

Influence and Interrelation of dykes on the Quartz and Feldspar deposits around Bhiknoor Region, Kamareddy District, Telangana State

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Abstract

Bhiknoor Region in Kamareddy District, Telangana State, is endowed with a variety of Mineral Resources, the prominent ones being, Quartz and Feldspar minerals. Being rich in Alkalis (K_2O+Na_2O in the range of 13- 14%) and having lower Fe_2O_3 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. 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. As per the information gathered from the Assistant Director of Mines and Geology, Kamareddy (Table 1), there are about 6 Working Mines of Quartz and Feldspar and a number of Quarry Lease/Mining Lease Applications, for Quartz and Feldspar minerals, indicating a huge demand for Quartz and Feldspar Minerals from this sector. Various Organizations, both Government (TSMDC – Telangana State Mine Development Corporation) and Private Entrepreneurs like Gimpex-Imerys Inida Private Limited, Trimex Industries Private Limited, Sibelco Asia Private Limited, Ceramin Inida Pvt.Ltd (A unit of RAK Ceramics), etc have been actively engaged in Mining, Prospecting, Exploitation and Exploration of Quartz and Feldspar Minerals in Bhiknoor Region. Although there are various indicators for locating Quartz and Feldspar Minerals, including Geo botanical guides, studies reveal that the most prominent indicator being, occurrence of Basic dykes (Intrusive) in the vicinity of all the Feasible - Quartz and Feldspar Mines, thereby acting as Geological guides, for identifying new Quartz and Feldspar Mines in this sector.

Keywords: Bhiknoor Region; Basic dykes; Quartz; Feldspar; Ramming Mass: Geological Guides.

1.0 Introduction

Bhiknoor Region is located between North Latitudes $18^{\circ}08'00''$ and $18^{\circ}14'00''$ and East Longitudes $78^{\circ}20'00''$ and $78^{\circ}29'00''$ in the Survey of India, Topographic map No.56 J/8 (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, Konapur, Lingampally. 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 (Fig 2).

2.0 Result and discussion:

Economically viable Quartz and Feldspar Minerals are being extensively prospected, in and around Rameshwarapally, Thippapur, Peddamallareddy, Baswapur, Konapur, Lingampally, Mallupally,

Malthummeda and Vellutla. Emphasis is made here, for identifying the influence and interrelation of dykes, on the Quartz and Feldspar deposits, pertaining to Bhiknoor region. It has been observed that the Basic intrusives/dykes, mostly of doleritic composition and a few of Gabbroic composition, trending N-S, ENE-WSW and NW-SE, intrude into all the pre-existing rock types, mostly Tonalite/Granodiorite/Adamellite and these basic dykes are found predominantly around all the Feasible Working mines of Quartz and Feldspar Minerals.

Table 1: Statement Showing the List of Working- Quartz and Feldspar Mines, , Kama reddy, Telangana State

Sl. No.	Name of the Lease Holder	Location			Extent in Hects		Lease Period
		Sy.No.	Village	Mandal	Govt.Land	Patta.Land	
1	Sri B. Jagan Mohan Reddy	271/4, 5,6	Rameshwarpally	Bhiknoor		2.300	22-5-2002 to 21-05-2022
2	Sri B. Jagan Mohan Reddy	753	Thipapur	Bhiknoor		2.146	01-12-2003 to 30-11-2023
3	M/s. Trimax Industries (P) Ltd	994	Paddamallareddy	Bhiknoor	3.200		23-7-2003 to 22-07-2023
4	Sri Jangam Boranna	188	Lingampally	Lingampet	2.330		10-11-2006 to 09-11-2026
5	Sri G. Chandrashekar	38	Malthummeda	Nagireddypet	6.680		31-10-2005 to 30-10-2025
6	K.Srinivas	835/1	Vellutla	Yellareddy			28.06.2017 to 27.06.2037



