INDOPHIL RESOURCES EXPLORATION SERVICES (INDIA) PVT. LTD.

CONSOLIDATED THREE YEAR REPORT ON MINERAL EXPLORATION CARRIED OUT IN THE 501.48 SQ KM, HUTTI NORTH RP BLOCK, RAICHUR DISTIRCT, KARNATAKA

1 INTRODUCTION

1.1 LOCATION AND ACCESSIBILITY

The Hutti North RP block granted to M/s Indophil Resources Exploration Services (India) Pvt. Ltd. (Indophil) is situated in the northern part of the Hutti greenstone belt of the Dharwar Craton, where the only working gold mine in the country-Hutti Gold Mines Limited is situated. The gold mine is located about 80 km west of Raichur, which is the headquarters of the District. The state highway SH-20 connecting Raichur to Lingsugur passes close to the southern boundary of the RP block. Nearest Railway Station is Raichur, which lies on the Guntakal-Sholapur section of South Central Railway **(Fig.1)**. Hutti is an important mining town with all marketing and civil facilities.

Indophil's technical personnel carried out a systematic study of the literature on the geology and mineral resources of the Hutti greenstone belt before selecting the area for filing the RP application. Literature research revealed many gaps and deficiencies in the exploration for gold carried out earlier and clearly indicated the possibility of discovering new gold bearing tracts and also finding extension of the known ones. The results of this research prompted M/s Indophil to prefer the northern part of the Hutti Belt for conducting exploration for gold under a Reconnaissance Permit.

2 DETAILS OF THE PERMIT

RP application was submitted on 7.3.2001 at the office of the Director, Department of Mines and Geology, Bangalore, covering the northern part of the Hutti greenstone belt. Indophil's application was recommended by the Govt. of Karnataka for grant and due concurrence was obtained from the Govt. of India. The permit was granted on 9th January 2003 over an area of 501.48 sq.km. and the RP Deed was executed with the Government of Karnataka on 23rd Jan 2003 **(Fig.2)**. On completion of 2 years of the RP tenure, Indophil relinquished 50% of the RP block and retained balance of 50% area of 250.74 sq km for further exploration in the 3rd year. During the course of exploration under the RP, applications for PL were made as and when encouraging gold anomalies and or mineralized zones were located. Total of 7 prospects were identified as deserving detailed exploration. Accordingly 7 applications have been filed for grant of PL over a total area of 147.9sq km in 7 PL blocks.

3 SCOPE OF THE REPORT

Report presents a synthesis of all the geological information on local geology, structure, mineralization with emphasis on the studies conducted by Indophil including details of geochemical sampling, geophysical surveys and drilling carried out and resultant findings over the

3 years tenure of the RP. Promising areas / prospects, which need to be explored in further detail under Prospecting Licence have been highlighted.

4 LITERATURE AND MAP COMPILATION

4.1 GEOLOGICAL MAP

Hutti-Maski greenstone belt is one of the most important auriferous belts in the Eastern Dharwar Craton of Karnataka. Geological map of the RP block was compiled from various published sources mainly from the Geological Survey of India. Comprehensive research of both published and unpublished works, results of mineral investigations of GSI and other agencies in Hutti-Maski greenstone belt, was carried out. An extensive bibliography of all the available literature on the belt was compiled covering all aspects of geology, mineralization, exploration, mineral resources and ancient and modern mining activity.

All geographical locations, sampling and borehole locations; location of old workings and all other prominent and important landmarks were located using GPS.

Number of geological traverses were undertaken by Indophil geologists and its consultants, and the geological map has been updated incorporating their findings. The geological map on 1:50,000 was prepared in GIS format. The digital version was transferred to MAPINFO environment for bringing the final output of the coloured version of the geological map of the RP block, which is presented in **Fig. 3.**

Indophil created a base map superimposing the drainage system in toposheets 56 D/11, D/12, D/15 and D/16 on the geological map for undertaking stream sediment geochemical sampling and follow up rock-chip, channel and bed rock sampling. The same base map was also use for detailed geological mapping on large scale and geophysical surveys in the promising gold-bearing areas.

Large-scale geological mapping on 1:10,000 was completed covering important prospects viz., North of Hutti Gold Mine, Uti, Chinchargi, Palkanmardi, Wandalli, Hira-Buddini, Hussainpur-Hutti Hosur and Yatkal-Hirenagnur areas.

5 REMOTE SENSING STUDIES

Digital Elevation Model image (DEM) of the Hutti North R.P. Block **(Fig.4)** has been studied in place of aerial photographs. DEM image provides a three dimensional view of topography without forest cover. As topography is controlled by structure, some broad structural features can be inferred by a study of the DEM. Some important tectonic lineaments that could be inferred are: (a) N35°E trending lineament near Gudenahal, (b) N-S lineament to the west of Hutti (c) N-S lineament east of Virapur and west of Hirenagnur (d) ENE-WSW lineament north of Gajalgatta and Yatkal (e) NW to WNW lineament northeast of Yatkal and SW of Hussainpur (f) a net work of NW, NNW, N-S and ENE lineaments near Rodlabandi (g) NNW lineament to the east of Palkanmardi and Topaldoddi and (h) a WNW-ESE and NE-SW lineament west and west southwest of Uti.

All the lineaments and structural discontinuities picked up from the study of satellite imageries were examined in detail on the ground. Some of them appear to control gold mineralization along these linear structures. Most significant of them is the D-1 detachment plane extending from Uti to Wandalli and further SE close to Bullapur. Uti Gold Mine of the Hutti Gold Mines Ltd., is situated right on the D-1 detachment structure. Bullapur and Hira-Buddini prospects appear on the splays of this structure. The other major linear structure is the WNW trending fracture/ local shear zone extending from close to Madrainkote, passing through Hutti-Hosur, Chinchargi-Hosur and South of Bullapur.

