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Salumbar-Ghatol Gold Field **(SGF)** *has the Potential to be a Trend Setter for Gold exploration & Mining in India*

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SNAPSHOT

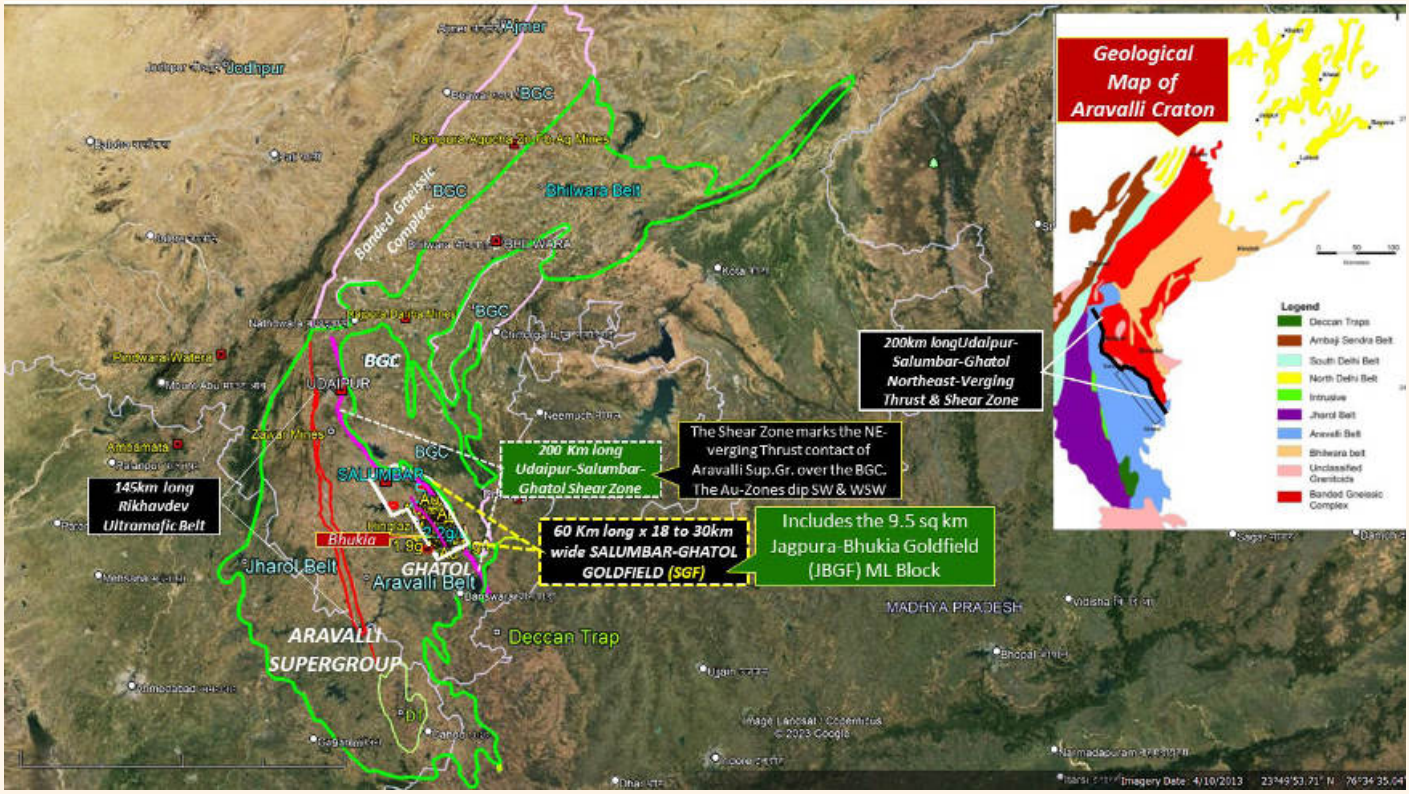
- **Area of SGF:** ~1270 sq km.
- **Gold Mineralization Zones:** 8 zones over a cumulative length of 200 km.
- **Gold Prospects:** 26 prospects within the 8 zones.
- **Cumulative Length of Prospects:** 93 line km.
- **Area Covered by Gold Prospects:** ~137 sq km.
- **Prognosticated Gold Resource:** 1,000 tonnes of gold metal.
- **Potential Gold Mines:** About 60 mines likely, with 16 in the Bhukia-Jagpura 9.5 sq km block.
- **Exploration Expenditure:** Rs. 1,000 Cr over a 5-year period.
- **Mine Construction Cost:** Rs. 500 Cr for different scales of mines over 2025-2030.
- **Establishment of Mineral Processing Plants:** Rs. 1800 Cr for 15 plants along the 60 km length of the SGF.

Discovery of Gold in Bhukia Area in SE Rajasthan and its aftermath: 30 years ago, in 1993 The Geological Survey of India (GSI) discovered gold-copper mineralization in the Bhukia area in Banswara dt., Rajasthan. Subsequent exploration by the GSI resulted in a series of successes that ended up in defining 13 Gold Prospects within an area of about 9.5 sq km in the village limits of Bhukia, Jagpura. Delwara, Gundelpara, and TimranMata. All these Prospects have drilled Resources of gold, the details of which are presented in a Table in slide 23. Within these 13 Prospects GSI has estimated 114.78 Mt of gold resource of an average gold grade of 1.95 g/t which equates to 223 tonnes of gold. The State Govt of Rajasthan has recently announced that the said 223 tonnes of gold is available for mining under a single ML block of 9.5 sq km area comprising 13 gold prospects. Significant Resources of Copper, Cobalt, Bismuth and Gallium-bearing Tourmalines are expected as co-products of Au mining.

Concurrently with drilling at the Bhukia-Jagpura sector, GSI's exploration in the last 30 years has resulted in locating gold mineralization at many other locations between Salumbar and Ghatol. I have attempted here a compilation of the data from published sources to understand whether the locations of gold so far reported from sampling of stream sediments, soil, rock chips, gossan chips and old gold mine dumps define a geologically (structurally) controlled coherent domain. Yes indeed, the available data define a geologically meaningful domain that I wish to name as Salumbar-Ghatol Gold Field (SGF). The 9.5 sq km Bhukia-Jagpura Gold Field (BGF) occupies a small part of the SGF towards its southern.

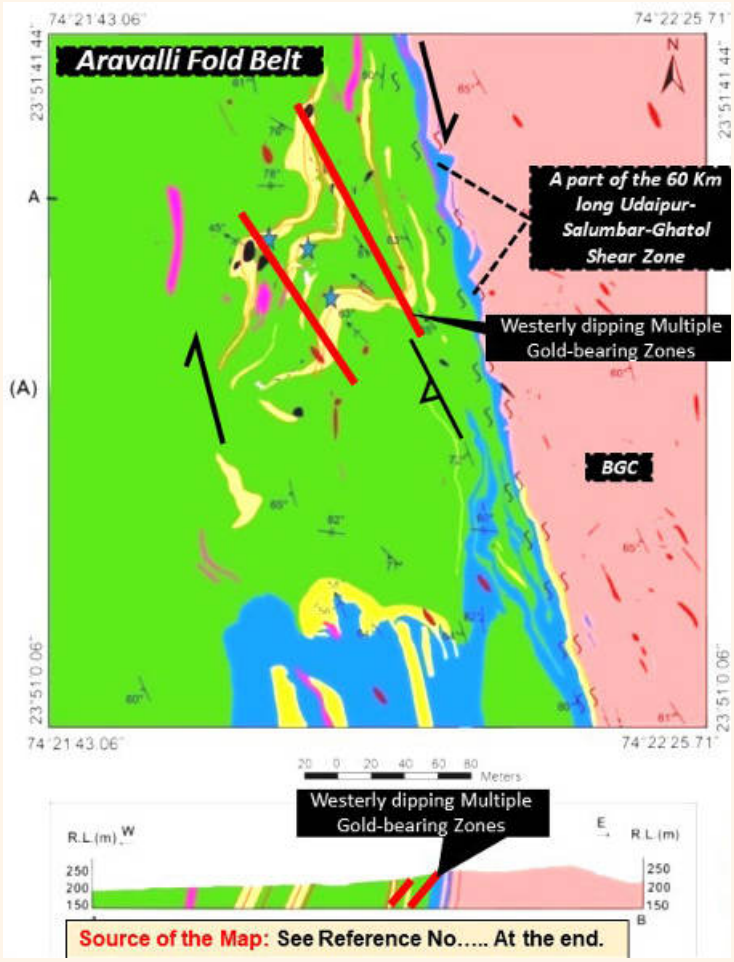
Salumbar-Ghatol Gold Field (SGF): Let's look at the Geology of this domain in the backdrop of the regional geology of the Aravalli Craton. The Aravalli-Delhi Fold Belt (ADFB) comprising sediment-dominated supracrustal rocks of Aravalli Supergroup (2.2–1.7 Ga Paleoproterozoic) and Delhi Supergroup (~1.7–0.7 Ga, Neoproterozoic) stratigraphically overlies 3.3–2.5 Ga Mesoarchaean basement known as the Banded Gneissic Complex (BGC). The Granites intruding the ADFB are Syn- to Post-tectonic in relation to the deformation of Aravalli-Delhi Fold Belt.

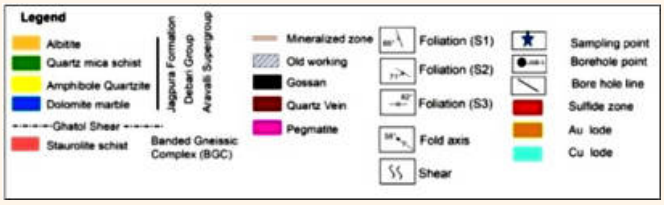
Location of the Salumbar-Ghatol Potential Gold Field (SGF) of 1270 sqkm Area:



The intent of this presentation is to comprehensively introduce the huge gold potential of the SGF outside the Bhukia-Jagpura ML block so that the State Govt is encouraged to take a quick decision to open up the 1270 sq km region for exploration by PSUs and Private companies under EL and CL granted on FCFS basis.

