

**Closing Report on Prakasam (Go.Ms.No.37) and Kurnool
(Go. Ms No. 446 & 543) Reconnaissance Permit Areas,
Andhra Pradesh**

Report for the period
Prakasam RP- 11th April, 2002 to 10th April, 2005.
Kurnool RP - 27th December, 2001 to 26th December, 2004.

1. Reconnaissance Permit Status

Exploration Enterprise India Pvt. Ltd. have held two Reconnaissance Permits (RPs) covering 1610 km² in the Prakasam and the Kurnool districts for the exploration of Copper, Lead and Zinc, Silver, Barite, Gold, Diamonds and associated minerals. This report summarizes the work done during the three years, in the following two RPs:

1.1 Prakasam Reconnaissance Permit

The Reconnaissance Permit lying in the district of Prakasam, was executed at the office of the Assistant Director, Mines and Geology Department, Ongole on 27th December, 2001. Out of an original area of 1283 km², 658 km² was relinquished on the 27th December, 2003 and the remaining area of the 625 km² was relinquished on the 26th December, 2004. As a result of these relinquishments the Exploration Enterprise India Pvt. Ltd. has closed this RP area (Map 1).

1.2 Kurnool Reconnaissance Permit

The Reconnaissance Permit lying in the district of Kurnool was executed at the office of the Assistant Director, Mines and Geology Department, Kurnool on 11th April, 2002. Out of an original area of 1327 km², 163.50 km² was relinquished on the 11th April, 2004 and the remaining area of 163.50 km² will be relinquished on the 10th April, 2005, 2004. As a result of these relinquishments the Exploration Enterprise India Pvt. Ltd. has closed this RP area (Map 2).

1.3 Prospecting License Application

As per the Government of India Rules and Regulation MCR 1960 Rule 7(1) (i) (b), applications for two Prospecting Licenses (353.39 km² in the Prakasam RP and 81.96 km² in the Kurnool RP) lodged on 21st December, 2004.

2. Geology and Geomorphology

Map 3 shows the regional geological setting of the Prakasam and Kurnool RP areas. The Prakasam RP is underlain, from east to west, by the Nallamalai fold belt comprising the Bairenkonda quartzite and the Cumbum formations intruded by Kimberlite dykes and Syenite stocks. The contiguous Kurnool RP is made up of similar stratigraphy with significant Kimberlite intrusions, into the Cumbum formation. The Nandyal shale and limestone, youngest formation of the Kurnool group, unconformably overlaps the strongly folded members of the Nallamalai group to the west.

The overall geological setting in the Cuddapah basin comprising the Kurnool and Prakasam reconnaissance permits (RPs) is conducive for searching barite, and copper –lead-zinc-silver mineralisation within Cumbum Formation comprising black shales and carbonate rocks. In the overall Sedimentary - Exhalative (sedex) type environment, the Mangampeta barite deposits and the extensive copper –lead-zinc-silver deposits of the Agnigundala base metal province are well known. The same belt (or stratigraphic packages) extend into parts of Kurnool and Prakasam RP,s. Further the Kimberlite-Lamproites in the Kurnool and Prakasam RP and the related drainage systems that are known for old workings are primary and placer target areas for the search of diamonds.

The Kurnool and Prakasam RP area is marked in the western part by the Pediplain underlain by the Kurnool Group sediments. It is followed eastwards by a Structural Plateau with median low ridges and valleys. The average relief here is around 100 to 150 meters and a maximum is around 250 meters. Piedmont slopes, Alluvial fans and isolated Pediments form the flanks of the Structural Plateau in the western part of Prakasam RP. The Structural Plateau marks a major drainage divide into stream systems draining towards west south west or to the east and south into the Sagilleru river system, one of the contributors of placer diamonds (Map 4).

3. Activity during the reporting period (Three years)

Based on initial experiences and the geological history of the RP areas, the exploration work conducted here has largely been on Base metals and diamonds. Hence the activities in the 3 years are reported under these two broad headings.