6 GEOLOGICAL SETTING

6.1 REGIONAL GEOLOGY

The Hutti-Maski schist belt **(Fig.5)** is a Neoarchaean volcano-sedimentary to syntectonic veins and sheet like bodies of granitoids of TTG affinity. The schist belt has a hook shape.

The western part of the RP block is mainly composed of metabasalts with a WNW trending zone of felsic volcanics and some metasediments including polymict conglomerate discovered by Indophil geologists. The Hutti Gold Mine lies north of a wedge of granites. A series of parallel shear zones control gold mineralization in Hutti area.

Geology of the eastern part of the RP block is much more complicated with considerable variety of rock types. Dominant being metabasalts, amphibolite, felsic volcaniclastics, hornfelsed greywacke, carbonaceous phyllite and chert.

In the north of the belt is the Yelgatti granitoid, which is a pink potassic granite intrusive; along the southern and eastern boundaries, the belt is bounded by Kavital and Mudulgund-Uti granodiorite. The western boundary of the belt is bounded by gneissic granites and granodiorites intruding the metabasalt.

6.2 STRUCTURE

The pattern represented by steeply dipping regional schistosity, local mylonitic foliation, elongation of clasts in conglomerate, mineral lineation, bedding-schistosity intersections and pillow elongation provide evidence for the deformation of rock formations. Folds of mappable dimension are in the eastern part of the belt. They are represented by an anticlinal structure flanked by two synclines **(Fig.5).** Three major linear structures have been identified. Two of them have been referred to in the section on Remote Sensing studies. These structures are shown in **Fig.4 and 5.**

6.3 GOLD MINERALIZATION IN THE RP BLOCK

Hutti-Maski greenstone belt is one of the most important auriferous belts in the eastern Dharwar craton of Karnataka. At present the Hutti Gold Mines Limited (HGML), a Karnataka State Government undertaking situated in the western part of the RP block is one and the only gold producing mining company in the country. HGML is now operating 3 mines, Hutti, Uti and Hira-Buddini. Gold mining has a hoary past in the Hutti belt, which dates back to more than 2000 years. There are innumerable old workings for gold spread over the RP block. GSI has examined most of

the known gold occurrences and explored them to varying degrees of intensity. However, except for sketchy information in the Records of the GSI, details are unpublished. More significant gold occurrences from west to east are Hutti proper (where the Hutti Gold Mine is situated), Hutti North, Hutti East, Kadoni, Yatkal, Wandalli, Uti Temple, Uti Mine Prospect, Chinchargi-Topaldoddi, Hira-Buddini mine Prospect and Bullapur Prospect.

7 EXPLORATION BY INDOPHIL

7.1 EXPLORATION STRATEGY

Two pronged strategy was worked out to rapidly cover the entire RP area by sampling of both stream sediments and rock-chips from exposed outcrops. In covered ground, stream sediment and bedrock soil sampling were carried out, coupled with panning for visual examination of gold particles.

Orientation stream sediment sampling was carried out to establish the suitability of the sampling technique in prospecting, as well as to establish various parameters such as quantity of sample, grain size and elements to be determined. The orientation survey, has established the suitability of -80 and -120 mesh size fraction of stream sediment for identifying stream sediment geochemical anomalies. Stream sediment anomalies were followed up by rock chip, soil, bed rock and channel profile sampling source areas to confirm gold mineralization and possible surface dimensions of the mineralized zone. At places geophysical surveys were also carried out to further confirm and define the mineralized zone. Reconnaissance test drilling was carried out in promising areas / prospects to investigate the third dimension and grade of gold mineralization.

7.2 DETAILS OF WORK DONE

Table-1 summarizes the nature and quantum of the geological, geophysical surveys and geochemical sampling carried out together with the reconnaissance drilling and related works carried out by Indophil in the three year tenure of the RP.

Table-1: Nature and quantum of geological, geophysical, geochemical, and test drilling work carried out under Reconnaissance Permit

Sl.No.	Type of work	Quantum
1	Geological mapping on 1:10,000 scale	501 sq km
2	Geological mapping on 1:10,000 scale of different prospects	
3	Total Station Surveys	5 sq km
4	**Geophysical Surveys:** Induced polarization Ground magnetic	 9 line km 145 line km
5	**Geochemical samples**	**(No. of samples)**
A	Stream sediment samples	347
B	Termite mound Soil samples	85

C	Soil samples	819
D	Surface rock-chip samples	953
E	Channel profile samples	1,646
F	Bed rock profile samples	3,980
G	DTH drill samples	469
H	R.C. Drill samples	985
I	Drill core samples	387
	TOTAL	**9,671**
6	**Quantum of Drilling**	**Meters**
A	Core drilling	807.7
B	RAB drilling	622
C	RC drilling	1,776
	TOTAL	**3,205.7**

8 GEOPHYSICAL SURVEYS

8.1 IP SURVEYS

IP surveys were conducted in the RP block north of the Hutti Gold Mines over 7.9 line kilometers. The results are given in **Fig.6.** IP survey in the prospect / area North of Hutti Gold Mine picked up the northern extension of Main Reef and New East Reef of the Hutti Mine. IP survey has highlighted subtle chargeability anomaly corroborating with the Western Reefs also. These surveys showed that the sulphide alteration zones as observed in the Hutti Gold Mines may probably extend to more than a kilometer north of the HGML area.

The IP chargeability anomalies, were proposed to be tested by drilling.
Ground Magnetic Surveys

Ground magnetic surveys were conducted over an aggregate length of 69 line kilometers in the R.P. Block in the following areas: (a) north of Hutti Gold Mine, (b) west of Hirenaganur, (c) Uti south and north blocks of the Uti area and (d) Wandalli NE area (**Figs.7a,b,c and d**).

