

DECCAN EXPLORATION SERVICES PVT. LTD.

CONSOLIDATED THREE YEAR REPORT ON MINERAL EXPLORATION CARRIED OUT IN THE 3,543 SQ KM, DHARWAR RP BLOCK, BELGAUM, DHARWAR, NORTH KANARA, HAVERI AND GADAG DISTRICTS, KARNATAKA

1 INTRODUCTION

Government of Karnataka, through its notification No. CI 15 MMM 20001, dated 17.10.2002, granted a Reconnaissance Permit (RP) to Indophil Resources Exploration Services (India) Pvt. Ltd., (Indophil for convenience) to carry out mineral exploration over an area of 3543 sq. km in the Belgaum, North Kanara, Dharwar, Haveri and Gadag Districts of Karnataka. This R.P. Block is designated as the Dharwar R.P. Block. The R.P. Block is shown in Fig.1. Indophil executed the R.P. Deed on 17.1.2003 and began its reconnaissance exploration in the area. The present report summarises the results obtained from the three year exploration activity in the R.P. Block.

The most important outcome of the reconnaissance exploration are the recognition of 4 gold prospects viz., Mangalgatti NW and SE, Bhavihal, Kulavalli and Turkar Sigihalli, all of which deserve to be explored in detail. Hence, these prospects have been covered under PL applications the details of which are given in Section-7.

Reconnaissance exploration consisted of the following activities.

1. Review of previous work and identification of areas of interest within the R.P. Block.
2. Preparation of base map in GIS format.
3. Geological mapping of the R.P. Block on 1:50,000 scale and interesting prospects on 1:5000 to 1:10000 scale.
4. Orientation stream sediment sampling followed by stream sediment geochemical sampling
5. Rock chip and channel sampling.
6. Rotary air blast (RAB) and reverse circulation (RC) drilling.
7. Analysis of surface and bore hole samples.
8. Interpretation of data.
9. Identification of prospective blocks for P.L. application.
10. Filing of P.L. and or M.L application over the identified prospective blocks.

1.1 GEOLOGY OF THE AREA

The Dharwar R.P. Block falls in the northern part of the Neoproterozoic Dharwar-Shimoga supracrustal belt. It is an area dominated by meta sedimentary rocks with a minor component of metavolcanics

(Fig.2). The rock formations belong to the Ranibennur Formation of the Dharwar Supergroup. The principal rock types are metagreywacke chlorite schists and phyllites and sulphidic banded iron formations. The metavolcanic rocks are dominantly of intermediate to felsic composition (andesitic to rhyodacitic).

Cherty, sulphidic banded iron formation (BIF) is the principal host to gold mineralization. The iron formation bands are narrow and extend along strike for short distances (typically few hundred metres to few kilometers). They are interbedded with metagreywackes. All rocks have been deformed by isoclinal folding with generally steep easterly dipping axial planes. The schistosity, well developed in meta-greywackes, is parallel to NNW-SSE to NW-SE trending axial planes of isoclinal folds. Generally axial planar schistosity has steep dip towards ENE or NE. Folds typically plunge at low to moderate angles towards SSE.

Although there are large number of iron formation bands, it has been observed during geological mapping that the iron formations invaded by quartz or quartz-carbonate veins and affected by hydrothermal alterations such as sericitisation and carbonatisation are the ones which are important from the point of view of gold mineralization.

NW-SE and nearly E-W striking post-Archaean dolerite dykes have intruded all the rock formations. Large quartz reefs sub-parallel to schistosity are common in the western part of the R.P. These late quartz reefs are undeformed and not important from the point of view of mineralization.

The rocks, particularly BIFs have undergone intense oxidation and converted to gossanous here and there. The greywackes are deeply weathered, strongly kaolinised considerable depths (tens of metres) as observed in the quarries around Someshwar near Dharwar and the deep cuts along NH-4. Mineralised BIFs show well-developed box work structures.

Drainage map of the area has been superimposed on the geology of the area and a base map has been prepared for geochemical exploration.

2 REMOTE SENSING STUDIES

Google satellite imagery and Digital Elevation Model imagery of the Dharwar R.P. Block are presented in Fig. 3 and 4 respectively.

Eastern part of the R.P. block appeared to be covered by black cotton soil. In the western part, the hills are forested.

It is observed that the area mainly occupied by the metagreywacke chlorite schists and phyllites appears in distinct grey tone in google imagery. The greywacke terrain occupies valleys intervened by ridges that are capped by iron formations very distinct in DEM image.

