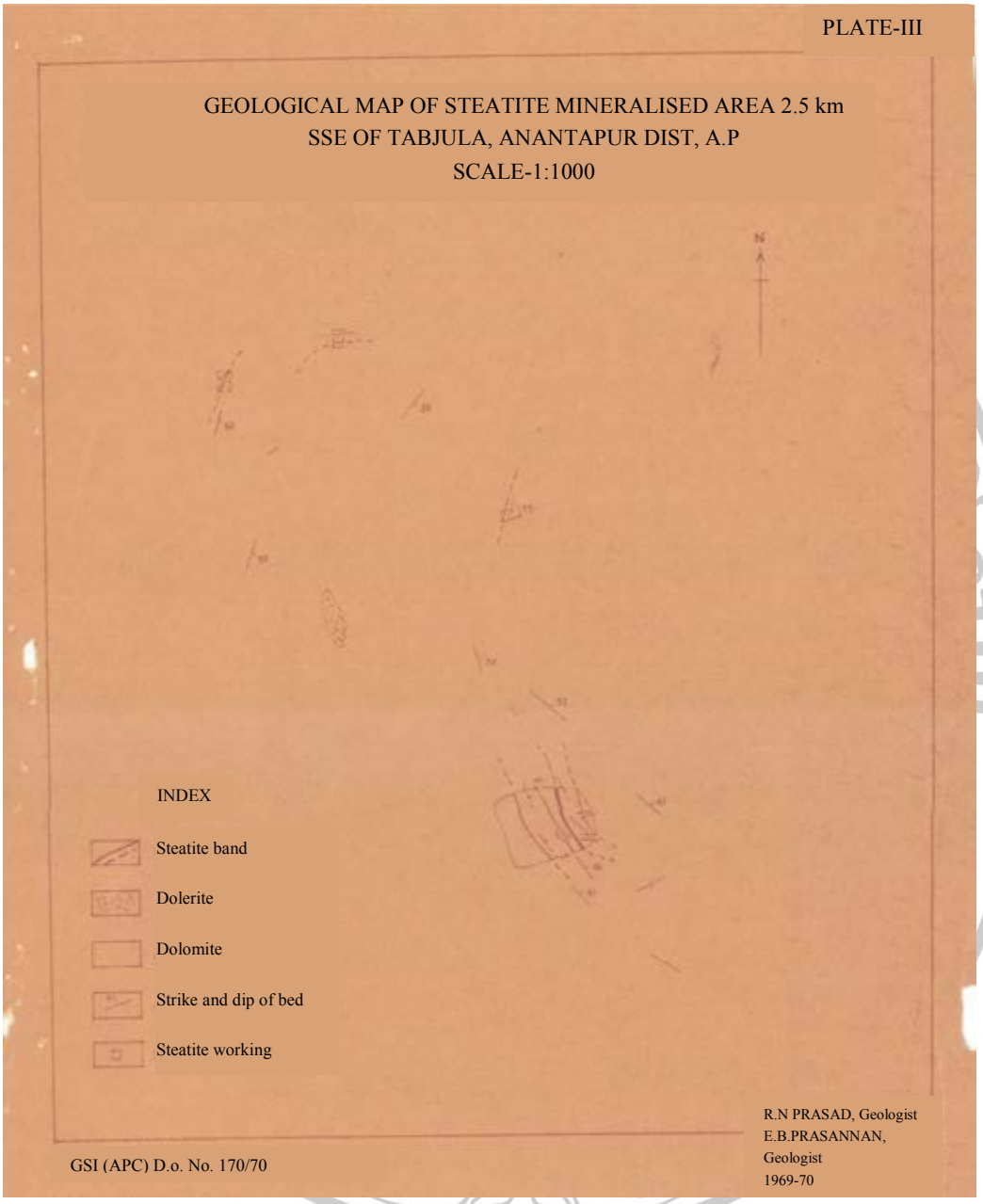
# PLATE II: GEOLOGICAL MAP OF STEATITE MINERALIZED AREA NORTH OF KARNAPUDI AREA, ANANTAPUR DISTRICT (SCALE 1:1000).



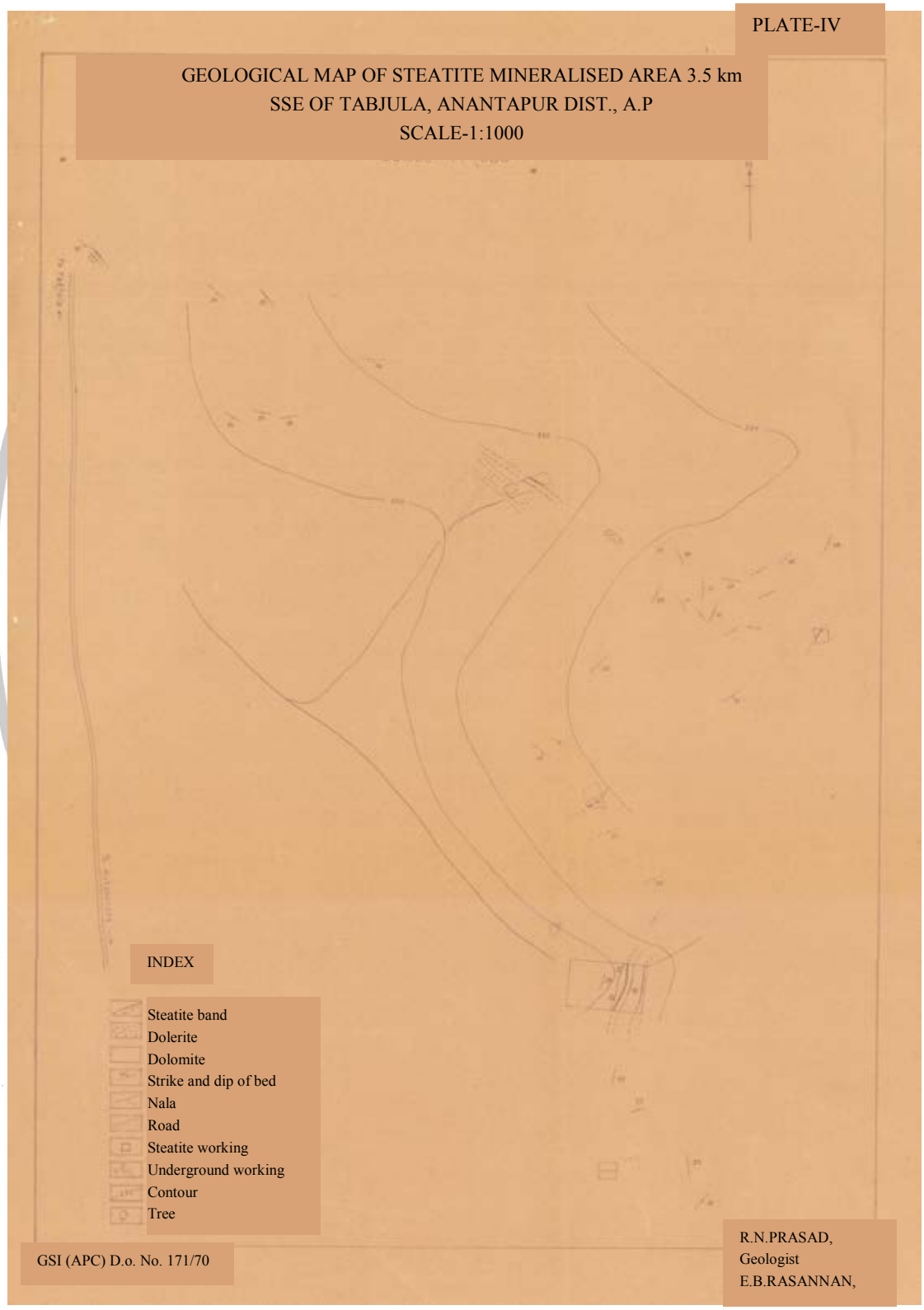
SRO_GSI_3042

# PLATE III: GEOLOGICAL MAP OF STEATITE MINERALISED AREA 2.5 KM SSE OF TABJULA, ANANTAPUR., A.P



SRO_GSI_3042

# PLATE IV: GEOLOGICAL MAP OF STEATITE MINERALISED AREA 3.5 KM SSE OF TABJULA, ANANTAPUR DIST., A.P



SRO_GSI_3042

# PLATE V: GEOLOGICAL MAP OF KARNAPUDI-MUTSSUKOTA-TABJULA AREA, ANANTAPUR DISTRICT (REDUCED FROM THE PHOTOSTAT ENLARGEMENTS ON 1:31,680 SCALE OF SHEETS 57 F/13 &E/16) SCALE 1:63,360.

OPEN SERIES MAP

# No. D43L13

Scale 1:50,000

| | | |
|---|---|---|
| D43F12 (57E/12) | Kurnool ANDHRA PRADESH D43F16 (57E/16) | D44A4 (57I/4) |
| D43L9 (57F/9) | **D43L13** (57F/13) Anantapur ANDHRA PRADESH | D44G1 (57J/1) |
| D43L10 (57F/10) | D43L14 (57F/14) | D44G2 (57J/2) Cuddapah ANDHRA PRADESH |

भारतीय सर्वेक्षण विभाग SURVEY OF INDIA

1st Edition 2011. Price : Rs. 77/-

## CONVENTIONAL SYMBOLS

Express highway: with toll, with bridge, with distance stone
Roads, metalled: according to importance
Roads, double carriageway: according to importance
Unmetalled road. Cart-track. Pack-track with pass. Foot-path
Streams: with track in bed; undefined. Canal
Dams: masonry or rock-filled; earthwork. Weir.
River: dry with water channel; with island & rocks. Tidal river.
Submerged rocks. Shoal. Swamp. Reeds.
Wells: lined; unlined. Tube-well. Spring. Tanks: perennial; dry.
Embankments: road or rail; tank. Broken ground.
Railways, broad gauge: double; single with station; under constrn.
Railways, other gauges: double; single with distance stone; do.
Mineral line or tramway. Kiln. Cutting with tunnel.
Contours with sub-features. Rocky slopes. Cliffs.
Sand features:(1)flat. (2)sand-hills(permanent). (3)dunes(shifting).
Towns or Villages: inhabited; deserted. Fort.
Huts: permanent; temporary. Tower. Antiquities.
Temple. Chhatri. Church. Mosque. Idgāh. Tomb. Graves.
Lighthouse. Lightship. Buoys: lighted, unlighted. Anchorage.
Mine. Vine on trellis. Grass. Scrub.
Palms: palmyra, other. Plantain. Conifer. Bamboo. Other trees.
Areas: cultivated; wooded. Surveyed tree.
Boundary, international.
,, state: demarcated; undemarcated.
,, district; subdivision; tahsil or tāluk; forest.
Boundary pillars: surveyed; unlocated
Heights, triangulated: station; point; approximate. △200 . 200 .200
Bench-mark: geodetic; tertiary; canal. BM 63·3 .BM 63·3 .63
Post office. Telegraph office. Overhead tank.
Rest house or Inspection bungalow. Circuit house. Police station.
Camping ground. Forest: reserved; protected. CAMP RF PF
Spaced names: administrative, locality or tribal. KIKRI NĀGA
Hospital. Dispensary. Veterinary: Hospital / Dispensary
Aerodrome. Helipad. Tourist site.
Power line: with pylons surveyed; with poles unsurveyed.

## NOTES :-

Heights are in metres and above Indian mean sea level.
Contours are approximate.
A relative height, e.g., *6r* represents the approximate height, in metres, between the top and bottom of a steep slope.
The major administrative partitions of districts in Andhra Pradesh State are called ' Mandals' and their boundaries are shown by tāluk boundary symbol.
Tanks, shown dry in this area, usually contain water from July to December.
Wind-Turbines are shown thus,
Exact position of wind powerline turbine poles are not surveyed. Only powerline is shown with remarks Wind turbine powerline.

## COMPILATION INDEX

A. Surveyed during 1974-75. Updated for major details during 2005-06.

*Projection - UTM Datum - WGS 84*

Magnetic Variation from True North about 1 3/4° East in 2005.
(Annual change negligible).

500 m to 1 cm 1:50,000 2 cm to 1 km

Metres 1000 500 0 1 2 3 Kilometres

CONTOUR INTERVAL 20 METRES

*For further details about this map, please contact*
Director
Andhra Pradesh Geo-Spatial Data Centre
Survey of India, Uppal
Hyderābād.

*WEBSITE - www.surveyofindia.gov.in*

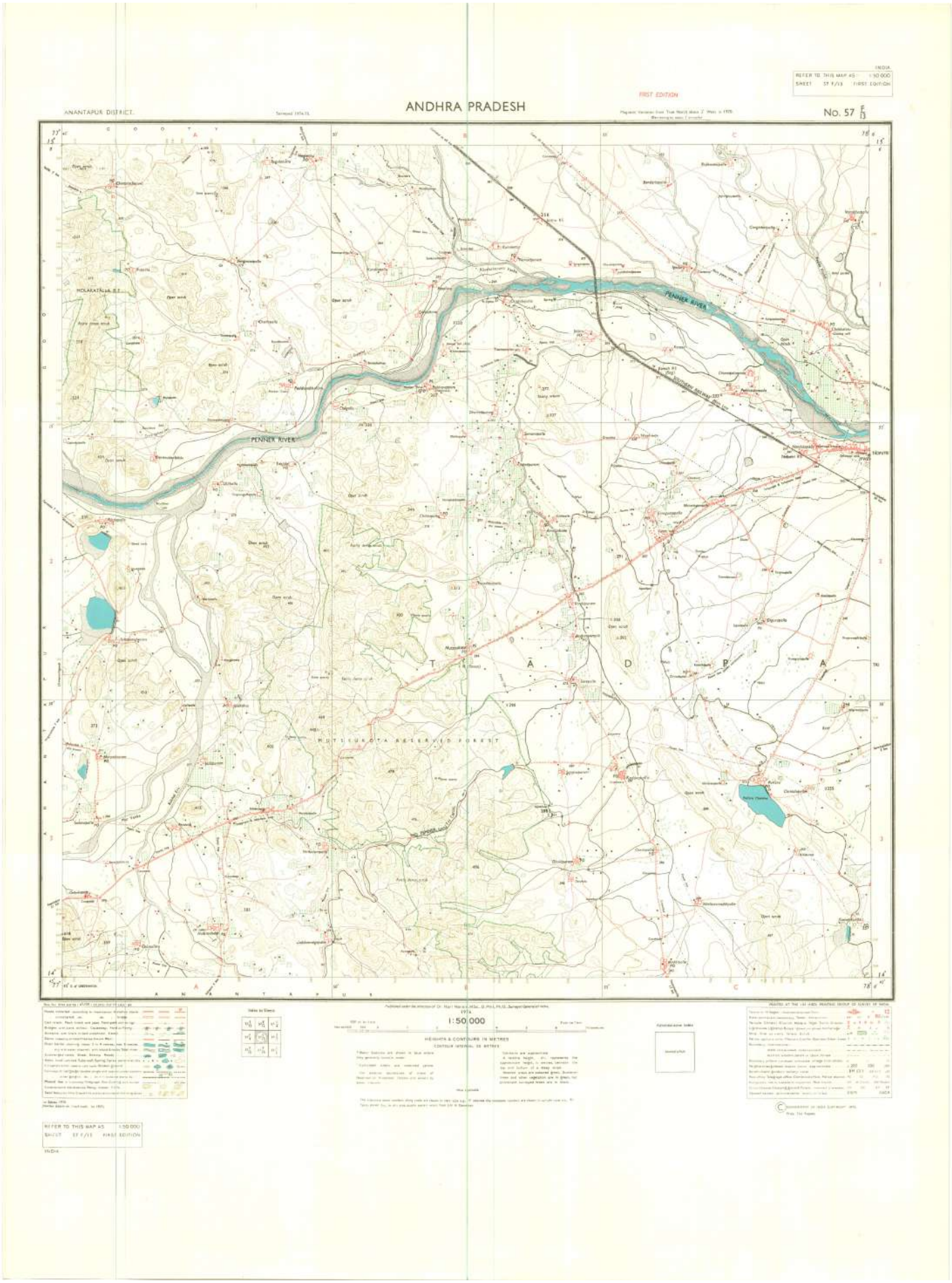


REG. No. -SPG D'11 (Andhra Pradesh GDC-1:50,000)-

*भारत के महासर्वेक्षक*, स्वर्ण सुब्बा राव, बी.ई., *के निदेशन में प्रकाशित,*
*Published under the direction of* Swarna Subba Rao, B.E., *Surveyor General of India,*
Survey of India, Hāthībarkala Estate, Post Box No.37, Dehra Dūn-248001 (Uttarākhand),
Department of Science & Technology, Government of India.

PRINTED AT THE SOUTHERN PRINTING GROUP OF SURVEY OF INDIA.

**6730922/2022/FCA -PCCF**



1141513/2018/FCA -PCCF

GOVERNMENT OF ANDHRA PRADESH

Lr.No. File No. 31281/R4-1/2017 dt:12-03-2018.

From
B.SREEDHAR, I.A.S.,
Director of Mines and Geology
5th Floor, Sri Anjaneya Towers
Ibrahimpatnam, Krishna District

To
The Principal Chief Conservator of Forests, Sankurathri Residency
EVR Gardens, M.G.Inner Ring Road
Agathavarapadu, Guntur 520 509.

Sir,

Sub:- Mining & Quarries – M/s. Rama Minerals, Prop: Smt. B. Rama Devi for grant of Quarry Lease for Dolomite and Steatite for an extent of 2.00 Ha. in Mutchukota R.F., Comp No. 594 of Mutchukota R.F., Julakalva Village, Singanamala Mandal, Gooty Forest Range, Anantapur Forest Division-Anantapur District – Proposals submitted for action under Forest Conservation Act - Reg.

Ref:- 1. Application Dated: 09-11-2017 of M/s: Rama Minerals.
2. Lr.No: 45921/2001/FCA-4,dt:15.06.2015,From the Principal Chief Conservator of the Forest, Aranya Bhavan, Hyderabad.
3. Lr.No:45921/2001-FCA-4, Dated: 07-12-2017, From the Principal Chief Conservator of the Forest, Sankurathri Towers, Agathavarappadu, Guntur.
4. Asst. Director of Mines & Geology, Tadipatri Lr. No. 2395/QL/2017, dt: 17-01-2018 addressed to the Director of Mines & Geology.