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

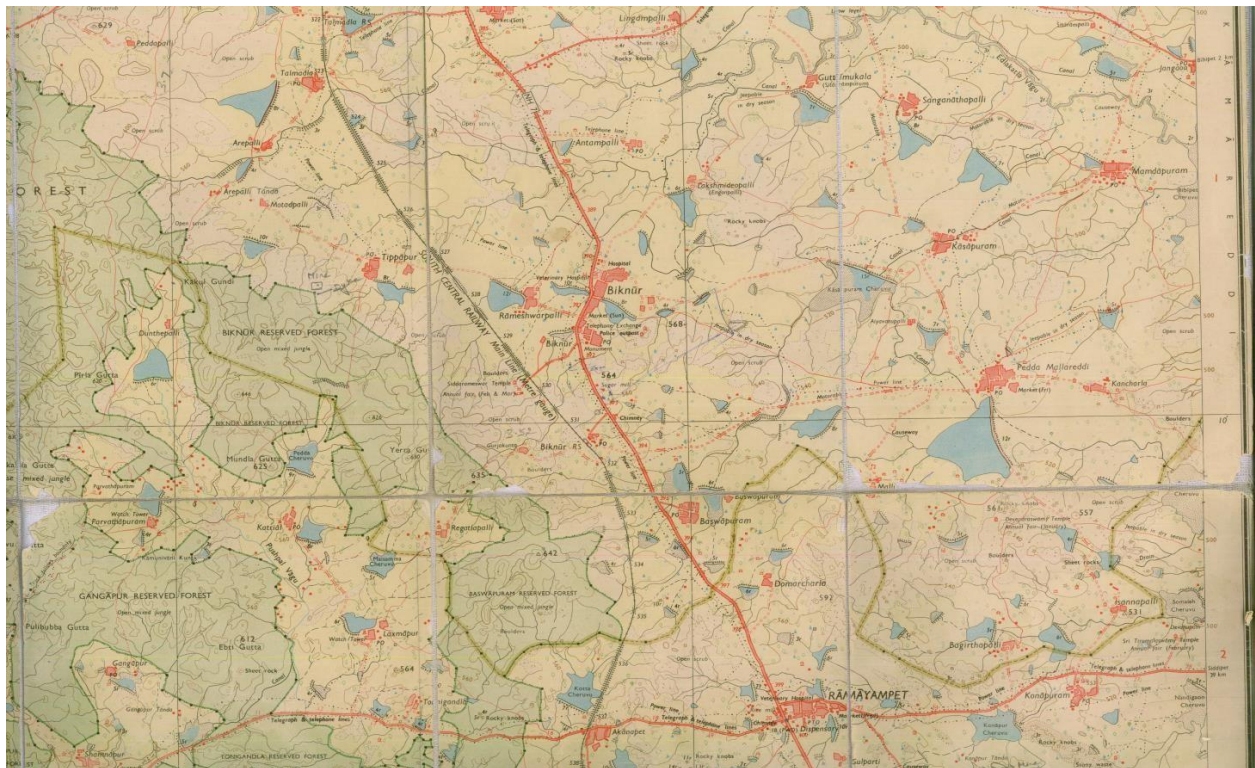


Figure (1b): Topographic Map (56 J/8) of Bhiknoor Region on a scale of 1:50,000

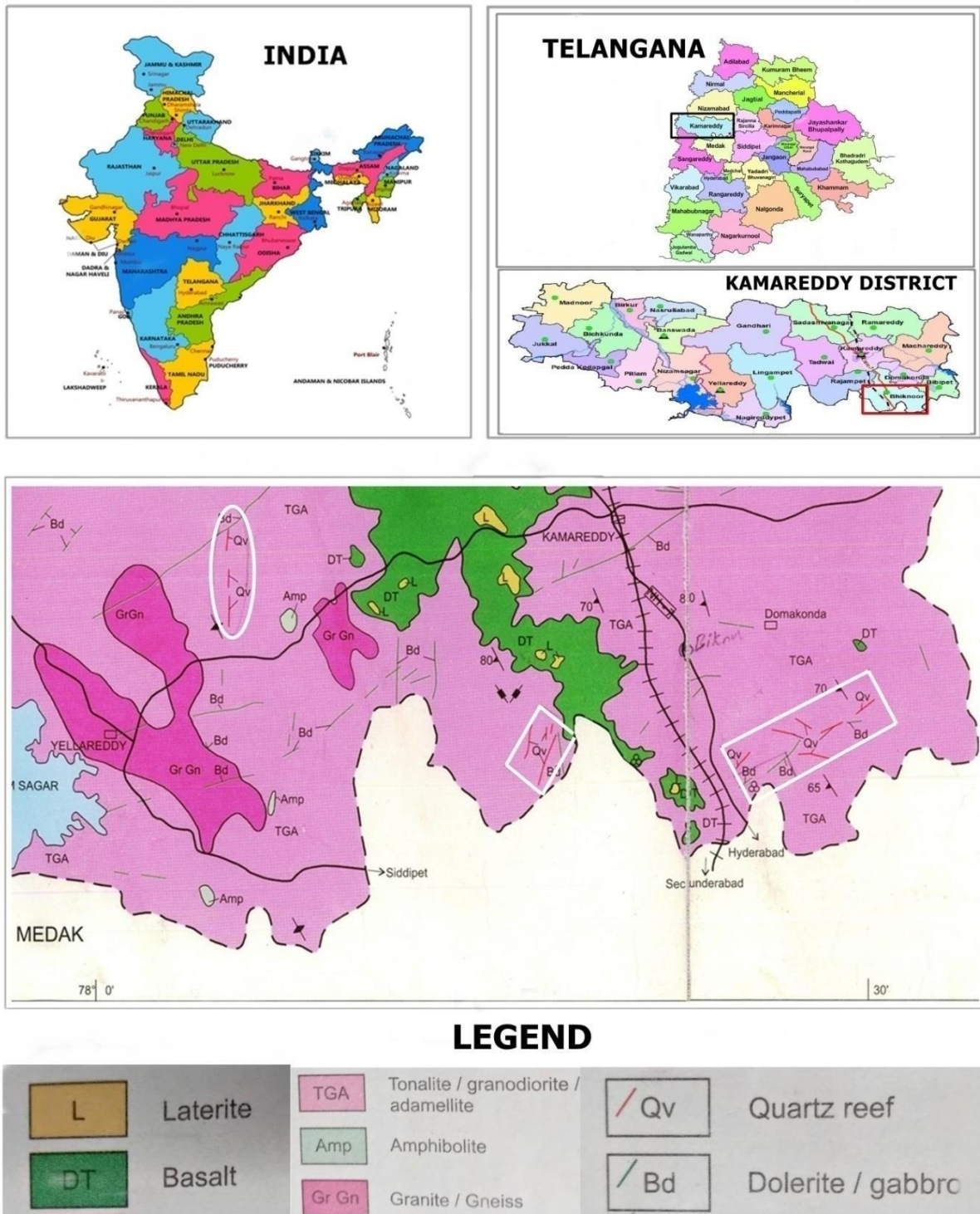




Figure 2: Inset -  shows the location of Bhiknoor Region. Geological Map of Bhiknoor Region with specific reference to the Dykes (Bd) and Quartz veins (Qv) marked (). As observed, Dykes are noticed, occurring, mostly parallel to the Quartz veins.