Two strong NW-SE striking parallel lineaments are noticed, one passes through Mangalgatti, Bhavihal and Sangoli and the other through Venkatapur-Turukara Sigihalli area. South of Dharwar the Mangalgatti-Turukar Sigihalli lineament passes through Giriyal. Here NW-SE striking lineaments may be shear lineaments. A distinct NE-SW lineament, probably a dyke, passes about mid way between Mangalgatti and Dharwar and to the south of Dharwar town.

3 GEOCHEMICAL EXPLORATION

Principal method adopted was geochemical exploration, based on which potential areas were identified and reconnaissance drilling in target areas undertaken. Stream sediment geochemical surveys were followed by random rock chip and channel sampling. Anomalous areas were then chosen, mapped and defined into for drilling. DTH or RAB (Rotary Air Blast) and Reverse Circulation (RC) drilling was carried out. The quantum of sampling and drilling are given in Table-1.

Table-1: Quantum of geochemical analyses carried out in the Dharwar R.P. Block

Nature of geochemical sampling	Number of samples collected and analysed
Stream sediments	167
Rock Chip from out crops	606
Channel rock-chip	1,561
Bore-hole rock cuttings	1,094
Total number of samples analyzed	3,428

3.1 STREAM SEDIMENT GEOCHEMICAL SURVEYS

Stream sediment geochemical surveys are a rapid method of scanning large areas to identify target areas for detailed exploration. Stream sediment survey has been carried out in two stages: (1) orientation stream sediment survey and analysis and (2) Exploration stream sediment survey.

Samples were collected from stream sediment trap sites along the courses of first and second order streams. During the orientation survey, the samples collected were sieved to different size fractions and each fraction was analyzed separately for gold by fire assay method. Principal focus of exploration has been gold. It was observed that -120 mesh fraction had most of the gold, hence, adopted for stream sediment sampling during exploration stream sediment survey. Stream sediments were collected from 167 sites and analyzed for gold and indicator trace elements. The analytical data are presented in Table-2a provided in CD enclosed. The sampling sites are shown in the regional base map prepared in GIS format for geochemical sampling (Fig.5). Stream sediment samples analyzing greater than 20ppb have been considered to be anomalous after taking into consideration the background values. Those samples, which analysed more than 100ppb gold are considered to be highly anomalous. The anomalous and highly anomalous stream sediment anomaly sites are represented in Fig.5 by yellow circles and red stars respectively. Stream sediment anomaly sites have been recognized southeast and south of Durgadkeri, southeast of Bhavihal, south of Venkatapur, east of Turukara Sigehalli and NW of Mangalgatti, west of Kyarkop, south of Behatti and southeast of Chillur Badni. Some of the samples collected south of Durgadkeri and SSE of Kuluvalli, SE of Bhavihal, southwest of Kyarkop are found to be highly anomalous. When these stream sediment anomalies were traced up stream, the source areas for them were found to be BIFs which are essentially cherty and sulphidic as indicated by boxwork structures in gossans.

3.2 ROCK CHIP SAMPLING

Rock chip sampling of outcrops in the source areas of stream sediment anomalies and their strike extensions were undertaken. 606 rock samples were collected from outcrops and analysed for gold and indicator trace elements arsenic. The sample locations are shown in Fig.6. Analyses of samples are in Table 2b in the CD enclosed. Rock chips more than 1 ppm gold are taken to be geochemically anomalous and indicative of mineralization. This value is also a value which is relevant to the cut off that may be considered for an open cast mineable gold deposit. The sites of these samples are shown by yellow triangles in Fig.6. The sites of samples, which have analyzed more than 4 ppm, the grade preferred for underground mining if the price of gold exceeds 600 us/ oz., are shown by red stars in the figure. Some samples collected NNW and SW of Kuluvalli, south of Durgadakeri, SE of Turukara Sigihalli, west of Mangalgatti and north of Chillur Badni have analysed more than 1g/t gold. A few samples of BIFs exposed near Durgadakeri, Kuluvalli, and east of Chillur Badni have analysed more than 4g/t.

3.3 CHANNEL ROCK CHIP SAMPLING

Investigations carried out so far have pointed to certain promising areas in the R.P. Block. These have been referred to as prospects and shown as blue boxes in **Fig.7**. Channel sampling has been undertaken in the Mangalgatti, Narendra, Kuluvalli, Attigeri (Sisnival-Marutipura) and Turukarsigihalli prospects. **1,561 channel samples** have been collected and analysed. Analyses are presented in **Table 2C in the CD**.