*****

I invite kind attention to the subject and reference cited. Through the reference 4th cited (Copy enclosed), the Asst. Director of Mines & Geology, Tadipatri submitted proposals on the Quarry Lease application filed by M/s. Rama Minerals, Prop: Smt. B. Rama Devi for Dolomite and Steatite for an extent of 2.00 Ha. in Mutchukota R.F., Comp No. 594 of Mutchukota R.F., Julakalva Village, Singanamala Mandal, Gooty Forest Range, Anantapur Forest Division-Anantapur District. The ADM&G, Tadipatri submitted report as called for by the Prl.C.C.F. Guntur vide references 2nd and 3rd cited is as detailed below:

Point No: 1: **The Said Mineral is Not available In Non-Forest Land**

It is bring to the kind notice that the Quality of the Mineral is the predominant factor which finds its application differently in Industrial applications as its Chemical Composition varies.

"**As already reiterated that Steatite/Dolomite available in this subject area applied in Muchukota Reserve forest has its own technical specificity and this Kind of the Mineral is No where available in the Entire State of Andhra Pradesh nor in Sothern India. "** either in Non-forest Land or in Forest areas.

This Steatite available in the Subject area applied & specified is of Lava Grade Steatite which has its own specifications and is only confined to the Northern parts of India especially in Rajasthan & Lower Himalayan Parts. Few of the Geological Survey Reports are here with submitted for your kind reference.

PROGRESS REPORT FOR THE FIELD SEASON 1969-70 GEOLOGY OF KARNAPUDI - MUTSSUKOTA - TABJULA AREA, ANANTAPUR DISTRICT IN CUDDAPAH BASIN, ANDHRA PRADESH, AND INVESTIGATION FOR STEATITE - ASBESTOS - BARYTES DEPOSITS. (By *R.N. Prasad & E.B. Prasannan,* Geologists (Jr.), Geological Survey of India.(September ,1970))

*"The steatite deposits of Mutssukota - Karnapudi and Tabjula are fairly extensive and have been studied in detail by carrying out large scale mapping by Plane Table on the scale 1:1,000. Representative samples of the steatite have been collected from different localities and tests conducted for the determination of* ***'Lava grade' steatite*** *from the area"*

Chemical analyses has also been carried out during the present investigation from the selected localities of Mutchukota and found that the available Dolomite is with varying percentages of Silica and it is a pure dolomite.

***"Intense steatitisation is found in the area about 4 km, west of Mutssukota where there are numerous working steatite mines"***

Hence ***the Said Mineral Steatite & Dolomite*** available in this subject area specified is of high purity and has extensive Industrial Importance ***and is not available either in Non-Forest land or in Forest land*** in entire state of Andhra Pradesh and hence there is every justification for this proposal for the Grant of Quarry Lease in the Subject area applied & specified.

2. The proposed area of mining is located at a Distance of ***3.00,*** KMs from the Forest Boundary

The approach road is very clear which is existing for the past 100 years which leads to Tabjula and it starts from Tadipatri to Muchukota Forest on the Tadipatri-Anantapuramu B.T. Road, up to a distance of about 18 Km from Tadipatri and from their taking right diversion towards North on a Existing cart track at a distance of 3 Km leads to the applied area, where the adjoining leases are existing and are using the same road for approachability and transport of Mineral.

The Present applied area is adjoining the existing road and hence there is no need of further road construction. Hence, the question of vulnerability and fragmentation to the forest area does not arise.

3. Details of the Mineral availability, annual Production etc., in the State of Andhra Pradesh.

| Name of the Mineral | No of Existing Leases | Capacity of Each Mine. | Average annual Production | Future Requirement of this Mineral | Present Requirement (Out of Col.No.5) | Remarks If Any |
|---|---|---|---|---|---|---|
| | | | | | | |

List of the **Existing Leases which are in Cluster** is here with submitted for your kind reference.

| S. No | Name of the Lessee | Location | Classification of Land | Mineral | Period | |
|---|---|---|---|---|---|---|
| | | | | | From | TO |
| 1. | M/s Nagalingeswara Mines & Minerals | JOOLAKALVA Muchukota .R.F. 300/P,, | Forest land | Steatite | 07-09-2008 | 07-09-2008 |
| 2 | M/s Bramaramba Mineral Company | 300/1,, Joolakaluva,Singanamala(M),Muchukota R.F | Forest land | Dolomite ,Steatite ,Clay Others) | 04-11-1997 | 25-04-2027 |
| 3 | M/s Sri Sai Minerals | 594/P&596/P of Muchukota R.F,Peddapappur(M) | Forest land | Dolomite ,Steatite | 23-10-2013 | 11-09-2023 |
| 4 | M/S.Srinivasa Mineral company | 300/1,Joolakaluva,Muchukota R.F | Forest Land | Dolomite & steatite | 10.15.2003 | 10.04.2023 |
| 5. | M/S.Narsu & Company | 300/1,Muchukota R.F,Joolakaluva(V) | Forest land | Dolomite & Steatite | 16.02.16 | 15.02.2020 |

Regarding the Existing Leases and mineral availability in the State of Andhra Pradesh, the information is herewith provided along the report ***"Indian Minerals Yearbook 2015*** (Part- I) 54th Edition STATE REVIEWS (Andhra Pradesh)(Copy Enclosed)(Encl-1) Page:11-5,Table No:4 of Page:11-11.

**FUTURE OUTLOOK**:

The apparent domestic demand for Talc-steatite was estimated to be 879 thousand tonnes in 2011-12 and 1.35 million tonnes by 2016-17 at 9% growth rate. India is one of the principal sources of 'lawa' grade talc suited for specialised purposes like low ceramic materials and of sawn shaped talc. Indian talc is considered to be the second best in the world next to Italian talc. The world market conditions for Talc/Steatite minerals are steadily growing. India has large resource base and well-developed, production facilities that utilise modern pulverising techniques. Therefore, concerted efforts are necessary to increase exports by making Indian talc suitable through R &D efforts for world market.

(Source, Extracted from, ***Indian Minerals Yearbook 2013*** (Part- III : Mineral Reviews) ,52nd Edition, TALC, SOAPSTONE AND STEATITE, By Indian Bureau of Mines.(Copy Enclosed)(Encl-2)Page 47-3,

*Regarding Specifications of Talc/ Steatite, Refer Page No: 47-9, 47-10

*Regarding the Consumption, Export, Future Outlook Refer (Pg) No: 47-11, 47-12, 47-13.
* Regarding the No of Existing Mines (Steatite /Talc/ Soap Stone: Refer page 47-6

**Point No:4:** In Case of Renewal Of Mining Leases, The Complete picture of Mining activity in the particular Block or compartment in S.I.toposheet on 1:50,000 scale to be Furnished.

The Applied subject area is **for the Fresh Grant of Quarry Lease** and hence Point No: 4, is not applicable in this case.

**Point No:5**. In Case of Open cast Mining;

The applied subject area for the Grant of Quarry Lease is only through **Under ground Mining,** Hence Point No:5 is not relevant in this case.

**Point No:6.**

**(a)** Whether the Proposed area is a part of Cluster of Mines: ***YES***

**(b)** **S.I.toposheet on 1:50,000 scale is Enclosed(Encl-3)**

**Other Information**: It is submitted that, as per this office record there are ( 5) Quarry Leases are existing North –west of the present applied area at a distance within 2 KM and the present applied area is not overlapped with any existing quarry Lease area, and therefore there are no pending applications in the present applied area.

Further the applicant has submitted an affidavit stating that he is not having any Mineral Revenue dues to the Government as on the date, and he is not having any other Q.L/M.L/P.L. in the State of Andhra Pradesh

Finally, the Asst. Director of Mines & Geology, Tadipatri submitted that the application filed for the grant of Quarry Lease for Steatite & Dolomite Over an Extent of 2.000 Hectares in compartment 594/P of Muchukota Reserve forest of Julakaluva (V) of Singanamala Mandal, Gooty Forest range, Anantapuramu Forest Division filed by Rama Minerals, Prop; Smt. B.Rama Devi may be considered for the Grant for a period of 20 Years subject to the satisfaction of all terms and conditions laid Under APMMC Rules,1966 and also subject to the satisfaction Forest Conservation Act 1980 and other terms and conditions of the Government issued instructions from time to time.

**1141513/2018/FCA -PCCF**

In view of the above circumstances, I furnish herewith the statutory proformas in (7) sets alongwith technical report with a request to process and accord clearance for diversion of forest land for non-forest purpose for grant of Steatite and Dolomite over an Extent of 2.000 Hectares in compartment 594/P of Muchukota Reserve forest of Julakaluva (V) of Singanamala Mandal, Gooty Forest range, Anantapuramu Forest Division filed by Rama Minerals, Prop; Smt. B.Rama Devi in taking further necessary action in the matter.

Yours faithfully,
Sd/- B.SREEDHAR
DIRECTOR OF MINES AND GEOLOGY

Encl: (As above)

//Attested//

for Director of Mines & Geology

1141513/2018/FCA -PCCF

GOVERNMENT OF ANDHRA PRADESH
DEPARTMENT OF MINES & GEOLOGY


From:
Sri P. Venkateswara Reddy, M.Sc.,
Asst. Director of Mines & Geology,
Tadipatri.

To:
The Director of Mines
& Geology,
Ibrahimpatnam,
Vijayawada.

**Lr.No:2395/QL/2017,Dt;17.01.2018.**

Sir,

Sub: Mining & Quarries – M/s. Rama Minerals, Prop: Smt. B. Rama Devi for grant of Quarry Lease for Dolomite and Steatite for an extent of 2.00 Ha. in Mutchukota R.F., Comp No. 594 of Mutchukota R.F., Julakalva Village, Singanamala Mandal, Gooty Forest Range, Anantapur Forest Division-Anantapur District – Further Report Called for – Submitted – Reg.

Ref: 1. Application Dated: 09-11-2017 from M/s: Rama Minerals,

2. This office proposal No. 2395/QL/2017, dt: 21-11-2017,

3. Letter No. 31281/R4-1/2017 dated 15-12-2017 of the Director of Mines & Geology, Ibrahimpatnam, Vijayawada.

4. Lr.No: 45921/2001/FCA-4,dt:15.06.2015,From the Principal Chief Conservator of the Forest, Aranya Bhavan, Hyderabad.

5.This Office.Lr.No:2395/QL/2017,Dt:05-01-2018

6. Lr.No:45921/2001-FCA-4, Dated: 07-12-2017, From the Principal Chief Conservator of the Forest, Sankurathri Towers, Agathavarappadu, Guntur.

**********

In continuation of 5th ref, cited I invite your kind attention to the subject and references cited supra and submit that in the 6th reference has sought to submit the information as per the Check List Proforma "M" while forwarding the Mining Proposals as per P.C.C.F. (HoFF)A.P..,Rc.No:45921/2001-FCA.4,Dt:07.12.2017 and also enclosed Proforma" M" consisting of Six(6) Points requesting to submit the proposals again by examining the "6"points and to submit the information Point wise clearly.

In this regard, it is submitted that the guidelines issued by the PCCF vide RS.No. 45921-2001-FCA-4 dt: 15-06-2015 & 07-12-2017 in ref: 4th & 6th has been verified and submitting the following lines against each point as sought in respect of the subject application.

**Check List Proforma --M**

Point No: 1: **The Said Mineral is Not available in Non-Forest Land**

This is to bring to your kind notice that the Quality of the Mineral is the predominant factor which finds its application differently in Industrial applications as its Chemical Composition varies.

(Cont---2)

"**As already reiterated that Steatite/Dolomite available in this subject area applied in Muchukota Reserve forest has its own technical specificity and this Kind of the Mineral is No where available in the Entire State of Andhra Pradesh nor in Sothern India.** " either in Non-forest Land or in Forest areas.

This Steatite available in the Subject area applied & specified is of Lava Grade Steatite which has its own specifications and is only confined to the Northern parts of India especially in Rajasthan & Lower Himalayan Parts. Few of the Geological Survey Reports are here with submitted for your kind reference.

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By *R.N. Prasad & E.B. Prasannan,* Geologists (Jr.), Geological Survey of India.(September ,1970)

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The approach road is very clear which is existing for the past 100 years which leads to Tabjula and it starts from Tadipatri to Muchukota Forest on the Tadipatri-Anantapuramu B.T. Road, up to a distance of about 18 Km from Tadipatri and from their taking right diversion towards North on a Existing cart track at a distance of 3 Km leads to the applied area, where the adjoining leases are existing and are using the same road for approachability and transport of Mineral.

Cont---3)

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| Name of the Mineral | No of Existing Leases | Capacity of Each Mine. | Average annual Production | Future Requirement of this Mineral | Present Requirement( Out of Col.No. 5) | Remarks If Any |
|---|---|---|---|---|---|---|
| | | | | | | |

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| S.No. | Name of the Lessee | Location | Classification of Land | Mineral | Period | |
|---|---|---|---|---|---|---|
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Regarding the Existing Leases and mineral availability in the State of Andhra Pradesh, the information is herewith provided along the report "***Indian Minerals Yearbook 2015*** (Part- I) 54th Edition STATE REVIEWS (Andhra Pradesh)(Copy Enclosed)(Encl-1) Page:11-5,Table No:4 of Page:11-11.

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The apparent domestic demand for Talc-steatite was estimated to be 879 thousand tonnes in 2011-12 and 1.35 million tonnes by 2016-17 at 9% growth rate. India is one of the principal sources of 'lawa' grade talc suited for specialised purposes like low ceramic materials and of sawn shaped talc. Indian talc is considered to be the second best in the world next to Italian talc.

(Cont----4)

The world market conditions for Talc/Steatite minerals are steadily growing. India has large resource base and well-developed, production facilities that utilise modern pulverising techniques. Therefore, concerted efforts are necessary to increase exports by making Indian talc suitable through R &D efforts for world market.

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*Regarding the Consumption, Export, Future Outlook Refer (Pg) No: 47-11, 47-12, 47-13.
* Regarding the No of Existing Mines (Steatite /Talc/ Soap Stone: Refer page 47-6

**Point No:4:** In Case of Renewal Of Mining Leases, The Complete picture of Mining activity in the particular Block or compartment in S.I.toposheet on 1:50,000 scale to be Furnished.

The Applied subject area is **for the Fresh Grant of Quarry Lease** and hence Point No: 4, is not applicable in this case.

**Point No:5**. In Case of Open cast Mining;

The applied subject area for the Grant of Quarry Lease is only through **Under ground Mining,** Hence Point No:5 is not relevant in this case.

**Point No:6.**

**(a)** Whether the Proposed area is a part of Cluster of Mines: ***YES***

**(b) S.I.toposheet on 1:50,000 scale is Enclosed(Encl-3)**

**Other Information**: It is submitted that as per this office record there are ( 5) Quarry Leases are existing North –west of the present applied area at a distance within 2 KM and the present applied area is not overlapped with any existing quarry Leased area, and therefore there are no any pending applications in the present applied area.

Further the applicant has submitted an affidavit stating that he is not having any Mineral Revenue dues to the Government as on the date, and he is not having any other Q.L/M.L/P.L. in the State of Andhra Pradesh

(Cont---5)

**Recommendations:**

In View of the Above, the application filed for the grant of Quarry Lease for Steatite & Dolomite Over an Extent of 2.000 Hectares in compartment 594/P of Muchukota Reserve forest of Julakaluva (V) of Singanamala Mandal, Gooty Forest range ,Anantapuramu Forest Division filed by Rama Minerals, Prop; Smt. B.Rama Devi may be considered for the Grant for a period of 20 Years subject to the satisfaction of all terms and conditions laid Under APMMC Rules,1966 and also subject to the satisfaction Forest Conservation act 1980 and other terms and conditions of the Government issued instructions from time to time.

Encl:

1: Indian Minerals Yearbook 2015 (Part- I) 54th Edition STATE REVIEWS (Andhra Pradesh)

2: Indian Minerals Yearbook 2013 (Part- III : Mineral Reviews) ,52nd Edition, TALC, SOAPSTONE AND STEATITE, By Indian Bureau of Mines

3. **S.I.toposheet on 1:50,000 scale**

Sri P. Venkateswara Reddy.
Assistant Director
O/o.Asst. Director of Mines & Geology,
Tadipatri.

## INSPECTION REPORT

The Application filed by Rama Minerals, Prop: Smt .B.Rama Devi for the Grant of Quarry Lease Steatite & Dolomite Over an Extent of 2.000 Hectares In Muchukota R.F, North Block, Anantapur Forest division of Gooty Range, compartment of 594/P, of Julakaluva Village, Singanamala (M), Aantapuramu District was inspected By me on 15.11.2017 along with the supervisor of this office and in the Presence of the applicant to verify the applied area for submissions of proposals on the above keeping in View of the Guidelines communicated by the Principle Chief Conservator of Forest, Govt of A.P,Vide R.C.No:45921/2001/FCA-4,dt:15.06.2015.

Further as per the Guidelines of the Principle Chief Conservator of Forest, Govt of A.P,Vide R.C.No:45921/2001/FCA-4,dt:07.12.2017, requested to furnish the Proposals duly examining Checklist Proforma 'M' and to submit the Point wise Information clearly.

In this regard, it is submitted that the guidelines issued by the PCCF vide R.C.No:45921/2001/FCA-4,dt:07.12.2017 has been verified and submitting the following lines along against each point as sought in respect of the subject application

Location and Approach:

The applied area falls in the Compartment No: 594/P of Muchukota Reserve Forest of Julakaluva Village, Singanamala Mandal, of Anantapur Division forest of Gooty Range situated at the Juncture of N:14.84090 Latitude and E:77.82928 Longitude in the survey of India Top sheet No:57 F/13,in 1:50,000 scale and the applied Quarry Lease area is situated at an aerial distance of 3.5 KM towards NW of Muchukota Village, and it can be approached by travelling from Tadipatri to Muchukota Forest on the Tadipatri-Aantapuramu, B.T road up to a distance of about of 18 KM and from there by taking right diversion towards North direction On a cart track at a distance of 3.6 KM can be reachable to the applied area. The nearest Railway station is Tadipatri and is well connected to all major ports by Rail and Road.

**Geology and Field Observation:** Topographically the applied area part starts adjoining to the Cart track Leading to Tabjula , which is West to East Direction. The applied Area falls in between two Hillocks extending from the North side of one Hillock to the North East side flank of second hillock. Geologically the applied area belongs to the western part of Cuddapah basin with Dendrytic pattern and the applied area belongs to Vempalli formations of Papagni group of Cuddapah Super Group and the formations successions are as follows.

