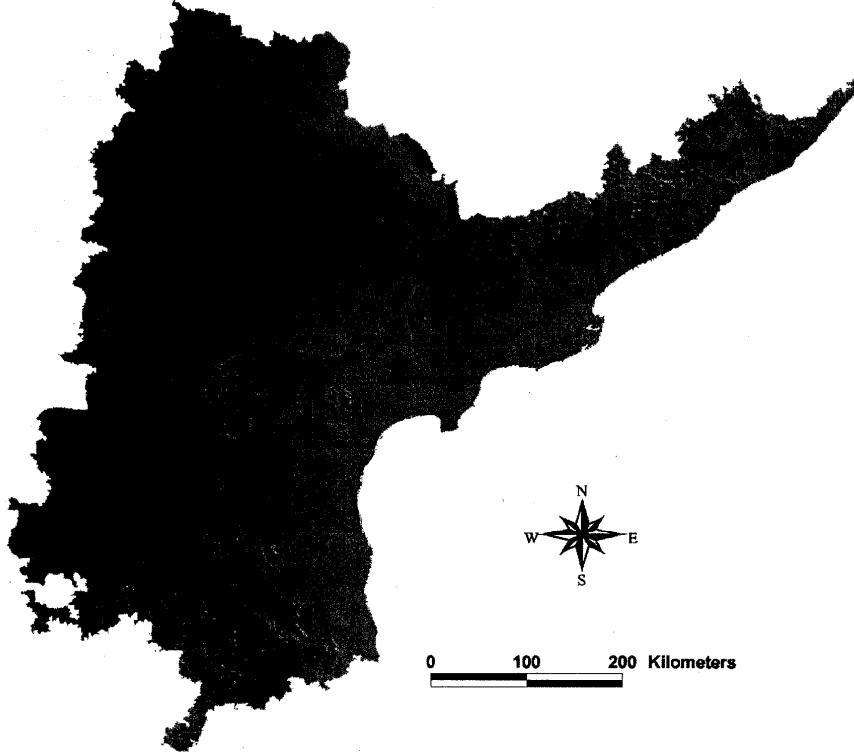


**Closing Report on Reconnaissance Permit  
G. O. Ms. No. 18 and 128, Andhra Pradesh**

**Closing Report for the period  
24-March-2001 to 23-March-2004**



*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.*



DE BEERS INDIA PROSPECTING PRIVATE LIMITED

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

**Closing Report on Reconnaissance Permit  
G. O. Ms. No. 18 and 128, Andhra Pradesh**

Report for the period  
24/03/01 to 23/03/04

**1. Reconnaissance Permit Status**

The RP was originally 300 km<sup>2</sup> in extent and was executed at Anantapur on 24<sup>th</sup> March 2001. It was reduced by 50% on 23<sup>rd</sup> March 2003 and as per the conditions of RP, the tenure of the permit expired on the 23<sup>rd</sup> March of 2004 (Map 1).

✓ As per Government Of India Rules and Regulation MCR 1960 Rule 7(1) (i) (b), three prospecting licenses of total 107 km<sup>2</sup> were applied (Map 2), on 23<sup>rd</sup> March 2004

**2. Geology and Geomorphology**

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 (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 indicates 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 diamond 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 17th century (and possibly much earlier), and old diggings can be seen in the west of the RP. Local villagers occasionally report the discovery of diamonds today.



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The major structural pattern in the area comprises lineaments oriented west-northwest to east-southeast. A particularly pronounced lineament is evident in the northeastern part of the RP. This lineament is interesting as it appears to separate the known historical diamond diggings in the Banganapalle Quartzite to the north, from non-diamondiferous quartzites to the south. It extends off the Proterozoic sediments into the basement rocks to the northwest of the RP.

The RP lies in the Penner drainage basin (Map 4). It is well-drained and well suited to heavy mineral stream sampling in most areas. Drainage is to the south and southeast over most of the RP, but a watershed occurs on the Kurnool Group rocks in the extreme northeast, and drainages flow east-northeast, controlled by a pronounced joint pattern in the sediments.

### **3. Activity during the reporting period of 24th March 2001 to 23rd March 2004.**

Based on the initial geological analysis of the terrain it was decided that regional stream sampling would be the most appropriate exploration technique to screen the reconnaissance permit area for diamondiferous kimberlites. Reconnaissance stream samples were collected from suitable trap sites. In addition, an Airborne Multispectral Scanner Survey (AMS) was flown over the RP area and the anomalies identified were followed up. Helicopter-borne geophysical magnetic and Frequency Domain EM surveys were carried out over part of the RP and ground follow up surveys were also carried out to locate drill targets.

#### **3.1 Reconnaissance Sampling**

A total of 92 reconnaissance samples were collected in the RP area.