Results of the survey in north of the Hutti Mines are presented in **Fig.7a.** The magnetic anomaly map for the area west of Hirenaganur is given in **Fig.7b.** The anomaly can be correlated to a BIF zone west of Hirenaganur and approximately is along a N-S tectonic lineament seen on the DEM image. E-W anomalies in the map correspond to dykes cutting across the banded iron formation. Magnetic susceptibility contour map of Uti SW Prospect (Fig.7c) shows NE-SW oriented anomalies corresponding to the mineralized quartz reef zone. The magnetic susceptibility map of the Wandalli area in the Chinchargi-Wandalli prospect shows a striking magnetic cool anomaly oriented WNW-ESE. This anomaly corresponds to a felsic dyke and the high magnetic anomalies are aligned along actinolite-tremolite schists.

9 GEOCHEMICAL SAMPLING

9.1 STREAM SEDIMENT SAMPLING

Orientation stream sediment samples collected from active stream channels showed that determination of Au, As, Cu, Pb, Zn, Fe and W in -120 size fraction is appropriate for stream sediment geochemical survey in the R.P. block. Statistical studies of the data helped in arriving at the back ground value of Au 20 ppb and anything equal to or above 30 ppb was considered anomalous value.

Stream sediment sampling was systematically carried out in the RP block at 347 sites. The samples were assayed particularly for gold and arsenic. Location of stream sediment samples collected in the RP block are shown in **Fig.8**. Analytical results are tabulated in **Table-2a** given in the CD attached. Several cohesive and significant stream sediment geochemical anomalies have been defined, of which 13 are very prominent. They include anomalies around area north of Hutti Gold Mine, Chinchargi, Hira Buddini, Hutti-Hosur, Madarkal-Palkanmardi, Timmapur-Topaldoddi, Uti, Wandalli-Mallapur, Yatkal, Hirenagnur and Yelagatti NE.

Follow up soil, bed rock and rock-chip sampling was carried out in all such possible source areas to confirm the presence of gold mineralization.

9.2 TERMITE MOUND SOIL AND SOIL SAMPLING:

Termites burrow through weathered soil profile all the way up to the water table, and bring up the hard soil particles from the weathered zone to the surface and build the termite mounds. Gold particles present in the soil, are also transferred to the surface in the process and are found as microscopic or visible particles in the soils of the termite mounds. Therefore termite mounds have been used in geochemical prospecting for gold. Reference to this technique has been made in Brihat Samhita of Varaha Mihira. In recent times, Dr. E.A.V Prasad of the Sri Venkateshwara University, Tirupathi has revived interest in this method of prospecting for gold in India. In Mali and African countries it has been extensively used in search of gold deposits.

Initially, panning of half a dozen termite mound soil samples from Yatkal area showed visible particles of gold. Encouraged by this observation, sampling of termite mound soil samples was undertaken in Hirenaganur, Yatkal, Uti and Wandalli areas where they have extensively developed. Locations of termite mounds in these areas are shown in **Fig.9**

In all, **85 samples** of termite mound soils have been analysed for gold and indicator trace elements. The results are presented in the **Table-2b.** The Hirenaganur sample showed a weak gold anomaly with 80ppb Au. Similar abundances of Au, have been observed in the samples from the Uti south prospect. Gold content >100 ppb, has been observed in several samples from Yatkal area, one sample showing as much as 630ppb Au. One termite mound sample from the area south of Palkanmardi also showed anomalous gold value of 220 ppb. Three out of nine samples from Wandalli prospect showed significantly anomalous gold content, with values of 189, 234 and 334 ppm gold. 28 samples were collected from Chinchargi central part. 3 samples have shown anomalous values of 83,246 and 303 ppb Au.

9.3 SOIL SAMPLES

9.3.1 Yatkal area

Following the termite mound soil sampling, a systematic programme of soil sampling was undertaken in the Yatkal area. Soil samples were collected along E-W profiles, laid at 40 metre intervals. Interval between the samples along each profile, was maintained at 20 metres. Profiles with soil sample locations are shown in **Fig. 10. In all, 819 soil samples** were collected and analysed. Analytical results are in **Table-2c (in the CD).** Considering that gold content above 50 ppb represents anomalous zone, a contour map was prepared based on gold content in the samples. The contour map distinguishes the areas with <50ppb, 50-100ppb, 100-200 ppb, 200-400ppb and >400ppb gold. Two distinct zones of mineralization emerge: (i) NE to N60°E trending zone in the western part, and (ii) N40°W trending zone in the east.

The more prominent zone of gold mineralisation recognized on the basis of soil sampling at Yatkal is the N60°E trending 150m wide zone, which consists of sheared, fractured granodiorite showing significant pyrite disseminations. Thin quartz veins, are emplaced along N60°E trending fractures. Five parallel zones of quartz veins and three sub-zones of soil gold anomaly, have been identified. The Eastern sub- zone is the narrowest and extends for ~400 metres and the anomaly is open towards NE. The central sub- zone is relatively broader and is of similar length. The Western sub-zone looks very significant. It is 900 metres long and 500metres wide. The anomaly is still open towards south. This zone encompasses 5-6 sets of NNE-SSW trending old workings. Many rock chip samples collected within this zone have analysed significant gold values. There are number of old workings along the fractured granodiorite. Several pounding marks are also seen.

The N40°W trending zone, is expressed by highly silicified pink granite with amphibolite patches traversed by pinkish grey quartz veins, disseminated with chalcopyrite and pyrite. Malachite encrustation is very common in this zone. The zone is also characterized by strong epidote alteration.