--------- Unconformity----------
Vempalli formation- Dolomites, Limestone's,
Shale's &Igneous Intrusives & Quartzite's
--------- Unconformity----------

**Local Geology of the Area:** The Local Geology is revealed from the (5) existing Quarry Leases in Cluster Located at the Muchukota Forest area at a Distance of within 2 KM in the North western direction of the applied area and the rock types come across in the subject area, the soil cover with sill (Dolerite Dyke) and as per the Observations in the existing leases near to the applied area, the formation is in alternative bedded formation. The beds are striking almost North-South direction due east with 8° to10° at surface soil, sill and weathered, shale & Dolomite are overlapping. The mineral beds with full exposure of Dolomite and Steatite are seen in the area. The Sequence of Mineral Placement is given with reference to the existing pit at western side of the area which followed vertically downwards with following sequences of bedding formation.

| Bedded formation | Thickness range |
|---|---|
| Soil, Weathered shale & Dolomite cover(Top Layer) | 1 to 15( at some places and it leads to less than 10 MT mixed with sill) |
| Shale | 15 to 16 MTS |
| Dolomite | 16 to 18.5 MTS |
| Steatite | 18.5 to 20MTS( Intermittent multiple thin beds of 0.5 to 0.7 MTS thickness) |
| Shale | 20. to 20.5 MTS |
| Dolomite | 20.5 to 24.5 Mts |
| Shale | 24.5 to 25.5 Mts |
| Dolomite | 25.5 to 35.5 Mts |
| Steatite | 35.5 to 36.5 Mts (( Intermittent multiple thin beds of 0.6 to 0.8 MTS thickness) |

The steatite Deposits of Muchukota are fairly extensive and have been studied in detail and tests are conducted for the determination of "Lava Grade"

(Extracted from GSI reports, "Geology of Karnapudi-Muchukota-Tabjula Area, Anantapur District In Cuddapah Basin, Andhra Pradesh .and Investigation for Steatite, By. R.N.Prasad & E.B.Prasannan,1970"). The Steatite Available in this area is of High quality and has its applications in Paper, Paints, Textile, Rubber, Pigments, Detergents, Ceramics, Cosmetic industry.

The Point was observation and guidelines communicated by the Principle Chief Conservator of the Forest of Andhra Pradesh Vide R.C.No:45921/2001/FCA-4,dt:07.12.2017 are as follows.

**Check List Proforma –M**

Point No: 1: **The Said Mineral is Not available In Non-Forest Land**
This is to bring to your kind notice that the Quality of the Mineral is the predominant factor which finds its application differently in Industrial applications as its Chemical Composition varies.

"**As already reiterated that Steatite/Dolomite available in this subject area applied in Muchukota Reserve forest has its own technical specificity and this Kind of the Mineral is No where available in the Entire**

**State of Andhra Pradesh nor in Sothern India. "** either in Non-forest Land or in Forest areas.

This Steatite available in the Subject area applied & specified is of Lava Grade Steatite which has its own specifications and is only confined to the Northern parts of India especially in Rajasthan & Lower Himalayan Parts. Few of the Geological Survey Reports are here with submitted for your kind reference.

PROGRESS REPORT FOR THE FIELD SEASON 1969-70 GEOLOGY OF KARNAPUDI - MUTSSUKOTA - TABJULA AREA, ANANTAPUR DISTRICT IN CUDDAPAH BASIN, ANDHRA PRADESH, AND INVESTIGATION FOR STEATITE - ASBESTOS - BARYTES DEPOSITS.

By *R.N. Prasad & E.B. Prasannan,* Geologists (Jr.), Geological Survey of India.(September ,1970)

*"The steatite deposits of Mutssukota - Karnapudi and Tabjula are fairly extensive and have been studied in detail by carrying out large scale mapping by Plane Table on the scale 1:1,000. Representative samples of the steatite have been collected from different localities and tests conducted for the determination of* ***'Lava grade' steatite*** *from the area"*

Chemical analyses has also been carried out during the present investigation from the selected localities of Muchukota and found that the available Dolomite is with varying percentages of Silica and it is a pure dolomite.

***"Intense steatitisation is found in the area about 4 km, west of Mutssukota where there are numerous working steatite mines"***

Hence ***the Said Mineral Steatite & Dolomite*** available in this subject area specified is of high purity and has extensive Industrial Importance ***and is not available either in Non-Forest land or in Forest land*** in entire state of Andhra Pradesh and hence there is every justification for this proposal for the Grant of Quarry Lease in the Subject area applied & specified.

**2**. The proposed area of mining is located at a Distance of ***3.00,*** KMs from the Forest Boundary

The approach road is very clear which is existing for the past 100 years which leads to Tabjula and it starts from Tadipatri to Muchukota Forest on the Tadipatri-Anantapuramu B.T. Road, up to a distance of about 18 Km from Tadipatri and from their taking right diversion towards North on a Existing cart track at a distance of 3 Km leads to the applied area, where the adjoining leases are existing and are using the same road for approachability and transport of Mineral.

The Present applied area is adjoining the existing road and hence there is no need of further road construction. Hence, the question of vulnerability and fragmentation to the forest area does not arise.

**3. *Details of the Mineral availability, annual Production etc., in the State of Andhra Pradesh***

| Name of the Mineral | No of Existing Leases | Capacity of Each Mine. | Average annual Production | Future Requirement of this Mineral | Present Requirement( Out of Col.No. 5) | Remarks If Any |
|---|---|---|---|---|---|---|
| | | | | | | |

List of the **Existing Leases which are in Cluster** is here with submitted for your kind reference.

| S.No. | Name of the Lessee | Location | Classification of Land | Mineral | Period | |
|---|---|---|---|---|---|---|
| | | | | | From | TO |
| 1. | M/s Nagalingeswara Mines & Minerals | JOOLAKALVA Muchukota .R.F. 300/P,, | Forest land | Steatite | 07-09-2008 | 07-09-2008 |
| 2 | M/s Bramaramba Mineral Company | 300/1,, Joolakaluva,Singanamala(M),Muchukota R.F | Forest land | Dolomite ,Steatie ,Clay (Others) | 04-11-1997 | 25-04-2027 |
| 3 | M/s Sri Sai Minerals | 594/P&596/P of Muchukota R.F,Peddapappur(M) | Forest land | Dolomite ,Steatie | 23-10-2013 | 11-09-2023 |
| 4 | M/S.Srinivasa Mineral company | 300/1,Joolakaluva,Muchukota R.F | Forest Land | Dolomite & steatite | 10.15.2003 | 10.04.2023 |
| 5. | M/S.Narsu & Company | 300/1,Muchukota R.F,Joolakaluva(V) | Forest land | Dolomite & Steatite | 16.02.16 | 15.02.2020 |

Regarding the Existing Leases and mineral availability in the State of Andhra Pradesh, the information is herewith provided along the report "***Indian Minerals Yearbook 2015*** (Part- I) 54th Edition STATE REVIEWS (Andhra Pradesh)(Copy Enclosed)(Encl-1) Page:11-5,Table No:4 of Page:11-11.

**FUTURE OUTLOOK**:

The apparent domestic demand for Talc-steatite was estimated to be 879 thousand tonnes in 2011-12 and 1.35 million tonnes by 2016-17 at 9% growth rate. India is one of the principal sources of 'lawa' grade talc suited for specialised purposes like low ceramic materials and of sawn shaped talc. Indian talc is considered to be the second best in the world next to Italian talc.

The world market conditions for Talc/Steatite minerals are steadily growing. India has large resource base and well-developed, production facilities that utilise modern pulverising techniques. Therefore, concerted

efforts are necessary to increase exports by making Indian talc suitable through R &D efforts for world market.

(Source, Extracted from, ***Indian Minerals Yearbook 2013*** (Part- III : Mineral Reviews) ,52nd Edition, TALC, SOAPSTONE AND STEATITE, By Indian Bureau of Mines.(Copy Enclosed)(Encl-2)Page 47-3,

*Regarding Specifications of Talc/ Steatite, Refer Page No: 47-9, 47-10.
*Regarding the Consumption, Export, Future Outlook Refer (Pg) No: 47-11, 47-12, 47-13.
* Regarding the No of Existing Mines (Steatite /Talc/ Soap Stone: Refer page 47-6.

**Point No:4:** In Case of Renewal Of Mining Leases, The Complete picture of Mining activity in the particular Block or compartment in S.I.toposheet on 1:50,000 scale to be Furnished.

The Applied subject area is **for the Fresh Grant of Quarry Lease** and hence Point No: 4, is not applicable in this case.

**Point No:5**. In Case of Open cast Mining;
The applied subject area for the Grant of Quarry Lease is only through **Under ground Mining,** Hence Point No:5 is not relevant in this case.
**Point No:6.**

**(a)** Whether the Proposed area is a part of Cluster of Mines: ***YES***

**(b) S.I.toposheet on 1:50,000 scale is Enclosed(Encl-3)**

However, the quarry lease for steatite and dolomite in the subject area is also in accordance with the provisions of FC Act 1980 as the subject area falls in Reserve Forest area.

Further there are nearly 30 Pulverizing units established around the radius of 30 Kms around the Muchukota Reserve forest, Anantapuramu district engaged in Micronized grinding of Dolomite & Steatite which finds its application in Paints ,Paper, Cosmetic, Detergents, Rubber, Textile, Pigments, Steel, Sponge Iron Units and these Minerals are also being exported by the Trading Merchants From Tamilnadu to various countries. Hence Granting of Fresh lease will promote Employment opportunities and Exports will also contribute in Earning Foreign exchange to the Country. Hence Grant of Fresh lease especially in this area which consists of Superior Grade Dolomite & Steatite will generate good revenue to the State exchequer and also promote Employment to the Local Peoples of Anantapuramu District which is a Backward & Drought area with meagre Rainfall and with Continuous famine.

In the Revenue lands USHB/Pattaland of Muchukota & Julakaluva Village no sufficient land (Useful for Quarrying Dolomite & Steatite) is Available. Hence the Dolomite & Steatite Mineral available is of superior grade which is only available

in Muchukota Reserve forest, Located in Julakaluva (V) Singanamala (M) of Anantapuramu District.

In View of the Above, the application filed for the grant of Quarry Lease for Steatite & Dolomite Over an Extent of 2.000 Hectares in compartment 594/P of Muchukota Reserve forest of Julakaluva (V) of Singanamala Mandal, Gooty Forest range ,Anantapuramu Forest Division filed by Rama Minerals, Prop; Smt. B.Rama Devi may be considered for the Grant for a period of 20 Years subject to the satisfaction of all terms and conditions laid Under APMMC Rules,1966 and also subject to the satisfaction of Forest conservation Act.

Sri P. Venkateswara Reddy.
Assistant Director
O/o.Asst. Director of Mines & Geology,
Tadipatri.

**SUB MISSION OF QUARRY LEASE PROPOSALS TO THE DIRECTOR OF MINES AND GEOLOGY, IBRAHIMPATNAM,VIJAWADA ON THE APPLICATION FILED BY, M/S.RAMA MINERALS, PROP : B.RAMADEVI FOR THE GRANT OF QUARRY LEASE FOR DOLOMITE AND STEATITE OVER AN EXTENT OF 2.000 HECTARES IN MUCHUKOTA R.F, COMPARTMENT NO:594/P OF JULAKALUVA VILLAGE, SINGANAMALA MANDAL, ANANTAPURAMU DISTRICT.**

INTRODUCTION :

It is submitted that M/S. Rama Minerals, Prop: B.Rama Devi has filed an application for the Grant of Quarry lease for Steatite and dolomite over an extent of 2.000 Hectares in Muchukota R.F, Compartment No: 594/P of Julakaluva Village, Singanamala Mandal,Gooty Range,Anantapuramu Forest Division, Anantapuramu District for a period of 20 yeras.The Lessee has applied Quarry lease application through Mee-seva Online on 09-11-2017 with following Enclosures.

1. Application Form-"P" in 9 sets.
2. Challan no: 13774, dated: 08-11-2017, Rs.12, 500-00/-paid in STO, SBI, Tadipatri, towards application fee & survey Charges.
3. ChallanNo: 13779, DT: 08-11-2017, Rs.50, 000-00/-Paid in SBI, Tadipatri, towards deposit Amount.
4. Affidavit in lieu of M.R.C.C & I.T.C.C.
5. Location Sketch of the applied area.
6. Xerox copies of Adhar & Pan card .
7. Checklist Proforma 'M'

In this connection the Assistant Director Of mines and geology of this office has inspected the applied area in presence of the applicant on 15.11.2017and submitted their report.

**Location and Approach**:

The applied area falls in the Compartment No: 594/P of Muchukota Reserve Forest of Julakaluva Village, Singanamala Mandal, of Anantapur Division forest of Gooty Range situated at the Juncture of N:14.84090 Latitude and E:77.82928 Longitude in the survey of India Top sheet No:57 F/13,in 1:50,000 scale and the applied Quarry Lease area is situated at an aerial distance of 3.5 KM towards NW of Muchukota Village, and it can be approached by travelling from Tadipatri to Muchukota Forest on the Tadipatri-Aantapuramu, B.T road up to a distance of about of 18 KM and from there by taking right diversion towards North direction On a cart track at a distance of 3.6 KM can be reachable the applied area. The nearest Railway station is Tadipatri and is well connected to all major ports by Rail and Road.

**Geology and Field Observation**:

Topographically the applied area part starts adjoining to the Cart track leading to Tabjula, which is west to East Direction. The applied Area falls in between two Hillocks extending from the North side of one Hillock to the North East side flank of second hillock. Geologically the applied area belongs to the western part of Cuddapah basin with Dendrytic pattern and the applied area belongs to Vempalli formations of Papagni group of Cuddapah Super Group.

The Papagni series formations successions are as follows.

--------- Unconformity----------
Vempalli formation- Dolomites, Limestone's,
Shale's &Igneous Intrusives & Quartzite's
--------- Unconformity----------

**Local Geology of the Area**:

The Local Geology is revealed from the (4) existing Quarry Leases Located at the Muchukota Forest area at a Distance of within 2 KM in the North western direction of the applied area and the rock types come across in the subject area, the soil cover with sill (Dolerite Dyke) and as per the Observations in the existing leases near to the applied area, the formation is in alternative bedded formation. The beds are striking almost North-South direction due east with 8° to10° at surface soil, sill and weathered, shale & Dolomite are overlapping. The mineral beds with full exposure of Dolomite and Steatite are seen in the area. The Sequence of Mineral Placement is given with reference to the existing pit at western side of the area which followed vertically downwards with following sequences of bedding formation.

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The steatite Deposits of Muchukota are fairly extensive and have been studied in detail and tests are conducted for the determination of "Lava Grade"

(Extracted from GSI reports, "Geology of Karnapudi-Muchukota-Tabjula Area, Anantapur District In Cuddapah Basin, Andhra Pradesh .and Investigation for

Steatite, By. R.N.Prasad & E.B.Prasannan,1970"). The Steatite Available in this area is of High quality and has its applications in Paper, Paints, Textile, Rubber, Pigments, Detergents, Ceramics, Cosmetic industry.

The Point was observation and guidelines of PCCF vide R.C.No:45921/2001/FCA-4,dt:07.12.2017 communicated by the Principle Chief Conservator of the Forest of Andhra Pradesh are as follows.

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**Point No 1**: **The Said Mineral is Not available In Non-Forest Land**

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Chemical analyses has also been carried out during the present investigation from the selected localities of Mutchukota and found that the available Dolomite is with varying percentages of Silica and it is a pure dolomite.

***"Intense steatitisation is found in the area about 4 km, west of Mutssukota where there are numerous working steatite mines"***

Hence ***the Said Mineral Steatite & Dolomite*** available in this subject area specified is of high purity and has extensive Industrial Importance ***and is not available either in Non-Forest land or in Forest land*** in entire state

of Andhra Pradesh and hence there is every justification for this proposal for the Grant of Quarry Lease in the Subject area applied & specified.

**2**. The proposed area of mining is located at a Distance of ***3.00,*** KMs from the Forest Boundary

The approach road is very clear which is existing for the past 100 years which leads to Tabjula and it starts from Tadipatri to Muchukota Forest on the Tadipatri-Anantapuramu B.T. Road, up to a distance of about 18 Km from Tadipatri and from their taking right diversion towards North on a Existing cart track at a distance of 3 Km leads to the applied area, where the adjoining leases are existing and are using the same road for approachability and transport of Mineral.

The Present applied area is adjoining the existing road and hence there is no need of further road construction. Hence, the question of vulnerability and fragmentation to the forest area does not arise.

**3.** Details of the Mineral availability, annual Production etc., in the State of Andhra Pradesh

| Name of the Mineral | No of Existing Leases | Capacity of Each Mine. | Average annual Production | Future Requirement of this Mineral | Present Requirement( Out of Col.No. 5) | Remarks If Any |
|---|---|---|---|---|---|---|
| | | | | | | |

List of the **Existing Leases which are in Cluster** is here with submitted for your kind reference.

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|---|---|---|---|---|---|---|
| | | | | | From | TO |
| 1. | M/s Nagalingeswara Mines & Minerals | JOOLAKALVA Muchukota .R.F. 300/P,, | Forest land | Steatite | 07-09-2008 | 07-09-2008 |
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**FUTURE OUTLOOK**:

The apparent domestic demand for Talc-steatite was estimated to be 879 thousand tonnes in 2011-12 and 1.35 million tonnes by 2016-17 at 9% growth rate. India is one of the principal sources of 'lawa' grade talc suited for specialised purposes like low ceramic materials and of sawn shaped talc. Indian talc is considered to be the second best in the world next to Italian talc.

The world market conditions for Talc/Steatite minerals are steadily growing. India has large resource base and well-developed, production facilities that utilise modern pulverising techniques. Therefore, concerted efforts are necessary to increase exports by making Indian talc suitable through R &D efforts for world market.

(Source, Extracted from, ***Indian Minerals Yearbook 2013*** (Part- III : Mineral Reviews) ,52nd Edition, TALC, SOAPSTONE AND STEATITE, By Indian Bureau of Mines.(Copy Enclosed)(Encl-2)Page 47-3,

*Regarding Specifications of Talc/ Steatite, Refer Page No: 47-9, 47-10

*Regarding the Consumption, Export, Future Outlook Refer (Pg) No: 47-11, 47-12, 47-13.

* Regarding the No of Existing Mines (Steatite /Talc/ Soap Stone: Refer page 47-6

**Point No:4:**

In Case of Renewal Of Mining Leases, The Complete picture of Mining activity in the particular Block or compartment in S.I. Top sheet on 1:50,000 scale to be Furnished.

