

Closing Report on Reconnaissance Permit  
G. O. Ms. No. 77, Andhra Pradesh

Report for the period  
20/09/01 to 22/07/04

*Am...  
...  
AP  
2*



*6 PL's Applied  
over an area  
of 227 sq. km*

In terms of the relevant legislation, the information reported in this document is to be kept strictly confidential by the Andhra Pradesh State Government for a period of two years from the date of expiry of the license.

1035  
27-10-04

Geological Mapping Cell

*26.10*



DE BEERS INDIA PRIVATE LIMITED

17/6 Ali Askar Cross Road, Bangalore 560 052, Karnataka, India

1721-Approved  
(Area)  
**Closing Report on Reconnaissance Permit  
G. O. Ms. No. 77, Andhra Pradesh**

Report for the period  
20/09/01 to 22/07/04

**1. Reconnaissance Permit Status**

The RP is of 1,635 km<sup>2</sup> in extent and was executed at Kurnool on 20<sup>th</sup> September 2001. As per rule 7(i) (a) of MCR 1960 50% of the area (817.5 km<sup>2</sup>) has been relinquished on 24<sup>th</sup> September 2003. As per the conditions of RP, the tenure of the permit expired on the 22<sup>nd</sup> July 2004 (Map 1).

✓ As per Government of India Rules and Regulation MCR 1960 Rule 7(1) (i) (b), six Prospecting Licenses of total 207 km<sup>2</sup> were applied (Map 2), on 22<sup>nd</sup> July 2004.

**2. Geology and Geomorphology**

The eastern portion of the RP is underlain by Proterozoic sediments of the Cuddapah and Kurnool Supergroups overlying Archaean basement of the East Dharwar Craton, which comprises part of the Peninsular Gneiss Complex and is exposed towards the west (Map 3).

The Cuddapah sequence comprises a thick pile (up to 12 km) of clastic and chemical sediments with minor volcanic units (Ramam and Murty, 1997). It is intruded by picritic and gabbroic sills and dykes. The sediments have been dated at Middle to Late-Proterozoic and have been termed 'Purana Basins' indicating cratonic Proterozoic sedimentary basins. However, these ages are poorly constrained. Rb/Sr dating of sills indicate a maximum age of 1800 Ma in the Lower Cuddapah sequence. A sill near the top of the Cuddapah Sequence has been dated at 980 Ma.

The Kurnool Supergroup comprises a relatively thin sequence of clastic and chemical sediments of Late Proterozoic age. The maximum thickness is 500 m. At the base of the Kurnool sequence and directly overlying the Cuddapah Supergroup rocks is the Banganapalle Quartzite Fm., which comprises a chemically mature quartz arenite with local conglomeratic lenses. This unit is important because it has been demonstrated to contain dia-



mond as well as mantle-derived garnet and spinel. These minerals have been interpreted to derive from pre-Kurnool age kimberlites, such as the Wajrakur kimberlites to the southwest or perhaps other undiscovered sources of similar age.

The Banganapalle Quartzite was a major source of diamonds in India in the 17<sup>th</sup> century, and old diggings can be seen to the southwest of the RP. Local villagers occasionally report the discovery of diamonds today.

The major structural pattern in the area comprises two sets of lineaments oriented west-northwest to east-southeast, and west-southwest to east-northeast respectively. The northern margin of the Kurnool Group is down-faulted against the underlying Cuddapah sequence in the north of the RP.

The RP straddles the watershed between the Tungabhadra / Krishna drainage basins, and the Penner drainage basin in the north. This area is flat and covered in vertisols which are thought to be remnants of Deccan basalts. The southern area extends into the more topographically diverse regions of the Kurnool and Cuddapah basins where well dissected streams prove extremely favourable for heavy mineral sampling (Map 4 and Map 5).

### **3. Activity during the period (20/09/01 to 22/07/04)**

Follow up stream and loam samples were collected from suitable trap sites and eight tailings samples of Banganapalle conglomerates were collected and processed for kimberlite indicator minerals. In addition, the AMS anomalies identified were followed up. Ground Geophysical surveys were also carried out to follow-up the interpretation of the data. Drilling has been conducted to test the anomaly in the RP area.

#### **3.1. Reconnaissance Sampling**

A total of 494 reconnaissance samples were collected from the RP.

Stream samples comprise 150 litres of unscreened material, collected from natural heavy mineral trapsites and field screened to -2.0mm.

Reconnaissance sample localities and information are shown in Map 6 and Table 1.

The samples were processed at De Beers heavy mineral treatment plant in Bangalore, and the concentrates were consigned to De Beers laboratory facilities in Australia for further processing and sorting. Kimberlitic indicator minerals recovered (garnet, spinel and ilmenites) were microprobed at the University of Melbourne.

#### **3.2 Reconnaissance Sampling Results**

Results were received for reconnaissance samples in the RP. 242 samples reported positive with respect to kimberlitic indicator minerals. Totals of 4,684 spinels, 16 garnets, and



19 ilmenites were reported. No clinopyroxenes were recovered from the samples collected (Map 7 and Table 2).

11 samples were reported positive with respect to micro-diamond recovery and 14 micro-diamonds were reported (Table 8).

### **3.3 Follow up sampling**

Follow up stream sediment sampling was carried out to further assess the RP area's diamond potential and a total of 42 samples were collected.

Stream samples comprise 75 liters of unscreened material, collected from natural heavy mineral trapsites and field screened to -2.0mm.

Sample localities are shown in Map 8 and Table 3.

