

## KIMBERLITES OF KARNATAKA\*

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### EXTENDED ABSTRACT

The world was introduced to diamonds by South India, which provided many a celebrated diamond like the Great Moghul (787 ct), the Koh-i-noor (186 ct), Pit/Regent (410 ct), Nizam (440 ct), Hope (67 ct), Orloff (300 ct), Darya-i-noor (185 ct) to name a few. Indian diamond industry reigned supreme in the historic past till the discovery of diamonds from Brazil in 1725. Today it is a major foreign exchange earner for the country to the tune of Rs.18,000 crores annually, solely because of its highly skilled manpower in lapidary industry, whose existence depends largely on imported rough diamonds.

To meet the heavy demand of the lapidary industry, Geological Survey of India (GSI) initiated and persisted with the exploration of diamonds since 1960 in Andhra Pradesh and 1993 in Karnataka. These efforts resulted in the discovery of a large number of kimberlites/lamproites, the primary source rocks of diamond and creation of a large database on various facets related to primary, secondary and tertiary source rocks.

The South Indian Diamond Province (SIDP) falling mostly in Andhra Pradesh, and adjoining parts of Karnataka, is endowed with both primary and secondary diamond resources. The known kimberlites are distributed in two major fields – namely the Wajrakarur kimberlite field (WKF) and the Narayanpet kimberlite field (NKF) within the granite-greenstone terrain of the Eastern Dharwar Craton. The lamproites are distributed in two fields – namely the Nallamalai fold belt of Cuddapah basin and the Jaggayyapeta lamproite field within the Peninsular Gneissic Complex (PGC).

Most of the kimberlite pipes, reported so far in Wajrakarur kimberlite field, are diamondiferous. In the Narayanpet kimberlite field, 35 kimberlites have been located of which 25 are in Andhra Pradesh and 10 in Karnataka; 15 pipes, including two pipes from Karnataka of the NKF, were tested and no diamonds were recovered from any of these pipes so far.

In the course of the systematic geological mapping by

the Geological Survey of India in the Mahboobnagar district of Andhra Pradesh, during 80s and early 90s, a few kimberlites were discovered. These discoveries opened up new vistas to search for the kimberlites away from the previously known Wajrakarur kimberlites. Multidisciplinary surveys employing remote sensing techniques of aerial photo-interpretation and satellite imageries, structural analysis, stream sediment surveys and detailed ground surveys helped in locating a number of kimberlite bodies in the western part of Mahboobnagar district of Andhra Pradesh and adjoining parts Gulbarga district of Karnataka, thus bringing the State of Karnataka on to the kimberlite map of India.

In Karnataka, the officers of GSI, Operation Andhra Pradesh discovered five kimberlites (NK-7 to 10 and BK-1), during Field Season 1995-96. Subsequently, operations Karnataka and Goa, has taken up the programme of the search for kimberlites resulting in the discovery of BK-2 (Bewanahalli kimberlite) and BK-3 (Shivapur kimberlite) mainly based on kimberlite indicator minerals obtained in the stream sediments. Further investigations during subsequent field seasons resulted in locating three more kimberlite bodies, BK-4 (Yagapur kimberlite), BK-5 (Goudagera Tanda kimberlite) and BK-6 (Sutar Hosahalli kimberlite) in Yadgir area. All the kimberlites are located along E-W lineaments at their intersections with NW-SE faults except BK-5, which was located in the vicinity of N-S and NE-SW trending faults, and away from the rest of the kimberlites. Thus, the survey carried out in the granitic terrain of Gulbarga district have brought out a total of 10 kimberlite occurrences in the westward continuation of the Narayanpet kimberlite field (NKF).

Most of the Gulbarga kimberlites are emplaced into T.T. gneiss and granite in two clusters, viz. (i) Narayanpet cluster – 4 kimberlites (NK-7 to 10) and (ii) Bhima cluster - 6 kimberlites (BK-1 to 6). These are very small bodies except BK-5, which measures 270 m in length (NNW-SSE) and 100 m in width and covers an area of

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about 2.7 hectares. In addition, nine small isolated occurrences, eight towards north and one towards south, are found to occur near the BK-5 kimberlite.

The Gulbarga kimberlites include both hardebank and yellow ground varieties. The hardebank kimberlites are melanocratic (steel grey to black), hard, compact with phenocrysts of olivine, ilmenite and phlogopite and a few crustal xenoliths. The yellow ground variety is yellowish green in colour, soft, friable, highly weathered and carbonated and has characteristic kimberlitic calcrete cover over most of the hidden bodies.

Clinopyroxene (chrome diopside) is the dominant indicator mineral present in all the kimberlites. Other kimberlite specific minerals include ilmenite (Mg and Mn-rich), chrome spinel, phlogopite, garnet, etc. Garnet is very rare. Hardebank kimberlites (NK-8,9 and 10) are potassic ( $K_2O > Na_2O$ ), analyse higher MgO (>20%) and moderate CaO around 12% and are undersaturated. The altered rocks analyse very high CaO and low MgO.

Taking historical and cultural data as a clue and the geology of the area into consideration, GSI initiated a programme of searching for kimberlites in Raichur area during Field Season 2000-01. This has proved fruitful by the discovery of a few kimberlites from a new area, away from the known Wajrakarur and Narayanpet kimberlite fields. The first kimberlite RK-1 (Undraddoddi kimberlite) was located at about 15 km SE of Raichur. Subsequently, two more kimberlite bodies were located, one near Mettimalkapur (RK-2), 9 km SSE of Raichur and Maliabad kimberlite (RK-3) at about 6 km south of Raichur.

All the three kimberlites (RK-1, RK-2 and RK-3) are found in dug well sections, falling on an E-W lineament, highly weathered and altered, capped by 1-2 m thick calcrete. All the bodies trend in WNW-ESE direction. Undraddoddi kimberlite (RK-1) is the largest of the kimberlites so far discovered in Karnataka, having dimension of about 700 m in length and 190 m in width. Mettimalkapur and Maliabad kimberlites are of smaller dimensions, measuring about 110 x 80 m and 150 x 75 m respectively. All the kimberlites contain autoliths and differ in their colours, alteration, mineralogy and indicator minerals. The kimberlites are greenish yellow (RK-1), bluish grey (RK-2) or yellowish

green (RK-3) in colour. RK-1 and RK-2 contain crustal xenoliths, mostly metasomatised granites. RK-1 is characterised by the abundance of indicator minerals, such as chrome spinel/chromite, chrome diopside and garnet of almandine variety. RK-3 is rich in phlogopite and contains Mn-rich ilmenites. RK-2 is very poor in indicator minerals and probably represents a highly evolved kimberlite.

The Raichur kimberlites are located almost midway between the known kimberlite fields, about 100 km north of WKF and 75 km south of NKF. The officers of Operations Andhra Pradesh have discovered a cluster of three hardebank variety kimberlite (SK-1, SK-2 and SK-3) during the Field Season 2001-02. The three kimberlites are located towards north of Siddampalli, 22 km east of Raichur and 10 km NE of Undraddoddi, in the adjoining district of Mahboobnagar in A.P. These six kimberlites together may probably constitute a separate kimberlite field distinct from WKF and NKF.

There are reported occurrences of stray diamonds from villages around Raichur and their source is not known. Incidentally Maliabad kimberlite is located at about 3 km east of Aralibench, the place inferred by Shakuntala and Krishna Brahmam (1984) to have had diamond mines in the historic past.

The new kimberlite discoveries in Raichur and adjoining Mahboobnagar district have opened up new vistas in kimberlite exploration and possibility of locating more kimberlites in the area.

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