- Base Metal Prospects
- Diamond Prospects

3.1 Base Metal Prospects

Base metal mineralisation is reported in the Cumbum formations of the Nallamalai Group, from the southern parts of the basin around Zangamrajupalle-Varikunta and in the northern part in the Agnigundala belt. Mineralisation is usually strata-bound, with Pb-Zn (Pb dominant with minor Cu) occurs in altered carbonate rocks around Zangamrajupalle, and Lead-Copper (with minor Zn) in the Agnigundala area in carbonate rocks -quartzites (calcarenites) interbedded with argillites & phyllites and apparently in association with granitic rocks & pegmatites.

Chelima Lead- Zinc mineralisation: Dr. Thomas Ianelli and his team while carrying out a major rapid reconnaissance of the Kurnool and Prakasam RP's have made special reference to Lead-zinc mineralisation around Chelima. At least six old workings are known within the strongly folded Cumbum formations which were apparently worked for lead (and Zinc?). Around the abandoned site near the Chelima village, samples of "brown- black to iridescent –brown frothy slag; extremely light with glass like texture" is seen, (sample No.752205; assayed copper 19 ppm, Pb-1ppm, Zinc 30 ppm). Samples bearing sulphides in dark grey to black siliceous fine grained quartzite, with pink to red grey weathering surface (sample No.752206 assayed copper 53 ppm, Pb-846ppm, Zinc 1007 ppm); and dark grey to black siliceous very fine grained quartzite carrying traces of finely crystalline pyrite (sample No.752207 assay copper 10 ppm, Pb-36 ppm, Zinc 68 ppm); samples of medium to coarsely crystalline sphalerite (brown-amber color) in dolospar vein stockworks along with pseudo breccia in a host of finely crystalline light grey dolostone ;with sphalerite –particularly replacing the dolostone; and sphalerite-dolospar stockwork with limonitic – smithsonite alteration rims were also noted. In another sample, medium to coarse crystalline galena with traces of sphalerite-smithsonite with rusty red-brown limonitic coating and box work textures possibly represented vein –stock work systems. The dolospar association is significant. An old working for Lead is reported near Chelima at 15° 25' 43.7": 78° 42' 27.9".

Dr. Ianelli's observations on areas south of Kurnool and Prakasam RPs, around Zangamrarupalle, within our Badvel Prakasam RP's are significant for the search of Lead- Zinc-Copper. We reproduce some typical descriptions of mineralized zones as follows. The main prospects to date, observed across the Badvel RP, consist of Zn-Pb-Cu mineralization set within a host of ferroan dolomitized, reactive limestone. Mineralization of significance occurs within at least three stratigraphically distinct units of dark brown, chocolate-brown to pink-red-brown weathered ferroan dolostone. The dolostone has developed largely from the alteration of primary limestone + calcisiltite. The distinctive pink-red to pink-brown weathered dolostone is confined to the northernmost part of Badvel RP; the distinctive colour may be a result of regional Fe-oxide alteration of the host carbonate unit in the manner outlined by Hitzmann (1995). The majority of rock samples were collected from mineralized

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ferroan dolostone. Mineralization and alteration features are similar across the field area; the main differences result from variations in the intensity of stock work veining, alteration and the extent of base metal replacement of the host carbonate. Significant mineralization (and associated alteration) appears to be stratabound.

Descriptions of some anomalous samples recovered from the most recent field work are summarized as follows:

(i). Mineralized ferroan dolostone boulders / blocks found at the Canal Dump site, located about 3.5 km southwest of Zangamarajupalle, in south central 57J/13 map sheet. The grab samples returned up to 7,504 ppm Cu, 1.28% Pb and 6.84% Zn. The bulk of the samples are similar in nature (i.e. Fe-carbonate + quartz stockwork networks in a host of brown-gray fine-crystalline dolostone). However, a sample consists of brown-gray weathered dolostone with a sphalerite-bearing pseudobreccia. Mineralized samples were recovered at this site, in a to effort understand major mineralization textures and to gain insight into the potential for the exposure of mineralized outcrop.

(ii). Chip and grab sampling in the area 1 km south-southwest of Kottapalle (1 m chip samples and out crop grabs); Zn+Pb mineralization is hosted by brown-gray to chocolate-brown weathered fine-crystalline ferroan dolostone, and is similar in nature and distribution to other mineralized carbonate bands previously sampled. Chip samples returned up to 1.75% Zn while grab samples returned up to 1,109 ppm Pb and 10.4% Zn.

