QUARTZ AND FELDSPAR DEPOSITS AROUND BHIKNOOR REGION, KAMAREDDY DISTRICT-THEIR RESPECTIVE GRADES AND MARKET POTENTIAL

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ABSTRACT
Quartz and Feldspar minerals, find extensive use in Ceramic & Glass Industries and to a few extents in Ramming Mass Industries and Cement Industries. There are number of economically viable working Mines of Quartz and Feldspar around Bhiknoor Region. Being rich in Alkalis (K2O+Na2O in the range of 13-14%) and having lower Fe2O3 percentage (less than 0.10%), the minerals (Quartz and Feldspar) from these region, are being extensively Mined, Processed and Transported to different end users, in domestic, as well as in International Market. Domestic consumers include RAK Ceramics, Aparna Ceramics, Johnson & Johnson Company, H& R Johnson, Sentini Ceramics, Segno Ceramics. Cement Industries in and around Guntur and Nalgonda, procure B grade Feldspar in lumps form (20-100 mm), from the working Mines in Bhiknoor Region. Quartz (A & B Grade), finds its use in Glass Industries and Ferro alloy Industries. Quartz (C-grade) is used as Ramming Mass. Feldspar is being exported in Lumps as well as Powder form, to countries such as Vietnam, Indonesia, China, Iran, South Korea, Indonesia, Bangladesh and Turkey. Quartz is being exported in lumps as well as powder form to Malaysia and some of the other South Eastern Asian Countries. The major ports from which exports are being carried out include Chennai, Krishnapatnam and Kakinada.

Key words: Bhiknoor Region; Alkali Content; Fe2O3 percentage; Lumps; Powder; Domestic; Export.

1. INTRODUCTION

Bhiknoor Region is located between North Latitudes 18°08’00” and 18°14’00” and East Longitudes 78°20’00” and 78°29’00” in the Survey of India, topographic map 56 J/8, on a scale of 1:50,000 (Fig. 1a & 1b). The study area is well connected by rail and road. Bhiknoor Region consists of Bhiknoor Revenue village and surrounding villages of Thippapur, Rameshwarapally, Baswapur, Peddamallareddy, Lingampally, Mallupally, Malthummeda and Vellutla. Bhiknoor is a Revenue Village in Kamareddy District, Telangana State. Kamareddy District is the 15th Largest District in Telangana State, spread over an area of 3,652.00 square kilometres (1,410.05 sq miles) and has been carved from the erstwhile Nizamabad District on 11-10-2016. Bhiknoor is bounded by Kamareddy and Domakonda Villages on North, Bibipet and Dubbak villages on East, Ramayampeta and Medak Villages on South and is bounded on West by Medak and Rajampet respectively. Economically viable Quartz and Feldspar Minerals are being extensively mined from Rameshwarapally, Thippapur, Peddamallareddy, Baswapur, Lingampally, Mallupally, Malthummeda and Vellutla.

![Figure 1a Topographic Map (56 J) of Bhiknoor Region on a scale of 1:2,50,000](image)

![Figure 1b Topographic Map (56 J/8) of Bhiknoor Region on a scale of 1:50,000](image)
Figure 2 Geological Map of Bhiknoor Region. Inset shows the location of Bhiknoor Region.

1.1. Geological Succession of Bhiknoor Region

<table>
<thead>
<tr>
<th>ERA</th>
<th>INTRUSIVES</th>
<th>LITHOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLEISTOCENE</td>
<td>Deccan Trap (DT)</td>
<td>Laterite (L)</td>
</tr>
<tr>
<td>UPPER CRETACEOUS TO LOWER EOCENE</td>
<td>Acid Invasive Basic Intrusives</td>
<td>Basalt</td>
</tr>
<tr>
<td>LOWER PROTEROZOIC</td>
<td>Quartz and Feldspar Reef (QV)</td>
<td>Dolerite/gabbro (Bd)</td>
</tr>
<tr>
<td>ARCHAEOAN TO LOWER PROTEROZOIC</td>
<td>Tonalite/Granodiorite/ Adamellite</td>
<td></td>
</tr>
<tr>
<td>ARCHAEOAN</td>
<td>Dharwar Super Group</td>
<td>Amphibolite</td>
</tr>
<tr>
<td></td>
<td>Peninsular Gneiss complex</td>
<td>Granite/Gneiss</td>
</tr>
</tbody>
</table>

2. GEOLOGY OF THE BHIKNOOR REGION

A variety of rock types belonging to peninsular Gneissic complex (Archaean), Schistose rocks of Dharwar Supergroup (Archaean-Proterozoic age), granatiods and younger acidic and basic intrusives (Lower Proterozoic), Deccan traps (Upper Cretaceous – Lower Eocene) and laterite (Pleistocene) are exposed in Bhiknoor Region. The Peninsular Gneissic Complex, occurring as enclaves and resites, within the younger granitoids is seen in the region, mainly around Yellareddy and Lingampet. The Gneisses which are banded and steaky comprise Tonalite,
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Trondjhemite and granodiorite. The general trend of the foliation varies from NW-SE to NNW-SSE with steep to sub vertical dips.