9.4 ROCK-CHIP SAMPLING

Most of the RP block is covered with black cotton soil. However, geological traversing picked up number of quartz veins and suspected zones of mineralization. Rock-chip sampling covered all such outcrops and also source areas indicated by stream sediment and soil sampling anomalies. **Figure 11** shows sampling locations in the R.P. Block. Sampling has been carried out in areas north of Hutti mine, west of Hirenagnur, East of Yatkal, South of Rodlabandi, NW, W and SW of Uti, near Wandalli, N and S of Palkanmardi in all 953 rock-chip samples were collected and analysed. Locations of the samples are shown in **Fig.11** and the analytical data are presented in **Table-3 (given in CD).** A minimum of 1 ppm Au in the rock chip sample is taken to indicate a geochemical anomaly of significance.A brief prospect-wise description of rock-chip sample anomalies is given below below:

9.4.1 North of Hutti mine prospect

Few significant values were obtained from the chip samples of quartz from north of Hutti Mine.

9.4.2 Hirenagnur prospect

The rock-chip samples collected from the surface have brought to light one of the most significant gold discoveries in Hutti North RP block. There has been no report of any earlier systematic sampling and drilling by any other agency including GSI at Hirenagnur. Samples were collected from sparse outcrops of sulphidic banded iron formation. The samples have yielded values up to 7.13 g/t Au. The rock-chip sampling and ground magnetic surveys brought out a coincident geophysical and geochemical anomaly over 1.2 km strike length and 50 m wide zone. Sample locations are shown in **Fig.11 and 13** and analytical results are given in **Table-3 in the CD attached.**

9.4.3 Yatkal prospect

Rock-chip sampling was undertaken to test significant soil sample anomalies. Gold mineralization is observed in sheared granite traversed by quartz veins with sulphide mineralization. The sheared granite trends NE-SW with 30-40°NW dips. Rock-chip sampling has revealed anomalous gold content in several samples with best values ranging from 1 g/t to 32.05g/t Au. Both soil and rock-chip sampling have confirmed a geochemical gold anomaly over an area with 950 m strike length and 175 m width. Sample locations are shown in **Fig.11 & 14.** Analytical results are given in **Table-3 in the CD.**

9.4.4 Uti prospect

Samples were collected in the northwestern, southwestern and southern parts of Uti village. NW of Uti village values ranged from <0.01 to 6.21 ppm with two significant values of 2.59 ppm and 6.21 ppm. To the SW of Uti village two samples analysed 2.04 ppm and 3.92 ppm gold. Rock-chip sampling has brought to light gold mineralization in quartz veins traversing both mafic and felsic volcanic rocks. Sample locations are shown in **Fig. 11 & 15.**Analytical results are given in **Table-3 in the CD.**

9.4.5 Chinchargi prospect

In addition to grab samples collected in the old mining areas, which gave values as high as 5.59 ppm and 8.33 ppm Au, two rock-chip samples have analysed 9.92 ppm and 12.73 ppm Au. Sampling suggests a good mineralised zone to the south of Chinchargi, but poor values to the west. Location of samples are shown in **Figure.11 & 16.** Analytical results are given in **Table-3 in the CD.**

9.4.6 Wandalli prospect

None of the samples gave more than 1 ppm Au. Sample locations are shown in **Fig.11 & 16.** and analytical results are in **Table-3 in the CD.**

9.4.7 Palkanmardi prospect

Rock chip sample locations in Palkanmardi area are shown in **Fig.11 & 17.** Analyses of the samples are given in **Table-3.** No significant anomalies were observed.

9.4.8 Yelagatti, Hutti-Hosur and Chiknagnur areas

In these areas rock-chip sampling results are not encouraging with the maximum gold assay value of 0.33 g/t.

9.5 CHANNEL PROFILE SAMPLING

Channel sampling was carried out in North of Hutti Mine, Hirenagnur and Uti prospects where significant soil and rock-chip sample anomalies were observed to understand the surface dimensions of the rock-chip anomaly.

9.5.1 North of Hutti Gold Mine Prospect

IP surveys carried out in the northern extension of the Hutti Gold Mine area showed chargeability anomalies along the strike continuity of New East Reef of the mine block. Earlier sampling had shown anomalous Au and W values in this sector. To further confirm the northern extensions of New East Reef, channel sampling was carried out. Channel sampling along 2 channels 30 m apart gave 1 m wide quartz reef analysing 9.4 g/t and 10 g/t Au respectively. Five more channels exposed 2-3 quartz veins but highest value was 0.94 g/t Au. Channel samples have confirmed the continuity of New East Reef, which needs to be tested by drilling. Location of channel profiles are shown in **Fig 12.** Analytical results are tabulated in **Table 4a-i & ii given in CD.**

9.5.2 Hirenagnur Prospect

Channel sampling was carried out across the BIF, which had returned some good values in bed rock and rock-chip sampling. Channel sampling has revealed 2-3 sub parallel zones with widths ranging from 2-15 m. Individual samples have given values ranging from 1 g/t to 3.33 g/t Au with a maximum value of 7.0 g/t Au. Location of channel profiles are shown in **Fig.13** and analytical results are tabulated in **Table 4b given in CD.**

9.5.3 Uti Prospect

Channel sampling was carried out in areas where anomalous values were noted during rock-chip and bed rock sampling. It has established the WSW continuity of lodes exposed in the Uti mine of HGML **(Fig. 15).** Results show that continuation of lodes 6 and 7 with good grades. A 2 m wide zone of 1.3-2.03 g/t Au was recognised on Lode 6 and a 2-8m wide zone with 2.24-2.93 g/t Au was noted on lode 7 **(Table-4c given in CD).**

9.5.4 Chinchargi-Wandalli Prospects

In Chinchargi-Wandalli-Palkanmardi area, Channel sampling was carried out along the mineralised zones indicated by bed rock sampling. In channel Ch-1791528, 1 m wide sample has analysed 1.7 g/t Au, bordering wall rock alteration zone has given values ranging between 106-828 ppb. In channel CH-1789730, two auriferous zones are met with one metre zone analysing 1.18 g/t Au and another 2 m wide zone analysing 2.02 and 4.38 g/t Au, the two zones are separated by an anomalous zone with 195 ppb Au. In profile W-3 and C-1, 1 m wide samples have analysed 1.15 g/t Au.

