DETAILED PROFILE OF KEY MINERALS OF ANDHRA PRADESH

I. DIAMOND

Diamond, an allotriomorphic form of carbon, is the hardest of all the known minerals. Gem diamonds are used for ornaments and the off coloured diamonds in lepidary and other industry. In Andhra Pradesh, diamond-bearing formations are extensive and found mostly in the drainage basins of the Krishna and Penna Rivers. Ancient mining in the Quaternary river gravels and Late Proterozoic conglomerates was prevalent in different parts of the state and the rocks had produced many of the historically world famous diamonds viz. the Koh-inoor, the Great Mogul, the Orloff, the Regent, the Hope and the Pitt. The primary source rocks for diamond, namely, kimberlite and lamproite of Late Proterozoic age and the secondary source rocks, conglomerates (Late Proterozoic) and river gravel (Quaternary) are spread over large tracts. Kimberlite pipes are found in Wajrakarur Kimberlite Field in Anantapur District and Narayanpet Kimberlite Field in Mahbubnagar District and Raichur Kimberlite Field in Raichur (Karnataka) and Mahbubnagar districts, whereas, lamproite intrusions occur in the Nallamalai Field in the eastern part of the Cuddapah Basin. Diamondiferous conglomerates are found (i) in the Cumbum pebbly sandstone (Nallamalai Group) but restricted to Kolluru area in Guntur District (ii) associated with the Banganapalle Quartzite occurring over 240 km along the western margin of the Kurnool Basin and 120 km in the Palnad Basin and (iii) associated with Jurassic and Mio-Pliocene sandstones in Krishna District. The Quaternary gravels are found mostly along the banks of Krishna, Penna and Sagileru rivers.

Anantapur District

Wajrakarur in the District is well-known for diamonds. Old mining activity is known from this area. Till now, a total of 29 kimberlite bodies (pipes/dykes) have been discovered in Wajrakarur Kimberlite Field (WKF) spread over 80 x 70 km area. The kimberlite occurrences are located around Wajrakarur, Lattavaram, Anumpalle, Venkatampalle, Muligiripalle, Timmasamudram, Kalyandurg, Gollapalle and Chigicherla. Out of all the pipes, 26 have been explored by GSI and majority of them are found to be diamond bearing.

The P-15 kimberlite dyke (30m x 190m) discovered recently is located at about 300m north of P-2 kimberlite body of Wajrakarur-Lattavaram cluster, WKF. Microdiamonds were recovered from the heavy concentrates of stream sediments from Pottipadu area.

The largest diamond recovered so far weighs 16.30 carats from Pipe-10 at Venkatampalle. However, diamonds weighing up to 90 ct. have been reported by the villagers in different parts of the WKF.

Timmasamudram kimberlite cluster forms apart of WKF. Out of the six kimberlite bodies discovered (TK-1, TK-2, TK-3, TK-4, TK-5 & TK-6), TK-4 kimberlite is diamondiferous and yielded 507 diamonds weighing 133.13 carats from about 208 tonnes of kimberlite material, indicating the grade to be 64 carats per hundred tonnes. The largest diamond recovered is 4.37 ct, and the average size of the diamond is 0.26 ct. Most of the diamonds are of gem quality. Peruru block of Anantapur district is the southern continuity of the Timmasamudram block where diamond occurrences from gravel are reported from the areas around Nutimadugu and Ralla Anantapuram.

Three kimberlites are located by GSI within the Anumpalle Cluster namely P-10, P-11 and P-12. Four more kimberlites were added by CREAI, they are 3-055 (7.5 ha), 3-021 (0.4 ha), 3-016 (22 ha) and 3-008. All these kimberlites were proven to bediamondiferous by caustic fusion analysis. The 3-
Kimberlite is located within an E-W trending mylonite shear zone within the Peninsular Gneisses and occurs 650 metres to the north west of P-10 (Anumpalle) kimberlite. The kimberlite is overlain by 4-5 metres of alluvium and colluvium. The 3-016 kimberlite is actually a complex dominated by outcropping and sub cropping granitoid breccias with lesser shoots of kimberlite breccia and a Sovite (Ca Carbonatite) stock. The 3-021 kimberlite is very similar to the 3-016 kimberlite both petrologically and also in disposition. The 3-021 kimberlite is located 1 km northeast of P-11 kimberlite and 3.5 km WSW of P-10 kimberlite. The 3-008 kimberlite is located 1.8 km east of P-10 kimberlite and is interpreted to comprise a series of narrow kimberlite stringers.

The Brahmanpalle cluster is currently defined by a single kimberlite namely B1 located approximately 12 km to the northeast of Kalyandrug cluster of kimberlites. The 0.6 ha B1 kimberlite intrudes a NE trending shear zone defined by chlorite schists and sheared ultramafics within the granitoid gneisses of the Archaean Peninsular Gneiss Complex. It is represented by multiple hypabyssal intrusives differentiated on the basis of variable macrocryst, xenolith and xenocryst content and the occurrence of segregation textures.

**Cuddapah District**

Old workings for diamond are known from the Penna gravels occurring at Chenur, Kanuparti, Kondapeta and east of Jammalamadugu. The gravels were deposited over the Kurnool/Cuddapah rocks.