3.3.1 Mangalgatti Prospect

The prospect was subdivided into 3 sub-prospects; Mangalgatti NW or the Main prospect; Mangalgatti SE prospect and Mangalgatti East Prospect. Analyses of random rock chip samples from all these prospects have shown good gold values. Gold mineralization is hosted by a folded sulphidic cherty banded iron formation. The BIF band, which is narrow on the limbs, widens in the hinge zones. In the NW prospect, the mineralization is localized in a SE plunging isoclinal synformal fold structure; In the Mangalgatti SE prospect the mineralization is confined to a SE plunging antiformal structure and the Mangalgatti East prospects represents the eastern limb of the southeast plunging antiformal fold (**Fig.8**).

Channel sampling was carried out along 6 profiles in the Mangalgatti NW, 27 profiles in the Mangalgatti Southeast, and along 10 profiles in the Mangalgatti East Prospects. Locations of the profiles are shown in **Fig.8**. Analyses of the channel rock chip samples from each of these prospects are presented in **Tables-2C- i, iii and iv in the CD**.

Perusal of the analyses, indicate wide mineralized zones of low grade in the hinge zones of the Mangalgatti NW and Southeast prospects. Channel sampling in the Mangalgatti East prospect has brought out a narrow, about a metre wide, zone of mineralization over a strike length of 800m. Samples from this zone show wide variation in gold content (1.01 to 8ppm).

Further, channel sampling has brought out mineralized zones, each 1 m wide in the southern most part of the Mangalgatti area.

3.3.2 Bhavihal Prospect

The channel sampling has clearly brought out surface expression of a wide ore body hosted in cherty BIF. The locations of the samples are shown in **Fig.16** and the analytical data are presented in

Tables-2C- ii in the CD. The sampling also revealed presence of a WNW trending dyke cutting the BIF.

3.3.3 Narendra Prospect

Channel sampling has been carried out along 6 profiles in the Narendra Prospect. Locations of the profiles are shown **Fig.9**, while the analyses of the samples are presented in **Table 2C-v in the CD**. Here again, gold mineralization is hosted by BIF, and also quartz veins in BIF and greywackes. A spot sample from NART-1 profile has analyzed 1.09 ppm. 1 to 3 m wide mineralized zone with samples analyzing more than 1 ppm gold are met with in NART-3. A sample representing one metre length in Channel NART-4 has shown gold content of 5.6 ppm. Such analyses, however, are very rare in the Narendra prospect.

3.3.4 Kuluvalli-Durgadakeri prospect

In the Kuluvalli-Durgadakeri prospects, mineralization is in banded ferruginous chert (BFC) occurring to the east and north east of Kuluvalli and southeast of Durgadakeri. The BFC occurs as narrow beds, 5 to 8 m wide, can be traced along strike for about 4km. Channel sampling has been carried out transverse to the NNWly strike along 37 profiles. Channels Ch 1 to Ch 3 and KC-1 to KC-12 are across the BFC band in the northern part, and KC-13 to 28 are across the band in the southern part. 3 channel samples come from the area southeast of Durgadakeri (DKC-29 to 31). Locations of the channel sampling profiles are shown in **Fig.10**.

Analyses of the channel samples from Kuluvalli and Durgadakeri prospects are given in **Table 2C-vi in the CD attached**. The analytical data suggest 2 to 6 m wide mineralized zone in the northern part of the Kuluvalli prospect with analyses of samples greater than 1ppm gold. Persistent mineralization is observed in this sector. By contrast, no such persistent grade is characteristic of the southern part. Here good grade mineralization over a width of 2 to 4 m has been observed only along a few channel profiles (KC-16, KC-22, KC-23, KC-29). In the BFC band southeast of Durgadakeri, eight metre wide mineralized zone has been picked up in channel profile DKC-29. But, in the other two channel profiles, no good mineralization was noticed.

Three channel profiles (KC-3, 9 and 12) have returned samples with good gold values up to 15ppm in the Kulavalli block. Widths of mineralized zones vary from 2 to 4 m.

3.3.5 Attigeri prospect

Channel sampling was carried out along 4 profiles in the Attigeri prospect. Locations of the channel profiles across the BIFs are shown in Fig.11 and analyses of channel samples are presented in (Table 2C-vii in the CD). Channel sampling along AC 2 profile has revealed a two metre wide gold mineralized zone with Au > 2 ppm. Most other channel samples were characterized by gold content <1 ppm.