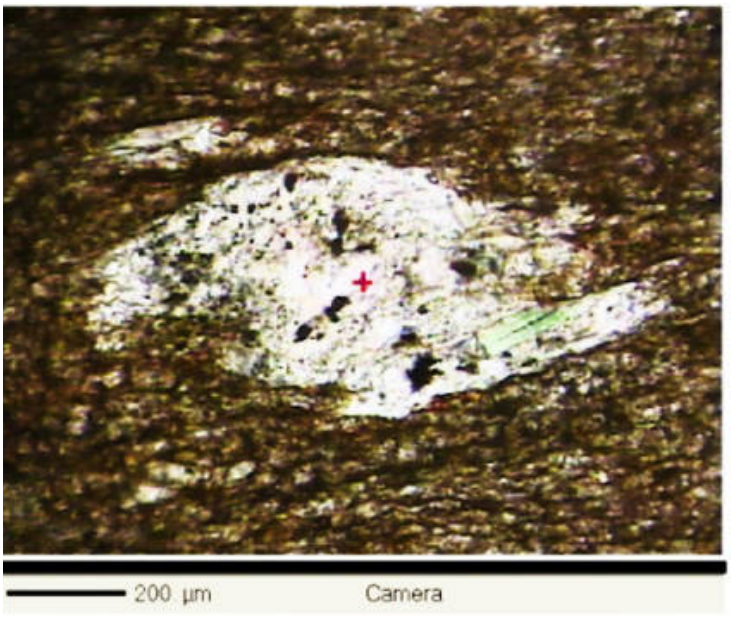
Udaipur-Salumbar-Ghatol Shear Zone (USGS): The contact between the basement BGC and the overlying ADFB is tectonic (locally unconformable) marked by a eastward-verging (westerly dipping) Thrust that eventually evolved as a Brittle-ductile regional shear / mylonite zone named Udaipur-Salumbar-Ghatol Shear Zone. The USGS is a part of the Great Boundary Fault. The sense of movement along the USGS appears to be dextral as demonstrated by 'Z'-asymmetrical Folds in the adjoining map. The Thrust-Shear zone is the key regional crustal-scale structure that was responsible for plumbing the hydrothermal fluids which caused gold-sulphide-oxide mineralization within the Salumbar-Ghatol Gold Field.

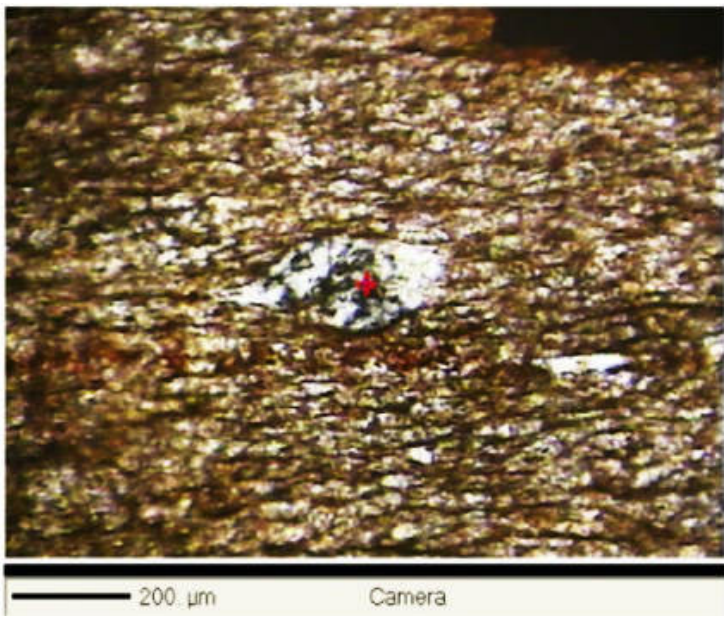




Photomicrographs of sheared mylonitic dolomite consisting of sigmoidal Porphyroclast of Quartz Source: Suresh Chander et al (2020) (Ref.No.6).

The planar fabrics (schistosity, fracture planes and dominant vein system) in the mineralized folded rocks overlying the Gneissic basement (BGC) trend NNW & NW and dip westerly at steep to moderate angles.





Gold Mineralization is Structurally controlled, Epigenetic at all scales- Regional to Outcrop. Gold is associated with high percentage of Sulphides and, in places Oxides (magnetite).

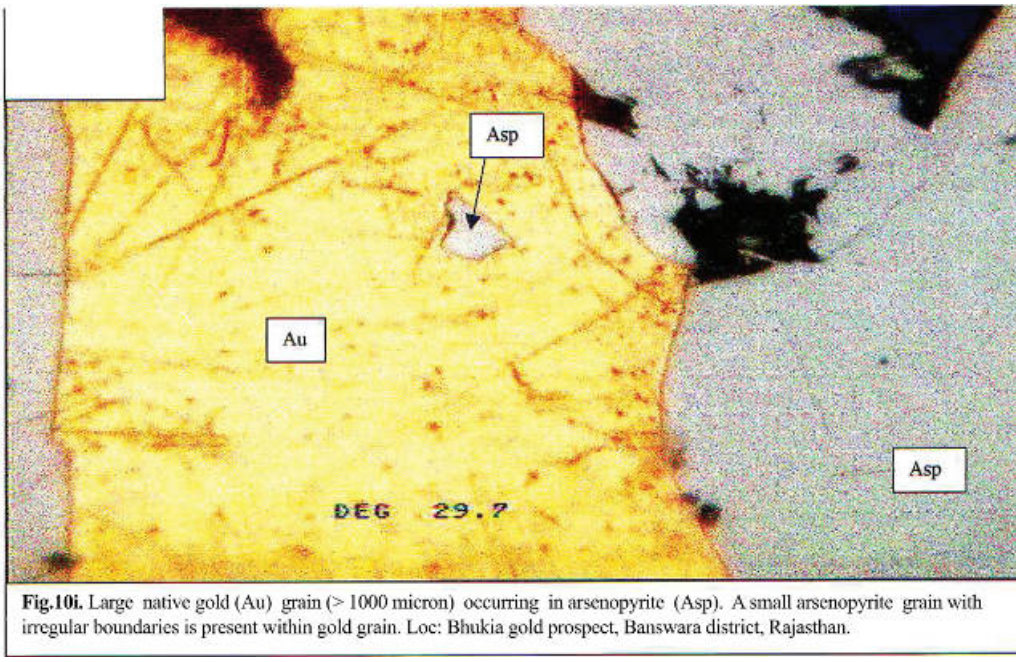
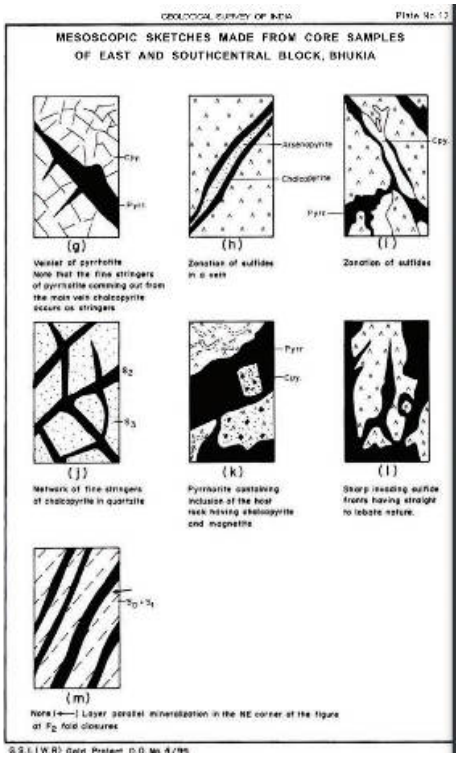
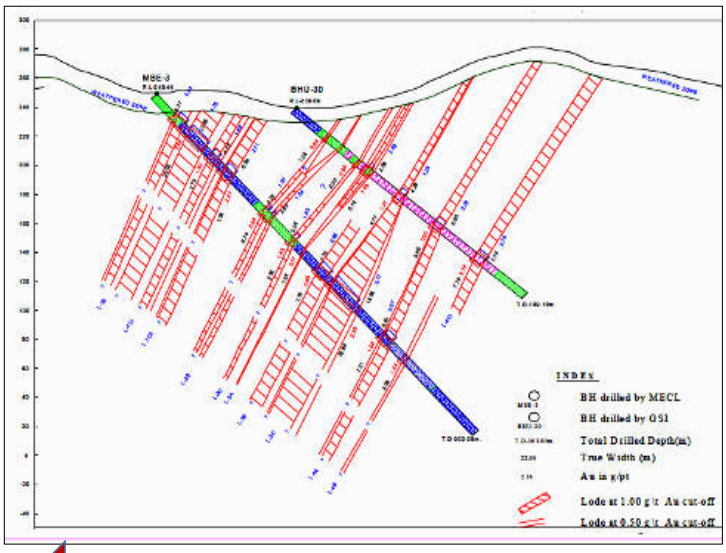


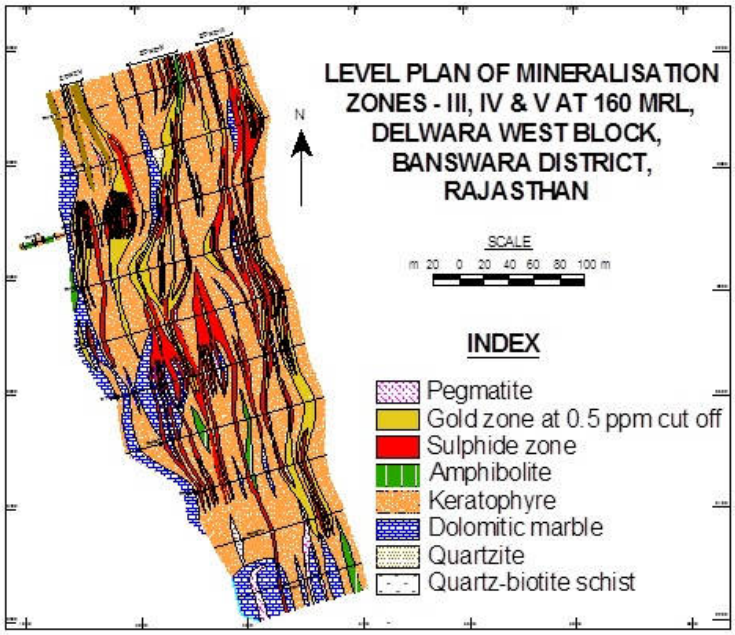
Fig.10i. Large native gold (Au) grain (> 1000 micron) occurring in arsenopyrite (Asp). A small arsenopyrite grain with irregular boundaries is present within gold grain. Loc: Bhukia gold prospect, Banswara district, Rajasthan.