### **3.4 Follow up sampling results**

Results were received for all follow up samples (Map 9 and Table 4), and 21 samples reported positive with respect to kimberlitic indicator minerals. A total of 119 spinels were reported. No clinopyroxenes, garnets or ilmenites were recovered from the samples collected.

### **3.5 Conglomerate Sampling**

Conglomerate samples are in the form of rock (Table 7) and tailings (Table 5) collected from old working of Banaganapalle conglomerates and analyzed for their kimberlitic indicator minerals. A total of 12 samples were collected.

Sample localities are shown in Map 10.

### **3.6 Conglomerate Sampling results**

Out of 8 samples results were received for 7 conglomerate tailing samples with respect to kimberlitic indicator minerals. A total of 467 spinels were reported. No clinopyroxenes, garnets or ilmenites were recovered from the samples collected (Map 11 and Table 7).

### **3.7 Mineral Chemistry**

Mineral Chemistry data from the reconnaissance indicator minerals recovered from the RP area is shown in Figures 1 – 8. Chemistries of the garnet and spinels recovered are consistent with derivation from diamondiferous kimberlite sources.



### **3.8 Hyperspectral Scanner Survey**

An airborne survey utilizing De Beers's proprietary hyperspectral scanner technology was completed during April 2002. The system works by measuring reflectance of narrow wavelength bands of sunlight reflected from the Earth's surface. Different minerals (as well as other materials) absorb different wavelengths of light to varying degrees. The AMS system is sensitive enough to actually distinguish some specific types of minerals by the absorption of certain wavelengths of light detected. In the search for kimberlites, the system is configured to look for the presence of magnesium-rich clay minerals, derived from the weathering of ultramafic rocks.

Follow up of the survey involved field visits to all of the selected 84 anomalies and identification of the causative lithological units (Table 9 and Map 12, 13 and 14). Samples were collected of surface material for PIMA (Portable Infra-Red Mineral Analyses) analysis to confirm the causative material.

Detailed sheets of AMS anomalies followed up are attached as Appendix 1

### **3.9 Airborne Geophysical Survey**

A Helicopter-borne Magnetic and Frequency Domain EM survey was carried out over part of the RP area (Map 15). The results were processed and interpreted. Based on the response, Aero Magnetic and Aero Electro Magnetic anomalies were identified (Maps 16 & 17) and they were followed up with ground geophysical surveys.

### **3.10 Ground Geophysical Survey**

#### **3.10.1 Ground Magnetic survey**

76 magnetic anomalies were followed up with ground magnetic survey using a Proton precision magnetometer with 50 meter line spaced (Table 10 and Map 18).

#### **3.10.1 Ground EM survey**

23 EM anomalies were followed up with ground frequency domain EM survey using GEM-2 (Table 11 and Map 19).



### 3.11. Drilling

A total 70 holes totaling 3,395 meters were drilled to test the geophysical anomalies (Table 12 and Map 20). No kimberlite was encountered during the drilling.

Detailed sheets of borehole logs are attached as Appendix 2.

### 4. Personnel

The following personal are employed by De Beers India Pvt. Ltd.

Name	Designation	Education
K.V.Suryanarayana Rao (Telugu speaking)	Project Manager	M.Sc. Tech-Applied Geology
Basudeb Datta	Staff Geologist	M.Sc.-Applied Geology
Praveen Kumar (Telugu speaking)	Staff Geologist	M.Sc. Tech-Applied Geology
Gargi Mishra	Geologist	M.Sc. Tech-Applied Geology
Suyash Kumar Jha	Geologist( in contract )	M.Sc.Geology
Biswajit Patel	Geologist( in contract )	M.Sc.Geology
Anand Kishor	Geologist( in contract )	M.Sc.Geology
Anand Kumar	Geologist( in contract )	M.Sc. Tech-Geophysics
Rekha K.R.	Kimberlitic Mineral Analyst	M.Sc Geology
Rakshita Richard	Kimberlitic Mineral Analyst	M.Sc. Environmental Science
Shobha N.	Kimberlitic Mineral Analyst	M.Sc. Geology
Sanjay Deogiri	IT Manager	B.Sc. Electronics,MCSE
Rina David	Office Administrator	MBA
R.Srinivaslu (Telugu speaking)	Field Driver	X Std.
J.Subramani (Telugu speaking)	Field Driver	X Std.
Nagraj	Field Driver	XII Std.
D.C.Shekar	Field Driver ( in contract)	XII Std.
Raghu M.	Treatment Plant Operator	X Std.
Gajanana Naik (Telugu speaking)	Treatment Plant Operator	XII Std.

### Labour

Labourers were employed on a daily basis from local towns and villages to help with the field work.



**5. Training**

All Earth scientists attended a training program on Microsoft Access.

An HIV/AIDS awareness presentation was delivered to the entire field based staff.

The drivers were put on a training course on Defensive Driving and Road Safety conducted by the Automobile Association of Southern India.

All earth scientists attended a course on ArcGIS conducted by ESRI, India.

Earth Scientists were put on a training on Geosoft conducted by Geosoft Inc, UK.

All field drivers attended a training on vehicle maintenance conducted by Mahindra & Mahindra.

All field geologists attended a training programme on First Aid conducted by International SOS.

**6. Expenditure**

Total expenditure of Rs. 26,751,404 has been incurred for the Reconnaissance Permit to date. The expenditure was incurred as follows:

Capital expenditure: Rs. 4,345,455

Revenue expenditure: Rs. 22,405,949

**7. References**

Ramam, P.K. and Murthy, V.N. (1997). Geology of Andhra Pradesh. Geological Society of India, Bangalore.

  
M.D. Lynn  
Regional Exploration Manager  
De Beers India Private Ltd