Channel samples in the Wandalli prospect, north of Kyamb have shown poor gold values ranging from 0.01-0.04 g/t Au.

Channel sampling profiles in the Chinchargi-Wandalli prospect is shown in **Fig.16** and the analysis of the channel samples are presented in **Table-4 d & e.**

9.6 BED ROCK PROFILE SAMPLING

9.6.1 North of Hutti Mine area

To test the IP anomaly observed on the northern continuity of Main reef, samples from 4 bed rock profiles were drawn. Although no strong bedrock geochemical anomaly was observed, a subtle anomaly corresponding to western IP zone 1 was noticed. Anomalous gold values between 20-90 ppb were noticed over 180 m wide zone overlapping the IP anomaly and projected northern extension of Main Reef. There is also indication that gold values increase from south to north along the inferred extension of Main Reef. The location of bedrock profiles are shown in **Fig.12** Analytical values are tabulated in **Table 5 a-i, ii and iii (given in the CD).**

9.6.2 Hirenagnur Prospect

Rock-chip and channel samples have given evidence of significant geochemical anomaly in this prospect. Magnetic traverses taken to the west of Hirenaganur have brought out a magnetic anomaly zone **(Fig.7b)**. In order to test these anomalies further and define possible zone of mineralization, bedrock geochemical sampling was undertaken. The rocks met with are carbonate veined chlorite schist, at places carbonaceous with thin inter bands of ferruginous chert (magnetite bearing) usually limonitised. A total of 474 bed-rock samples were collected at 10m along E-W oriented profiles laid at 40 m interval across the strike of the BIF **Fig 13.**Analyses of the samples are presented in the Table **(Table-5b)**. Generally the gold values are low except for in one sample of limonitised ferruginous chert, which has 7.78 ppm of gold. Nearly 50% of the samples analysed Au in the range of 56-491ppb. A 90m wide anomaly is traced which indicates broadening towards north. The Au anomaly is also associated with a strong arsenic anomaly and overlaps the magnetic anomaly zone picked-up earlier.

9.6.3 Uti prospect

In **Uti prospect**, bed rock sampling was carried out in Uti South, Uti North, Uti Temple and Uti SW prospects. Location of samples are shown in **Fig. 15** and analytical results are tabulated in **Table -5c-i to iv.**

9.6.3.1 Uti South Prospect

Uti South Prospect is located 3.5 km southwest of Uti village. A geochemical bedrock sampling programme was launched in this Prospect to trace the southward extension of the Uti lodes. Coarse grained spotted amphibolite, massive amphibolite, schistose silicified amphibolite, carbon phyllite, felsic volcanic intercalated with BIF and metagreywacke are the different rock types encountered from west to east in this prospect. Bed-rock sampling was carried out along 9 ESE-WNW oriented profiles and samples were collected at 20 m interval along each profile. The sampling profiles are shown in **Fig.15** and the analyses of the samples are presented in the **Table (Table-5c-i)**. An anomalous zone was identified in profile 1towards east, which appears to be the southern extension of Lode No 5 exposed in the open cast mine of HGML. A weak Au-As anomaly, which is in line with Lode nos. 8 and 9, was noticed. At a distance of 200-300m from this zone, another Au- anomaly was also noticed within the felsic volcanic rock-sedimentary sequence. A sheared, N40°E trending mylonitised felsic volcanic rock traversed by quartz-carbonate veins was also

traced north of this zone. The results show that Au values increase considerably towards north, indicating that, the best mineralisation may be to the north of Profile 1.

9.6.3.2 Uti North Prospect

This prospect is located about 1.5 km NW of Uti village to the north of the HGML's Uti Mining Lease area. Schistose and pillowed metabasalt, coarse-grained amphibolite, felsic volcanic rock and subordinate metasediments are the main rock types in this sector. Foliation strike is N10°-20°E, dip is steep towards west. Mineralisation is at the contact of coarse- grained and schistose amphibolite. Many old workings are seen along these lodes. Another mineralized zone is noticed towards east at the contact of felsic volcanic and schistose metabasalt. A bed-rock geochemical sampling programme and geological mapping was undertaken to explore this Prospect in detail. A total of 124 samples were collected from 3 profiles, laid along E-W direction. 23 samples have analysed anomalous gold values in the range of 30-95 ppb **(Table-5c-ii)**. Initial study of the data indicates two broad moderate Au-As anomalous zones of which, the eastern zone is in line with Lode 1 in Uti open pit mine, and another anomaly is towards west. Previously, GSI has carried out preliminary investigation of these lodes, which included drilling of 6 bore holes.

9.6.3.3 Uti Temple Prospect

Ground magnetic survey brought out a moderate magnetic anomaly to the west, which coincides with the Main Temple Lode. Another major magnetic anomaly to the east was found to be due the effect of highly magnetic coarse-grained amphibolite. In order to firm up the mineralisation pattern in this prospect, a semi detailed bed-rock geochemical sampling was carried out, which involved collection of 94 samples from 3 profiles. Sampling profiles are shown **Fig.15** and the analyses are presented in the **Table-5c-iii.** The profiles were laid in N60°W and S60°E direction. Samples were collected at an interval of 20m along each profile from the weathered bed- rock horizon. In the **Uti Temple Prospect,** 2 out of 4 profiles show several values >50 ppb Au. Two Au anomalies are noticed, one corresponding to the main Temple lode and another 60 m wide anomaly to the east of the 1st anomaly. The eastern anomaly recorded 244 ppb Au from one of the samples. It is proposed to test these anomalies by reverse circulation drilling.