The Applied subject area is **for the Fresh Grant of Quarry Lease** and hence Point No: 4, is not applicable in this case.

**Point No:5**. In Case of Open cast Mining;

The applied subject area for the Grant of Quarry Lease is only through **Under ground Mining,** Hence Point No:5 is not relevant in this case.

**Point No:6.**

**(a)** Whether the Proposed area is a part of Cluster of Mines: ***YES***

**(b) S.I.toposheet on 1:50,000 scale is Enclosed(Encl-3)**

**Other Information**: It is submitted that as per this office record there are ( 5) Quarry Leases are existing North –west of the present applied area at a distance within 2 KM and the present applied area is not overlapped with any existing

quarry Leased area, and therefore there are no any pending applications in the present applied area.

Further the applicant has submitted an affidavit stating that he is not having any Mineral Revenue dues to the Government as on the date, and he is not having any other Q.L/M.L/P.L. in the State of Andhra Pradesh .

As per the Amended Sec.11(5) of Amended MM(D&R) Act-2015" for the Purpose of Granting Prospective License-Cum Mining Leases, the state Government Shall select, through auction by the Method of Competitive Bidding, Including E-Auction, an applicant who fulfills the Eligibility conditions as specified in this Act". Further the Mineral Steatite & Dolomite come under schedule -1, Minor Minerals as per rule 12(1) of APMMC, Rules 1966, The Deputy Director of Mines & Geology; Anantapuramu is the competent authority for the grant of Quarry lease for schedule-1 Minerals. Therefore leases may be granted to the Individuals as per APMMC Rules, 1966 and not comes under auction procedure.

It is submitted that, subsequent to the amendment of MMDR Act vide Act No. 3 of 2015 of MMDR Amendment Act of 2015, the Government of India Vide GSR No. 423(E) dated 10-02-2015 issued notification and declared 31 major minerals including Steatite and Dolomite as minor minerals. As such the grant of lease for Steatite and Dolomite is in accordance with APMMC Rules - 1966, GCDR Rules – 1999. However, the quarry lease for steatite and dolomite in the subject area is also in accordance with the provisions of FC Act 1980 as the subject area falls in Reserve Forest area.

Further there are nearly 30 Pulverizing units established around the radius of 30 Kms around the Muchukota Reserve forest, Anantapuramu district engaged in Micronized grinding of Dolomite & Steatite which finds its application in Paints ,Paper, Cosmetic, Detergents, Rubber, Textile, Pigments, Steel, Sponge Iron Units and these Minerals are also being exported by the Trading Merchants From Tamilnadu to various countries. Hence Granting of Fresh lease will promote Employment opportunities and Exports will also contribute in Earning Foreign exchange to the Country. Hence Grant of Fresh lease especially in this area which consists of Superior Grade Dolomite & Steatite will generate good revenue to the State exchequer and also promote Employment to the Local Peoples of Anantapuramu District which is a Backward & Drought area with meagre Rainfall and with Continuous famine.

In the Revenue lands USHB/Pattaland of Muchukota & Julakaluva Village no sufficient land (Useful for Quarrying Dolomite & Steatite) is Available. Hence the Dolomite & Steatite Mineral available is of superior grade which is only available in Muchukota Reserve forest, Located in Julakaluva (V) Singanamala (M) of Anantapuramu District.

In View of the Above, the application filed for the grant of Quarry Lease for Steatite & Dolomite Over an Extent of 2.000 Hectares in compartment 594/P

of Muchukota Reserve forest of Julakaluva (V) of Singanamala Mandal, Gooty Forest range ,Anantapuramu Forest Division filed by Rama Minerals, Prop; Smt. B.Rama Devi may be considered for the Grant for a period of 20 Years subject to the satisfaction of all terms and conditions laid Under APMMC Rules,1966 and also subject to the satisfaction of Forest conservation Act.

**Purpose of available Minerals:**

The Steatite and Dolomite occurring within applied area is useful in mainly Steel, Paper, and Textile industry. The Dolomite may be supplied to, M/S.Jindal steel Industries at Bellary, Satavahana Ispath Limited near Bommanahal, Gerdau steel plant at Tadipatri and Number of Sponge Iron Plants In and around Bellary Town of Karnataka State. The Steatite finds its application in mainly Industries like Paints, Pigments, Ceramics, Cosmetics, Detergents, Paper Industries, etc.

**Other Information**: It is submitted that as per this office record there are ( 5) Quarry Leases are existing North –west of the present applied area at a distance within 2 KM and the present applied area is not overlapped with any existing quarry Leased area, and therefore there are no any pending applications in the present applied area.

Further the applicant has submitted an affidavit stating that he is not having any Mineral Revenue dues to the Government as on the date, and he is not having any other Q.L/M.L/P.L. in the State of Andhra Pradesh.

**Recommendations:**

In View of the above circumstances, The applicant has filed application on 09-11-2017 for Grant of quarry Lease in the Name of M/S.Rama Minerals, Prop: B.Rama Devi for the Grant of Quarry lease for Dolomite and Steatite Over an Extent of 2.000 Hectares In Muchukota R.F, compartment of 594/P of Julakaluva Village, Singanamala (M), Aantapuramu District for the period of 20 Years may be submitted to the Director of Mines and Geology, as per the GO .MS.No:107,Industries & Commerce(Mines-ii)Department Dated:30.07.2016 with the Technical Observations of the applied area and subject to the satisfaction of APPMMC Rules 1966,Forest Conservation act 1980 and other terms and conditions of the Government issued instructions from time to time.

The Entire Records of the enquiry containing 1 to ____N.F. +01 to ____ C. F. is here with submitted to DM&G, Vijayawada for taking necessary action in the matter.

ENCL: 9 Sets of statutory Forms.

ADM &G
Tadipatri.

D M &G
Vijayawada.

# Indian Minerals Yearbook 2015

## (Part- I)

## 54th Edition

## STATE REVIEWS
## (Andhra Pradesh)

**(FINAL RELEASE)**

**GOVERNMENT OF INDIA**
**MINISTRY OF MINES**
**INDIAN BUREAU OF MINES**

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**July, 2017**

# ANDHRA PRADESH

## Mineral Resources

Andhra Pradesh is the sole producer of apatite and mica (crude). The State is the leading producer of barytes, ball clay, dolomite, garnet (abrasive), laterite, limestone, quartz, quartzite, silica sand and vermiculite. The State is the sole holder of the country's slate and shale resources. It accounts for 90% barytes, 61% ball clay, 42% calcite, 41% mica, 31% kyanite, 30% garnet, 19% titanium minerals, 16% bauxite, 14% vermiculite, 13% dolomite & iron ore (magnetite) each and 11% limestone resources of the country. Andhra Pradesh is endowed with the internationally known black, pink, blue and multicoloured varieties of granites. Krishna-Godavari basin areas in this State have emerged as new promising areas for hydrocarbons, especially natural gas.

Important minerals occurring in Andhra Pradesh are: **apatite** in Visakhapatnam district; **asbestos** in Cuddapah district; **ball clay** in West Godavari district; **barytes** in Anantapur, Cuddapah, Krishna, Kurnool, Nellore and Prakasam districts; **calcite** in Anantapur, Cuddapah, Kurnool and Visakhapatnam districts; **china clay** in Anantapur, Chittoor, Cuddapah, East Godavari, West Godavari, Guntur, Kurnool, Nellore and Visakhapatnam districts; **coal** in Godavari Valley Coalfiled; **corundum** in Anantapur district; **dolomite** in Anantapur and Kurnool districts; **felspar** in Anantapur, Cuddapah, West Godavari, Nellore and Vizianagaram districts; **fireclay** in Chittoor, Cuddapah, East Godavari, West Godavari, Kurnool and Srikakulam districts; **garnet** in East Godavari and Nellore districts; **granite** in Anantapur, Chittoor, Cuddapah, Guntur, Krishna, Nellore, Prakasam, Srikakulam and Vizianagaram districts; **iron ore (haematite)** in Anantapur, Cuddapah, Guntur, Krishna, Kurnool and Nellore districts; **iron ore (magnetite)** in Prakasam district; **lead-zinc** in Cuddapah, Guntur and Prakasam districts; **limestone** in Anantapur, Cuddapah, East Godavari, West Godavari, Guntur, Krishna, Kurnool, Nellore, Srikakulam, Visakhapatnam and Vizianagaram districts; **manganese ore** in Srikakulam and Vizianagaram districts; **mica** in Nellore district; **ochre** in Cuddapah, West Godavari, Guntur, Kurnool and Visakhapatnam districts; **pyrophyllite** in Anantapur district; **quartz/silica sand** in Anantapur, Chittoor, Cuddapah, West Godavari, Guntur, Krishna, Kurnool, Nellore, Prakasam, Srikakulam, Visakhapatnam and Vizianagaram districts; **quartzite** in Kurnool, Srikakulam, Visakhapatnam and Vizianagaram districts; **talc/ soapstone/steatite** in Anantapur, Chittoor, Cuddapah and Kurnool districts and **vermiculite** in Nellore and Visakhapatnam districts. **Petroleum & natural gas** deposits of importance are located in the onshore and offshore areas of Krishna-Godavari basin of the State.

Other minerals that occur in the State are **bauxite** in East Godavari and Visakhapatnam districts; **chromite** in Krishna district; **copper** in Guntur, Kurnool and Prakasam districts; **diamond** in Anantapur, Krishna and Kurnool districts; **gold** in Anantapur, Chittoor and Kurnool districts; **graphite** in East Godavari, West Godavari, Srikakulam, Visakhapatnam and Vizianagaram districts; **gypsum** in Guntur, Nellore and Prakasam districts; **kyanite** in Nellore and Prakasam districts; **magnesite** in Cuddapah district; **pyrite** in Kurnool district; **sillimanite** in West Godavari district; **silver** in Guntur district; **titanium minerals** in East Godavari, Krishna, Nellore, Srikakulam and Visakhapatnam districts; and **tungsten** in East Godavari district (Tables-1 & 2).

## Exploration & Development

The details of exploration activities conducted by various agencies for coal and other minerals during 2014-15 are furnished in Table - 3.

During 2014-15, National Oil Companies (NOC) continued their operations for exploration of oil and gas in the State.

**Table –1: Reserves/Resources of Minerals as on 01.04.2010/01.04.2013* : Andhra Pradesh**

| Mineral | Unit | Reserves | | | | Remaining Resources | | | | | | | | Total Resources (A+B) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Proved STD111 | Probable | | Total (A) | Feasibility STD211 | Pre-feasibility | | Measured STD331 | Indicated STD332 | Inferred STD333 | Reconnaissance STD334 | Total (B) | |
| | | | STD121 | STD122 | | | STD221 | STD222 | | | | | | |
| Apatite* | tonnes | 29112 | - | 1680 | 30792 | - | - | - | - | - | 200163 | - | 200163 | 230955 |
| Asbestos | tonnes | 5754 | - | 9028 | 14782 | 856 | 3117 | 9191 | - | 1500 | 27085 | - | 41749 | 56531 |
| Ball clay# | tonnes | 6017412 | - | 1288720 | 7306132 | 1821233 | 2806267 | 9512513 | - | 2279330 | 27555824 | - | 43975167 | 51281299 |
| Barytes# | tonnes | 28010116 | 79736 | 1400265 | 29490117 | 173429 | 4206661 | 2411683 | 105872 | 374454 | 28921318 | 105721 | 36299138 | 65789255 |
| Bauxite* | '000 tonnes | - | - | - | - | - | - | - | 188971 | 138120 | 288176 | - | 615267 | 615267 |
| Calcite# | tonnes | 3267 | 500 | - | 3767 | - | - | 104970 | 8562700 | 5200 | 122148 | - | 8795018 | 8798785 |
| China clay# | '000 tonnes | 2285 | 339 | 2205 | 4828 | 286 | 790 | 996 | 126 | 669 | 51378 | 3088 | 57333 | 62161 |
| Chromite* | '000 tonnes | - | - | - | - | - | - | - | - | - | 0.4 | - | 0.4 | 0.4 |
| Copper* | | | | | | | | | | | | | | |
| Ore | '000 tonnes | - | - | - | - | 686 | - | 105 | - | 5791 | 1000 | - | 7582 | 7582 |
| Metal | '000 tonnes | - | - | - | - | 6.88 | - | 1.05 | - | 97.45 | 8.32 | - | 113.70 | 113.70 |
| Corundum*# | tonnes | - | - | - | - | - | 7 | - | - | - | - | - | 7 | 7 |
| Diamond* | carat | - | - | - | - | - | - | - | 200483 | 1524317 | 98155 | - | 1822955 | 1822955 |
| Dolomite*# | '000 tonnes | 65062 | 2845 | 19360 | 87267 | 39106 | 7652 | 27935 | 554 | 77 | 881409 | 2238 | 958972 | 1046238 |
| Felspar# | tonnes | 4350209 | 293117 | 1878807 | 6522132 | 527528 | 17739 | 701284 | 60776 | 1644301 | 1364199 | - | 4315827 | 10837959 |
| Fireclay# | '000 tonnes | 434 | - | 381 | 815 | 7 | 656 | 1259 | 56 | - | 9878 | 132 | 11988 | 12803 |
| Garnet | tonnes | 2911387 | 4500 | 710000 | 3625887 | - | - | - | - | 8800000 | 4731800 | - | 13531800 | 17157687 |

(Contd.)

Table - 1 (contd.)

| Mineral | Unit | Reserves | | | | Remaining Resources | | | | | | | | Total Resources (A+B) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Proved STD 111 | Probable STD121 | Probable STD122 | Total (A) | Feasibility STD211 | Pre-feasibility STD221 | Pre-feasibility STD222 | Measured STD331 | Indicated STD332 | Inferred STD333 | Reconnaissance STD334 | Total (B) | |
| Gold* | | | | | | | | | | | | | | |
| Ore (primary) | tonnes | - | - | - | - | 655133 | - | 889515 | 8059000 | 55000 | 2616699 | - | 12275347 | 12275347 |
| Metal(primary) | tonnes | - | - | - | - | 2.45 | - | 3.57 | 16.93 | 0.17 | 12.60 | - | 35.72 | 35.72 |
| Granite (Dim. stone) | '000 cu m | - | - | - | - | - | - | - | - | - | 2360396 | - | 2360396 | 2360396 |
| Graphite* | tonnes | - | - | - | - | - | - | 1135 | - | 1122 | 205487 | - | 207744 | 207744 |
| Gypsum* | '000 tonnes | - | - | - | - | - | - | - | - | - | 404 | - | 404 | 404 |
| Iron ore* (hematite) | '000 tonnes | 14886 | 680 | 8206 | 23772 | 46153 | 49641 | 66485 | 377 | 4666 | 148384 | 506 | 316212 | 339984 |
| Iron ore* (magnetite) | '000 tonnes | - | - | - | - | 43034 | - | - | 13800 | 1266666 | 68527 | - | 1392027 | 1392027 |
| Kyanite | tonnes | - | - | - | - | - | - | 399 | - | - | 32003829 | - | 32004228 | 32004228 |
| Laterite*# | '000 tonnes | 7628 | 510 | 1276 | 9414 | 20579 | 4033 | 1379 | 24 | 1107 | 458 | - | 27580 | 36994 |
| Lead-zinc* | | | | | | | | | | | | | | |
| Ore | '000 tonnes | - | - | - | - | - | - | - | 1000 | 4159 | 17530 | - | 22689 | 22689 |
| Lead metal | '000 tonnes | - | - | - | - | - | - | - | 28.70 | 119.53 | 688.65 | - | 836.88 | 836.88 |
| Zinc metal | '000 tonnes | - | - | - | - | - | - | - | 12.40 | 43.57 | 7.19 | - | 63.16 | 63.16 |
| Limestone | '000 tonnes | 1426745 | 235126 | 590969 | 2252840 | 171812 | 53170 | 386526 | 58874 | 189657 | 16967376 | 122648 | 17950064 | 20202904 |
| Magnesite* | '000 tonnes | - | - | - | - | - | - | - | - | - | 80 | - | 80 | 80 |
| Manganese ore* | '000 tonnes | 3582 | 660 | 484 | 4726 | 414 | 373 | 256 | 188 | 3220 | 9010 | 12 | 13473 | 18199 |
| Marble | '000 tonnes | - | - | - | - | - | - | - | - | - | 3 | - | 3 | 3 |
| Mica | tonnes | 162325 | 15247 | 2205 | 179777 | 7794 | 5101 | - | 3750 | 5502 | 18277 | - | 40424 | 220201 |

(Contd.)