3.3.6 Tururkar Sigihalli

Channel sampling profiles in the Tururkar Sigihalli prospect are shown in Fig.12. Analyses of the samples are presented in Table 2C-viii in the CD. Samples analyzing more than 1 ppm Au have been met with in a few profiles in the northern half of the prospects (channel profile numbers – TC 10, 11, 14, 15, 16, 20 and 23). A two metre wide mineralized zone in banded ferruginous chert is met with along TC-10 and 11 with grade varying from 1.67 ppm. TC-15 exposes a 8 m wide zone of BFC and greywacke with the grade varying from 1.35 to 2.96 ppm. This width is impersistent and pinches down to 2m in the next channel profile to the northwest (TC-16). Along TC-20 and 23 only two metre wide zones in BFC were seen mineralized with samples greater than 1 ppm.

4 SAMPLING OF ROOF OF THE ADIT LIKE O/W IN MANGALGATTI NW PROSPECT

There is a cave like old working in the Mangalgatti NW prospect. Location of the old working is shown in Fig. 13. Channel samples were collected from the roof of the old working and analysed for gold and arsenic (Table- 2C-ix in the CD). Out of 9 samples analysed, 6 samples assayed more than 1 ppm of gold, the range of values being 1.49 to 4.2ppm. These analyses support the inference that Mangalgatti area has good potential and is worthy of detailed prospecting by drilling, pitting and trenching under Prospecting License. However, reconnaissance drilling has been undertaken for preliminary assessment of depth persistence and grade of mineralization, the details of which are presented in Section 6.

5 GROUND GEOPHYSICAL SURVEY

Ground magnetic survey was carried out in Mangalgatti Prospect to find out unexposed mineralized BIFs. The survey was partly successful in pointing to the presence of BIFs beneath soil cover. The map showing the contoured ground magnetic survey data superimposed on geology is presented in Fig.14.

6 DRILLING EXPLORATION

Analyses of stream sediment, random rock chip and channel samples, have all consistently pointed to the promising nature of the Mangalgatti Prospect in the Dharwar RP Block. Also, good indications have been found in the Bhavihal prospect. Therefore, drilling has been initiated first in these prospects. Rotary Air Blast (RAB) and Reverse circulation (RC) methods of drilling were adopted, principally to get an idea of the dimensions of mineralization at shallow depths from the point of open pit mining. The RC drilling has advantage over RAB drilling technique as the former provides scope for controlled collection of samples from the weathered and oxidized column. The reco. drilling that has been completed forms part of a large drilling programme envisaged. Rest of the holes planned for drilling during the RP tenure will be drilled during the PL stage.

6.1 RAB DRILLING

6.1.1 Mangalgatti Prospect

685 m of RAB drilling was carried out in Mangalgatti NW and SE prospects. Locations of the boreholes in the Mangalgatti Prospect are shown in Fig. 15.

Samples of rock chips recovered from each metre of drilling were separately collected. Based on visual characters of the rock chips, decision was taken to homogenize samples of each metre separately or to prepare composite samples of 2 to 3 metre widths and homogenize them. Homogenized samples were analysed for Au and As. The analyses are presented in Table.2D in the CD enclosed. Summary of borehole parameters of RAB results of drilling is presented in Table-3.

Table-3: Summary of Borehole parameters of RAB drilling in Mangalgatti prospect

Hole ID	EASTING	NORTHING	RL	Azimuth	Inclination	Depth (m)
MP1	494909.6	1717792.99	720.492	62	45	60
MP2	494901.39	1717855.76	722.725	60	60	61
MP3	494849.8	1717898.7	717.408	62	45	63
MP4	495460.85	1717328.12	735.703	20	60	61
MP6	495524.95	1717453.56	711.174	60	50	76
MP7	495569.79	1717426.43	706.255	259	49.5	55
MP8	495573.99	1717474.94	702.133	42	65	40
MP10	495573.62	1717431.38	705.968	60	60	50
MP11	495561.37	1717379.97	708.471	249	50	50
MP13	494973.02	1717856.11	722.859	250	50	67
MP14	495474.51	1717539.26	705.157	70	50	47
MP15	494945	1717900.03	722.629	240	55	55
TOTAL						685

RAB drilling in Mangalgatti has shown that mineralisation is confined to BIF and also quartz veins traversing the sulphidic BIF. The mineralized zone is weathered to depths of 50m or more. Two mineralized zones have been delineated;

Zone-1: 315 m strike length; 15 m width drilled to 70 m depth, Av. Gr. 1.63 g/t.

Zone-2: 278 m strike length, 8.5 m width drilled to 25 m depth, Av. Gr. 1.21 g/t.