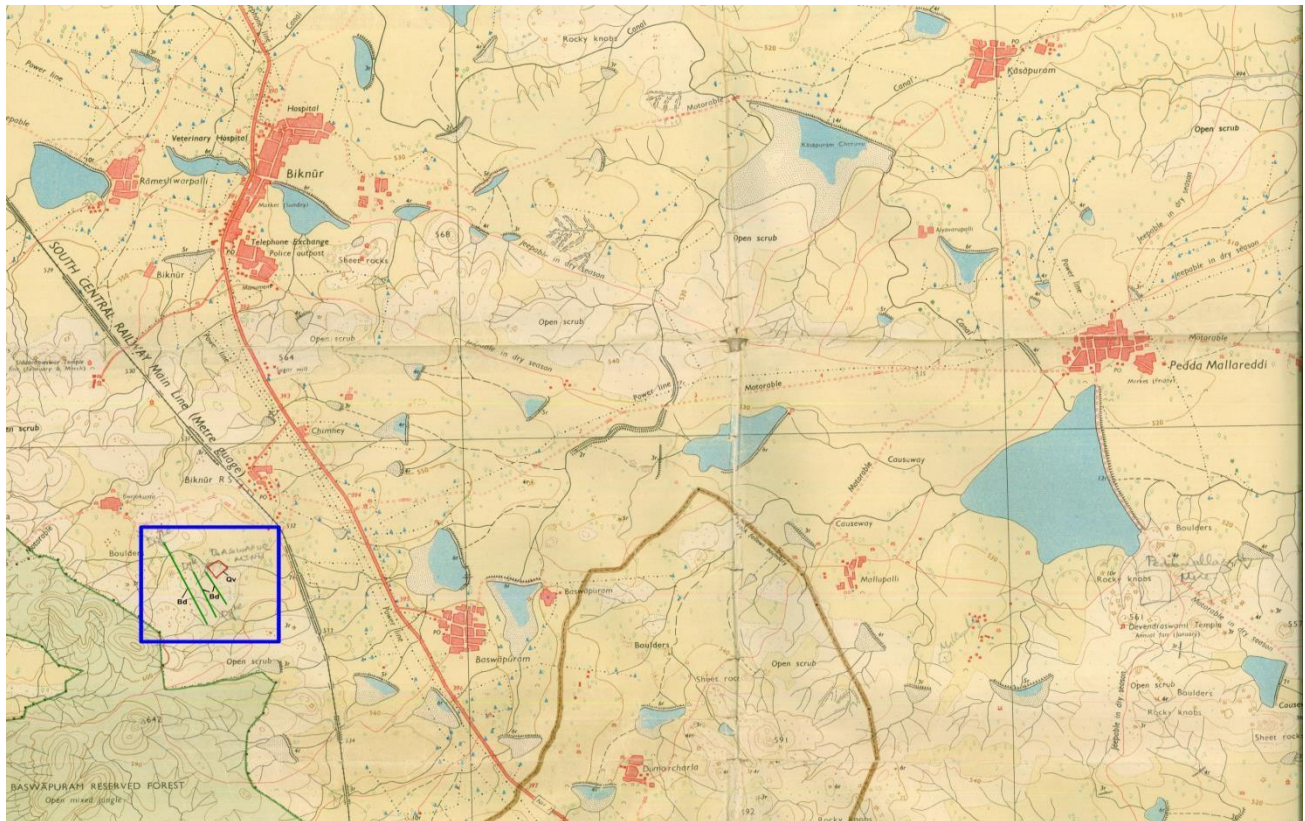


Figure 3: Topographic Map (56 J/8/NE) of Bhiknoor Region on a scale of 1:25,000. Inset () shows a portion of the study area (Baswapuram- N 18° 09' 19.3", E 78° 23' 52.7") with the adjacent dykes (N 18° 09' 17.9", E 78° 23' 43.7", N 18° 09' 22.0", E 78° 23' 49.1", N 18° 09' 31.7", E 78° 23' 38.0").



Figure 4: Exposure of Dolerite Dyke in Bhiknoor Region (N 18° 09' 17.9", E 78° 23' 43.7"), very close to the existing Quartz and Feldspar Mine.

Geological Succession of Bhiknoor Region with specific reference to the Basic Intrusives (Bd) and Acidic Intrusive (Qv), both of Lower Proterozoic age:

ERA	INTRUSIVES	LITHOLOGY
PLEISTOCENE		Laterite (L)
UPPER CRETACEOUS TO LOWER EOCENE	Deccan Trap (DT)	Basalt
LOWER PROTEROZOIC	Acid Intrusive Basic Intrusive	Quartz and Feldspar Reef (Qv) Dolerite/gabbro (Bd)
ARCHAEAN TO LOWER PROTEROZOIC		Tonalite/Granodiorite/ Adamellite
ARCHAEAN	Dharwar Super Group	Amphibolites
	Peninsular Gneissic complex	Granite/Gneiss

Geology of the Bhiknoor Region with specific relation to the Dykes of that 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 (**Fig 2**). The Gneisses which are banded and streaky comprise Tonalite, Trondijhemite 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 of lower Proterozoic age, trend N-S, ENE-WSW, NE-SW and NW-SE and intrude into all the pre-existing rock types.

Dykes and their interrelation with Bhiknoor Region - Quartz and Feldspar

Deposits:

A wide range of studies have been carried out in the Bhiknoor region, on the existing dykes, for understanding the influence and interrelation of dykes on the surrounding Quartz-Feldspar Mines. These studies include

- Identifying/Mapping the Strike direction of the exposed Dykes, as well as the adjacent Quartz- Feldspar veins.
- Collection of samples, for establishing the Age aspect of the Quartz-Feldspar veins and the surrounding Dykes.
- Remote sensing studies and Chemical Analysis Studies, further indicate that, there exists a concurrent relationship between the dykes and the Quartz- Feldspar deposits of Bhiknoor region.

As can be observed from the existing Quartz and Feldspar Mines, the strike direction of the existing Quartz - Feldspar deposits vary from N-S, NE-SW, ENE-WSW to NW-SE. The Strike direction of most of the adjacent dykes are almost matching with the strike direction of the existing Quartz-Feldspar deposits of Bhiknoor Region (**Ref Fig 2**).

Mafic dykes are episodic and widespread in Bhiknoor region and represent important strain and time markers. They show a wide span of igneous intrusion events, between 2500 Ma to 1500 Ma. As per the available isotopic data, most of the basic dykes of Bhiknoor region, fall within the Age range of 2200 Ma to 1700 Ma. The other important point is that Meso-proterozoic and younger dykes, have not been reported from this region, indicating that dykes from this region, are almost in concurrence with the Quartz and Feldspar deposits of this region.