Table - 1 (concld.)

| Mineral | Unit | Reserves | | | | Remaining Resources | | | | | | | | Total Resources (A+B) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Proved STD111 | Probable STD121 | Probable STD122 | Total (A) | Feasibility STD211 | Pre-feasibility STD221 | Pre-feasibility STD222 | Measured STD331 | Indicated STD332 | Inferred STD333 | Reconnaissance STD334 | Total (B) | |
| Ochre# | tonnes | 1692839 | 344121 | 631277 | 2668237 | - | 97810 | 1199762 | 347681 | - | 6569575 | - | 8214828 | 10883065 |
| Pyrite | '000 tonnes | - | - | - | - | - | - | - | - | - | 880 | - | 880 | 880 |
| Pyrophyllite# | tonnes | 245019 | 41841 | 171143 | 458003 | 121475 | 33360 | - | - | 75201 | 662193 | - | 892229 | 1350232 |
| Quartz-silica sand# | '000 tonnes | 28196 | 2975 | 29607 | 60778 | 9493 | 1778 | 15299 | 5245 | 8314 | 35515 | 5732 | 81376 | 142154 |
| Quartzite# | '000 tonnes | 2114 | 406 | 2131 | 4651 | 548 | 1009 | 7481 | - | 4390 | 5209 | 295 | 18931 | 23583 |
| Sillimanite | tonnes | 518000 | - | 170000 | 688000 | - | - | - | - | 7430300 | 1526200 | - | 8956500 | 9644500 |
| Shale# | '000 tonnes | 14992 | 76 | 263 | 15331 | - | - | 245 | - | - | 252 | 83 | 580 | 15911 |
| Slate# | '000 tonnes | - | - | - | - | - | 113 | 1187 | - | - | 1069 | - | 2369 | 2369 |
| Silver* | | | | | | | | | | | | | | |
| Ore | tonnes | - | - | - | - | - | - | - | - | - | 16950000 | - | 16950000 | 16950000 |
| Metal | tonnes | - | - | - | - | - | - | - | - | - | 128.13 | - | 128.13 | 128.13 |
| Talc/soapstone/ steatite# | '000 tonnes | 1031 | 1044 | 3060 | 5135 | 71 | 168 | 1187 | - | 369 | 3757 | 537 | 6088 | 11223 |
| Titanium** minerals | tonnes | - | - | - | - | - | - | - | - | - | 76702509 | - | 76702509 | 76702509 |
| Tungsten* | | | | | | | | | | | | | | |
| Ore | tonnes | - | - | - | - | - | - | - | 3640000 | 4700800 | 5952500 | 509000 | 14802300 | 14802300 |
| Contained $WO_3$ | tonnes | - | - | - | - | - | - | - | 5096.00 | 6574.64 | 8273.65 | 318.28 | 20262.57 | 20262.57 |
| Vermiculite | tonnes | 102058 | 24593 | 50939 | 177590 | 1912 | 3981 | 2750 | 35195 | 9878 | 119270 | 3600 | 176586 | 354176 |

*Figures rounded off.*

** Reserves/Resources as on 1.4.2013.*

*** Resources of ilmenite, rutile, leucoxene and zircon as per Department of Atomic Energy are provided in the respective Mineral Reviews.*

*# Declared as minor mineral vide Gazette notification dated 10.02.2015.*

*Note: The proved and indicated balance recoverable reserves of crude oil and natural gas as on 1.4.2015 in the State are 13.19 million tonnes and 48.44 billion cu m, respectively.*

STATE REVIEWS

**Table – 2: Reserves/Resources of Coal as on 1.4.2015 : Andhra Pradesh**

(In million tonnes)

| Coalfield | Proved | Indicated | Inferred | Total |
|---|---|---|---|---|
| Total/Godavari Valley | - | 1149.05 | 431.65 | 1580.70 |

***Source:*** *Coal Directory of India, 2014-15.*

**Table – 3 : Details of Exploration Activities in Andhra Pradesh, 2014-15**

| Agency/ Mineral/ District | Location | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| **GSI** | | | | | | | |
| **Base metal** | | | | | | | |
| | Western and central part of Karempudi blocks | - | - | - | - | - | In the western and central part of the Karempudi blocks, E-W trending dolomite band having about 24 m strike length and width up to 5 m having specs of chalcopyrite and galena has been mapped at about 30 m SSW of proposed borehole KD-1. The Karempudi drilling block lies in the eastern part of the ENE-WSW trending Karempudi-Papayapalem mineralised dolomite band having 6.5 km strike length which is located in the extreme northern part of the 50 km long Agnigundla mineralised belt of Cuddapah basin. The ENE-WSW trending northern limb of anticline of the dolomite band extends about 700 m long having 12 m thickness shows gradational contact with phyllite hosts base metal mineralisation (mainly galena) within a 4.5 m zone in central part. The central part of the dolomite is massive and has galena mineralisation in them. AAS analysis of dolomite from central part of the Trench-1 samples show up to a maximum of 1.9% Pb and 5804 ppm Zn. Pitting and trenching across an E-W trending dolomite band of about 24 m strike length and width up to 5 m shows incidence of disseminated chalcopyrite, galena and bornite which is about 30 m. XRD analyses of dolomite samples (Nos. KD-1/5X & K9/x) from Trench-1 in general inferred 67%-90% dolomite, 7-17% quartz, 1-6% muscovite etc. with ~1% Owyheeite ($Pb_7Ag_2(Sb,Bi)^*S_{20}$, 2% cerrusite ($PbCO_3$) & 1% galena. |
| | Cuddapah Mangampeta | - | 52 | 2 | 1600 | - | A deep lithostratigraphic-cum-structural drilling of 1600 m (two bore holes) and large scale mapping of 52 sq km was carried out. Drilling of 1600 m was carried out in two boreholes M/01 of depth 873 m with RL 84 m and M/02 of depth 727 m with RL 260 m. The first borehole was drilled in the hinge of the synform of F1 fold in Mangampeta (Contd.) |

Table – 3 ( Contd.)

| Agency/ Mineral/ District | Location | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| | | | | | | | Barytes Mine near the old GSI Borehole MGP 29 where the maximum thickness of barytes was recorded. The objectives were to check the occurrence of base metal below the bedded barytes horizon as likelihood to find such occurrence is high in this type of deposit (Missisipian Valley Type deposits) and also to check for any other barytes bed other than the existing baryte bed. The second borehole was drilled 470 m due east of first borehole along the dip direction to check the continuity of barytes bed which pinches out around 250 m due east of first borehole. |
| **Base metal** | | | | | | | |
| Guntur | West of Karempudi to east of Khandrika area | 1:2000 | - | - | - | - | In the preliminary investigation for base metal and other associated mineralisation west of Karempudi to east of Khandrika area of Agnigundala mineral belt, a few gossanised bands in association with grey to black dolomite and chert have been reported in the area at 4 km NW of Remedicherla. The gossan is highly silicified and contains sulphide disseminations such as sphalerite, pyrite, chalcopyrite etc. A potential block of about 1 sq km (1.75 km × 0.6 km) is identified and mapped on 1:2000 scale with the help of GPS and tape. A few silicified, brecciated and gossanised lensoidal chert bands have also been reported in the area. The silicified and brecciated lensoidal chert bands occur along the eastern margin of the purple dolomite which is in contact with shaly dolomite and are noticed at 2 km east of Domalugundam. These bands extend over a cumulative strike length of about 1 km having a maximum width up to 15 m. They are gossanised at a few places containing disseminated sulphides such as sphalerite, pyrite etc. Two potential zones for mineralisation are worked out in the area. First is a gossanised zone (1.75 km × 0.6 km) 4 km NW of Remedicherla. A detailed map of this has also been prepared on 1:2000 scale. The chert lenses occur within the purple dolomite 2 km east of Domalugundam. These chert lenses having a maximum thickness of about 15 m are highly silicified and gossanised. Mineralisation is mostly observed in the chert bands associated with the dolomites. The chert bands are full of pyrite disseminations but a few specs of galena or chalcopyrite are also common. Apart from this the cherty dolomite is also seen to contain mineralisation at a few places as disseminations of galena. Analytical results are awaited. |

(Contd.)

Table – 3 ( Contd.)

| Agency/ Mineral/ District | Location | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| **Gold** | | | | | | | |
| Kurnool | Gani-Kalava area | - | - | - | - | - | G4 stage investigation was carried out in the western part of the Proterozoic Cuddapah Basin. In Kalava South Block the quartz veins have been found to be trending in NE-SW and ENE-WSW directions. They are intruded in gabbroic sills with cumulative strike extension of about 700 m with width varying from a few centimeter to 2.5 m. This quartz veins show sulphide mineralisation in the form of chalcopyrite disseminations and malachite staining. In the Kalava block, two old workings of copper were noticed which are surrounded by the dump material consisting of quartz vein, basic sill and ferruginous shale fragments. Quartz vein rubble shows incidence of sulphides mainly pyrite and chalcopyrite with malachite staining. Sulphidic quartz vein (chalcopyrite, pyrite and chalcocite has been noticed after a gap of 500 m from the old workings along the same trend of the mineralised quartz vein. The old workings in the Gani blocks extend for a strike length of about 2.4 km in an en-echelon pattern in NW-SE direction and are situated generally at the shale/sill contacts. The Gani block is devoid of any gossan and wall rock alteration characteristics. However, chloritisation, silicification and introduction of carbonate are noticed. In the Kalava south block, 1 km SW of Gudembai Tanda, two quartz veins trending NE-SW and ENE-WSW direction are noticed within the gabbroic sills. They show indications of Cu mineralisation in the form of malachite staining and occasional chalcopyrite, pyrite disseminations. A total of 25 cu m trenching was carried out in the Kalava east block. Trench KT-1 was excavated in the old working which exposed quartz-carbonate vein with sulphides in the form of disseminations and malachite staining. Trench KT-3 excavated in the further east of the Kalava east block exposed quartz vein with chalcopyrite specks and malachite staining. Eight (08) bed rock samples analysed 60 ppb to 9 ppm Au. Out of the 04 samples collected from the NE-SW trending quartz vein in Kalava south block, 2 samples analysed 9 ppm and 1.5 ppm Au. Out of 25 trench samples from the Kalava east block submitted so far, results of 10 samples have been received. The Au values range from <25 ppb to 85 ppb. The quartz-carbonate vein exposed in the Trench KT-1 analysed 85 ppb Au. IP/ Res/SP surveys have been carried out in the Kalava east and south block. The investigation will be continued. (Contd.) |

Table – 3 ( Contd.)

| Agency/ Mineral/ District | Location | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| **Graphite** | | | | | | | |
| East Godavari | Burugubanda area | 1:2000 | - | 5 | - | - | G3 stage investigation for graphite and tungsten mineralisation was carried out. The mineralisation is confined to the E-W trending with two isolated eastern and western graphite gneiss lenses occurring within the porphyritic charnockite that belong to Eastern Ghat Mobile Belt (EGMB). These graphite gneiss lenses extend over a strike length of about 180 m having a width up to 12 m each are separated apart by 180 m in the Burugubanda area. These graphite gneiss lenses are encircled by garnetiferous pegmatites in the area. Thin quartz-rich pegmatite veins are seen emplaced along the foliation planes of the graphite gneiss which appears to be the carriers of the tungsten mineralisation in the area. Concentration of graphite mineralisation is nearer to the quartz-rich pegmatite vein. Drilling has been taken up both in the eastern and western graphite old working lenses to intersect the mineralisation at 60 m vertical depth to test the depth persistence as well as grade of the mineralisation. Out of the five boreholes drilled till date, three boreholes in the western lense and two boreholes in the eastern lense were completed. The borehole data indicated depth persistence as well as strike continuity of the mineralisation. The mineralisation is associated with garnetiferous quartz-pegmatite. Core samples studied under UV-lamp indicated the presence of disseminated scheelite mineralisation in quartz-rich pegmatite portions. One core sample of borehole BBD-1 analysed 13.9% of fixed carbon and 750 ppm of tungsten. Drilling of Borehole BBD-6 in the eastern lense is yet to commence. Another two more boreholes (BBD-7 & 8) have also been planned in the area; the BBD-7 is in between the two lenses to test the strike continuity of the mineralisation whereas BBD-8 will aim to test the depth persistence of the mineralisation at 90 m vertical depth. Due to non availability of laboratory facility in GSI, SR, 50 core samples have been submitted for analysing fixed carbon to Ore Dressing Division, IBM, Nagpur. |
| **Iron ore** | | | | | | | |
| Chittoor | Vedullacheruvu-Krishnapuram, Chandragiri and Srikalahasti Taluk | 1:2000 | - | - | - | - | G4 stage investigation for iron and manganese ore was carried out with an objective to delineate the iron ore bands along with manganese ore. The study area exposed quartzite and phyllite of Bairenkonda Formation and phyllite of Cumbum Formation & Cuddapah Supergroup. The intercalated sequence of quartzite and phyllite is found to host iron and manganese bands. The band very close |

(Contd.)

Table – 3 ( Concld.)

| Agency/ Mineral/ District | Location | Mapping | | Drilling | | Sampling (No.) | Remarks Reserves/Resources estimated |
|---|---|---|---|---|---|---|---|
| | | Scale | Area (sq km) | No. of boreholes | Meterage | | |
| | | | | | | | to the contact with massive quartzite is the thickest with width ranging from 8-12 m for a strike length of around 1.5 km. Another significant band is in the east central part of the intercalated sequence of quartzite and phyllite with average thickness of 8 m. The work will continue in FS 2015-16. |
| **REE** | | | | | | | |
| Chittoor | Chetlamalla-puram | 1:2000 | - | - | - | - | In the REE investigation, seven major pegmatite bodies have been mapped out of which one is emplaced in agglomerate, another in the leucogranite and the rest in actinolite-chlorite schist. All the quartz and pegmatite bodies are emplaced along major fault planes. The pegmatites are intruded by multiple quartz and haematite veins. Mainly two varieties of pegmatites have been identified (i) K-feldspar-rich pink pegmatite with multiple quartz and haematite injections and (ii) quartz, feldspar and tourmaline bearing white pegmatite. Trenching in the west of Chetlamallapuram helped in identification of a zoned pegmatite body. A major tourmaline bearing leucogranite unit has been mapped which was earlier mapped as grey biotie granite. Around Basitipadu zone pegmatite intrudes the leucogranite as horizontal sheets, both containing tourmaline. Outliers of Gulcheru quartzite that have been mapped were recorded as Narji limestone in earlier maps. A Nb-Ta mineral (Euxenite) grain has been identified through EPMA which is found to be enclosed within a feldspar grain from the main pegmatite of Chetlamallapuram. All the pink feldspar bearing pegmatites emplaced along WNW-ESE trending fault planes bear multiple injections of specular haematite. Malachite stains are also recorded in this zone. An old working is located in this zone. Euxenite (Nb-Ta_U) mineral has been identified with the help of BSE studies of pink pegmatite from Chetlamallapuram. The analytical results are awaited. |

## Production

Andhra Pradesh was bifurcated into two States on 02.06.2014 and the new State 'Telangana' was formed with ten districts of the erstwhile State. The data for previous years have been analysed by considering the districts of the newly formed State. The value of mineral production (excludes atomic mineral and value for February and March in respect of 31 minerals declared as minor mineral vide Gazette notification dated 10.02.2015) in Andhra Pradesh (newly formed) at ₹ 15,158 crore in 2014-15 decreased by 4% as compared to that in the previous year. Most of the important minerals are produced in Andhra Pradesh. The principal minerals produced in the State were limestone, petroleum (crude), natural gas (utilised) and barytes.

Andhra Pradesh contributed about 5% to the total value of the mineral production in the country. It was the sole producer of apatite and mica (crude) and also contributes almost the entire output of barytes in India. It was the leading producer of vermiculite, garnet (abrasive) and sillimanite with a share of 86%, 71%, and 51% in the total production of the respective minerals in the country.

Among the minerals produced in the State, the output of vermiculite increased 36%, iron ore 28% and limestone 3 percent. However, a decline in production was observed in petroleum

(crude) (14%), sillimanite 23%, manganese ore (24%), garnet (abrasive) (49%) and natural gas (utilised) (54%) as compared to the production of previous year (Table - 4).

The value of production of minor minerals was estimated at ₹ 13,108 crore for the year 2014-15 (since information of value of minor minerals for Telangana is not available separately the figures of minor minerals are shown against Andhra Pradesh).

The number of reporting mines in the State was 421 in 2014-15 as against 492 in the previous year.

## Mineral-based Industry

The present status of each mineral-based industry is not readily available. However, the principal mineral based industries in the organised sector in the State are provided in Table-5.

**Table – 4 : Mineral Production in Andhra Pradesh, 2012-13 to 2014-15**
**(Excluding Atomic Minerals)**

(Value in ₹ '000)

| Mineral | Unit | 2012-13 | | | 2013-14 | | | 2014-15 (P) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | No. of mines | Quantity | Value | No. of mines | Quantity | Value | No. of mines | Quantity | Value |
| **All Minerals** | | **536** | | **167703097** | **492** | | **158660646** | **421** | | **151576048** |
| Natural Gas (utilised) | m c m | - | 1249 | 10329390 | - | 1171 | 9684320 | - | 541 | 4474139 |
| Petroleum (crude) | '000t | - | 295 | 5361853 | - | 297 | 5398204 | - | 254 | 4616646 |
| Gold | kg | | | | | | | 1 | - | - |
| Iron ore | '000t | 38 | 1149 | 588352 | 33 | 709 | 403897 | 25 | 908 | 491871 |
| Manganese ore | t | 32 | 353302 | 503713 | 31 | 334265 | 716420 | 27 | 253675 | 470420 |
| Apatite | t | 1 | 572 | 1208 | 1 | 1300 | 2768 | 1 | 930 | 2021 |
| Asbestos | t | 3 | 389 | 17057 | 3 | 172 | 7271 | - | - | - |
| Ball Clay# | t | 13 | 184345 | 99828 | 13 | 143430 | 75352 | 9 | 148774 | 77414 |
| Barytes# | t | 18 | 1769940 | 5291524 | 26 | 1149081 | 3520639 | 18 | 886929 | 2639622 |
| Calcite# | t | 1 | 1790 | 895 | 1 | 1960 | 980 | 1 | 4100 | 1702 |
| Clay (others)# | t | 10 | 76574 | 9648 | 9 | 63622 | 7806 | 5 | 50920 | 7264 |
| Dolomite# | t | 37 | 856330 | 185332 | 42 | 747409 | 152244 | 33 | 698273 | 162891 |
| Felspar# | t | 15 | 73007 | 23925 | 9 | 100276 | 34209 | 7 | 100930 | 28500 |
| Fireclay# | t | 15 | 49478 | 10512 | 11 | 32061 | 7366 | 9 | 27286 | 6788 |
| Garnet (abrasive) | t | 2 | 83683 | 497499 | 2 | 108409 | 831543 | 2 | 55803 | 564497 |
| Kaolin# | t | 11 | 53057 | 8945 | 8 | 58516 | 11183 | 6 | 45857 | 8487 |
| Sillimanite | t | - | 23896 | 205289 | - | 43705 | 277396 | - | 33801 | 265716 |
| Laterite# | t | 11 | 1661825 | 262353 | 9 | 795729 | 211244 | 13 | 1760358 | 400194 |
| Limestone | '000t | 81 | 36544 | 5565061 | 74 | 34331 | 5495772 | 70 | 35435 | 5623833 |
| Lime kankar# | t | 2 | 275 | 138 | - | - | - | - | - | - |
| Mica# (crude) | t | 31 | 1177 | 37988 | 33 | 1660 | 47838 | 25 | 636 | 21892 |
| Mica# (waste & scrap)* | t | - | 7415 | - | - | 7626 | - | - | 7644 | - |
| Ochre# | t | 12 | 97581 | 21953 | 17 | 130901 | 23136 | 11 | 155723 | 23188 |
| Pyrophyllite# | t | 1 | 176 | 141 | 2 | 1980 | 1584 | 2 | 1603 | 1122 |
| Quartz# | t | 61 | 515353 | 104788 | 52 | 522446 | 127727 | 49 | 508179 | 110151 |
| Quartzite# | t | 18 | 221885 | 96019 | 16 | 389984 | 194956 | 17 | 456494 | 220509 |
| Silica sand# | t | 74 | 2128989 | 325572 | 60 | 1693844 | 294559 | 54 | 1242041 | 223500 |
| Sand (others)# | t | 1 | 9349 | 1356 | 1 | 7788 | 1246 | 1 | 7197 | 1089 |
| Shale# | t | 3 | 53617 | 6407 | 4 | 104309 | 12922 | 4 | 102331 | 13422 |
| Talc/soapstone/ steatite# | t | 39 | 85117 | 30980 | 29 | 62214 | 31203 | 25 | 57752 | 30679 |
| Vermiculite | t | 6 | 6474 | 1885 | 6 | 9650 | 4542 | 6 | 13126 | 6172 |
| Minor Minerals@ | | - | | - 138113486 | - | - | 131082319 | - | - | 131082319 |