6.2 REVERSE CIRCULATION DRILLING

In order to further assess the grade and width of mineralization reverse circulation drilling was undertaken in the southeast portion of the Mangalgatti prospect where the hinge zone of mineralized banded iron formation plunges southeastward. 1677m of drilling was completed. Locations of the boreholes are shown in Fig.15. The present reverse circulation drilling exercise is a part of a larger drilling programme which has been drawn up for implementation under Prospecting License. Analyses of the drill cuttings are presented in Table 2e in the CD attached. It is observed that good grades of mineralization have been intersected by these bore holes at shallow depth. Parameters of drillholes are summarized in Table- 4.

Cross sections of drillholes are presented in Figures 15a to 15e.

Table-4: Summary of borehole parameters of Reverse Circulation Drilling in Mangalgatti SE Prospect

Hole ID	EASTING	NORTHING	RL	Azimuth	Inclination	Depth (m)
MP25	495578.77	1717303.87	706.676	62	60	114
MP26	495601.91	1717398.61	703.136	248	50	96
MP27	495595.78	1717276.35	703.69	60	60	114
MP28	495613.11	1717248.78	701.531	60	60	102
MP29	495558.31	1717290.34	709.334	58	60	140
MP31	495562.05	1717256.65	707.822	60	60	139
MP32	495578.72	1717228.78	704.588	60	60	144
MP33	495543.62	1717208.77	708.222	60	60	146
MP34	495523.1	1717236.06	713.938	60	60	48
MP36	495624.4	1717219.47	699.791	60	60	107
MP37	495588.48	1717200.24	702.751	60	60	138
MP38	494974	1717799	724.4	0	90	95
MP48	494983	1717770	725	245	60	66
MP49	494991	1717740	724.8	0	90	48
MP50	495021	1717721	726.2	245	45	72
MP51	495042	1717698	727.3	245	45	66
MP52	495032	1717693	726.6	245	45	42
TOTAL						1677

More intensive and deeper drilling is essential to fully establish the potential of this prospect in depth.

6.2.1 Bhavihal Prospect

1113 m of reverse circulation drilling has been carried out in the Bhavihal prospect to examine mineralization in banded iron formation over a strike length of 400m. Drilling to shallow depths between 50 to 90m is intended to delineate open pittable resource if any in this prospect, as at Mangalgatti. The borehole locations are shown in Fig.16. Analyses of rock cuttings from boreholes are given in Table. 2f in the CD attached. Parameters of drillholes are summarized in Table-5. The lodes defined by these intersections are shown in Fig.16.

Cross sections of drillholes are presented in Figures 16a to 16d.

Table-5: Summary of Borehole parameters of Reverse Circulation Drilling in Bhavihal Prospect.

Hole ID	Easting	Northing	RL	Azimuth	Inclination	Depth (m)
BHL3	490508.86	1723699.48	677.412	20	50	114
BHL4	490540.38	1723698.14	677.322	20	50	114
BHL5	490570.77	1723697.38	677.14	20	50	108
BHL7	490666.61	1723771.46	678.141	198	45	102
BHL10	490451.21	1723722.31	678.271	20	50	96
BHL16	490559.15	1723668.17	676.2	20	50	120
BHL17	490590.28	1723667.24	676.408	20	50	134
BHL18	490619.72	1723661.1	675.999	20	50	132
BHL27	490456	1723747	681.8	20	50	60
BHL30	490659	1723680	676.4	20	50	133
TOTAL						1113

BWL 3)

108 mls

7 APPLICATIONS FOR PROSPECTING LICENCES AND MINING LEASE

Exploration carried out under Reconnaissance Permit has led to identification of 4 promising blocks within the Dharwar R.P. Block, which need to be prospected in greater detail under Prospecting Licences. They are Mangalgatti, Bhavihal, Kuluvalli and Turukarasigihalli blocks. P.L. applications have been filed with the Directorate of Mines and Geology, Government of Karnataka as follows:

Sl. No.	Name of PL application block	Area in Sq km	Date of Application
1)	Kulavalli	2	15.10.2004
2)	Turkara Sigihalli	1.7	31.12.2004
3)	Bhavihal	1.5	4.1.2005
4)	Mangalgatti	4	11.1.2005

RAB and RC drilling carried out in the Mangalgatti area has given us confidence that an open pittable resource is available for exploitation in this prospect. In order to fast track mine development in the

area, Indophil has considered it feasible to go for a Mining Licence and has applied for a ML over an area of 0.24 sq km on 9.1.2004. In the mean time it is proposed to carry out deep drilling in the area and plan development of underground mine below the bottom level of the open pit.

PL and ML blocks -applied for within Dharwar RP block are shown in **Fig. 17**.

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