9.6.3.4 Uti South West Prospect

This prospect is found to the West of Uti South prospect and includes Lode No 8A identified by GSI. Bed-rock geochemical sampling was carried out from two profiles oriented N60°W-S60°E in order to understand the prospectivity of this Prospect **(Fig.15)**. The data of 22 samples shows a weak Au anomaly in line with the interpreted lode no. 8A **(Table-5c-iv).**

9.6.4 Chinchargi-Wandalli North East prospect

A strong stream sediment geochemical Au anomaly has been observed in the Wandalli area. To locate the source of this anomaly, an area of two sq. kms, has been geologically mapped; rock chip and bed- rock geochemical sampling has been carried out. Main rock type in the area is actinolite schist, which is associated with schistose amphibolite and pillowed metabasalt. Foliation strikes N40°W and dips steeply towards SW. The area also exposes carbon phyllite intercalated with thin chert bands. N50°W trending quartzo-feldspathic rock is also exposed in the southern part. Several old workings and pounding marks have been noticed for the first time from this prospect.

N50°E-S50°W trending profiles were laid during an initial phase of sampling at 80m intervals and later the profile intervals were reduced to 40 m. Bed-rock samples were collected at 20m intervals along each profile. Bed-rock sampling profiles are shown **Fig-16**. In all 1,546 bed-rock samples were collected and analysed for gold and indicator trace elements **(Table-5d&e).** Weak geochemical anomaly for gold with Au values >30ppb in weathered bed-rock has been noted in several profiles and in one profile-Profile 4- high values like 362ppb and 2211ppb have been noted.

In Chinchargi-Wandalli prospect, the bed rock sampling has brought out a broad anomaly with vein and alteration zone as much as 80-200m in south of Chinchargi. Similarly W of Chinchargi also a wide zone of 75-100 m has been noted. In Chinchargi proper some of the samples have analysed as high as 927 ppb; in Chinchargi Central several samples have analysed more than 50 ppb with one sample analysing as high as 1646 ppb. In Chinchargi east some of the samples have analysed in the range of 50-215 ppb. All samples analysing >50ppb are, considered anomalous warranting further exploration at the stage of PL.

9.6.5 Palkanmardi prospect

Encouraged by significant stream sediment geochemical anomalies observed in this area, the polymictic conglomerate- meta volcanic contact was considered worthy of prospecting based on the experience of Placer Dome geologists of Western Australia. Gold mineralization is hosted by highly sheared sericitic schist with quartz and sulphide in this prospect. Bed-rock samples were collected from the C-horizon at 20 m intervals along 8 profiles spaced at 160m, four in the area near Palkanmardi (N1 to N4) and 4 in Madarkal area (S1to S4). The sampling profiles are shown in **Fig.17**. Analytical data are given in **Table-5f**. Weakly anomalous values ranging between 30-98 ppb Au were observed in N1 Profile over a 60m wide zone. N2 and N3 profiles also revealed continuation of the anomalous zone. Similar weak anomalies are noticed along profiles S1 an S2 and S3.

10 DRILLING

Limited reconnaissance drilling comprising of RAB, RC and Core drilling was carried out in selected prospects to test the depth wise continuity of gold mineralization in the established geochemical and geophysical anomaly zones.

10.1 NORTH OF HUTTI MINE PROSPECT

Previous workers have inferred that auriferous quartz reefs in Hutti Gold Mines may extend northward. IP survey brought out chargeability anomalies north of Hutti Gold Mines. Based on these criteria, and surface geochemical surveys, core drilling was undertaken at 4 locations to pick up the northward extension of the auriferous quartz reefs. DGML-1 to 4 **(Figs. 18).** The results of analyses of drill core samples are given in **Table-6a.** Borehole cross sections are given in **Fig.19 a to d.** DGML-1 intersected Strike Reef at 224.5m, but with very low gold values; DGML-2 also intersected Strike Reef at 220.3 and gold values were only 0.63 g/t over a width of 6.3m. In DGML-3 lodes were met between 99.15 and 99.65, 102.95 & 105.30, 121.35 & 122.60; 122.95 &123.40 and 138.25 &138.65m. None of the intersections yielded good values. DGML-4

intersected inferred extension of Oakley reef. No good grade was met here also. In general ore grade was seen to be very poor in the area north of Hutti Gold Mine.

Limited RC drilling in 3 boreholes was taken up to test the channel sampling results on the New East Reef. The vein quartz was intersected, but with poor values. Only one sample analysed 1.08 g/t Au. Location of boreholes are shown in **Fig-18**; Analytical results are tabulated in **Table-6b.** Further geochemical sampling and drilling is required to assess the full potential of the Prospect. A PL application has been filed to enable detailed exploration of the prospect.

10.2 HIRENAGNUR PROSPECT

RAB and RC drilling has been undertaking in this prospect. Borehole location plan is given in **Fig.20** and analytical results are enclosed in **Table-6c-i & ii.** Cross sections of boreholes are presented in **Figures. 21 a to g.** Drilling has confirmed the results of surface geochemical sampling. Very encouraging intersections have been met and so far 300 m central part of the 1.2 km long mineralised zone, has been tested by drilling with positive results. Preliminary drilling to the north and south have also indicated significant intercepts. Salient intersections in boreholes drilled in Hirenagnur prospect are given **Table-7.**

Table-7: Salient intersections in the boreholes drilled in Hirenaganur Prospect, North Hutti R.P. Block.