** Includes mine waste obtained while dressing of crude mica.*
*@ Figures for earlier years have been repeated as estimates, wherever necessary, because of non-receipt of data.*
*# Declared as minor mineral vide Gazette notification dated 10.02.2015.*

***Note:** The number of mines excludes petroleum (crude), natural gas (utilised) and minor minerals.*

*(1) The figures reported for 2012-13 & 2013-14 are for comparative purpose only by considering the corresponding districts under the newly formed states.*

*(2) Due to non-availability of district-wise minor mineral data the figures reported against Andhra Pradesh includes that of districts falling under Telangana for 2012-13 to 2014-15.*

**Table – 5 : Principal Mineral-based Industries in Andhra Pradesh**

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| **Abrasives** | |
| Grindwell Norton Ltd, Renigunta, Distt. Chittoor. | 5 |
| **Asbestos Products** | |
| Hyderabad Industries Ltd. Ibrahimpatnam, Distt. Krishna. | 45 |
| Ramco Industries, Ibrahimpatnam, Distt. Krishna. | 225 |
| **Cement** | |
| ACC Ltd (formerly Encore cement), Vishakhapatnam (G). | 400 |
| Andhra Cements Ltd (Visaka Cement Works), Durga Nagar, Distt. Visakhapatnam (G). | 620 |
| Andhra Cements Ltd, Durga Cement Works, Dachepalli, Distt. Guntur. | 2000 |
| Bharthi Cement Corp. Pvt. Ltd, Nallingayapalli, Distt. Cuddapah. | 5000 |
| Bhavya Cement, Thangeda, Distt. Guntur. | 1400 |
| Dalmia Cement (Bharat) Ltd, Cuddapah. | 2500 |
| India Cements Ltd, Chilamkur, Distt. Cuddapah. | 1460 |
| India Cements Ltd, Yeraguntla, Distt. Cuddapah. | 730 |
| Jaypee Balaji Cement, Budawada, Distt. Krishna. | 5000 |
| JSW Cement Ltd, Nandyal, Distt. Kurnool. | 4800 |
| KCP Ltd, Macherla, Distt. Guntur. | 830 |
| KCP Ltd, Muktyala, Distt. Krishna. | 1520 |
| My Home Cement Industries Ltd, Mulakapalli, Distt. Visakhapatnam (G). | 2000 |
| NCL Industries Ltd, Kondapalli, Distt. Krishna (G). | 990 |
| Panyam Cements & Mineral Industries Ltd, Cement Nagar, Distt. Kurnool. | 3000 (tpd) |
| Parashakti Cement, Jettipalem, Distt. Guntur. | 1260 |
| Penna Cement Industries Ltd, Talaricheruvu, Tadipatri, Distt. Anantapur. | 1800 |
| Penna Cement Industries Ltd, Boyareddypalli, Distt. Anantapur. | 2000 |
| Rain Commodities Ltd (Rain Cements), Boincheruvupalli, Distt. Kurnool. | 2160 |

(Contd.)

Table - 5 (Contd.)

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| Ramco Cement Ltd (formerly Madras Cements), Jayantipuram, K.S. Rajanagar, Distt. Krishna. | 3600 |
| Ramco Cement Ltd, Vizag Grinding Unit, Distt. Visakhapatnam. | 950 |
| Sree Jayajothi (Subs. of Myhome Cement Ind.) Yanakandala, Distt. Kurnool. | 1800 |
| Sri Chakra Cements Ltd, Alamada, Distt. Vizianagaram (G). | 300 |
| Sri Chakra Cements Ltd, Karampudi, Distt. Guntur. | 700 |
| Toshali Cement Ltd, Bayyavaram, Distt. Visakhapatnam (G). | 200 |
| Ultra-Tech Cements Ltd (APCW), Tadipatri, Distt. Anantapur. | 5600 |
| Zuari Cement, Krishnanagar, Yerranguntala, Distt. Cuddapah. | 4600 |
| **Chemical** | |
| A.P. Carbides Ltd, Kurnool. | 23 (calcium carbide) |
| Andhra Sugars Ltd, Saggonda, Distt. West Godavari. | 132 (caustic soda)<br>99 ($H_2SO_4$) |
| Shree Rayalseema Alkalies & Allied Chem. Ltd, Gondiparla, Distt. Kurnool. | 69.5 (caustic soda)<br>49.8 (Cl)<br>24.7 (HCl)<br>23.1 (KOH) |
| Shree Rayalseema High Strength Hypo Ltd, Gondiparla, Distt. Kurnool. | 9 (bleaching powder)<br>45 ($H_2SO_4$)<br>15 (Oleum) |
| **Ceramic** | |
| RAK Ceramics India Pvt Ltd, Samalkot, Distt. East Godavari. | 30000 (Vitrified tiles sq m/day)<br>1500 (sanitary ware pc/day) |
| Sentini Ceramica Pvt Ltd, Kanukollu, Distt. Krishna (JV with H R Johnson (I) Ltd). | 75 |
| Spartek Ceramics India Ltd, Narsingapuram, Distt. Chittoor. | NA |
| Kajaria Ceramics Ltd, Vijaywada. | 2.3 (mill. sq m) |
| **Fertilizer** | |
| Agri Green Fertilizers & Chemicals Pvt Ltd, Cuddapah. | 30 (SSP) |
| Bhaskar Fertiliser (P) Ltd., Anantpur | 45 (SSP) |
| Coromandel International Ltd, Visakhapatnam. | 1300 (NP/NPKs) |

(Contd.)

Table - 5 (Contd.)

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| Coromandel International Ltd, Kakinada, Distt. East Godavari. | 1925 (DAP) |
| GDS Chemicals & Fertlizer Pvt Ltd., Anakapalli, Visakhapatnam | 36 (SSP) |
| K. P. R. Fertilizers Ltd. Biccavolu, | 90 (SSP) |
| E. Godavari | |
| Krishna Industrial Corpn. Ltd, Nidadavole, Distt. West Godavari. | 45 (SSP)<br>33.5 ($H_2SO_4$) |
| Nagarjuna Fertilizers & Chemicals Ltd, Kakinada, Distt. East Godavari. (Unit I & II) | 1520 (Urea) |
| NG Fertilizers & Chemicals Pvt. Ltd., Kodurupadu, Distt. Krishna | 200 (SSP) |
| Prathyusha Chemicals and Fertilisers Ltd., Parwada, Visakhapatnam | 100 (SSP) |
| Subhodaya Chemicals Ltd, Gauripatnam, Distt. West Godavari. | 42.9 (SSP) |
| The Andhra Sugars Ltd, Tanuku, Kovvur, Distt. West Godavari. | 66 (SSP)<br>45 ($H_2SO_4$) |
| **Pesticides** | |
| Jayalakshmi Fertilizers, Tanuku, Distt. West Godavari. | 2.4 |
| **Glass** | |
| Triveni Glass Ltd, Kondagudem, Distt. West Godavari. | 10 (mill. sq m) |
| **Iron & Steel** | |
| Visakhapatnam Steel Plant, Visakhapatnam. | 8856 (sinter)<br>3400 (pig iron)<br>2910 (crude/liquid steel) |
| **Pig Iron** | |
| Lanco Industries Ltd, Rachaguneri, Distt. Chittoor. | 225 |
| Mid-west Iron & Steel Co Ltd, Dusi, Distt. Srikakulam. | 90 |
| Sathavahana Ispat Ltd, Haresamudram, Distt. Anantapur. | 210 |
| **Pellets** | |
| Essar Steel Ltd, Visakhapatnam. | 8000 |

(Contd.)

Table - 5 (Concld.)

| Industry/plant | Capacity ('000 tpy) |
|---|---|
| Sponge Iron | |
| GSAL (India) Ltd, Sriramapuram, Distt. Vizianagaram. | 220 |
| Sree Rayalseema Green Steloy Ltd, Gooty, Distt. Anantapur. | 36 |
| Sri Venkateshwara Sponge & Power Pvt Ltd, Merlapaka, Distt. Chittoor. | 90 |
| Maa Mahamaya Industries Pvt Ltd, Relligaurammapeta, Distt. Vizianagaram. | NA |
| **Ferro-alloys** | |
| Andhra Ferro Alloys Ltd, Kothavalasa, Distt. Vizianagaram. | 20 |
| Deccan Ferro Alloys (P) Ltd, Pendurthi, Visakhapatnam. | 13 |
| FACOR Alloys Ltd, Shreeramnagar, Distt. Vizianagaram. | 72 |
| Jindal Stainless (Hisar) Ltd, Kothavalasa, Distt. Vizianagaram. | 40 |
| Metkore Alloys & Ind. Ltd (GMR Ferro Alloys & Ind. Ltd) Ravivalasa, Distt. Srikakulam. | 25 |
| Shree Sarda Alloys Ltd, Ravivalasa, Distt. Srikakulam. | 6 |
| **Refractory** | |
| Carborandum Universal Ltd, Visakhapatnam. | 3.6 |
| RHI Clasil Ltd, Venkatapuram, Visakhapatnam. | 50 |
| Vesuviusindia Ltd, Visakhapatnam. | 24 |
| **Lead-zinc** | |
| HZL, Zinc Smelter, Visakhapatnam. | 56 (Zn)* |
| **Petroleum Refinery** | |
| HPCL, Vizag. | 8300 |
| ONGC, Tatipaka, Distt. East Godavari | 66 |

** Operation have been discontinued.*

***Note:*** *Data, not readily available for fertilizer and cement Industries on respective website, hence it has been taken from Indian Fertilizer Scenario, 2015/FAI Statistics, 2014-15 and Survey of Cement Industry & Directory, 2015 respectively.*

# Indian Minerals Yearbook 2013

## (Part- III : Mineral Reviews)

## 52nd Edition

# TALC, SOAPSTONE AND STEATITE

## (ADVANCE RELEASE)

**GOVERNMENT OF INDIA**
**MINISTRY OF MINES**
**INDIAN BUREAU OF MINES**

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**January, 2015**

# 47 Talc, Soapstone and Steatite

Talc is a hydrous magnesium silicate. In trade parlance, talc often includes: (i) the mineral talc in the form of flakes and fibres; (ii) steatite, the massive compact cryptocrystalline variety of high-grade talc; and (iii) soapstone, the massive talcose rock containing variable talc (usually 50%), which is soft and soapy in nature. Commercial talc may contain other minerals like quartz, calcite, dolomite, magnesite, serpentine, chlorite, tremolite and anthophyllite as impurities. The properties of talc that enables its use in a wide variety of applications are its extreme softness & smoothness, good lustre & sheen, high slip & lubricating property, low moisture content, ability to absorb oil & grease, chemical inertness, high fusion point, low electrical & heat conductivity, high dielectric strength, good retention for filler purposes, whiteness, good hiding power as pigment and high specific heat. In addition, it has the advantage of being relatively abundant. It can be easily mined and prepared for market. Rajasthan is the hub of talc activity in India.

## RESOURCES

As per the UNFC system, the total reserves/ resources of talc/steatite/soapstone as on 1.4.2010 is estimated at 269 million tonnes of which reserves and remaining resources are 90 million tonnes and 179 million tonnes, respectively. Substantial quantities of resources are established in Rajasthan (49%) and Uttarakhand (29%). The remaining 22% resources are in Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Odisha, Sikkim and Tamil Nadu. By grades, Paper & Textile grade accounts for about 22% share in total resources followed by insecticides (19%) and cosmetics (13%). Resources of ceramic and paint grades are negligible. Others, Unclassified and Not-known grades account for about 45% resources (Table-1).

## EXPLORATION & DEVELOPMENT

No exploration was carried out during the year 2012-13.

## PRODUCTION, STOCKS & PRICES

The production of steatite in 2012-13 was 939 thousand tonnes which decreased by about 6% as compared to that in the previous year .

There were 133 reporting mines in 2012-13 as against 138 in the previous year. Besides production of steatite was reported by nine mines as associated mineral in 2012-13 as against eight mines in previous year . Ten principal producers accounted for nearly 70% of the total production during 2012-13. In both the years, the entire production of steatite was reported by private sector mines. About 88% of the total production in 2012-13 was contributed by 34 mines, each producing over 5,000 tonnes annually, whereas about 10% of the total output was reported by 34 mines, each producing 1,000 to 5,000 tonnes. The remaining about 2% of the total production was contributed by 74 mines with annual output below 1,000 tonnes .

About 50% of the production in 2012-13 was of grade other than insecticide and the remaining was of insecticide/DDT grade.

Rajasthan, the major producing state accounted for as much as 80% of the total production in 2012-13. Among the other states, the share of Uttarakhand was 10% and that of Andhra Pradesh was nearly 8% and rest of the 2% was reported from Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh and Tamil Nadu.

Mine-head stocks at the end of the year were 522 thousand tonnes as against 1,017 thousand tonnes in the beginning of the year.

The average daily employment of labour was 4,009 in 2012-13 as against 3,894 in the previous year.

**Table – 1 : Reserves/Resources as on 1.4.2010 : Talc/Steatite/Soapstone**
**(By Grades/States)**

(In '000 tonnes)

| Grade/States | Reserves | | | | Remaining resources | | | | | | | | Total resources (A+B) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Proved STD111 | Probable | | Total (A) | Feasibility STD211 | Pre-feasibility | | Measured STD331 | Indicated STD332 | Inferred STD333 | Reconnaissance STD334 | Total (B) | |
| | | STD121 | STD122 | | | STD221 | STD222 | | | | | | |
| **All India** | **54615** | **8772** | **26640** | **90026** | **9732** | **12773** | **27080** | **6403** | **7256** | **115195** | **558** | **178996** | **269023** |
| **By Grades** | | | | | | | | | | | | | |
| Paper & textile | 18852 | 3926 | 8803 | 31581 | 3564 | 524 | 5286 | 5201 | 430 | 13718 | - | 28721 | 60302 |
| Cosmetics | 18365 | 1049 | 6593 | 26008 | 203 | 1856 | 776 | 232 | 142 | 5610 | - | 8819 | 34827 |
| Insecticide | 11006 | 2795 | 5551 | 19353 | 3127 | 2756 | 11451 | 941 | 217 | 12661 | 42 | 31194 | 50547 |
| Ceramic | 410 | - | 558 | 968 | - | 46 | 87 | - | 35 | 212 | 344 | 724 | 1691 |
| Paint | 84 | 374 | 182 | 640 | 9 | - | 151 | - | - | 200 | - | 360 | 1000 |
| Others | 871 | 104 | 810 | 1785 | 461 | 3630 | 2095 | 17 | 100 | 2209 | - | 8513 | 10297 |
| Unclassified | 5026 | 523 | 4140 | 9690 | 1105 | 3877 | 6567 | 11 | 6276 | 71195 | 167 | 89188 | 98878 |
| Not-known | - | - | 3 | 3 | 1263 | 84 | 678 | 2 | 56 | 9388 | 5 | 11477 | 11479 |
| **By States** | | | | | | | | | | | | | |
| Andhra Pradesh | 1031 | 1044 | 3060 | 5135 | 71 | 168 | 1187 | - | 369 | 3777 | 537 | 6109 | 11243 |
| Bihar | - | - | 149 | 149 | - | - | - | - | - | 3 | - | 3 | 152 |
| Chhattisgarh | 22 | - | 8 | 30 | - | - | - | - | 70 | 8 | - | 78 | 108 |
| Gujarat | - | - | 6 | 6 | - | 20 | 8 | - | - | 4 | - | 31 | 37 |
| Jharkhand | - | - | - | - | - | - | 73 | 2 | 4 | 243 | 16 | 338 | 338 |
| Karnataka | 35 | - | 182 | 217 | 49 | 124 | 217 | 11 | 208 | 1242 | - | 1851 | 2068 |
| Kerala | - | - | - | - | - | - | - | - | - | 14390 | - | 14390 | 14390 |
| Madhya Pradesh | - | - | - | - | 4 | 375 | 954 | - | 1679 | 6107 | - | 9119 | 9119 |
| Maharashtra | - | - | - | - | - | - | - | - | 2565 | 14262 | - | 16827 | 16827 |
| Odisha | 123 | 178 | 112 | 414 | 31 | 1 | 109 | - | - | 265 | - | 406 | 820 |
| Rajasthan | 28179 | 2705 | 14770 | 46193 | 6155 | 7323 | 19196 | 1686 | 837 | 50768 | 5 | 85969 | 132162 |
| Sikkim | - | - | - | - | - | - | 60 | - | - | - | - | 60 | 60 |
| Tamil Nadu | - | - | 333 | 333 | 194 | 210 | 1400 | - | - | 524 | - | 2328 | 2661 |
| Uttarakhand | 24684 | 4845 | 8021 | 37550 | 3228 | 4551 | 3876 | 4706 | 1524 | 23604 | - | 41487 | 79037 |

*Figures rounded off.*

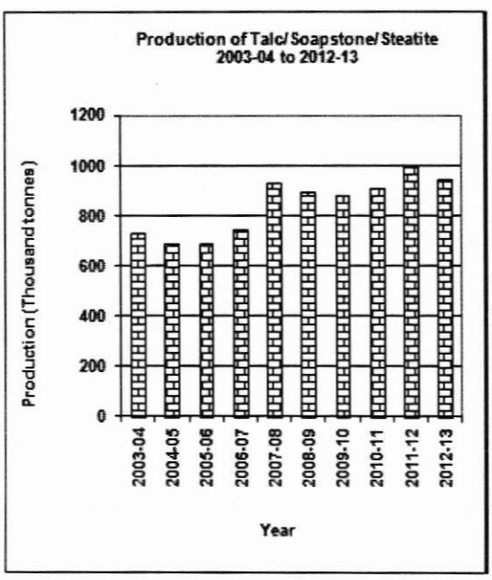



**Table – 2: Principal Producers of Steatite, 2012-13**

| Name & address of producer | Location of mines | |
|---|---|---|
| | State | District |
| Associated Soapstone Distributing Co. (P) Ltd, Golcha Garden, Agra Road, Jaipur - 302 003, Rajasthan. | Rajasthan | Udaipur |
| Udaipur Mineral Development Syndicate (P) Ltd, Golcha Trade Centre (GTC), 4th Floor Ajmeri Gate, MI Road, Jaipur – 302 001, Rajasthan. | Rajasthan | Bhilwara |

(Contd.)