Remote sensing studies of Landsat, Aerial photograph interpretation and field observations, reveal, that dykes are acting as Geological indicators for prospective/workable deposits of Quartz and Feldspar. One of the reasons being, both Dykes and Quartz- Feldspar deposits belong to Lower proterozoic age.

A set of parallel, brittle to ductile NW-SE (**Fig 2**) trending sinistral shear zones, within the Tonalite/ Granodiorite/ Adamellite, reveal many tectonic events, which are closely associated with Basic intrusives. It has also been inferred, that the dyke emplacements, have been correlated with the Pegmatite intrusions at the sinistral shear zones and basement fabrics. The mechanism of emplacement of these dykes in the Quartz and Feldspar deposits is dilatational via brittle crack filling, related to the periodic extensional tectonics that affected the Peninsular Gneissic Complex. These dykes show lesser degree of crustal contamination. These dykes are massive and are mostly doleritic in composition excepting a few, which are gabbroic. These dykes are dark grey, dark greenish grey (or) black coloured. They are mainly tholeiites, characterized by silica rich and low - K₂O, Na₂O and MgO content. A typical Chemical Analysis of Dyke from this region is given below (**Table 2.0**).

S.No	Composition of ROCKS	Percentage
1	SiO ₂	45.44
2	Feo	17.45
3	Al ₂ O ₃	15.34
4	CaO	11.41
5	MgO	3.34
6	Na ₂ O	2.34
7	K ₂ O	0.63
8	TiO ₂	1.05

Table 2.0 : Typical Chemical Analysis of a Dyke sample (N 18° 09' 17.9", E 78° 23' 43.7") collected from Bhiknoor Region Area.



Figure 5: 1) View of the exposed Dyke in Bhiknoor Region. 2) Observing the orientation of the exposed Dyke, and 3) GPS Co-ordinates ($N 18^{\circ} 09' 17.9''$, $E 78^{\circ} 23' 43.7''$), of the exposed Dyke by Garmin make GPS, in WGS-84 Datum Plane.



Figure 6: 1) Dyke exposure near a Mine (Baswapuram) with readings (N 18° 09'18.7", E 78° 23'46.6"), depicted in Inset (scale: 20 cm Hammer) 2) GPS Reading (N 18° 09'31.7", E 78° 23'38.0", Datum- WGS-84, Garmin) of another exposed Dyke. 3) Dyke with Quartz and Feldspar Floats. 4) Closer view of the nearby Feldspar and Quartz Mine (N 18° 09'19.3", E 78° 23'52.7").



Figure 7: 1) Capturing the Strike and GPS Reading of the exposed Dyke in Bhiknoor Region area (Near Konapur Village) 2) GPS Reading (N 18^o 06'15.3", E 78^o 27'52.2", Datum-WGS-84) of the exposed Dyke. 3) Exposed Quartz vein near the above Dyke 4) GPS Reading (N 18^o 06'28.4", E 78^o 28'01.6", Datum- WGS-84) of the exposed Quartz Vein.



Figure 8: 1) Dyke Outcrops near a Virgin Mine (Thippapur) 2) GPS Readings (N 18^o 11'27.5", E 78^o21'25.8", Datum-WGS-84) of the exposed Dyke. 3) Dyke with the adjacent Quartz Outcrops/Vein. 4) Closer view of the Quartz outcrops (N 18^o 11'27.9", E 78^o 21'24.8"), in Thippapur.

Google Earth Maps of Bhiknoor Region Dykes and Quartz-Feldspar Mines:

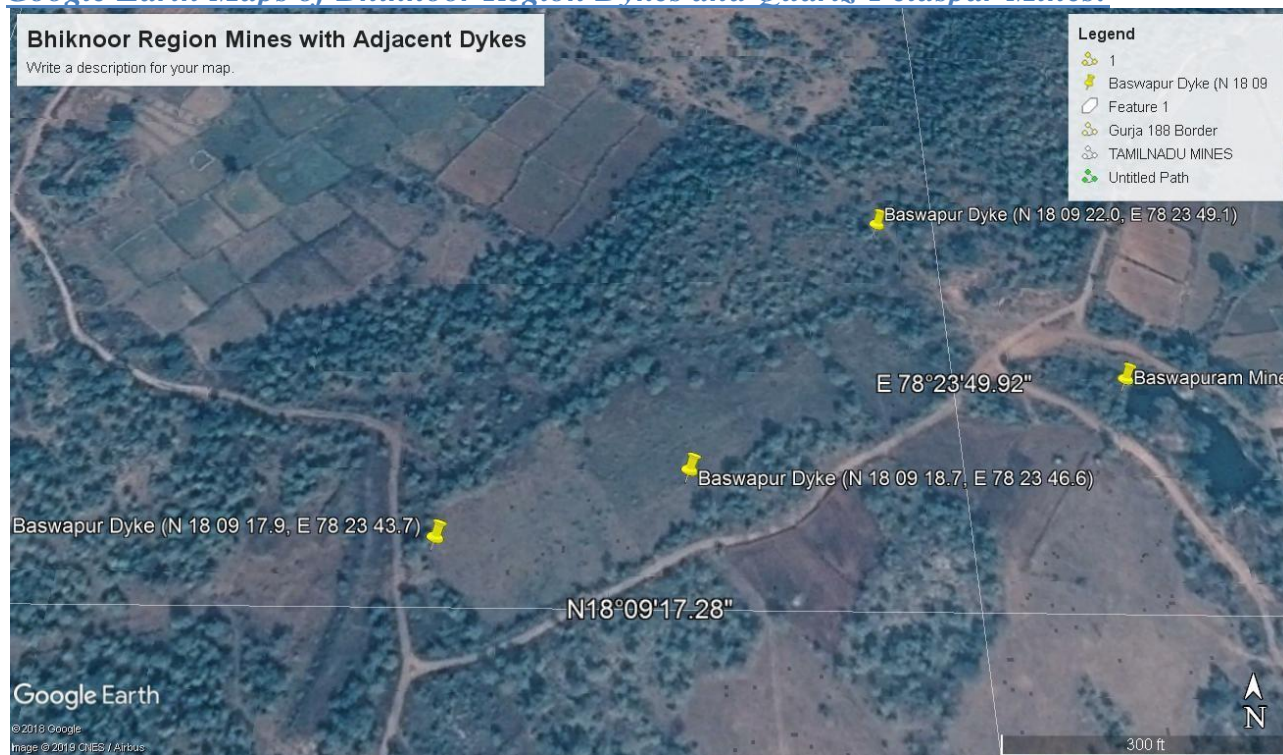


Figure 09: Google Map of a Bhiknoor Region Mine (Baswapur) with Adjacent Dykes marked.



Figure 10: Closer view of Quartz and Feldspar Mine at Thippapur (N 18^o 11'27.9", E 78^o 21'24.8") with the adjacent dyke (N 18^o 11'27.5", E 78^o 21'25.8").

3.0 Conclusions:

Bhiknoor Region in Kamareddy District, 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, Konapur, Malthummeda and Vellutla villages, is endowed with a variety of Mineral Resources, the prominent ones being Quartz and Feldspar minerals. There are number of economically viable working Mines of Quartz and Feldspar around Bhiknoor Region. Various Government Organizations and Private Entrepreneurs have been actively engaged in Mining, Prospecting, Exploitation and Exploration of Quartz and Feldspar Minerals in Bhiknoor Region. Although there are various indicators for locating Quartz and Feldspar Minerals, the most prominent indicator being, occurrence of Basic dykes (Intrusive) in the vicinity of all the Feasible Quartz and Feldspar Mines, thereby acting as guides for locating new Quartz and Feldspar Mines in this sector. A wide range of studies, ranging from Strike direction, Isotopic studies, Chemical Analysis data and remote sensing studies, indicate a close relation between the dykes and Quartz- Feldspar deposits of Bhiknoor region. The trend of the existing Quartz and Feldspar deposits vary from NE-SW, ENE-WSW, N-S and NW-SE, which is almost matching with the Strike direction of the adjacent dykes. Apart from the strike direction, as per the available Isotopic data, the Basic (Dykes) and Acidic Intrusives (Quartz and Feldspar veins) fall within the age range of 2200 Ma to 1700 Ma. Also the dykes from this region are mainly tholeiitic, characterized by silica rich and low - K₂O, Na₂O and MgO content. Further, Remote sensing studies of Landsat, Aerial photograph interpretation and field observation, reveal that the dykes in Bhiknoor region are closely related to the Quartz and Feldspar deposits of that region. By taking into consideration, all the above factors, it can be assumed, that Dykes occurring in Bhiknoor region, act as Geological Indicators, for locating/Identifying, new prospective areas, for economically viable, Quartz and Feldspar deposits, which have a high potential market in domestic and International Sectors.

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