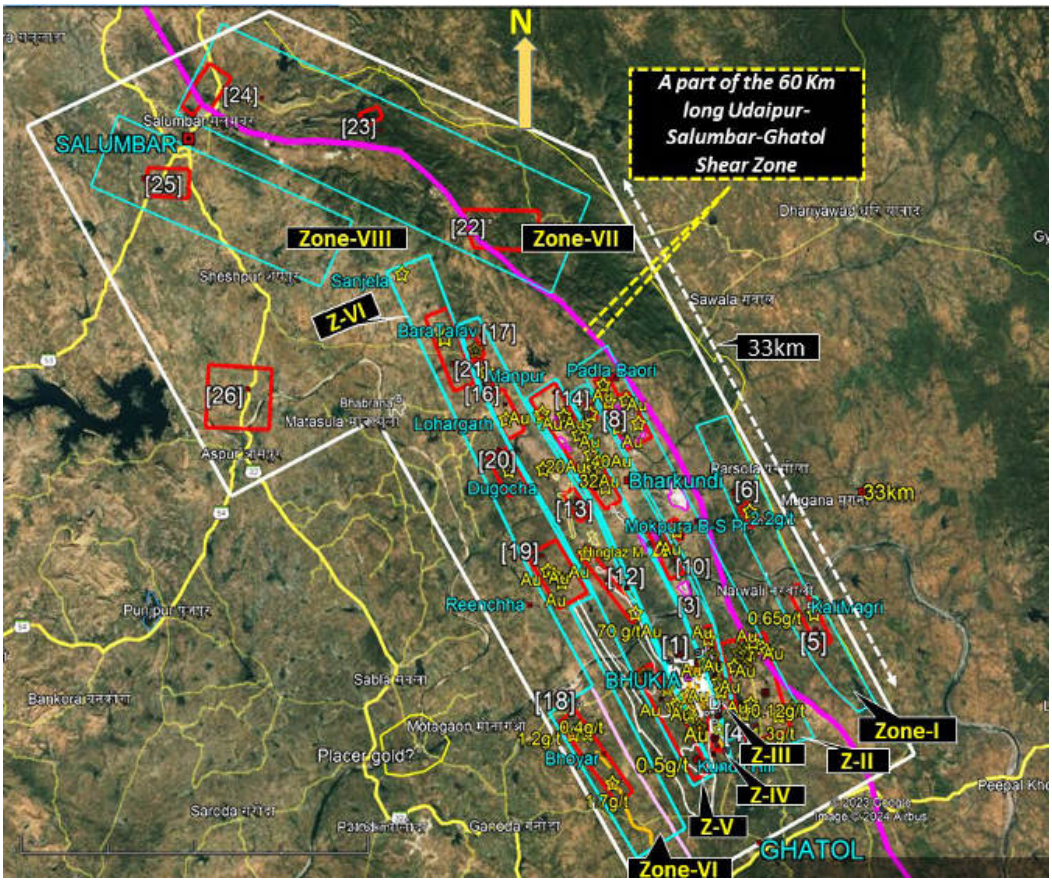
Mineralization occurs along multiple, parallel to subparallel Brittle-ductile shear Zones; most of which are wide (20m to 140m) open-pitable zones. Within the Zones Gold & Sulphides +/-magnetite occur as Sub-Zones within which occur as narrow (0.5 to 3m) Lodes of relatively higher grade (>3.5 g/t).



Westerly dipping multiple gold-bearing zones.



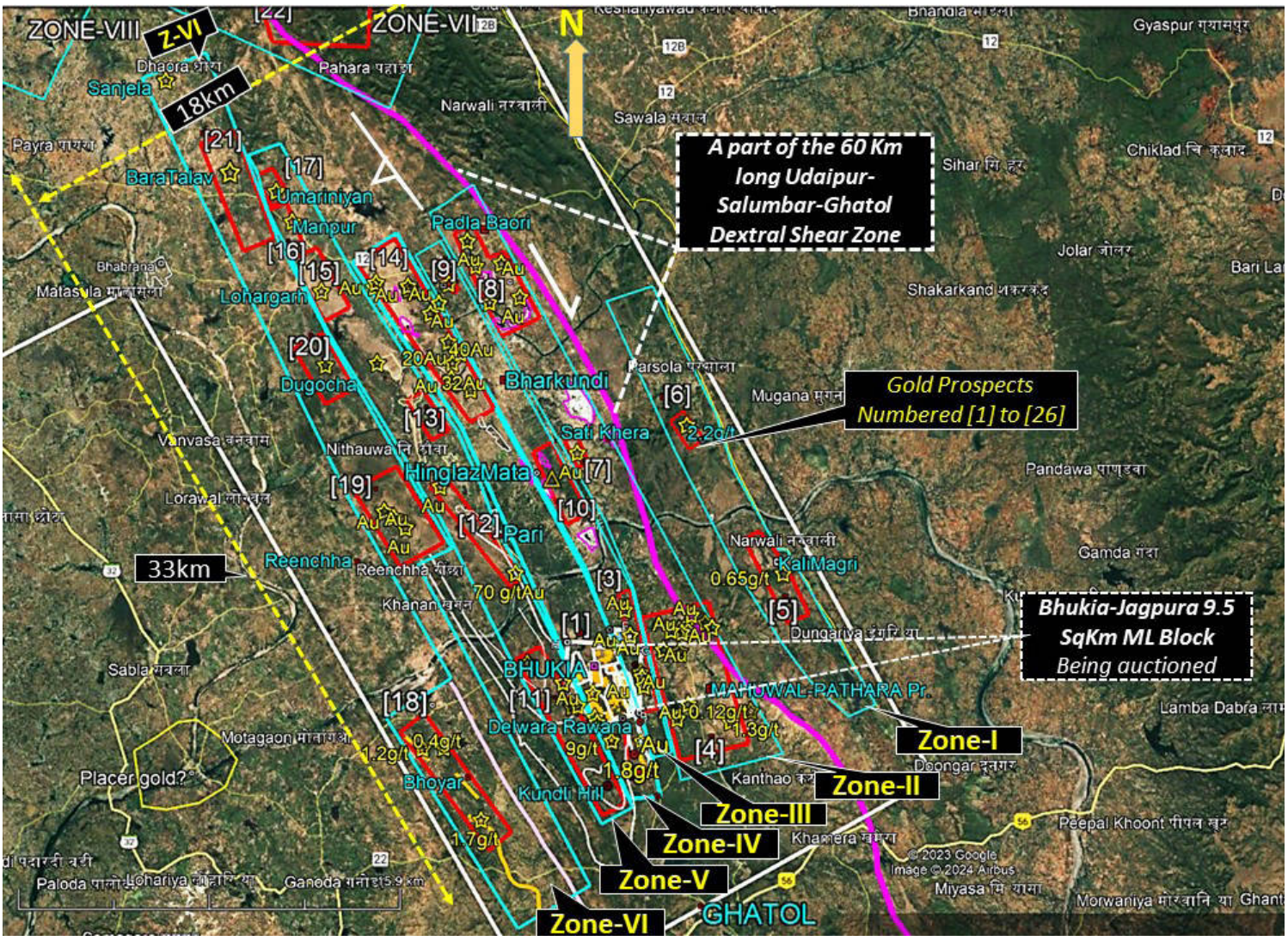
Salumbar-Ghatol Gold Field (SGF):



The SGF covers an area of about 1270 sq km. and comprises 8 zones of gold mineralization. These Zones trend NNW and Northwesterly. I have named them Zone-I to Zone-VIII as indicated in the adjoining map. They have a cumulative length of 200 km. The mineralization is controlled by multiple shear-fracture zones splaying off the main Aravalli belt-margin thrust-shear designated as Udaipur-Ghatol Shear Zone (USGS). The splay shear/ fracture/ mylonite zones are spread across a width of 40km and length of 60km along the western side of the USGS.

The 8 mineralized zones comprise 26 Gold Prospects. They are numbered [1] to [26] in the adjoining map. The cumulative length of these Prospects is 93 line km & they cover an area of 137sqkm. All of these Prospects were identified by GSI on the basis of geochemical sampling, geophysical surveys and by locating Gossans, rusty weathered features, old workings, old mine dumps & hydrothermal alteration.

Enlarged view of the southern half of Salumbar- Ghatol Gold Field (SGF) digitized on GoogleEarth image: Check below table for dimensions of the Prospects



26 Gold Prospects spread over 8 Zones (I to VIII) of Gold Mineralization within the 1270 sq km area of the Salumbar-Ghatol Gold Field(SGF).

Zone No.	Length of Zone (Km)	Number & Name of Gold Prospect		Area in SqKm
		No. on Map	Name	
I	20km	5	Kalimagri *(Sadron Ki Kundi)*	3.5
		6	Mokpura-Bara-Sarpatia	1
II	26km	4	Mahawal-Pathara	17
		7	Sati Khera	0.6
		8	Padla-Baori	6.5
III	23km	3	Delwara Lokiya-Jagpura Extn.	2.3
		9	Samoda	0.3
		10	Hinglaz Mata	3
IV	25km	1	Bhukia-Jagpura ML	9.5
		2	Kankariya	2
		14	Palnithuwa-MahuaKhera	12
V	31km	11	Kondli Hill	9
		12	Pari	3.7
Total	125 km	13 Nos.		70sqkm

Zone No.	Length of Zone (Km)	Number & Name of Gold Prospect		Area in SqKm
		Number	Name	70SqKm(Bf)
V	Continued	13	Bharkundi	1.6
		15	Lohagarh	3.5
		16	Manpur	1.5
		17	Umariniyan	1
VI	38km	18	Bhoyar	7.5
		19	Reenchha-Kanoriya	7.5
		20	Dugocha	3.5
		21	Baratalav	7
VII	25km	22	Pahara	9.7
		23	Berawal	1
		24	NE Salumbar	4.5
VIII	15km	25	SW Salumbar	4.2
		26	Jaitana	14.5
Total	203km(Cum)	26 Nos.	Grand Total	137sq km

Geology of the SGF comprises basal quartzite and conglomerate, metabasalt with intercalations of conglomerate, dolomitic marble with intercalations of phyllites including carbonaceous phyllite, garnet-biotite schist. mica schist, quartzite calc-silicates, slivers of amphibolite, feldspathic schist, feldspathic quartzite, tourmalinites and intruded by carbonate veins, quartz veins with or without tourmaline and tourmaline-bearing pegmatites.