Table - 2 (Concld.)

| Name & address of producer | Location of mines | |
|---|---|---|
| | State | District |
| Rajasthan Mineral & Co. B-25, Gautam Marg, Hanuman Nagar Post-Vaishali Nagar, Jaipur -302 021, Rajasthan. | Rajasthan | Bhilwara |
| Ratanlal Deedwaniya D-4,Nagori Garden, Near Bank of Baroda Bhilwara, 311 001, Rajasthan. | Rajasthan | Bhilwara |
| Nalwaya Mineral Industries (P) Ltd, 7/A, Bapu Bazar, Udaipur - 313 001, Rajasthan. | Rajasthan | Dungarpur |
| Kedarnath Khaitan Khaitan Industries 5, Shivaji Nagar, Udaipur, Rajasthan. | Rajasthan | Udaipur |
| Katiyar Mining & Industries Corpn, 117/L/215, Naveen Nagar, Kakadeo, Kanpur – 208 025, Uttar Pradesh. | Uttarakhand | Bageshwar |
| Buddhra Mineral Aangan 7, New Fateh Pura, Udaipur - 313 001 Rajasthan. | Rajasthan | Udaipur |
| G. Radha Reddy* House No 4/194/3 Sunder Singh Colony, Dhone - 518 222 Distt - Kurnool, Andhra Pradesh. | Andhra Pradesh | Kurnool |

**Associated with dolomite.*

**Table – 3 : Production of Talc/Steatite/Soapstone, 2010-11 to 2012-13(P)**
**(By States)**

(Qty in tonnes; value in ₹'000)

| State | 2010-11 | | 2011-12 | | 2012-13(P) | |
|---|---|---|---|---|---|---|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| **India** | **902686** | **618286** | **998438** | **878590** | **939022** | **825559** |
| Andhra Pradesh | 59336 | 25684 | 91646 | 34941 | 79546 | 25474 |
| Bihar | 2948 | 513 | - | - | - | - |
| Chhattisgarh | 5 | 2 | 316 | 95 | 440 | 132 |
| Gujarat | 2316 | 289 | 2981 | 426 | 2626 | 784 |
| Jharkhand | - | - | 4041 | 1144 | 1400 | 532 |
| Madhya Pradesh | - | - | 66 | 7 | 140 | 56 |
| Rajasthan | 664649 | 420656 | 738877 | 634367 | 756381 | 653515 |
| Tamil Nadu | 1295 | 259 | - | - | 282 | 76 |
| Uttarakhand | 172137 | 170883 | 160511 | 207610 | 98207 | 144990 |

**Table – 4 : Production of Steatite, 2011-12 & 2012-13 (P)**
**(By Frequency Groups)**

(Qty in tonnes)

| Production group | No. of mines | | Production for the group | | Percentage in total production | | Cumulative percentage | |
|---|---|---|---|---|---|---|---|---|
| | 2011-12 | 2012-13 | 2011-12 | 2012-13 | 2011-12 | 2012-13 | 2011-12 | 2012-13 |
| **All Groups** | **138(8)** | **133(9)** | **998438** | **939022** | **100.00** | **100.00** | - | - |
| Up to 500 | 48(1) | 61(2 ) | 3821 | 7535 | 0.38 | 0.80 | 0.38 | 0.80 |
| 501 to 1000 | 7 | 11 | 5330 | 7675 | 0.54 | 0.82 | 0.92 | 1.62 |
| 1001 to 2000 | 14(1) | 14(1) | 22487 | 22019 | 2.25 | 2.35 | 3.17 | 3.97 |
| 2001 to 5000 | 31(3) | 17(2) | 105168 | 70339 | 10.53 | 7.49 | 13.70 | 11.46 |
| 5001 to 10000 | 18(1) | 12(1) | 144153 | 108726 | 14.44 | 11.58 | 28.14 | 23.04 |
| 10001 to 25000 | 12(2) | 11(3) | 193282 | 207370 | 19.36 | 22.08 | 47.50 | 45.12 |
| 25001 & above | 8 | 7 | 524197 | 515358 | 52.50 | 54.88 | 100.00 | 100.00 |

*Figures in parentheses indicate no. of associated mines with clay (others), dolomite and kaoline.*

**Table – 5 : Production of Talc/Steatite/Soapstone, 2011-12 & 2012-13 (By Sector/States/Districts/Grades)**

(Qty in tonnes; value in ₹ '000)

| State/District | 2011-12 | | | | | 2012-13 (P) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No.of mines | Quantity | | | Value | No.of mines | Quantity | | | Value |
| | | Insecticide/ DDT | Other than Insecticide | Total | | | Insecticide/ DDT | Other than Insecticide | Total | |
| **India** | **138(8)** | **467673** | **530765** | **998438** | **878590** | **133(9)** | **473859** | **465163** | **939022** | **825559** |
| Private Sector | 138(8) | 467673 | 530765 | 998438 | 878590 | 133(9) | 473859 | 465163 | 939022 | 825559 |
| **Andhra Pradesh** | **35(4)** | **61170** | **30476** | **91646** | **34941** | **38(5)** | **65555** | **13991** | **79546** | **25474** |
| Anantapur | 8(1) | 8425 | 5896 | 14321 | 9965 | 9(1) | 3300 | 3542 | 6842 | 7563 |
| Kurnool | 27(3) | 52745 | 24580 | 77325 | 24976 | 29(4) | 62255 | 10449 | 72704 | 17911 |
| **Chhattisgarh** | **3** | **316** | **-** | **316** | **95** | **1** | **440** | **-** | **440** | **132** |
| Kanker | 3 | 316 | - | 316 | 95 | 1 | 440 | - | 440 | 132 |
| **Gujarat** | **1** | **2981** | **-** | **2981** | **426** | **1** | **2626** | **-** | **2626** | **784** |
| Sabarkantha | 1 | 2981 | - | 2981 | 426 | 1 | 2626 | - | 2626 | 784 |
| **Jharkhand** | **1** | **-** | **4041** | **4041** | **1144** | **1** | **1400** | **-** | **1400** | **532** |
| Saraikela | 1 | - | 4041 | 4041 | 1144 | 1 | 1400 | - | 1400 | 532 |
| **Madhya Pradesh** | **(1)** | **66** | **-** | **66** | **7** | **1(1)** | **20** | **120** | **140** | **56** |
| Jabalpur | (1) | 66 | - | 66 | 7 | 1(1) | 20 | - | 20 | 2 |
| Narsingpur | - | | | | | 1 | - | 120 | 120 | 54 |
| **Rajasthan** | **63(3)** | **319490** | **419387** | **738877** | **634367** | **60(3)** | **340356** | **416025** | **756381** | **653515** |
| Banswara | 1 | - | 2425 | 2425 | 2449 | 1 | - | 1420 | 1420 | 1136 |
| Bhilwara | 13(2) | 109266 | 174942 | 284208 | 146670 | 15(2) | 148491 | 184328 | 332819 | 170853 |
| Dungarpur | 6 | 25657 | 15412 | 41069 | 26136 | 5 | 28548 | 14779 | 43327 | 30163 |
| Jaipur | 1 | - | - | - | - | 1 | - | - | - | - |
| Karauli | 2 | 2120 | 4160 | 6280 | 7046 | 2 | 2095 | 3715 | 5810 | 7023 |
| Rajsamand | 7 | 14095 | 7376 | 21471 | 11607 | 5 | 7676 | 11037 | 18713 | 7380 |
| Udaipur | 33(1) | 168352 | 215072 | 383424 | 440459 | 31(1) | 153546 | 200746 | 354292 | 436960 |
| **Tamil Nadu** | **-** | **-** | **-** | **-** | **-** | **1** | **282** | **-** | **282** | **76** |
| Coimbatore | - | - | - | - | - | 1 | 282 | - | 282 | 76 |
| **Uttarakhand** | **35** | **83650** | **76861** | **160511** | **207610** | **30** | **63180** | **35027** | **98207** | **144990** |
| Almora | 1 | 2850 | - | 2850 | 2024 | 2 | 640 | - | 640 | 454 |
| Bageshwar | 28 | 65522 | 76361 | 141883 | 185188 | 21 | 60966 | 31935 | 92901 | 139154 |
| Pithoragarh | 6 | 15278 | 500 | 15778 | 20398 | 7 | 1574 | 3092 | 4666 | 5382 |

*Figures in parentheses indicate no. of associated mines with limestone, clay (others), quartz, asbestos, kaoline and dolomite.*

**Table – 6 : Mine-head Stocks of Talc/ Steatite/Soapstone, 2012-13 (P)**
**(By States/Grades)**

(In tonnes)

| State | At the beginning of the year | | | At the end of the year | | |
|---|---|---|---|---|---|---|
| | Insecticide/ DDT | Other than Insecticide | Total | Insecticide/ DDT | Other than Insecticide | Total |
| **India** | **282813** | **733815** | **1016628** | **356789** | **164922** | **521711** |
| Andhra Pradesh | 180763117 | 21193 | 25066 | 5885 | 30951 | |
| Bihar | 31 | - | 31 | 31 | - | 31 |
| Chhattisgarh | 670 | - | 670 | 770 | - | 770 |
| Gujarat | 1999 | - | 1999 | 1934 | - | 1934 |
| Jharkhand | 1000 | - | 1000 | 1979 | - | 1979 |
| Karnataka | - | - | - | 3 | 390 | 393 |
| Madhya Pradesh | 200 | - | 200 | 170 | 215 | 385 |
| Odisha | 342 | - | 342 | 342 | - | 342 |
| Rajasthan | 244635 | 715460 | 960095 | 315996 | 144388 | 460384 |
| Tamil Nadu | - | - | - | 107 | - | 107 |
| Uttarakhand | 15860 | 15238 | 31098 | 10391 | 14044 | 24435 |

## MINING, MARKETING & TRANSPORT

The deposits of talc are worked both by opencast and underground methods of mining. In India, almost all the mines are worked by opencast method except a few mines in Rajasthan and Andhra Pradesh, where underground method of mining is followed.

In opencast method, the overburden, being hard, is removed by drilling and blasting and the mineral, being soft, is mined and transported to the stacking places manually. In some opencast pits in Rajasthan, mechanical excavators are in use. Benches are formed along the strike on the hanging wall and footwall sides to work the deposit at depth. Most soapstone mines are worked manually. Some mines are semi-mechanised and a few are mechanised. In manually worked opencast mines, drilling is sometimes done by compressor-jackhammer unit. In semi-mechanised mines, drilling and face transport are by mechanical means but face loading, sorting, etc. are carried out manually. In a few mines, small capacity shovel and matching dumpers are deployed for handling waste. In most opencast mines, loading is done manually. In some larger mines, loading and transport are done by shovel and dumper combination. In a few mines, hand trimming is carried out on the surface. Mechanical haulage transports the material through the incline.

In underground mining in Rajasthan and Andhra Pradesh, the deposit is reached from the surface through shafts or inclines depending upon the topography and the configuration of the deposit. Generally, inclines of 1.8 m x 1.8 m and 2 m x 2 m in section are developed from the surface through the soapstone mineralisation along the dip. Levels of 1.8 m x 1.8 m or 2 m x 2 m in cross-section are driven along the body at vertical intervals of 15 to 25 m. For development, holes are drilled with compressed-air operated jackhammers. Holes in soapstone are blasted with special gelatine using ordinary detonators and safety fuses. For transportation and hoisting from underground, tipping tubs and skip hoists are used.

Talc stacked at the mine site or in stacking yard is processed by hand sorting to remove impurities like calcite, dolomite, iron oxide and quartzite. After removal of impurities grading is done visually on the basis of its whiteness. Sometimes, talc is washed to remove fine dust and impurities. It is generally graded as Grade 'A', Grade 'B', Grade 'C' and Grade 'D'.

### Grade A

It is known as the first quality material. The colour of the mineral is pure white to slightly green. The whiteness is in the range from 90 to 95%. It is used in producing pharmaceuticals and cosmetics.

### Grade B

It is known as the second quality material. The colour is pale-greenish to white. The whiteness is in the range from 85 to 90%. It is used in producing superior-grade paper, textile and ceramics.

### Grade C

It is known as the third quality material. The colour is light greenish-grey. Whiteness is in the range from 78 to 85%. It is used in paper (inferior grade), paint, rubber, plastic and detergent industries.

### Grade D

It is known as the fourth quality or DDT grade. The material having whiteness of 78% or below is generally classified under this grade. The colour of the material is dark greenish-grey to reddish-green. The DDT grade material is considered to be of a very poor quality. Gradewise whiteness & their specification consuming industries are given in Table-7.

**Table – 7: Gradewise Consuming Industries of Talc**

| Grade | Whiteness Percentage | Industry |
|---|---|---|
| Grade - A | 90 to 95% | i) Pharmaceutical<br>ii) Cosmetic |
| Grade - B | 85 to 90% | i) Superior grade paper<br>ii) Textile<br>iii) Ceramic |
| Grade - C | 78 to 85% | i) Paper inferior grade<br>ii) Paint<br>iii) Rubber<br>iv) Plastic<br>v) Detergent |
| Grade - D | 78% or below | DDT |

The Industry's demand for fine powder is continuously prompting technological advancements to meet this purpose. The pulverisers/hammer mills developed and manufactured in India are capable of producing up to 700 mesh powder. The world market prefers fine powder which can be produced by adopting new processing techniques like micronising and sterilisation of the product.

Talc is crushed and ground by hammer mills and roller mills into powder and the size of talc particles is analysed by classifier. After pulverising/processing, the material is packed in 25 kg, 50 kg, 500 kg and 1,000 kg HDPE bags for internal use and laminated bags for export purpose. The pulverised talc from the processing plants and unprocessed talc from the mines are despatched through trucks and railway wagons to various consuming centres. The important loading stations for talc in the country are Maharana Pratap Nagar (Udaipur) and Kachhola in Rajasthan and Tanakpur in Uttarakhand. For exports, nearest ports are Kandla or Mumbai.

## USES & SPECIFICATIONS

Talc, in pulverised form, is mostly used as a filler in paper, textile, rubber, insecticides and fertilizer industries. Pure talc after calcining, called 'Lava', is used in the manufacture of low-loss ceramic materials essential for radio, radar, television, etc. In roofing products, such as, tar, paper, asphalt shingles and roll roofing, talc acts as a fire retardant and increases weather resistance. Body and face powders (talcum powder) are prepared from the finest quality talc after adding deodorant and perfumes. Massive steatite when cut into panels is used for switchboards and acidproof tabletops in laboratory, laundry and kitchen sinks, in tubs and tanks as well as for lining alkali tanks in Paper Industry. Due to its high melting point (1630 $^{0}$C), soapstone can be used in refractories and fire places. It is also quite useful in sculpturing.

Indian talc, especially mined in Rajasthan and Andhra Pradesh, is comparable with the best quality available in other countries. In the world market, talc, free from grit, having high whiteness and high degree of soapiness feeling is very much

sought after in cosmetic, filler and weighing applications. Talc having more than 92% brightness, less than 1% $Fe_2O_3$ and less than 1.5% $CaCO_3$ is preferred for exports.

Soapstone powder is also used as parting agent in Foundry Industry. Parting agents are used for easy release of moulds and cores from pattern equipment and core boxes. BIS specification IS 8250-1988 (first revision reaffirmed, 2008) prescribes use of off-white or cream-coloured material having a very smooth and slippery feel, passing completely through 75 micron IS-sieve. The material shall be predominantly magnesium silicate and chemical composition as agreed to between buyer and purchaser compatible with naturally occurring soapstone. In Paint Industry, foliated, fibrous or lamellar material of 300 mesh and free from silica is used. Specifications of steatite (as French chalk) used in paper, textile, pyrotechnic and rubber industries as per IS: 380-1978 (Second Revision, Reaffirmed 2003) are furnished in Table - 8. Specifications as per IS : 10429-1982 (Reaffirmed 2001) for Ceramic Industry and actual user specifications for Insecticide Industry are furnished in Table-9. BIS has prescribed specifications for use of talc in Cosmetic Industry vide IS: 1462-1985 (Third Revision, Reaffirmed 2006). The international specifications of talc for use in ceramic, cosmetic and paint industries are detailed in Table - 10.