Joints/Fractures are recognized along NW-SE, N-S and NE-SW trends.

All the above rocks are profusely intruded by Potash rich grey granite. Acidic and Basic Intrusives of lower Proterozoic age. Grey granite is characterized predominated by potash feldspar. The contact between different granites is gradational.

The basic dykes, trend N-S, ENE-WSW and NW-SE and intrude into all the pre-existing rock types. These dykes are massive and are mostly doleritic in composition excepting a few, which are gabbroic.

![Figure 3 Exposure of Dolerite Dyke in Bhiknoor Region (N 18° 09'17.90", E 78° 23'43.7")](image)

2.1. Quartz and Feldspar Deposits

![Figure 4](image)

**Figure 4** 1) Quartz Outcrops in Mallupally Mine (scale: 20 cm Hammer) 2) Observing the orientation of the Outcrop, 3) Collecting samples from Outcrops and 4) Co-ordinates of the exposed outcrop.
Quartz and Feldspar deposits, traverse the older rock units (Tonalite/Granodiorite of Archaean to lower Proterozoic age) and trend ENE-WSW, N-S and NW-SE. They range in length from a few meters to several meters intermittently with widths of 2-30 mts and depths varying from 10-30 mts. Potassium Feldspar is the main Feldspar occurring in this region and has major components of SiO$_2$ in the range of 65-69%, K$_2$O between 11-7% and Na$_2$O between 1.5-2%. Likewise Quartz occurring in Bhiknoor region has SiO$_2$ in between 99-98% and is Milky and Semi glassy in appearance.

2.2. A View of the Working Quartz and Feldspar Mine in Bhiknoor Region

*Figure 5* Excavator working at Peddamallareddy Mine (N 18° 09' 17.22", E 78° 28' 03.12")

*Figure 6* Peddamallareddy Mine face/Wall depicting Quartz and Feldspar Mineral formation
2.3. Google Earth Map of Bhiknoor Region

Figure 7 Google Map of Bhiknoor Region with working Mines marked.

Figure 8 Closer view of Working Mine at Peddamallareddy (N 18°09’17.22”, E 78°28’03.12”)

2.4. Different Grades of Feldspar and Quartz

**Feldspar**

The Feldspar material being mined from Bhiknoor Region is divided into 3 grades, depending on the below said parameters.

<table>
<thead>
<tr>
<th>Grade</th>
<th>K₂O %</th>
<th>Na₂O %</th>
<th>Fe₂O₃ %</th>
<th>L %</th>
<th>Melting</th>
<th>Glassiness</th>
<th>Black Spots</th>
<th>Bead Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-grade</td>
<td>&gt; 11.0</td>
<td>&gt; 2.0</td>
<td>&lt; 0.10</td>
<td>75+</td>
<td>Good</td>
<td>Good</td>
<td>Nil</td>
<td>White</td>
</tr>
<tr>
<td>B-grade</td>
<td>9-11</td>
<td>1.5-2</td>
<td>0.10-0.12</td>
<td>72-75</td>
<td>Partial</td>
<td>Average</td>
<td>Trace</td>
<td>Dull white</td>
</tr>
<tr>
<td>C-grade</td>
<td>7-9</td>
<td>1.3-1.5</td>
<td>0.12-0.15</td>
<td>70-72</td>
<td>Poor</td>
<td>Poor</td>
<td>Present</td>
<td>Buff</td>
</tr>
</tbody>
</table>

L – Luminance/Brightness.
Melting – Melting of Feldspar at 1200°C.
Glassiness – Glaze/Smoothness of the Bead at 1200°C.
Black Spots – Presence or Absence of Black spots on the Bead.

**Quartz**
The Quartz being mined from Bhiknoor Region is divided into the below grades, depending on the SiO₂ %, Fe₂O₃ % and the Physical appearance.

<table>
<thead>
<tr>
<th>Grade</th>
<th>SiO₂ %</th>
<th>Fe₂O₃ %</th>
<th>Size</th>
<th>Physical Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-grade</td>
<td>&gt; 99.8</td>
<td>&lt; 0.02</td>
<td>40-100 mm</td>
<td>White on all the sides.</td>
</tr>
<tr>
<td>B-grade</td>
<td>99.8-99.6</td>
<td>0.02-0.08</td>
<td>40-100 mm</td>
<td>3 Sides White and One side Reddish Coated.</td>
</tr>
<tr>
<td>C-grade</td>
<td>99.6-99.0</td>
<td>0.08-0.10</td>
<td>10-40 mm</td>
<td>3 Sides Reddish and One side White.</td>
</tr>
</tbody>
</table>