HOST ROCKS: The rocks hosting gold-copper mineralization are Quartz-albite rock (earlier Keratophyre), dolomitic-marble, amphibolite, quartzite, calc-gneisses, graphite-tourmaline rock (meta-exhalite), pegmatite and quartz-mica schist constituting the Basal Group of Aravalli Supergroup.

The Bhukia-Jagpura Block within the SGF was a scene of artisanal mining activity which was prolific around Bhukia as evidenced by innumerable pits and linear excavations within the gossan zones outcropping over the mineralised zones. Within the Bhukia-Jagpura ML block gold mineralization extends over a length of 4 km and width of 2 km. 11 subparallel mineralised zones have been identified by surface mapping and drilling and are named(MZ-I to MZ-XI from east to west. They trend parallel to the axial trace of the major F2 generation Synform. 15 prospects cover the 11 mineralised zones. The cumulative strike length of the mineralised zones is 15.8 km. Several parallel lodes have been identified in each zone. The thickness of lodes vary from 1.86 m to 5.56 m and the grade varies from 1.33 g/t to 2.33 g/t.

HYDROTHERMAL ALTERATION: Evidence of Hydrothermal activity related to Gold mineralization is common in the SGF. The HT alteration is reflected in Silicification, Sulphidation, Tourmalinization, Albitization, Chloritization, Sericitization and Magnetitization.

FREE-MILLING OR NATIVE GOLD: Apart from the sulphide-hosted gold, free-milling or native gold occurs in quartz-carbonate-amphibole veins and in association with granular tourmaline. Native gold also occurs within sulphides. Native gold (<10 to 1000 microns in size) of variable shapes occurs in arsenopyrite, lollingite, chalcopyrite, bismuth and pyrrhotite in that order of frequency. Native gold grains varying in size from a fraction of a micron to 20 microns also occur in the hydrothermally altered zones. Fractures containing composite veins of chalcopyrite, gold and gangue minerals (calcite, amphiboles, feldspars, biotite, tourmaline, quartz etc.) invariably occur in fractured and brecciated arsenopyrite and in host silicate rocks. Bismuth, maldonite, wehrlite and several other gold tellurides occur in close association with native gold.

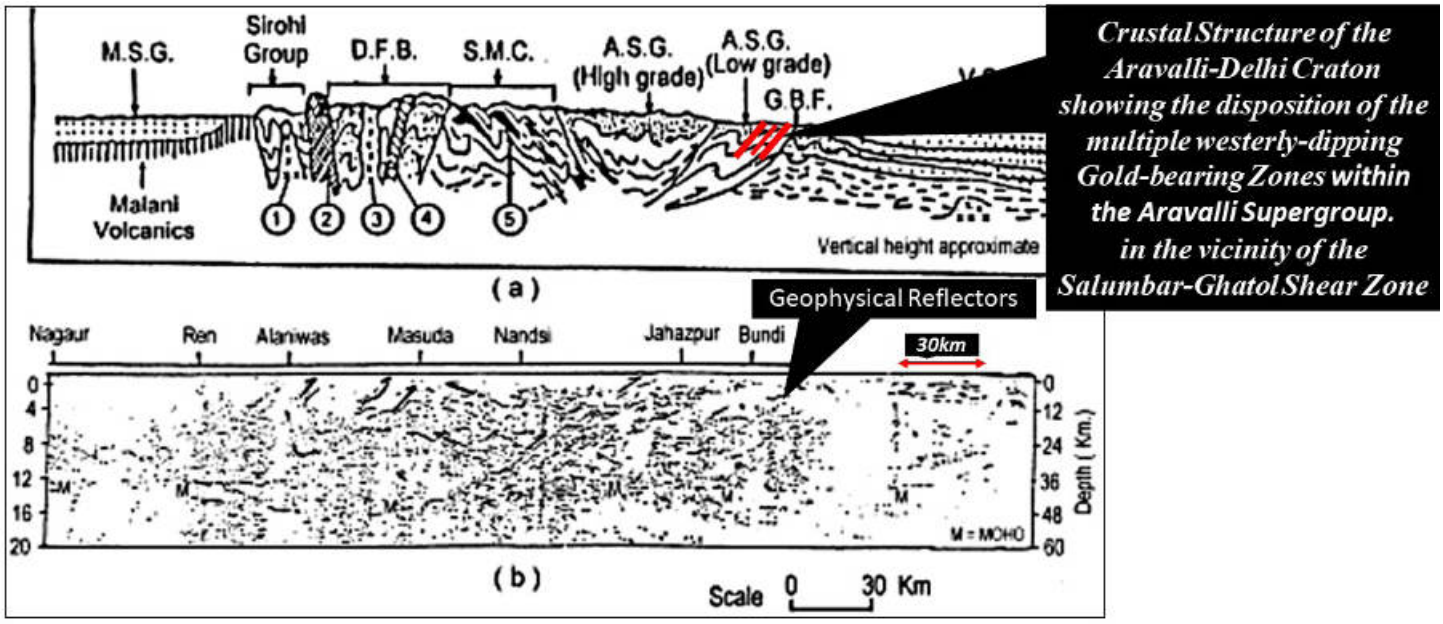
STYLES OF SULPHIDE & GOLD MINERALIZATION: The style of mineralisation is stratiform as well as vein type and stock work type. Three different styles of gold mineralization characterize the SGF as revealed in the drill cores of Bhukia Gold Field. They are (i) gold associated with massive sulphides, (ii) gold in quartz-carbonate veins and stringers filling fractures, (iii) gold associated with disseminated sulphides. Higher gold values are associated with the 2nd phase of Mineralization. The massive to semi-massive to disseminated sulphide mineral assemblage is represented by pyrrhotite, arsenopyrite, pyrite, chalcopyrite and lollingite in order of decreasing abundance. Cobaltite is present in subordinate amount. Alteration of pyrrhotite into pyrite and marcasite is ubiquitous. Oxide facies is represented by significant amount of magnetite and ilmenite. Accessory maldonite (Au2Bi) and hedleyite (Bi7Te3) are the bismuth phases.

Mineralization (contd.,): Quartz veins, quartz stringers, calcite veins and pegmatite veins +/- tourmaline traverse all the lithologic units. Quartz veins traverse two sets of foliation planes and fill fractures at all scales. The initial process of mineralization began with sulphidation, quartz and carbonate veining concurrently with the first phase of deformation and metamorphism. Quartz veins of second-generation are associated with sulphide and gold mineralization with preferential concentration in closure or hinge region of folds at all scales. Anand et al (2022) have observed "magnetite occurring ubiquitously within quartz-mica schist and albitite as dissemination and discontinuous veins parallel to the S2 foliation plane". "Bhukia tourmalines contain highest ever reported Ga content (up-to 1380 ppm)".

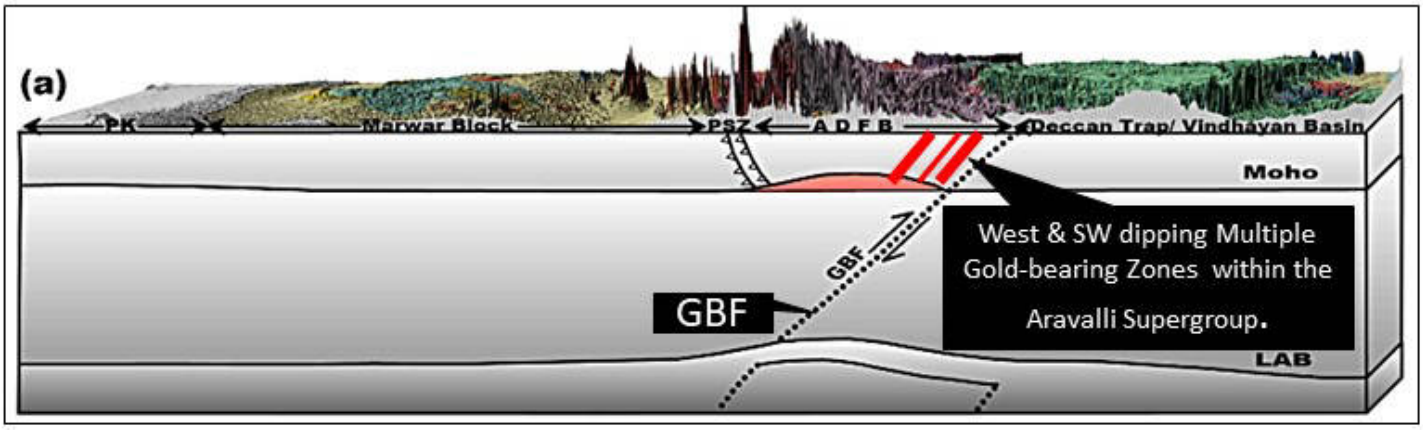
Orogenic Style: Gold mineralization outlasted veining and deposition of sulphides and oxide minerals. All the characteristics of mineralization are typical of Orogenic style gold mineralization, hence deep seated (>a km) from the extant topography.

Controls of ore localization: The localization of ore is essentially controlled by shears genetically related to AD2 - deformation. The intersection of these shears, trending in NNW - SSE direction with moderate to steep dip towards

SW, and the folded form surface (F2) are the potential traps for richer ore shoots. The pitch of these plunging ore shoots and the attitude of F2 - folds show striking coincidence.