**Table – 8 : Specifications of Steatite (French Chalk, Technical for Use in Paper, Textile, Pyrotechnics and Rubber Industries) (IS: 380-1978, Second Revision, Reaffirmed 2003)**

| Parameter | Paper | Textile | Pyrotechnics | Rubber |
|---|---|---|---|---|
| Loss on ignition | 4% (max.) | 4% (max.) | 4% (max.) | 4% (max.) |
| Matter insoluble in HCl | 95% (min.) | 95% (min.) | 95% (min.) | 95% (min.) |
| Grit, percentage by mass, max. | 0.02 | 0.02 | 0.02 | – |
| Chlorides (NaCl) | 0.5% (max.) | 0.5% (max.) | 0.5% (max.) | 0.5% (max.) |
| Iron (as $Fe_2O_3$) percentage by mass, max. | 0.3 | 0.3 | 0.3 | – |
| pH 8.5 (max.) | 8.5 (max.) (of 10% solution) | 8.5 (max.) (of 10% solution) | 8.5 (max.) (of 10% solution) | 8.5 (max.) (of 10% solution) |
| Whiteness, reflectance to blue light of wave length 5040 $A^0$ (percent, min.) | 80 | 80 | 80 | – |
| Relative density | 2.7-2.9 (at 27 °C) | 2.7-2.9 (at 27 °C) | 2.7-2.9 (at 27 °C) | 2.7-2.9 (at 27 °C) |
| Remarks | – | – | – | * |

* *Material required for preservation of rubber goods shall contain not more than 0.05%, by mass, of copper or manganese or their compound in terms of respective compounds.*

**Table – 9 : Specifications of Steatite for Use in Insecticide and Ceramic Industries**

| Parameter | Insecticide (User) | Ceramics (IS:10429-1982) | |
|---|---|---|---|
| | | Grade-I | Grade-II |
| Loss on ignition (% by mass, max.) | 7% (max.) | 5.5% | 6.5% |
| Moisture and other volatile matter | 1% (max.) | 1% (max.) | 1% (max.) |
| Silica (as $SiO_2$) % by mass, min. | – | 60 | 56 |
| Alumina (as $Al_2O_3$) % by mass, max. | – | 1.5 | 2.5 |
| Iron oxide (as $Fe_2O_3$) % by mass, max. | 1-1.5 | 1.0 | 1.5 |
| Calcium oxide (as CaO) % by mass, max. | – | 1.0 | 3.5 |
| Magnesia (as MgO) % by mass, min. | – | 30 | 28 |
| Alkali (as $Na_2O + K_2O$) % by mass, max. | – | 0.4 | 0.5 |
| pH | 6-7 | – | – |
| Fineness | 300 mesh | – | – |
| Size grading | | | |
| Material passing through 75 microns IS sieve, % by mass, min. | – | 99 | 99 |
| Material passing through 45 microns IS sieve, % by mass, min. | – | 80 | 80 |
| Specific gravity | – | 2.7 to 2.8 | 2.7 to 2.8 |
| Fusibility (Orton Standard Pyrometric Cone) | – | 18 to 23 (1522-1605 °C) | 16 to 18 (1491-1522 °C) |
| Linear shrinkage (fired) % by length, max. | – | 12 | – |
| Water absorption % by mass, max. | – | 0.1 | – |

*Grade-I : Suitable for Ceramic Insulator Industry & Grade II: Suitable for Ceramic Pottery Industryl*

**Table – 10 : International Specifications for Talc**

| Parameter | Ceramic | Cosmetic | Paint* |
|---|---|---|---|
| MgO | 30% (min.) | – | 88% (Mg and Ca silicates) |
| $SiO_2$ | 60% | 0.1-1.0% | – |
| CaO | 1% (max.) | – | – |
| $Al_2O_3$ | 4% (max.) | – | – |
| $Fe_2O_3$ | 1.5% (max.) | – | – |
| Alkali | 0.4% (max.) | – | – |
| Size | -325 mesh (95%) | -200 mesh | -325 mesh |
| Acid soluble | 6 | – | – |
| Water soluble | – | 0.1 (max.) | 1 |
| Loss on ignition | – | 6 | 7 |
| Brightness | – | – | Over 90 |

* *Moisture 1%.*

## CONSUMPTION

Talc is used mostly in pulverised form as a filler and extender in various industries. The non-pulverised talc is used in refractory, etc. Total reported consumption of talc/steatite/ soapstone in the organised sector was at 368 thousand tonnes in 2012-13. About 56% consumption in 2012-13, was in Paper Industry, followed by Paint (20%), Pesticide (11%), Ceramic (8%) and Cosmetic (4%) industries. Nominal consumption was shared by Fertilizer, Rubber, Textile, Chemicals and other industries. Consumption of talc/steatite/soapstone during 2010-11 to 2012-13 is given in Table-11.

**Table – 11 : Consumption of Talc/Steatite/ Soapstone, 2010-11 to 2012-13 (By Industries)**

(In tonnes)

| Industry | 2010-11 | 2011-12(R) | 2012-13(P) |
|---|---|---|---|
| **All Industries** | **368900** | **368800** | **368300** |
| Ceramic | 28100(23) | 28900(24) | 28800(24) |
| Cosmetic | 12000 (16) | 13700(16) | 13300(16) |
| Paint | 75000(32) | 75200(32) | 75200(32) |
| Paper | 210100(42) | 207300(42) | 207300(42) |
| Pesticide | 42100 (17) | 42100 (17) | 42100 (17) |
| Rubber | 800 (26) | 800 (26) | 800 (26) |
| Others (abrasive, chemical, electrode, electrical fertilizer, foundry, pharmaceutical, refractory, textile and vanaspati) | 800 (27) | 800 (27) | 800 (29) |

*Figures rounded off.*
*Figures in parentheses denote the number of units in organised sector reporting* consumption.*
*(*includes actual reported consumption and estimates made whenever required)*
*Plastic Industry also consumes talc for which data is not available.*

## POLICY

The Export-Import Policy incorporated in the Foreign Trade Policy, 2009-14, allows imports and exports of talc freely without restrictions under Heading no. 2526.

## WORLD REVIEW

The world reserves of talc and pyrophyllite are quite large and sufficient to meet the world demand. The world reserves of talc (along with pyrophyllite) are given in Table -12. Reserves of talc are not available separately.

The world production of talc is estimated at 6.6 million tonnes in 2012. Principal producing countries were China (33%), followed by India (14%), USA (9%), Mexico(7%), Brazil &France (6% each) (Table -13).

**Table – 12 : World Reserves of Talc and Pyrophyllite (By Principal Countries)**

(In '000 tonnes)

| Country | Reserves |
|---|---|
| **World : Total (rounded)** | **Large** |
| Brazil | 230000 |
| China | Large |
| Finland | Large |
| France | Large |
| India* | 75000 |
| Japan | 100000 |
| Korea, Rep. of | 14000 |
| USA* | 140000 |
| Other countries | Large |

** Excludes pyrophyllite.*
***Source:** Mineral Commodity Summaries, 2014.*

**Table – 13 : World Production of Talc (By Principal Countries)**

(In '000 tonnes)

| Country | 2010 | 2011 | 2012 |
|---|---|---|---|
| **World Total** | **5700** | **6100** | **6600** |
| Argentina@ | 25 | 24e | 25e |
| Australiae | 80 | 99 | 135 |
| Austria | 138 | 132 | 135 |
| Brazil@ | 412 | 443 | 450e |
| Canada | 100 | 147 | 154 |
| Chinae | 2000 | 2200 | 2200 |
| Eygpt | 35 | 13 | 21 |
| Finland | 419 | 429 | 396 |
| Francee | 400 | 400 | 400 |
| India* | 902 | 958 | 950e |
| Iran | 96 | 59 | 60e |
| Italye | 110 | 110 | 110 |
| Japane | 24 | 24 | 25 |
| Korea, Rep. ofe | 50 | 50 | 50 |
| Mexico | 01 | 51 | 463 |
| Russiae | 150 | 150 | 150 |
| Spain | 52 | 12 | 09 |
| USA | 604 | 616 | 623e |
| Other countries | 102 | 183 | 244 |

***Source:** World Mineral Production, 2008-2012.*
*@ Including talc, agalmatolite and pyrophyllite.*
** India's production of talc/steatite/soapstone in 2010-11, 2011-12 and 2012-13 was 9,02,686 tonnes, 9,98,438 tonnes and 9,39,022 tonnes, respectively.*

# FOREIGN TRADE

## Exports

Exports of talc/steatite/soapstone increased considerably to 1,21,852 tonnes in 2012-13 from 1,00,562 tonnes in the previous year. Out of total steatite exported in 2012-13, steatite blocks constituted 3,278 tonnes, steatite lumps 4,625 tonnes and steatite powder & others 1,14,309 tonnes. Steatite in different forms was exported mainly to Thailand (18%), Nigeria (11%), Bangladesh (9%), UAE (8%), Malaysia & Indonesia (7% each), Kenya, Philippines & Saudi Arabia (4% each) and Japan (2%) (Tables - 14 to 17).

## Imports

Imports of steatite decreased considerably to 2,905 tonnes in 2012-13 from 5,022 tonnes in the previous year. Out of total steatite imported in 2012-13, steatite lumps were 195 tonnes and steatite powder & others 2,570 tonnes. Imports of steatite blocks were 140 tonnes in 2012-13. Steatite in different form was imported mainly froms China (39%), Italy and Australia (13% each), Pakistan and Japan (6%) each.

**Table – 14 : Exports of Steatite (By Countries)**

| Country | 2011-12 | | 2012-13 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **100562** | **913949** | **121852** | **1215354** |
| Thailand | 16061 | 100772 | 21589 | 179780 |
| UAE | 8824 | 73504 | 10257 | 109205 |
| Bangladesh | 5239 | 51580 | 10571 | 97675 |
| Indonesia | 5465 | 54079 | 7930 | 75924 |
| Malaysia | 6069 | 49456 | 8015 | 71439 |
| Nigeria | 4841 | 33592 | 12842 | 67004 |
| Philippines | 4882 | 43604 | 5202 | 62022 |
| Saudi Arabia | 3084 | 28092 | 4632 | 49704 |
| Kenya | 4853 | 37574 | 4428 | 39227 |
| Japan | 6473 | 67871 | 2518 | 37453 |
| Other countries | 34771 | 373825 | 33868 | 425921 |

**Table –15 : Exports of Steatite Blocks (By Countries)**

| Country | 2011-12 | | 2012-13 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **5599** | **52364** | **3278** | **38773** |
| Japan | 3341 | 30117 | 969 | 9923 |
| Bangladesh | 416 | 1855 | 1216 | 5763 |
| UK | 7 | 552 | 178 | 3296 |
| Netherlands | 47 | 1532 | 53 | 2776 |
| USA | 35 | 2068 | 125 | 2742 |
| China | 625 | 5627 | 170 | 2324 |
| Afghanistan | - | - | 9 | 2184 |
| Spain | - | - | 10 | 1769 |
| France | 64 | 1294 | 66 | 1605 |
| Pakistan | 72 | 854 | 24 | 1250 |
| Other countries | 992 | 8465 | 458 | 5141 |

**Table –16 : Exports of Steatite Lumps (By Countries)**

| Country | 2011-12 | | 2012-13 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **3004** | **21198** | **4265** | **49848** |
| China | 201 | 4084 | 1056 | 26049 |
| Mozambique | - | - | 520 | 4505 |
| Vietnam | - | - | 578 | 3692 |
| Bangladesh | 475 | 1045 | 1142 | 3372 |
| Belgium | 112 | 1862 | 166 | 3200 |
| Germany | 44 | 880 | 73 | 1570 |
| Netherlands | 161 | 2232 | 96 | 1499 |
| Japan | 60 | 910 | 118 | 1384 |
| Spain | 1013 | 3160 | 200 | 1244 |
| Kenya | 60 | 816 | 113 | 1136 |
| Other countries | 878 | 6209 | 203 | 2197 |

**Table – 17 : Exports of Steatite Powder & Others (By Countries)**

| Country | 2011-12 | | 2012-13 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **91959** | **840387** | **114309** | **1126734** |
| Thailand | 16061 | 100772 | 21589 | 179780 |
| UAE | 8602 | 72797 | 10254 | 108944 |
| Bangladesh | 4348 | 48680 | 8213 | 88540 |
| Indonesia | 5465 | 54079 | 7930 | 75924 |
| Malaysia | 5875 | 47776 | 7911 | 70707 |
| Nigeria | 4839 | 33562 | 12842 | 67004 |
| Philippines | 4882 | 43604 | 5202 | 62022 |
| Saudi Arabia | 3084 | 28092 | 4587 | 49415 |
| Kenya | 4793 | 36758 | 4300 | 37729 |
| Sri Lanka | 1496 | 18354 | 2355 | 29788 |
| Other countries | 32514 | 355913 | 29126 | 356881 |

**Table – 18 : Imports of Steatite (By Countries)**

| Country | 2011-12 | | 2012-13 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **5022** | **141498** | **2905** | **121394** |
| China | 2365 | 71729 | 1122 | 42056 |
| Italy | 196 | 10252 | 392 | 23409 |
| Austria | 151 | 7626 | 379 | 17163 |
| Japan | 361 | 17171 | 160 | 13841 |
| USA | 111 | 6391 | 67 | 4678 |
| Belgium | 19 | 1374 | 79 | 4026 |
| France | 48 | 2166 | 70 | 2702 |
| Germany | 66 | 2087 | 74 | 2563 |
| Pakistan | 1037 | 6118 | 175 | 1845 |
| Korea, Rep. of | 2 | 165 | 13 | 1282 |
| Other countries | 666 | 16419 | 374 | 7829 |

**Table –19: Imports of Steatite Lumps (By Countries)**

| Country | 2011-12 | | 2012-13 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **868** | **4923** | **195** | **2367** |
| Pakistan | 688 | 4072 | 175 | 1845 |
| China | - | - | 20 | 522 |
| Other countries | 180 | 851 | - | - |

**Table – 20 : Imports of Steatite Powder & Others (By Countries)**

| Country | 2011-12 | | 2012-13 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **4122** | **136174** | **2570** | **118328** |
| China | 2365 | 71729 | 1102 | 41534 |
| Italy | 196 | 10252 | 392 | 23409 |
| Austria | 151 | 7626 | 379 | 17163 |
| Japan | 361 | 17171 | 160 | 13841 |
| USA | 111 | 6391 | 67 | 4678 |
| Belgium | 19 | 1374 | 79 | 4026 |
| France | 48 | 2166 | 70 | 2702 |
| Germany | 66 | 2087 | 74 | 2563 |
| Korea, Rep. of | 2 | 165 | 13 | 1282 |
| Netherlands | 48 | 1520 | 22 | 1082 |
| Other countries | 755 | 15693 | 212 | 6048 |

**Table – 21: Imports of Steatite Blocks (By Countries)**

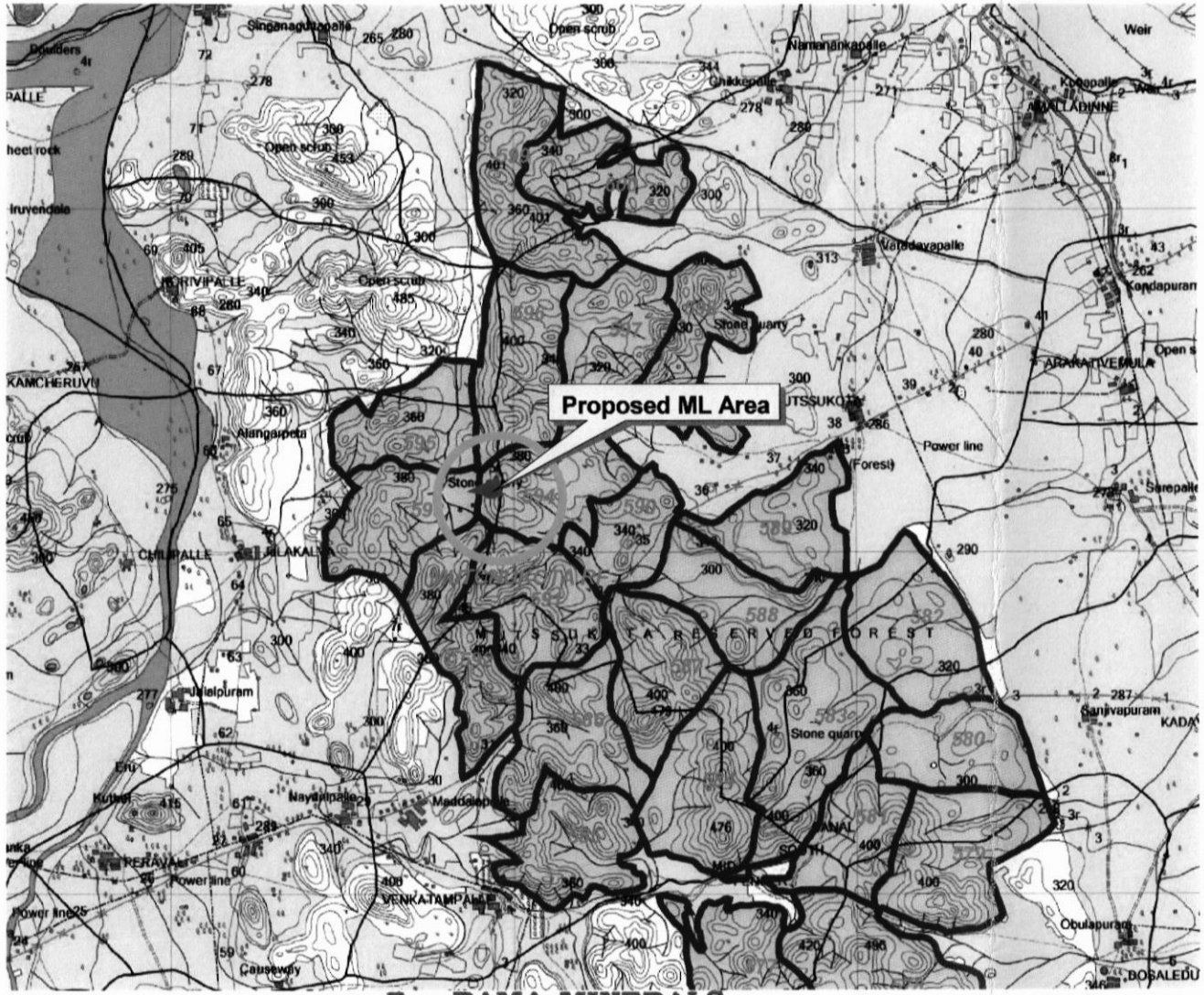
| Country | 2011-12 | | 2012-13 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countriess** | **32** | **401** | **140** | **699** |
| Nepal | - | - | 140 | 699 |
| Other countries | 32 | 401 | - | - |

## FUTURE OUTLOOK

The apparent domestic demand for talc-steatite was estimated to be 879 thousand tonnes in 2011-12 and 1.35 million tonnes by 2016-17 at 9% growth rate. India is one of the principal sources of 'lawa' grade talc suited for specialised purposes like low ceramic materials and of sawn shaped talc. Indian talc is considered to be the second best in the world next to Italian talc. The world market conditions for talc minerals are steadily growing. India has large resource base and well-developed production facilities that utilise modern pulverising techniques. Therefore, concerted efforts are necessary to increase exports by making Indian talc suitable through R &D efforts for world market.

1141513/2018/FCA -PCCF

**Location Map showing 2.00 Ha. Proposed Mining Lease area for Steatite and Dolomite minerals in Compartment No. 594 (Part) of Mutchukota RF in Mutchukota North Beat of Mutchkota Section in Gooty Range of Ananthapuramu Forest Division, in favour of Rama Minerals.**




N

Scale 1: 50000
Map Datum: Wgs84

**REFERENCE**

- Survey Points
- Proposed ML Area
- RF Boundary Line

**For RAMA MINERALS**

B. Ramadevu

**PROPRIETOR**

0 2 4 Kilometers

# Location Map showing Cluster of Existing and Proposed Mining Lease areas for Steatite and Dolomite minerals in Mutchukota RF in Mutchukota North Beat of Mutchkota Section in Gooty Range of Ananthapuramu Forest Division.


For RAMA [illegible]RAI
B. Ramadevi
PROPRIETOR