Samples comprise 150 litres of unscreened material, collected from natural heavy mineral trap sites and field screened to -2.0mm. Sample localities and information are shown in (Map 5 and Table 1).

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

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

Results were received for all the samples collected (Map 6 and Table 2) and 63 samples reported positive with respect to kimberlitic indicator minerals. Totals of 1606 spinels, 20 garnets and 13 ilmenites were reported.



### **3.3 Mineral Chemistry**

Mineral Chemistry data from the reconnaissance indicator minerals is shown in Figures 1 – 16. Chemistries of the spinels and garnets recovered are consistent with derivation from kimberlite sources.

### **3.4 Airborne Multispectral Scanner Survey**

An airborne survey utilising De Beers 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.

The AMS equipment was fitted into a P68C (registration VT-TAH) aircraft chartered from Taneja Aerospace and Aviation Limited, 1010, 10th Floor, Prestige Meridian - 1, 29 M.G Road, Bangalore 560 001. The surveying was conducted from an altitude of 9,500 ft (2,896 m) along flight lines 2 km apart (Map 7).

A total of 12 anomalies were selected as areas comprising Mg-rich clay with the potential to be kimberlites (Map 9). Follow up of the survey involved field visits to anomalies and identification of the causative lithological units (Table 3). Small samples were collected for PIMA (Portable Infra-Red Mineral Analyser) analysis to confirm that the lithology identified on the ground corresponded to the anomalous Mg-rich absorption feature identified by the aerial survey. PIMA analysis was carried out in Bangalore. No kimberlites were discovered from this survey.

A false colour composite image of the RP is shown in Map 8.

Detail summaries of AMS anomalies followed up are attached as Appendix 1.

### **3.5 Airborne Geophysical Survey**

A helicopter borne magnetic and Frequency Domain EM survey has been carried out in the RP area (Map 10). The results have been processed and interpreted. Based on the response, anomalies were identified (Maps 11, & 12) and they were followed up with ground Geophysical surveys.



### **3.6 Ground Geophysical Survey**

#### **3.6.1 Ground Magnetic survey**

48 anomalies (Maps 11 & 12) were followed up with ground magnetic surveys using Geometrics G856 Proton precision magnetometer (Table 4). A total of 276.2 line kilometers of ground magnetic survey had been completed.

Detail sheets of GM anomalies followed up are attached as Appendix 2.

#### **3.7 Drilling**

13 short bore holes were drilled to test airborne and ground geophysical anomalies (Map 13, Table 5). A total of 558 meters were drilled. No kimberlite was encountered in the drilling.

Detail borehole log sheets are attached as Appendix 3.

### **4. Personnel**

<b>Name</b>	<b>Designation</b>	<b>Education</b>
K.V.Suryanarayan Rao	Project Manager	M.Sc. Tech-Applied Geology
Basudeb Datta	Staff Geologist	M.Sc.-Applied Geology
K.V.Praveen Kumar	Staff Geologist	M.Tech-Remote Sensing
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	Geophysist( 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	ICT Manager	B.Sc. Electronics,MCSE
N.Gangadhar Gowda	Account Assistant	B.Com.
Rina David	Office Administrator	MBA
R.Shrinivaslu	Field Driver	X Std.
J.Subramani	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	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**

De Beers maintains high operating standards including safety and environmental awareness. To this end, training is an integral part of career development with the organization. The following is a short summary of training completed to date.

All staff including geologists and field drivers received first aid and safety training, including fire fighting. All staff also receives ongoing education in HIV/AIDS awareness and other wellness issues.

Geologists received training in field navigation, sample site selection, sample collection, labeling and recording of sample data. They have also received training in undertaking of ground magnetic surveys. Quality control and further on the job training is ongoing.

Geologists received training in basic kimberlite geology and field identification during the period 11th-12th June 2001.

Geologists received training on Arcview GIS software during the period 25th to 27th July 2001. Geologists received further training on Arcview GIS software during the period 3rd to 4th December 2001.

Mr K.V. Suryanarayan Rao and Mr Basudeb Datta were sent to South Africa for a two-week period in June 2003 to visit De Beers's mines and exploration facilities.

All skilled staff attended a management training programme run by Deloitte's Haskins and Sells in Bangalore.

All geologists attended a Geosoft training programme in August 2003.

All Geologists have attended training in Geosoft for the geophysical data interpretation in August 2003.

All geologists attended a Microsoft access training programme in January 2004

## **6. Expenditure**

Total expenditure of Rs 3,704, 247.00 has been incurred for the Reconnaissance Permit to date. The expenditure was incurred as follows:

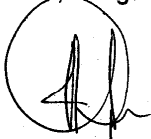
Capital expenditure: Rs 612, 762.08

Revenue expenditure: Rs 3, 91,484.92



**7. References**

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



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