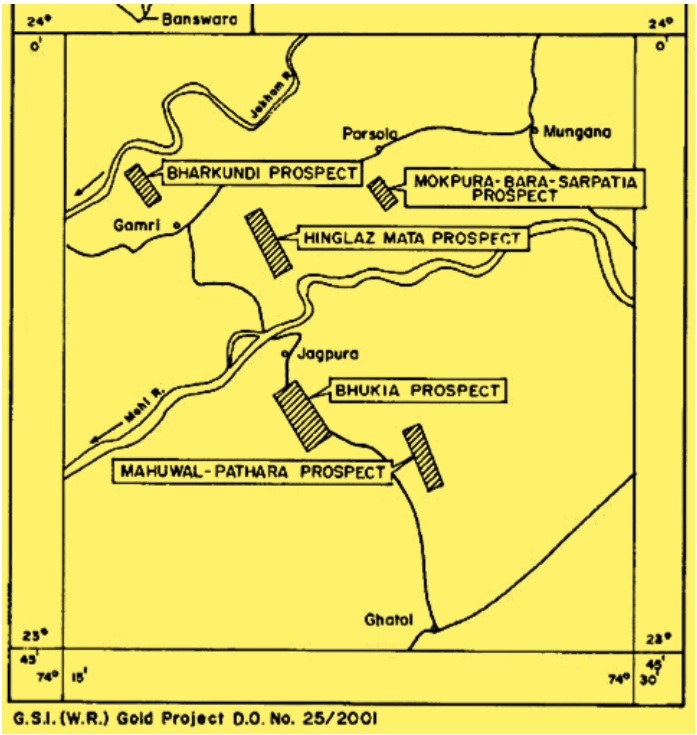


The Aravalli and Delhi Supracrustal Fold Belts together with the basement BGC structures are interpreted as the result of Accretionary Collisional Plate Tectonic processes during ~3.3 to 0.7 Ga.



The gold-bearing westerly (W & SW)-dipping planar structures, viz., Shear planes and compressional & extensional (tensile) Fractures were the result of thrusting and shearing along the USGS part of the GBF.

Map showing the Locations of the Gold Prospects presented on Google Earth image



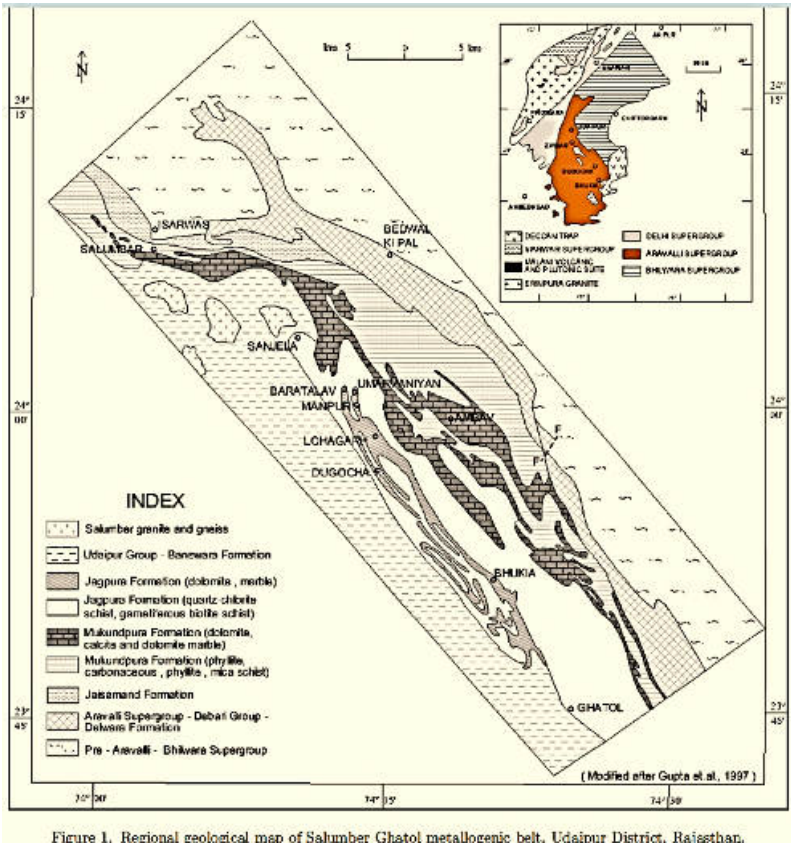


Figure 1. Regional geological map of Salumber Ghatol metallogenic belt, Udaipur District, Rajasthan.

Map showing the Locations of the Gold Prospects presented on Google Earth image.

Significant Gold Mineralization in Baratalav, Dugocha and Manpur Prospects. See Prospect Nos.21, 20, & 16

Table 1. Details of mineralisation in Sanjela-Manpur Dugocha belt

Sample No.	Lithology	Cu	Pb	Zn	Ni	Co	As	Au
Baratalav Block								
G-IN/E 14	Dolomite with malachite	13%	10	780	60	95		1.02
G-INE 12.1	Gossanised dolomite	0.19%	10	35	0.12%	320		
CSN-1	Dolomite	0.42%	-	90	30	25		0.17
CSN-2	Dolomite	0.38%	-	200	40	50	-	1.14
CSN-4	Dolomite	0.13%	-	70	25	30	-	1.61
CSN-5	Dolomite	425	-	70	90	0.17%	-	1.48
CSN-6	Dolomite	0.29%	-	75	240	125	-	0.26
CSN-10	Dolomite	0.21%	-	150	35	545	-	2.70
Dugocha Block								
2N / E5	Silicified dolomite	150	10	45	35	60	0.11%	0.46
2N / W2	Gossan	620	-	20	30	45	0.29%	0.15
3N / 54	Silicified dolomite	30	10	30	75	240	0.78%	0.24
3 N/E5	Silicified dolomite	-	10	15	25	35	0.11%	0.18
3 N / W10	Silicified dolomite	-	10	30	25	35	0.11%	0.55
3 N / W13-G	Gossan (dolomite)	0.27%	-	30	35	90	0.76%	0.25
O / E1	Meta-exhalite	20	-	10	15	15	100	1.35
O / E 6.5	Silicified dolomite	0.14%	-	20	30	70	1.49%	0.15
O / W 11-12G	Gossan (dolomite)	0.29%	-	25	45	90	0.46%	0.16
O / 1N	Meta-exhalite (brecciated)	250	-	15	10	15	0.21%	1.00
305 N/ER0 G	Gossan (dolomite)	380	-	10	20	45	1.64%	8.52
Manpur Block								
SC/MNP/1	Silicified dolomite	75	10	50	25	35	305	0.17
SC/MNP/2	Silicified dolomite	20	10	35	30	0	280	0.17
SC/MNP/3	Silicified dolomite	15	20	45	30	40	770	0.26
SC/MNP/4	Silicified dolomite	-	-	40	25	45	-	0.23

Analysed by AAS in Geochemical Laboratory, AMSE, GSI, Bangalore. Values are in ppm except those shown in percentages.

Gold in g/t

Suresh Chandar & C.P.Sisodia in JGSI V.61, No/4, 2003.

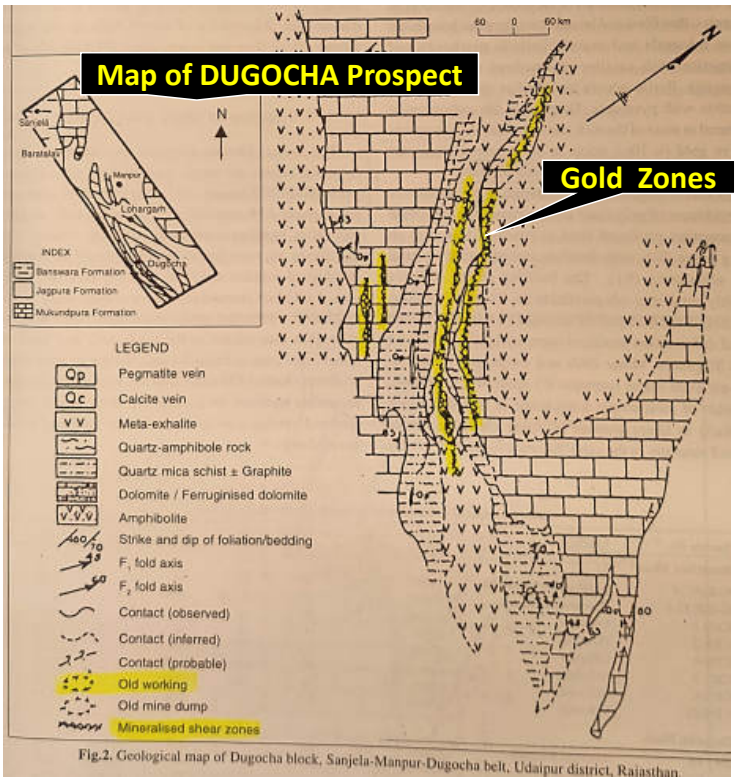
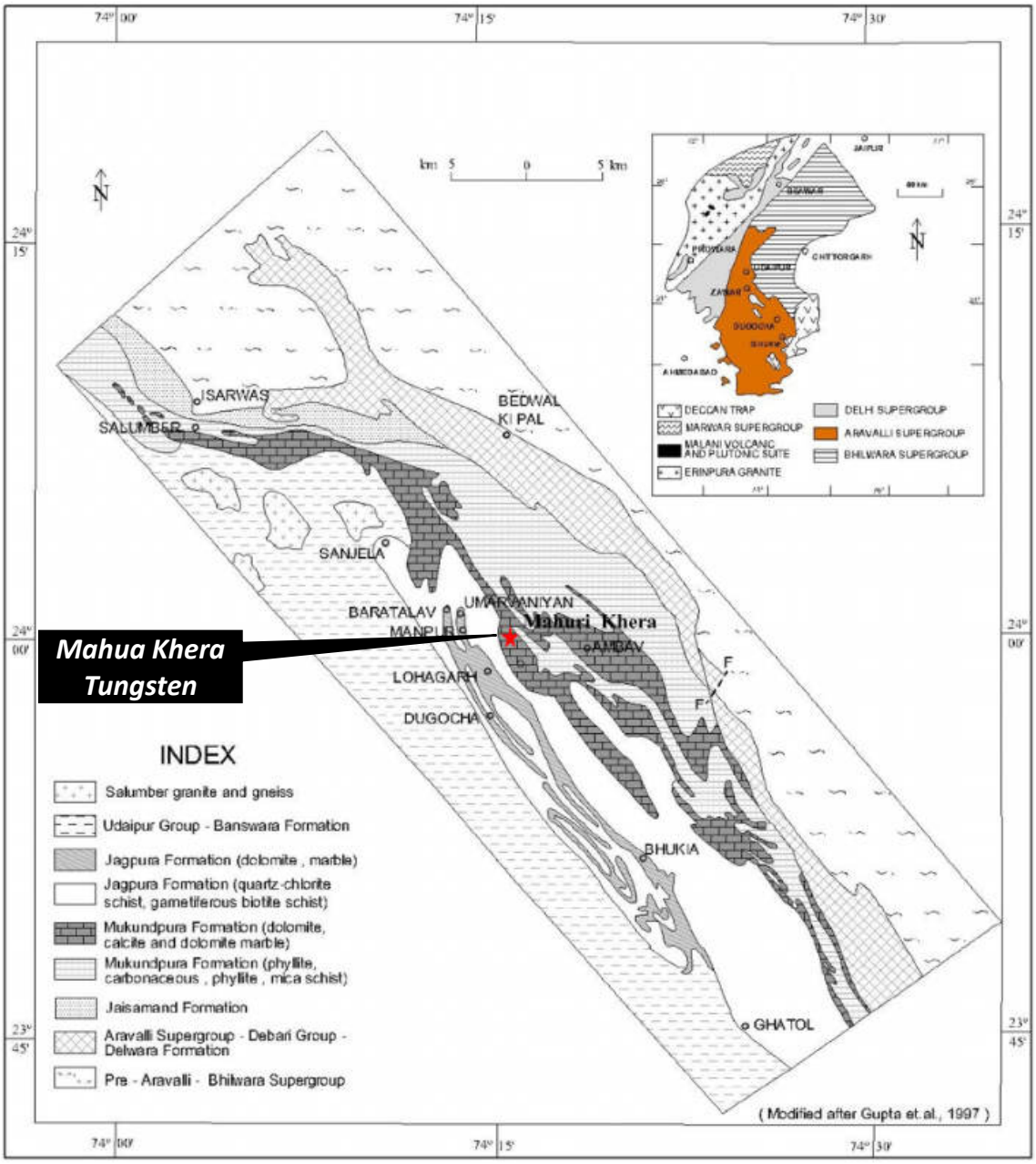