Drill hole No.	Depth (m)	Width (m)	Grade (g/t)	Remarks
DHN-5	87	9.0	2.77	Visible gold in pan concentrate, Max value 12.87 g/t Au
DHN-6	51	16.0	6.38	West lode
DHN-7	48	5.0 4.0 4.0	1.77 1.53 1.24	East zone
DHN-8	46	9.0	2.21	Visible gold in pan concentrate, Max value 8.77 g/t Au
DHN-10	46	2.0 12.0	3.72 1.5	Max value 3.72 g/t Au
DHN-11	60	9.0	1.24	Max value 3.94 g/t Au
DHN-13	66	7.	0.84	Max value 1.37 g/t Au
DHN-14	88	10	2.36	Visible gold in pan concentrate, Maximum value 8.5g/t
DHN-15	98	5.0 7.0	3.02 2.65	Visible gold in pan concentrate, Max. value 6.26 g/t Au
DHN-16	30	11	4.52	Visible gold in pan concentrate, Max value 10.89 g/t Au
IHN-1	17 57	2 1	1.59 1.53	
IHN-2	5 46 79	5 2 1	5.35 1.13 2.79	Max. value 13.28 g/t
IHN-3	47	1	1.81	
IHN-4	33 51	3 2	1.63 2.44	
IHN-5	34 69 53 69	1 1 1 8	1.94 2.98 1.56 5.02	Max. value 11.52 g/t
IHN-6	37	4	1.46	

The gold mineralization is open along strike and also along depth dimension. The drill hole data together with surface sampling data has indicated existence of an open pittable gold reserve of an average grade of ~3 g/t. A PL application has been filed to undertake detailed exploration to test the depth continuity and fill the gaps in the present series of holes. It is also planned to submit an application for a Mining Lease over an area of 1.5 sq km in view of the existence of open pittable gold resource in Hirenagnur prospect.

10.3 CHINCHARGI PROSPECT

Preliminary RC drilling in 8 boreholes was carried out to test the mineralised zone delineated by geochemical sampling. 4 holes in Chinchargi east, 3 in Chinchargi West and 1 in Chinchargi central were drilled. Borehole locations are shown in **Fig.22.** Cross sections of boreholes are given in **Figures 23 a to e.** Analytical results are tabulated in **Table-6d.** Drilling results are summarised in **Table-8.**

Table-8: Summary of results of drilling in the Chinchargi Prospect

Drill hole No.	Location (Sub-block)	Depth (m)	Width (m)	Grade (g/t)	Remarks
DCH-1	East	66	8.0	1.41	Visible gold seen in panning
DCH-7	East	49	4.0	1.1	
DCH-8	East	70	NIL	NIL	
DCH-2	West	80	5.0	2.0	Visible gold seen in panning
DCH-3	West	57	2.0	0.38	
DCH-4	West	36	2.0	0.83	
DCH-5	Central	63	1.0 2.0	1.06 0.65	
DCH-6	East	33	Nil	Nil	High value of tungsten upto 0.35%

Further infilling geochemical sampling and deeper drilling are required to asses the full potential of the prospect. A PL application has been filed to enable detailed exploration of the prospect.

10.4 UTI PROSPECT

RAB Drilling was carried out in the Uti area to test the geochemical anomalies encountered during surface sampling. Locations of boreholes are shown in **Fig.24;** cross sections of bore holes are illustrated in **Fig.25 a and b** and analyses of samples of drill cuttings are presented in **Table-6e-i (RAB) & 6e-ii (RC).** Drilling results are summarized in **Table-9.**

Table-9: Summary of results of drilling in Uti Prospect

Drillhole No.	Location (sub-block)	Depth (m)	Width (m)	Grade g/t Au	Remarks
DGU-1		62			
			5	0.82	Lode-6
			3	1.40	
			1	1.02	
DGU-2		62	1	1.72	Lode-7
DGU-3		58	2	1.34	Lode-7
DGU-4		56	4	3.49	Lode-8, 9
DGU-5		48	All values <1g/t central BIF		
DGU-6		25			
DGU-7		36			
DGU-8		53			
DGU-9		78			
DGU-10		82			
DUN-11		49			

5 out of 11 boreholes have given mineralized zones analysing more than 1 g/t. Drilling has established the strike continuity of a few of the lodes from the present Uti Pit of HGML.

11 RESULTS OF EXPLORATION

11.1 IDENTIFICATION OF PROSPECTIVE BLOCKS

Systematic outcrop, soil and stream sediment sampling and preliminary reconnaissance drilling have been successful in establishing the potentiality of several of the known gold prospects earlier explored and abandoned by GSI. It has also led to discovering one new prospect in Hirenagnur where no history of earlier mining or exploration exists. Analysis of results of exploration carried out by Indophil in the last 3 years in Hutti North block has successfully identified following prospects warranting further detailed exploration at the stage of Prospecting Licence.

12 PROSPECTWISE RESULTS

12.1 NORTH HUTTI PROSPECT

In the Hutti gold mine block, total of 6 reefs are being mined designated from west to east as Main Reef, Prospect Reef, Oakley Reef, Middle Reef, Zone 1 Reef, Village Reef, Strike Reef and New East Reef. The geophysical surveys and geochemical sampling have helped in tracing anomalies coinciding with the inferred northern extensions of Middle Zone-1, Village, Strike and New East Reefs. Though, preliminary drilling results are not very encouraging, good surface sampling values suggest good potential for the prospect. Strike extension of Hutti Main Reef has shown values upto 16 g/t Au and New East Reef has analysed 1.0 to 10.7 g/t Au. Further drilling is planned at PL stage to explore the full potentiality of the block.

12.2 HIRENAGNUR PROSPECT

Surface geological and geophysical surveys, geochemical sampling and 873 m of drilling have been successful in defining 4 independent gold bearing lodes having a cumulative strike length of 1,030 m. These lodes are:

Footwall magnetite-gold zone:	500 m long with 7.5 m av. width; 3.34 g/t av. gold grade.
Central magnetite-gold zone:	80 m long with 6.23 m av. width; 2.12 g/t av. gold grade.
Hangingwall sulphidic zone:	250 m long with 8.63 m av. width; 4.34 g/t av. gold grade.
A single intersection lode west of (c):	25 m long with 6 m av. width; 3.52 g/t av. gold grade.