(iii). Sample of a float boulder collected at stream silt site located in central 57J/13, 2.4 km southwest of Kandimallayypalle; the boulder comprises mineralized, stockwork veined fine-crystalline ferroan dolostone which returned up to 1.41% Zn; the boulder may have been derived from an (unvisited) old working located ~1 km to 2 km southwest of the sample site.

(iv). Sample of another float boulder recovered at stream silt site located 2 km west of Lingaladinnepalle in central 57J/13, comprised brecciated dark-gray chert which contained 1.02% Zn; it may indicate the presence of an unmapped old working site located to the west in the Yapa Konda area.

Field evidence for Pb-Zn mineralisation could be summarized as follows:

Sulphide mineralisation is by and large strata bound; pyrite –chalcopyrite(minor) is dominant in black unusually thinly laminated shale sections of the Cumbum Formation, and most observations of this feature were around Mangampeta barite deposits, where barite possibly is an end member in a Sedex type Basin. The barite-dominated zones could be a part of a sulphidic, vertically or laterally zoned facies.

Pervasive ferroan dolomitisation and silicification with minor Pb-Zn mineralisation in carbonate dominant sequences with sparry dolomite stockworks confined to stratigraphy again suggests Lead-Zinc Sulphide mineralisation in a Sedex, Irish type or Mississippi Valley type systems that were operative. Iron- silica enrichment and sparry alteration is emphasized. Typically, siderites flank and could enclose major Pb-Zn ore deposits formed in this environment.

Sedimentary features in the Cumbum formations suggest a dominant argillaceous facies with lateral variations into localised, black shale- chert-barite-sulphidic zones in restricted oxygen deficient grabens or sub-basins which were also known centers for the effusives with gradations into more platformal type carbonate sedimentation followed by ferroan-silicic alteration followed by Lead -Zinc and Copper mineralisation. The black shale facies in restricted basins follow EM trends (Map -2). It is proposed to use these features in a working model in the search for base metals.

3.1.1 Follow-up work for the Base Metal Prospect

Exploration Enterprise India Private Limited had procured airborne Electro-magnetic and Magnetic data of "Operation Hard Rock " (OHR) from the Geological Survey of India (GSI), AMSE Wing, Bangalore, for the Southern and Central parts of the Cuddapah basin. The Electro - Magnetic response, as plotted over geology in Figure-2, helped with identifying and separating the major conductor horizon within the Cumbum, the dominant Carbonaceous-Sulphidic shales and the Sulphidic carbonate beds (dolomites). In the Figure 2, these have been marked by black hashed lines (EM anomalies). Often the EM anomalies also appear to occur within the unconformably overlying Nandyal shales. These anomalies could also possibly reflect conductor response from the underlying Cumbum - Pullampet shales that lie below the thin cover of unconformably overlying Nandyal shales. The EM anomaly intermittently extends northwards into the western part of the Kurnool RP. It is located to the west of the unconformity, directly underlying the Nandyal shales of the Kurnool Group. The EM anomaly trends as plotted from south towards north in the Figure 2 would suggest a NNW trend of the airborne EM anomalies from the south-central part of the Cuddapah basin, well within the Cumbum shale members towards the western edge of the Nallamalai basin. The NNW feature could mark distinct sub-basinal troughs which were locally the hosts for the dark, often sulphidic-carbonaceous facies within the Cumbum Formation. Detailed ground Geophysical surveys are planned for detailing the anomalies, once the Prospecting Licenses are granted.

3.2 Diamond Prospects

Traverses completed so far in the Kurnool and Prakasam RP's merely confirm the existence of established hosts for diamonds, (i) The WNW to NW trending Kimberlite- Lamproite dykes Chelima in Kurnool RP area, (ii) and the alluvial diamond in the present day stream and related geomorphic systems. Several old workings were visited around 15° 25' 22": 78 ° 42' 19.3", near Chelima in the Kurnool RP (Map-5). These were located within Kimberlite- Lamproites as evident from weathered float. In addition workings were seen in gravels forming terraces relating to the Gandleru stream near Sarva Narasimha Swami temple, (15° 23' 13.5": 78° 40' 09") and near Gajulapalle village (15° 25' 42.9": 78° 37' 54.5"). While the placer diamond locations near the Sarva Narasimha Swami temple in the Kurnool RP appear to be clearly relatable to the kimberlite source, the location near Gajupalle needs to be explained.