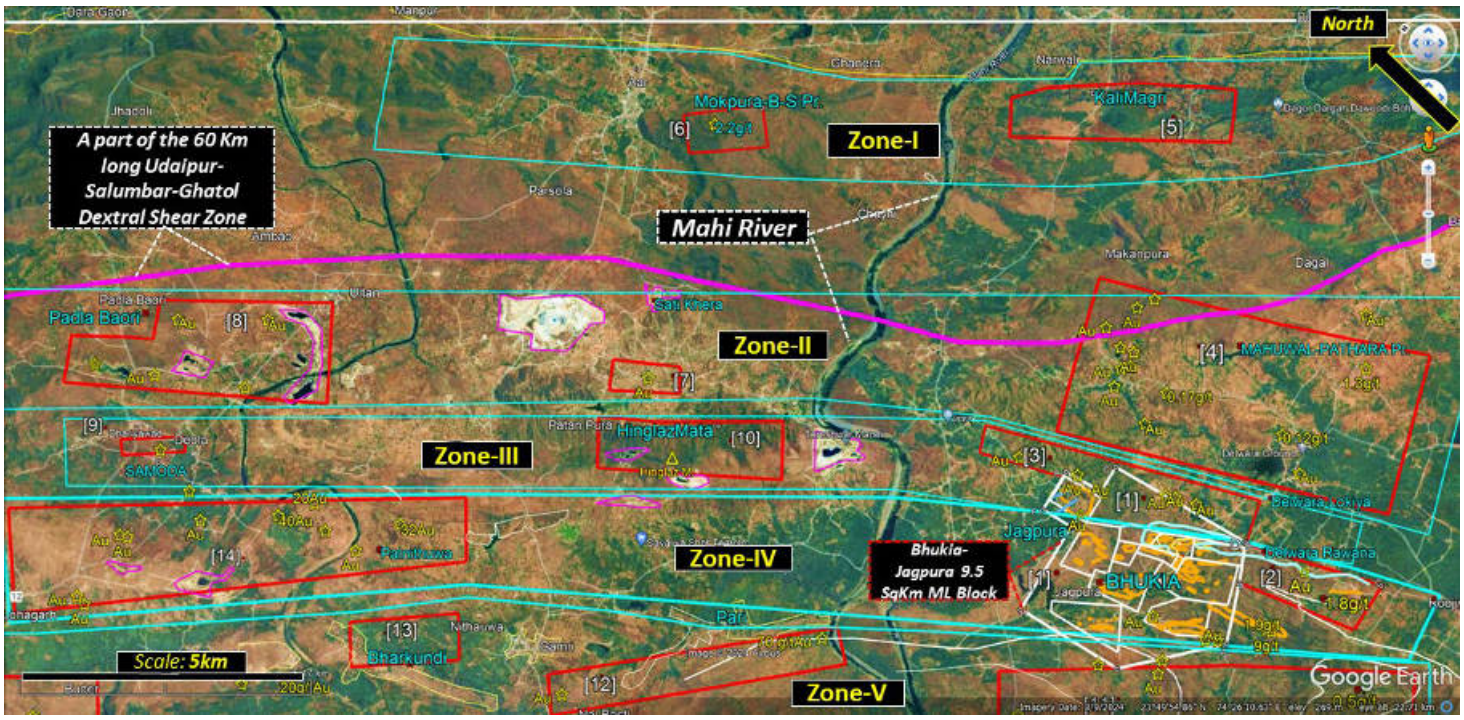
Fig.2. Geological map of Dugocha block, Sanjela-Manpur-Dugocha belt, Udaipur district, Rajasthan.

Geological map of Salumber–Ghatol Metallogenic Belt (SGMB) or Gold Field. Suresh Chander et al. (2022) have found high.

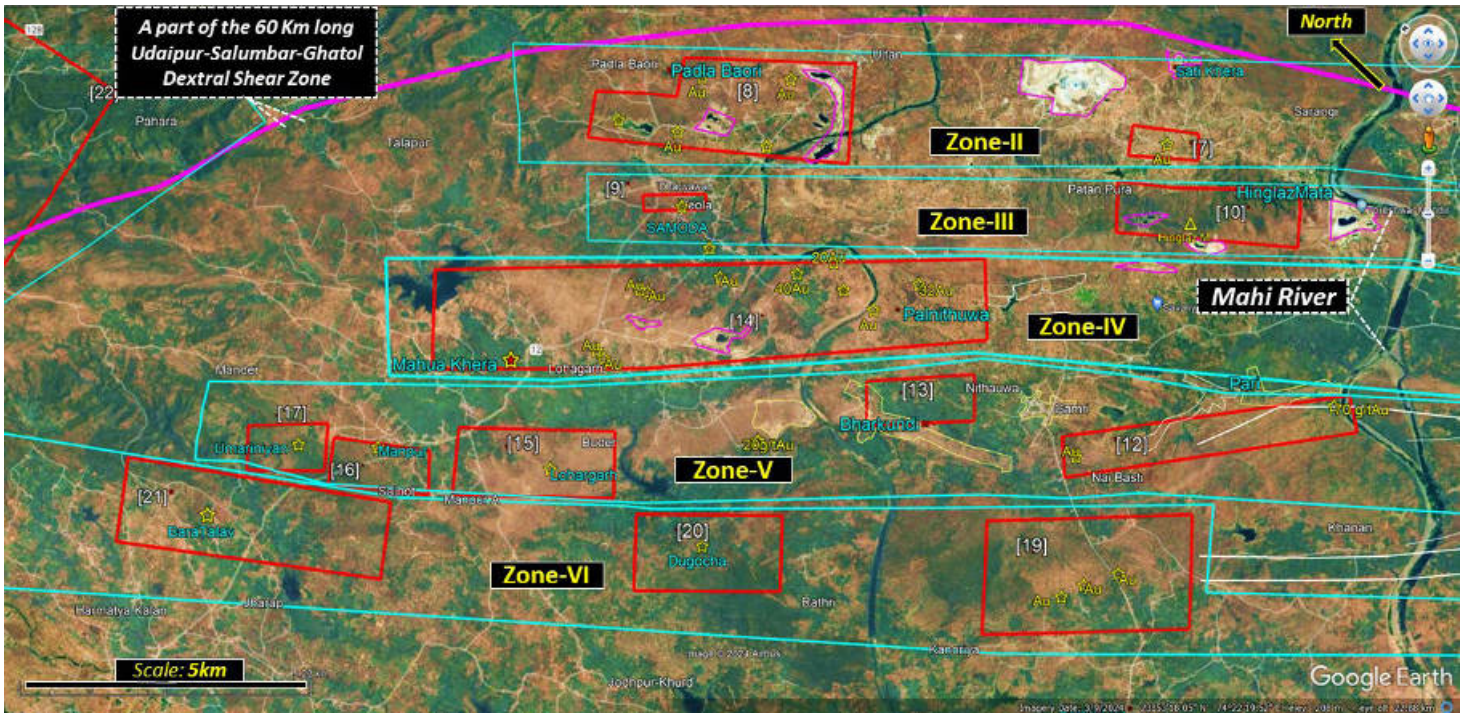


-average Tungsten (W) content in the bulk rock samples of tourmalinite is 380 ppm with some samples showing W values above 1000 ppm and as high as 2000ppm. The higher values of W are supported by the presence of small grains (10–50 micron) of scheelite in the tourmalinite. Anomalous values for Tungsten along with its mineral phase (Scheelite) and Sulphides make this area an interesting Tungsten and likely Gold prospect. Scheelite is a common path finder mineral for gold in areas of Orogenic-style gold mineralization. This location is at Mahua Khera. See the red star in the adjoining map.