The mineralized zones intersected in the boreholes are listed below:

Footwall magnetite zone	Central magnetite zone	Hangingwall Sulphide zone
19m x 3.02	11 x 2.17	11 x 4.52
8m x 5.02	8 x 1.38	16 x 6.38
6m x 2.94	5 x 3.02	9 x 2.7
7m x 2.65	9 x 2.21	10 x 2.36

Gold values intersected in the boreholes range from 2 g/t to 6.38 g/t. The average grade works out to 3.28 g/t gold for an average width of 8 m and a cumulative length of 1.03 km. The reconnaissance drilling has tested the depth persistence of the lodes up to 60m from the surface.

The above results are highly encouraging to mount a more intensive drilling programme under the Prospecting Licence.

A recent programme of geological mapping to trace the southern extension of the Hirenagnur prospect was successful in tracing the mineralized zone for another 800 m thereby, taking the total strike length of the mineralized zone to 2km.

Hirenagnur Prospect is a structurally controlled gold-sulphide type of mineralization. The average 8 m width of the mineralized zone is good enough for mining the deposit by open cut method in the initial stages. The structural control and the strike length of nearly 2 km suggest that the Hirenagnur prospect has the potential to host a substantial gold reserve.

12.3 CHINCHARGI-WANDALLI PROSPECT

The Chinchargi-Wandalli prospect is located about 15 km east of Hutti Gold Mine. The areas near Chinchargi and the adjacent Topaldoddi villages, have been known since ancient times, for gold mining activity by local people. British miners carried out further prospecting in the area in the early part of 20th century.

A total of 31 rock chip samples taken mainly from quartz veins in mafic and felsic meta-volcanic rocks from several old workings south of Chinchargi and the area between them were analysed for gold. While most samples assayed in the range <0.01 to 0.33 ppm gold, one sample showed 8.3 g/t, indicating that there are mineralized zones present which need to be probed in detail. Bed rock geochemical sampling has already been undertaken. A total of 652 samples were collected at 10m intervals along profiles perpendicular to the strike of the mineralized zone. Strong geochemical anomalies with gold values in the rang of 100 ppb to 2.36 g/t have been found along three profiles, in strike continuity of veins observed in the old workings south of Chinchargi. The data suggest that mineralized veins continue for at least a kilometer WNW from the old workings. South of that zone, another quartz reef has been traced over a strike length of about 500 m. This reef is associated with a 100m-wide geochemically anomalous zone observed in four profiles. Widely-spaced reconnaissance drilling over a strike length of 3.7 km has indicated depth continuity of the mineralization. Borehole DCH-A passed through a mineralized zone with an apparent width of 8 m and average grade of 1.41 g/t gold.

12.4 UTI PROSPECT

12.4.1 Uti South Prospect

This block is in the area south of HGML's Uti open pit mine. Bedrock sampling has revealed an anomalous zone 50 m wide, with 591 ppb gold. This anomaly falls along strike of the Uti Mine's Lode No. 5. The sampling results have opened up a new target for detailed exploration by Indophil.

12.4.2 Uti North Prospect

Systematic geochemical and ground magnetic surveys have been carried out to explore the area north of the Uti open pit mine. A total of 124 bed rock samples from 5 profiles point to two broad,

moderately auriferous anomalies. One anomaly is at the contact between schistose metabasalt and amphibolite. The other is at the contact of felsic volcanic rock with metabasalt. The limited number of rock-chip samples taken from these zones so far have yielded gold contents in the range of 0.12 to 6.21 g/t gold.

12.4.3 Uti Temple Prospect

Bed rock geochemical sampling has been undertaken in the Uti Temple prospect to trace the strike continuity of the Uti Mine's Temple lode that is known to extend west from the mine. While that targeted lode extension was picked up by a 60 metre wide geochemical anomaly, another anomalous zone has been identified east of the targeted one. Samples from this second zone, have assayed 244 ppb gold. Magnetic surveys have picked up geophysical anomalies coinciding with the geochemical anomalies, indicating that it is worth testing the identified zones by drilling.

12.4.4 Bullapur prospect

Existence of small old workings for gold in the form of pits had been recorded in the literature. These old workings are located 2 km west of Bullapur village. A programme of geological mapping and sampling of the old pits and their extensions were undertaken. This programme was successful in locating a new zone of mineralization unknown earlier.

The mineralized zone comprises a series of parallel fracture-controlled gold bearing quartz veins disposed as N-S trending splays from a narrow ENE trending shear zone. **One of the quartz veins showed a number of visible gold grains after panning.** A rock-chip sample of mineralized quartz yielded a high gold value of 6.53 g/t.

This shear zone is likely to link up with the main WNW trending shear zone hosting Topaldoddi-Chinchargi mineralized tract. **Thus the recent finding has opened up a fairly long zone of over 5 km target for future exploration.**

13 RELINQUISHMENTS AND SELECTION OF PL BLOCKS

Extensive geological studies, geochemical sampling, geophysical surveys followed by preliminary drilling led to relinquishment of 50% of the RP block on completion of the 2nd year of the R.P. tenure and continuation of exploration work in 250.74 sq km area that was retained during the 3rd year.

Through reconnaissance exploration during the three year RP tenure, 7 prospects were identified as having potential to graduate into mining prospects. Accordingly 7 PL applications have been filed to continue detailed exploration under Prospecting Licence. The details of the blocks are given in **Table.10.**

Table-10. Details of the P.L. Blocks applied for in the granted Hutti North R.P. Block

Name of the block	Area in sq km	Applied on
Hutti North Block	5	1.8.2003
Uti block	2.9	14.1.2004
Yatkal-Hirenagnur block	28	1.10.2004

Wandalli block	90	21.10.2004
Yelagatti block	9	17.12.2004
Palkanmardi	6	28.2.2006
Bullapur	7	15.3.2006
TOTAL	**147.9**	

Fig.26 shows the 7 PL blocks identified within the area granted under R.P. for which P.L. applications have been filed with the Department of Mines and Geology, Government of Karnataka.

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