**Guntur District**

Historically famous Koh-i-noor and other diamonds are reported to have been recovered from Kolluru, located on the right bank of the Krishna River. Ancient workings are found in the terrace gravels and Cumbum pebbly sandstone. Jean Baptist Tavernier, a French traveller, recorded that about 60,000 people were working for diamonds in Kolluru area during his visit in 17th century. Besides Kolluru, extensive workings are found in the terrace gravels in Mallavaram area downstream of Nagarjunasagar. Besides, Banganapalle conglomerate, the lower part of which was diamondiferous also occurs in this area. Virgin gravel patches are found in Bodanam-Chityala area.

**Krishna District**

Famous ancient workings for diamond are seen at several places in the terrace gravels close to the left bank of the Krishna River. Prominent among them are at Paritala, Battinapadu, Kodavatikallu, Patempadu and Ustapalle. GSI investigated a few blocks in these areas and established diamondiferous nature of the gravels but the diamond content is generally poor. About 18 Mt of diamondiferous gravel was established in Veladikottapalem area. The thickness of gravel in this area is nearly 4 m. The overburden, comprising alluvium and silt is 1 to 6 m thick and it is more at a few places.

A total of 27 major lamproite bodies located in 12 clusters are reported from Krishna and Nalgondadistricts. These clusters are designated as “Krishna Lamproite Field” (KLF) and the clusters are located around Ramannapeta, Peddavaram, Vedadri, Pochampally, Jayanthipuram, Gopinenipalem, Tirumalagiri, Anumachapalli, Sher Mohammadpeta, Ramapuram, Nallabandagudem and Reddi kunta. Thelamproites occur mostly as dykes and volcanic necks/plugs and exhibit rare, diverse and complex mineral assemblages and textures with varying proportions of diopside, leucite, phlogopite, richterite, olivine, enstatite and sanidine. The KLF lamproites, in general are fine grained and typically vesicular. No diamond was recovered from 15 tonnes of lamproite material collected and processed from Vedadri and Nallabandagadem lamproites. However, further exploratory work is
required to locate the deep seated lamproite bodies present if any in the area. Besides, old workings for diamond are found in the Quaternary gravels and sandstones of Gollapalle (Jurassic) and Rajahmundry (Mio-Pliocene) Formations of Malavelli area to the north east of Vijayawada.

**Kurnool District**

The Tungabhadra Kimberlite Field discovered recently is located about 25 km south of Raichur Kimberlite Field (RKF). There are seven pipes MNK-1 and MNK-2 in the Mantralayam cluster and CG-1, CG-2, CG-3 and CG-4 in Chagapuram cluster. The Naddigadda Malkapur Kimberlite (MNK-2) in Emmiganur area is a highly weathered kimberlite measuring 450m x 370m in dimension and is covered mostly by thick black soil. Textural characteristics indicate that it represents diatreme facies kimberlite with a geochemistry comparable with that of the kimberlite of Wajrakarur Kimberlite Field (WKF).

Old workings for diamond are found extensively in the basal conglomerate of the Banganapalle Quartzite. Two prominent conglomerate belts wherein major workings are found are (i) 30 km long Banganapalle-Nereducherla belt and (ii) Ramallakota–Yambayi belt. Important areas are Banganapalle, Vajragiri, Munimadugu, Racherla, Gattimanikonda, Ramallakota, Balapuram, Pendekallu, Virayapalle, Yambayi and Tammarajupalle. The NMDC carried out assessment of diamond grade of the conglomerates in the Ramallakota-Yambibelt during 1968-71 and the GSI in the Banganapalle-Nereducherla belt during 1980-87. The conglomerate is generally between 1 and 50 cm, average being 10 cm. Exploration carried out in selected blocks of the Banganapalle-Nereducherla belt indicated that the diamond grade is 1 to 3 ct/100 t, and conglomerate resource of 3.64 Mt. Similar grades were obtained by the NMDC in Ramallakota area. The gravels along the banks of the Krishna River at Panchalinga, Marugutti, etc. were worked in the past. Old workings are also known in Basavapuram area, at the base of the Nallamalai range in the Kundair valley and at Laxmipuram along the banks of the Hindri River, a tributary to the Tungabhadra. Neoproterozoic lamproite dykes, emplaced into the Meso-Neoproterozoic Cumbum Formation are prominently found along WNW-ESE to NW-SE trending enechelon fractures in Chelima area and also at Pachcherla and Zangamarajupalle in Prakasam district and are included in the Chelima Lamproite Field. Prominent old workings (5 to 15m wide and > 30m deep) are recorded, presumably for diamond at Chelima. Diamonds are also reported from the gravels of the Sagileru and Kundair rivers, both draining the Chelima and its adjoining area.

**Nellore District**

Terrace gravel flats extending over 35 km from Somasila to Sangam are reported to contain a few old workings for diamond at Challapalle, Uppalapadu and Battipadu.

**Prakasam District**

Extensive gravel deposits are found all along the Sagileru Valley and old workings in the surface gravels over 40 km between Giddalur and Porumamilla around Kalasapadu, Adimurtipalle, and Sanjivaraopet. These gravels were derived from the Nallamalai hill range. A few gravel samples tested by the GSI established the diamondiferous nature of the gravels.