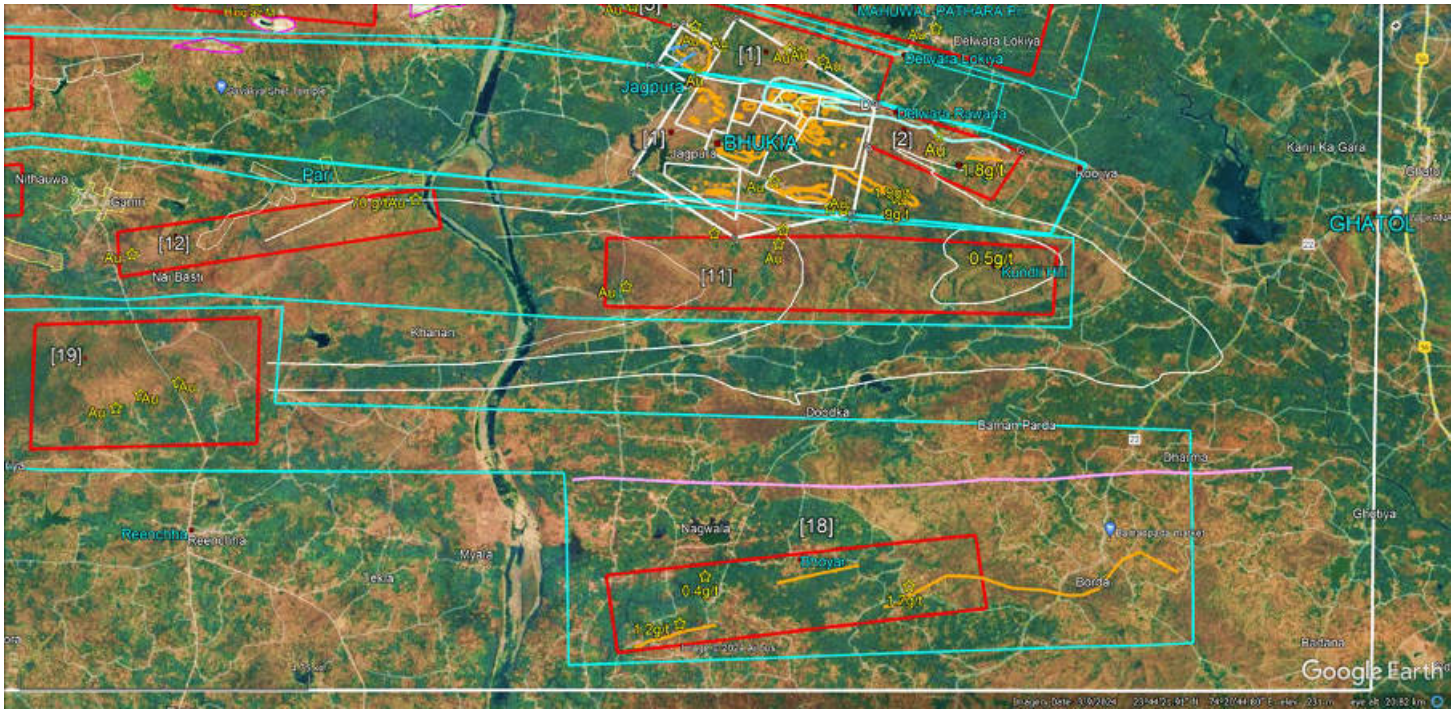
Enlarged View of the southern part of the Salumbar-Bhukia-Ghatol Gold Field showing the Mineralized Zones and Gold Prospects (Red boundary) awaiting detailed Exploration outside the Bhukia-Jagpura ML Block.



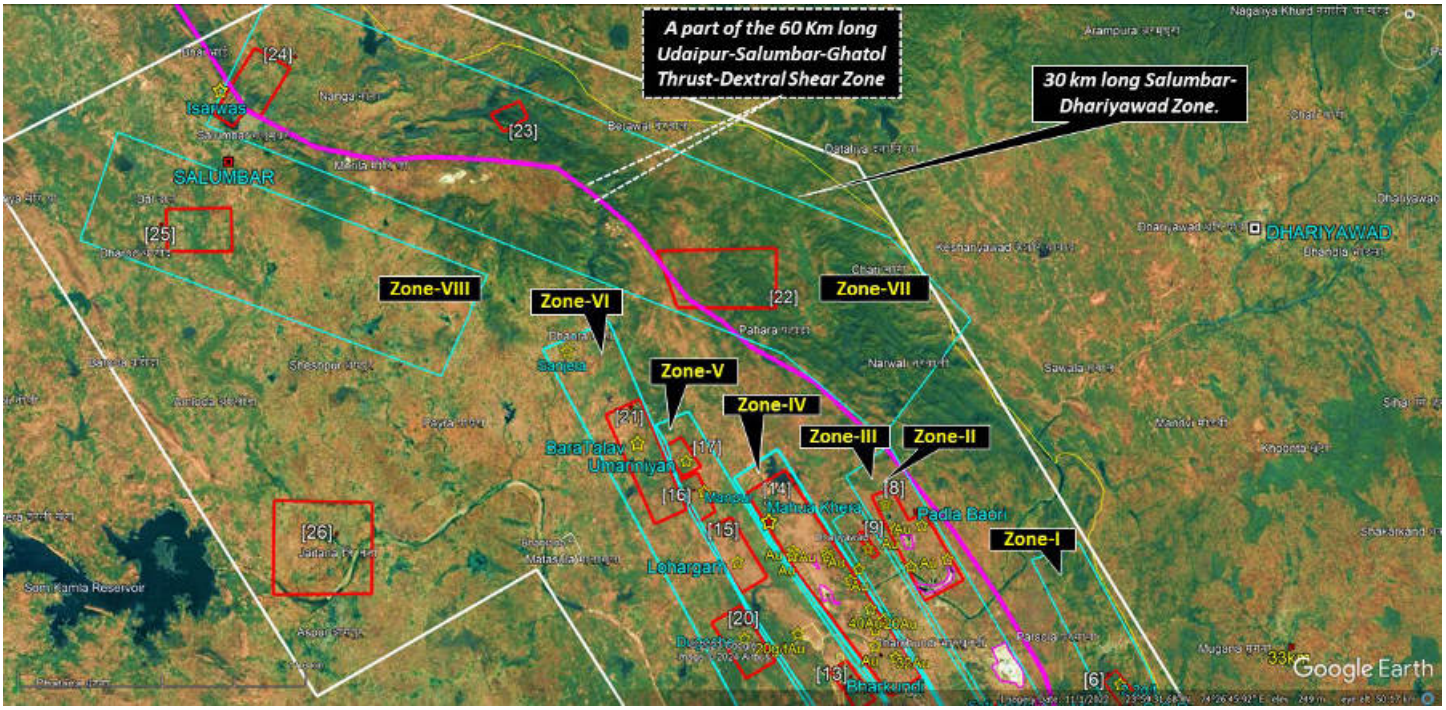
Enlarged View of the southern part of the Salumbar-Bhukia-Ghatol Gold Field showing the Mineralized Zones and Gold Prospects (Red boundary) northwest of Mahi River. All the Prospects await detailed Exploration.

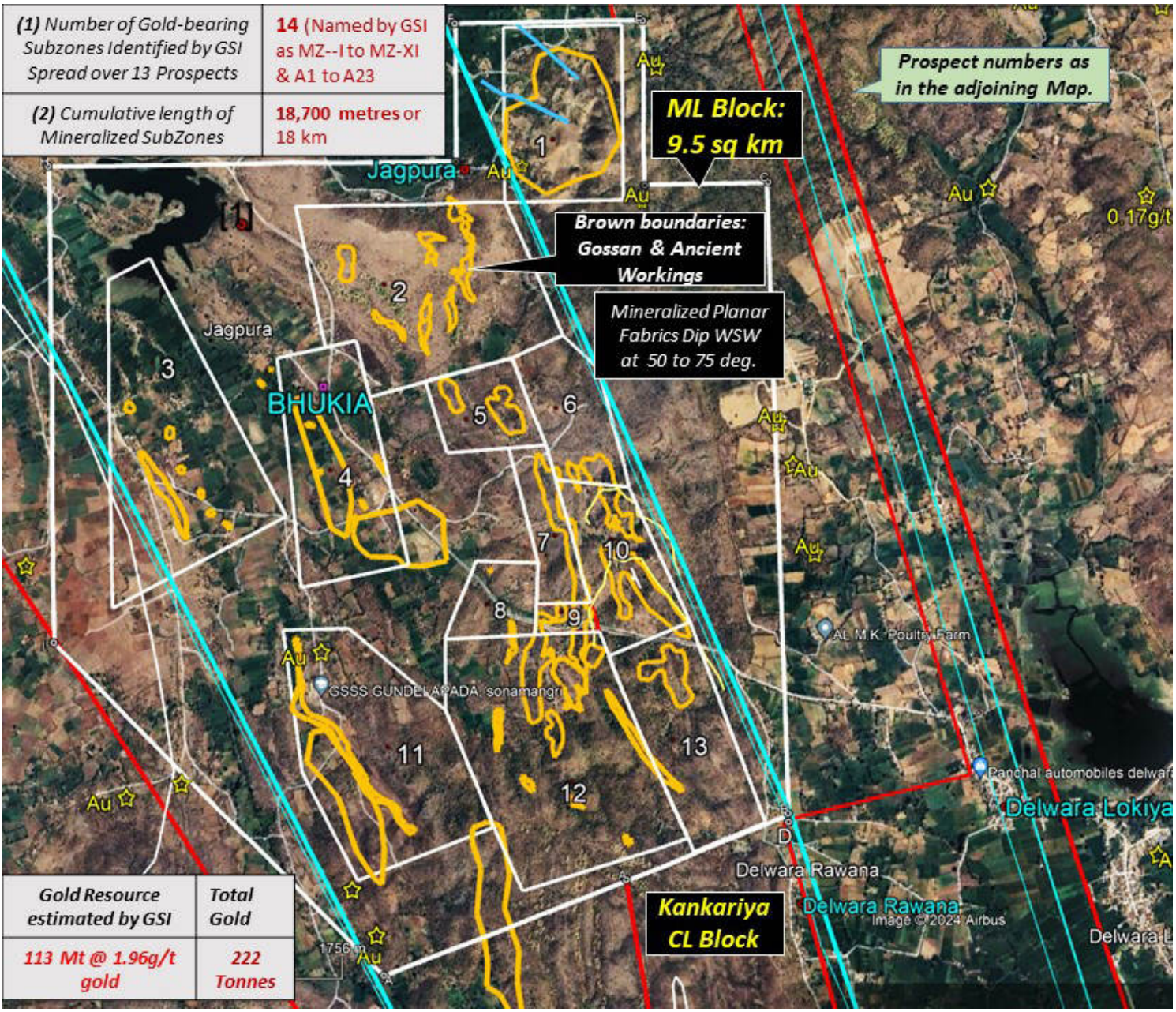


Enlarged View of the southern part of the Salumbar-Bhukia-Ghatol Gold Field showing the Mineralized Zones and Gold Prospects (Red boundary) South of the Mahi River. These Prospects await detailed Exploration.



