

APR 23

DE BEERS  
A DIAMOND IS FOREVER

STRICTLY CONFIDENTIAL

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No. Kimberville  
deposited  
A.P.  
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- To,
1. The Director Mines and Geology  
Government of Andhra Pradesh,  
8F B.R.K.R. Govt. offices Complex,  
Secretariat Road, Hyderabad - 500 063
  2. The Controller General, Attn.: Superintending Mineral Economist (Statistics)  
Indian Bureau of Mines,  
Indira Bhawan, Civil Lines  
NAGPUR - 440 001
  3. The Controller of Mines (South)  
Indian Bureau of Mines,  
29 Industrial Suburb  
II nd stage, Tumkur Road  
Yashwantpuram  
Bangalore- 560022
  4. The Regional Controller of Mines  
Indian Bureau of Mines,  
Kendriya Sadan  
Ist Floor, Sultan Bazar  
Koli, Hyderabad

**Sub: CLOSING REPORT OF RECONNAISSANCE OPERATIONS CARRIED OUT DURING MARCH 23 2003 TO MARCH 22 2003**

(Under Rule 7 (1) (vii) of MCR, 1960)

Ref: Reconnaissance permits for an area of 2000 sq km in Kurnool district of Andhra Pradesh.

G.O. Ms. No. 131

*& Nishabadi Nagar*

Dear Sir,  
Dear Sir,

Please find enclosed herewith the Closing Report of Reconnaissance Operations during the period 24/3/2001 to 23/3/2004 over the above Reconnaissance Permits required under Rule 7(1) (VII) of the Mineral Concession Rules, 1960. We are also enclosing form BB, with this report as per the Rule 3E of MCDR 1988.

As you are aware that prospecting agencies are working in a competitive environment, we request that the contents of the report be kept **confidential under Rule 7(1) (viii), MCR, 1960.**

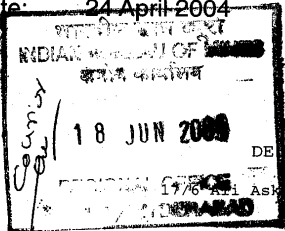
SMG (R)  
STA (PG)  
18/6/04

Place: Bangalore  
Date: 24 April 2004

Signature :

*(Handwritten signature)*

Name in full: M. D. Lynn  
Designation : Regional Exploration Manager



Diary No. 1066  
Date 2-11-04  
मौलिक खण्ड प्रकल्प  
Regional Mapping Cell



DE BEERS INDIA MINERALS PRIVATE LIMITED  
17/6 Ashok Cross Road, Bangalore 560 052, Karnataka, India

*(Handwritten notes and signatures)*

**Closing Report on Reconnaissance Permit  
G. O. Ms. No. 131, Andhra Pradesh**

Report for the period  
23/03/01 to 22/03/04

**1. Reconnaissance Permit Status**

The RP is 2,000 km<sup>2</sup> in extent and was executed at Kurnool on 23<sup>rd</sup> March 2001. A total area of 513 km<sup>2</sup> was relinquished on 19<sup>th</sup> March 2002 and a further 487 km<sup>2</sup> was relinquished on 22<sup>nd</sup> March 2003; as per the conditions of RP, the tenure of the permit expired on the 23<sup>rd</sup> March of 2004 (Map 1).

**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 2).

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 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 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.



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

The RP straddles the watershed between the Tungabhadra / Krishna drainage basins, and the Penner drainage basin (Map 3).

### **3. Activity during the reporting period (23/3/01 to 22/03/04)**

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 465 reconnaissance samples were collected in the RP area.

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

Loam samples comprise 75 litres of material collected from surface in interfluves.

Sample localities and information are shown in Map 4, 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, clinopyroxene and ilmenite) were microprobed at the University of Melbourne.

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

Kimberlite indicator mineral results were received for all reconnaissance samples in the RP area (Map 5 and Table 2). 95 samples revealed positive results with respect to kimberlite indicator minerals. A total of 13 garnets, 30 ilmenites, 800 spinels and 9 diamonds (Table 4) were recovered. No clinopyroxenes were recovered from the samples collected.

#### **3.3 Follow up sampling**

Follow up stream sediment and loam sampling was carried out to assess the anomalies generated by the reconnaissance sampling. A total of 2 samples were collected.



Stream samples comprise 75 litres of unscreened material, collected from natural heavy mineral trapsites and field screened to -2.0mm. Loam samples comprise 30 litres of material collected from surface in interfluves

Sample localities and information are shown in Map 4, Table 3.

### **3.4 Follow up sampling Results**

Results of the samples were received and no kimberlitic indicator minerals were reported.

### **3.5 Mineral Chemistry of samples collected**

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

### **3.6 Airborne Multispectral Scanner (AMS) Survey**

An airborne survey utilising 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.

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 6).

A total of 33 anomalies were selected as areas comprising Mg-rich clays with the potential to be kimberlites (Map 8). Follow up of the survey involved field visits to anomalies and identification of the causative lithological units (Table 5). 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 7.

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



### **3.7 Airborne Geophysical Survey**

Part of the RP area was covered with a helicopter-borne magnetic and Frequency Domain EM survey (Map 9). The results have been processed and interpreted. Based on the response, anomalies were identified and they were followed up with ground Geophysical surveys.

### **3.8 Ground Geophysical Survey**

#### **3.8.1 Ground Magnetic survey**

20 magnetic anomalies were followed up with ground magnetic survey using Geometrics G856 Proton precision magnetometer (Table 6 and Maps 11). A total of 104.6 line kilometers of ground magnetics were done.

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

#### **3.8.2 Ground EM survey**

In addition 2 EM anomalies were followed up with ground Frequency Domain EM survey using GEM-2 (Table 7 and Map 10). A total of 14.5 line kilometers of ground EM had been completed.

Detail sheets of EM anomalies followed up are attached as Appendix 3.

### **3.9 Drilling**

5 short bore holes were drilled to test airborne and ground geophysical anomalies. A total of 292 meters were drilled with these drill holes (Map 12, Table 8). No kimberlite was encountered in the drilling.

Detail borehole log sheets are attached as Appendix 4.



**4. Personnel**

<b>Name</b>	<b>Designation</b>	<b>Education</b>
KrishnaChandra Pande	Staff Geologist	M.Sc. Tech-Applied Geology
K.K.Deepa	Staff Geologist	M.Sc. Tech-Applied Geology
Ivy Manohara	GIS Manager	M.Sc. Environmental Science
P.Thatha Rao	FSLO	B.Com
Archana Balakrishna	Account Assistant	B.Com
V.Kumaran	Field Driver	XII Std.
Lawrance Ashok	Treatment Plant Driver	X Std.
Venkatswamy	Field Driver	X Std.
Venukumar	Field Driver (in contract)	X Std.
Arul Das	Office Driver	X Std.
Peter Daniel	Office Driver	X Std.
Sidharaju	Treatment Plant Operator	X Std.
Nagraju	Treatment Plant Operator	X Std.

**Labour**

Labourers were employed on a daily basis from local towns and villages to help with 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 Krishna Chandra Pande, K.K.Deepa and Ivy Manohara were sent to South Africa to visit mines of De Beers and exploration facilities and to develop their skills in their related fields.

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 33, 282, 177.80 has been incurred for the Reconnaissance Permit to date. The expenditure was incurred as follows:

Capital expenditure: Rs 4,794, 789.00

Revenue expenditure: Rs 28, 487, 388.80

#### **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 Minerals Private Ltd



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