3. PROCESSING
The mined ROM (Run off Mine) material of Quartz and Feldspar, would be shifted to the stockyard and segregated into different grades using different sized Screens and with the help of Labourer’s. The different grades of material would be stocked separately. Normally A-grade material of Feldspar would be sold off, in the form of Lumps (20-100 mm) and Chips (3-10 mm). If the material is to be sold in the form of powder, then the Lumps (20-100 mm) from the Mine would be transported to the nearest Ball mill. Ball mill is a grinding unit, where the Grinding media would be of silica balls (or) Alumina Balls. The Operating Ball mills would be fitted with powerful Magnets (2400-1200 Gauss) for removing inherent excess Fe₂O₃ %. Depending upon the Customer requirement, the end product (Powder) would be of 200 mesh (or) 325 mesh. The Final product would be packed in 500 Kg’s Bags (or) Jumbo Bags (1.0 Ton (or) 1.2 Tons) and transported to the Nearest Ports for Export. Whereas for Quartz, the process would be slightly different. The Mined ROM (Quartz) would be shifted to the stockyard and segregated manually into A, B, C grades, with the help of Labourer’s because the grades are directly proportional to the Physical appearance and size of the material. A-grade Quartz, apart from the percentages of SiO₂ and Fe₂O₃, should be white on all the four sides and should be in between 40-100 mm in size. Less than 40mm, would be rejected in case of A-grade. Similarly, B-grade Quartz, should have physical appearance of 3 sides white and only one side Reddish coating, apart from matching the percentages of SiO₂ and Fe₂O₃ mentioned above. Depending upon the Customer requirement, the Segregated Quartz would be sold off as Lumps (or) would be transported to the nearest Ball mill, for making powder of 200 mesh (or) 325 mesh.

3.1. Prospective Buyers- Domestic and Exporters
The processed Feldspar and Quartz material from Bhiknoor Region, has market both in Domestic as well as in International Market.

Domestic consumers include Ceramic Industries such as RAK Ceramics (Samarlakota, Near Kakinada, East Godavari District), Aparna Ceramics (Samarlakota, Near Kakinada, East Godavari District), Johnson & Johnson Company (Karaikal, Pudicherry), H &R Johson (Tiruchirappalli, Tamil Nadu), Silica Ceramics (Near Tadepalligudem, West Godavari District), Sentini Ceramics(Chiguru kota, Krishna District), Segno Ceramics (Vemavaram, Guntur District). B- Grade Feldspar is also being supplied to a few Cement Industries in Guntur and Nalgonda Districts Quarzt (A-Grade and B-Grade) is procured by Chettinad Industries at Kanchipuram, Tamil Nadu and at Bhoghapuram, Vizianagaram District. Quartz (C-grade) is used as Ramming Mass and procured by local Industries in and around Bhiknoor/Kamareddy. Acidic Ramming Mass is used in the lining of induction furnaces. Quality of Acidic Ramming mass is directly related to the heating performance of the furnaces.
furnaces. Better quality of lining results in the smooth working of furnaces, optimum output and better metallurgical control. Export of both Feldspar and Quartz is made in the form of Lumps as well as in Powder form (200 mesh (or) 325 Mesh). The principle exporters are from Vietnam, Indonesia, China, Iran, South Korea, Malaysia, Indonesia, Bangladesh and Turkey. At present, Export is being carried out from principally 3 Major Ports namely Krishnapatnam Port in S.P.S.R Nellore District, Kakinada Port in East Godavari District and from Chennai Port. From Chennai, Exports are being carried out from Chennai Port, managed by Port Trust of India and from Katupalli Port, managed by Adani Ports and Special Economic Zone Limited (APSEZ) promoted by Adani Group, Adani. Kakinada port is managed by Kakinada Sea Ports and Krishnapatnam Port is managed by Hyderabad based C.V.R Group.

4. CONCLUSIONS
Mining is the backbone of any economically developing country. Sustainable and judicial exploitation of available Mineral Resources, would benefit the Nation in a big way. Kamareddy District, being newly developed district, has great potential for Mineral based development. The Bhiknoor Region located between North Latitudes 18°08'00” and 18°14’00” and East Longitudes 78°20’00” and 78°29’00” and comprising Bhiknoor, Rameshwarapally, Baswapur, Thippapur, Peddamallareddy, Lingampally, Mallupally, Malthummeda and Vellutla villages, contain very good, high grade Quartz and Feldspar Mines. Potassium Feldspar is the main Feldspar, occurring in this region and has major components of SiO₂ in the range of 65-69%, K₂O between 11-7% and Na₂O between 1.5-2%. The grade of Quartz from Bhiknoor region has SiO₂ in between 99-98% and is Milky and Semi glassy in appearance. Mining is being carried out from this sector since a decade and the mined out material in Lumps as well as Processed Form (Powder) is being exported to various countries like Vietnam, Indonesia, China, Iran, South Korea, Malaysia, Indonesia, Bangladesh and Turkey and also utilized domestically by RAK Ceramics, Aparna Ceramics, Johnson & Johnson Company, H &R Johnson, Silica Ceramics, Sentini Ceramics, Chettinad Industries in Ceramic, Glass, Ramming Mass and Cement Industries.

REFERENCES