In the Prakasam RP, old placer workings alone are reported (Figure 6 T. M. Babu, 1998), from several locations in the quaternary terraces of gravels of the south flowing Sagilleru river, a major tributary of the Pennar river in the Cuddapah district. The important locations between the Giddalur and the Southern boundary of the RP- Area Sanjivaraopeta, Adimurtipalle and Kalasapadu villages (Map-5). The drainage apparently has no relationship with known Kimberlites, and the source for the diamonds here is a matter of conjecture. The Sagilleru stream system originates within a catchment comprised of Bairenkonda quartzites and rocks of the Cumbum shale-clacarenites- and carbonates of the Nallamalai group. Within the map area (Figure 4), the river appears to be controlled on the west flank of a doubly plunging, mainly anticlinal structure formed of the more competent quartzose members of the Cumbum formation.

Based on the same study Reconnaissance stream sediment sampling was conducted to locate the Kimberlites with in the RP area.

3.2.1 Reconnaissance Stream Sampling

Reconnaissance stream sediment sampling was carried out to assess the RP area for diamond potential and a total of 122 of Reconnaissance Samples were collected.

Seventy-five liters of -10mm material collected from natural heavy mineral trapsites and field screened to -2.0mm.

Sample localities are shown in Map 6 and Table 1.

The samples were processed at the De Beers Heavy Mineral Treatment Plant in Bangalore and the concentrates were consigned to the Bangalore Mineralogical laboratory India for further processing and sorting. Kimberlitic indicator minerals

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recovered (garnet, spinel, clinopyroxene and ilmenite) were microprobed at the University of Melbourne.

3.2.2 Reconnaissance Sampling Results

Results have been received for all the 122 samples (Map 7). Results of 112 samples are positive with respect to kimberlitic indicator minerals and totals of 2798 spinels and 2 garnets are reported (Table 2). No ilmenites and clinopyroxenes were recovered.

A total of five micro diamonds are reported (Table 3).

3.2.3 Mineral Chemistry

Mineral Chemistry data of the indicator minerals received is shown in Figures 1-8.

4. Remarks

During the period of Reconnaissance Permit, geological work was slow, because of Naxalite activities in the Prakasam and Kurnool districts. The Prakasam and Kurnool RPs have great diamond potential. Hence detailed ground Geophysical surveys are planned for following up the positive results received and therefore will need intensive efforts. The PL has been already applied in the Prakasam and Kurnool RPs with the hope of discovery of concealed diamondiferous source rocks.

5. Personnel

Name	Designation	Education
Tarun Rautela	Staff Geologist	M.Sc. Tech-Applied Geology
Gargi Mishra	Geologist	M.Sc. Tech-Applied Geology
Chandan Kumar	Geologist	M.Sc. Tech-Applied Geology
Anand Kishor	Geologist(in contract)	M.Sc. Tech-Applied Geology
Shiva Sankar P.V.	Kimberlitic Mineral Analyst	M.Sc Geology
Manjunath	Kimberlitic Mineral Analyst	M.Sc Geology
K.Aravind	Financial controller	Chartered Accountant
Archana Sehgal	Office Manager	MBA Marketing
Ashish Bhat	User Support Officer	Dip. In E&C.,H/W & N/W
A.Chenniah	Field Driver	IX Std.
Kumaran Vinayankan	Field Assistant	IX Std.
K.Ekambaram	Treatment Plant Operator	X Std.
Girish Menon	Advisor-Security and Liaison	B.A.
Runa Agarwal	HRBP	MBA
Meena Raj	Receptionist	B.A.

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Labour

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

6. 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 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 training on Geosoft conducted by Geosoft Inc, UK.

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

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

7. Expenditure The Expenditure in the two permits against commitments made are as follows:

R P Name	Expenditure (Rs. in Lakhs)
1.Prakasam Reconnaissance Permit	17.52
2 Kurnool Reconnaissance Permit	15.25