Enlarged View of the Northern part of the SGF showing the Mineralized Zones and Gold Prospects (Red boundary). These Prospects await detailed Exploration. SALUMBAR-DHARIYAWAD Zone-VII is being looked at as an important Gold-bearing zone by the GSI. I expect the gold-bearing zone to continue further northward along the USGS (Thrust-Shear zone) beyond Udaipur & Rajpura-Dariba.



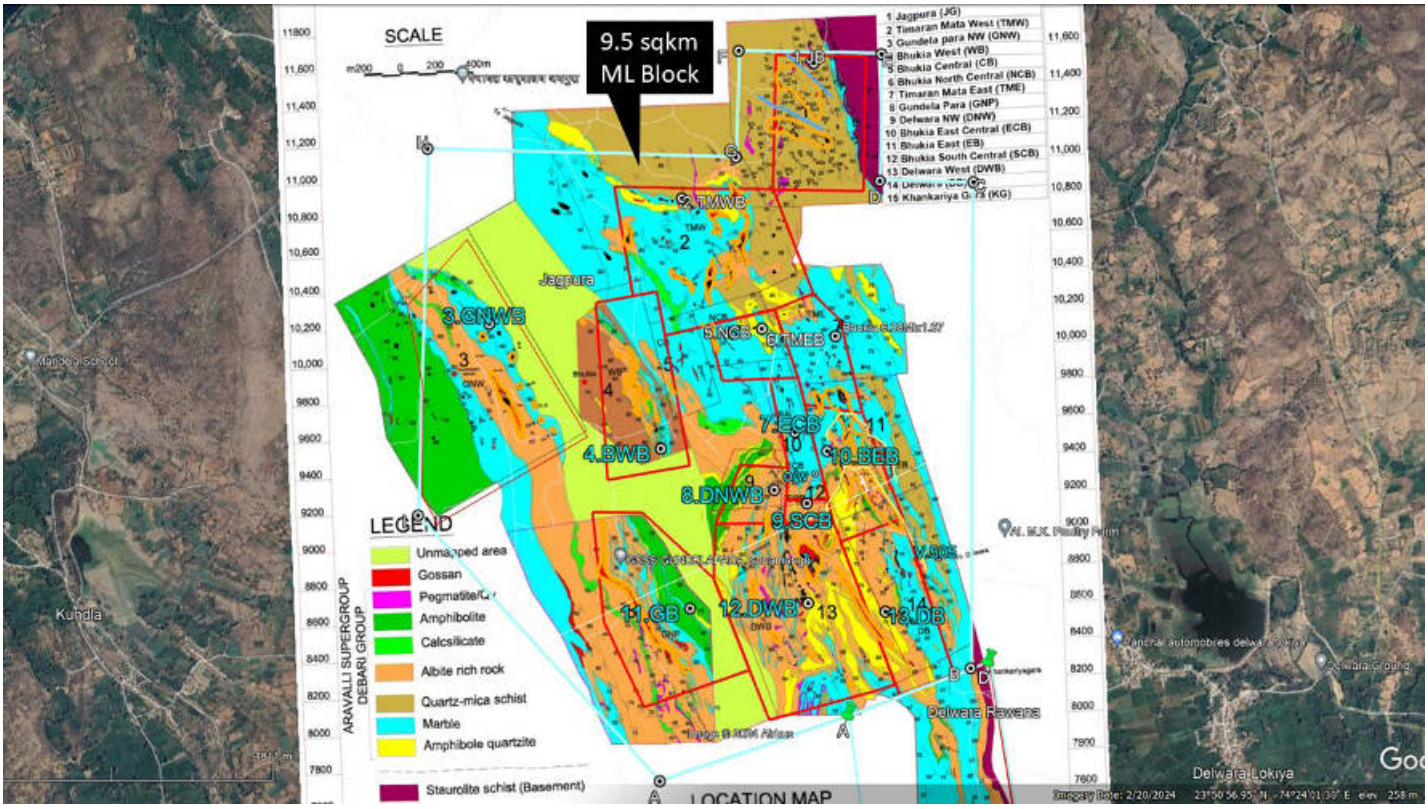


Prospect No.	Name of Prospect.	Resour -ce in Mt.	Grade in g/t	Gold in Tons	Length of SubZones (m)	Width in m.	Name of the Zone
13	Delwara	14.9	1.59	24	2100	10 to 100	MZ-I
10	Bhukia East	11.19	2.34	26	1700	10 to 50	MZ-II
6	TimranMata E.	3.85	2.48	9	2100	10 to 60	MZ-III
12	Delwara West	50.12	2.06	103	800	10 to 90	MZ-IV
					900	30 to 150	MZ-V
					800	20 to 130	MZ-VI
					150	30 to 75	MZ-VII
					400	30 to 60	MZ-VIII
9	South Central	1.38	1.58	2	480	-	MZ-IV & VI
7	Bhuki East Central	11.52	2.12	24	600	-	MZ-IV
5	Bhuki NorthCentral	2.16	1.78	4	700	-	MZ-IV & VI
2	TimranMata West	2.81	1.62	4	1600	1 to 2.5	MZ-IV & VI
8	Delwara NW	1.84	1.29	2	500	-	MZ-VI & VII
4	Bhukia West	2.86	1.33	4	750	5 to 50	MZ-X
11	Gundelpara	1.93	1.95	4	1850	10 to 90	MZ-XI
3	Gundelpara NW	2.9	1.63	5	2000	-	MZ-XI
1	Jagpura	6.07	1.67	10	1270	5 to 90	MZ-AI to A3

EXPLORATION by Geological Survey of India (1991-2021) Hindustan Zinc Limited (HZL): Mineral Exploration and Consultancy Limited (MECL): Metal Mining India Private Ltd., have carried out exploration in the Bhukia-Jagpura sector. GSI's exploration began with regional mapping and detailed mapping at scales of 1:1000/1:2000, pitting/trenching and systematic geochemical sampling to establish surface mineralized zones. A total of 13 Prospects were explored in the Bhukia-Jagpura ML block for Au, Cu, Co, & Ni. The Prospects explored are Bhukia West, Bhukia East, East Central, Southcentral, Northcentral, Timaran Mata East, Timaran Mata West, Delwara, Delwara West, Delwara NW, Gundelapara, Gundelapara NW, and Jagpura blocks. Total drilling 41,921m.

Exploration by Hindustan Zinc Limited(HZL): HZL evaluated the potential for mining the oxidized zone in the Bhukia-Jagpura area, and processing of ore by Heap Leach technology for extracting gold. the company completed 8853 meters of shallow diamond drilling. The drilling activities were primarily conducted over what HZL referred to as the NW block, situated as a low ridge just west of the Lokia Delwara to Jagpura road near Bhukia village. The outcome of the drilling and evaluation efforts resulted in a resource estimate of approximately 0.3 million tons at an average grade of 1.5 grams per ton (g/t) of gold. However, the trial heap leach was reported to be unsuccessful. Following a review by an Australian consultant geologist, it was decided that the sulphide potential was much more significant and a programme of 7000m of diamond drilling was completed in the area they refer to as the SE-SW Block, an area south of the Lokia Delwara to Jagpura road, aout. 750 m SE of the NW block. This resulted in the definition of a resource of 8.7 Mt @ 2.0 g/t Au..

Geological Map of the ML Block (Source: Fig.1 in Guha et al (2021) Spl.Pub.No.11, Geol.Soc.India, Bengaluru.



Gold Bearing Zones within Bhukia-Jagpura ML Block: On the basis of presence of ancient workings, gossans and mineral stains, fourteen parallel to sub-parallel auriferous mineralized zones have been delineated by the GSI at the surface. These have been designated as Zone-I to XI & A-I to A-III (Slide-1). The cumulative length of these zones is 17,540m or 17.5km with their width varying from 5m to 150m, averging 50m. The planar fabrics and the major gold-bearing veins trend NNW and NW and dip 50 to 70degrees to WSW / SW.

Resources estimated by MECL in a part of the Bhukia Sector: The total resource at 0.50 g/t Au cut-off are 18.428 Mt grading 1.875g/t Au=34.551 tonnes of gold metal classified under Probable Resource category.

Exploration carried out by Metal Mining India Private Ltd (MMI): During the period from January 19, 2005, to January 18, 2008, MMI and its joint venture partner Indo Gold Ltd. conducted comprehensive exploration activities in the Bhukia-Jagpura area. These activities included Geological Mapping on various scales to understand the geological controls of mineralization. Satellite-derived data viz., Aster, Multi Spectral and QuickBird Multispectral data were processed to understand the surface features and geological structures. Magnetic survey was conducted to understand the geological controls of mineralization. Stream sediments and Rock-Chip Sampling were carried out to detect anomalous contents of gold and associated path finder metals. A major programme of Soil sampling was performed to understand the geochemical characteristics of the soil and to demarcate prospective blocks.

Reverse circulation (RC) drilling was carried out totaling 1140 meters, followed by Core drilling (2449m) at the Bhukia, Gundelpara, and Grassy Hill Prospects between March 29 and September 23, 2006.

Resources estimated by Metal Mining India Private Ltd (MMI) in the Bhukia Sector:

(i) Mahi zone was estimated as 24.1 Mt @ 1.3 g/t Au (1.01 Moz Au).

(ii) Panch Mahuri zone was estimated as containing as inferred resources of 14.4 mt @ 1.6 g/t Au (0.73 Moz Au).

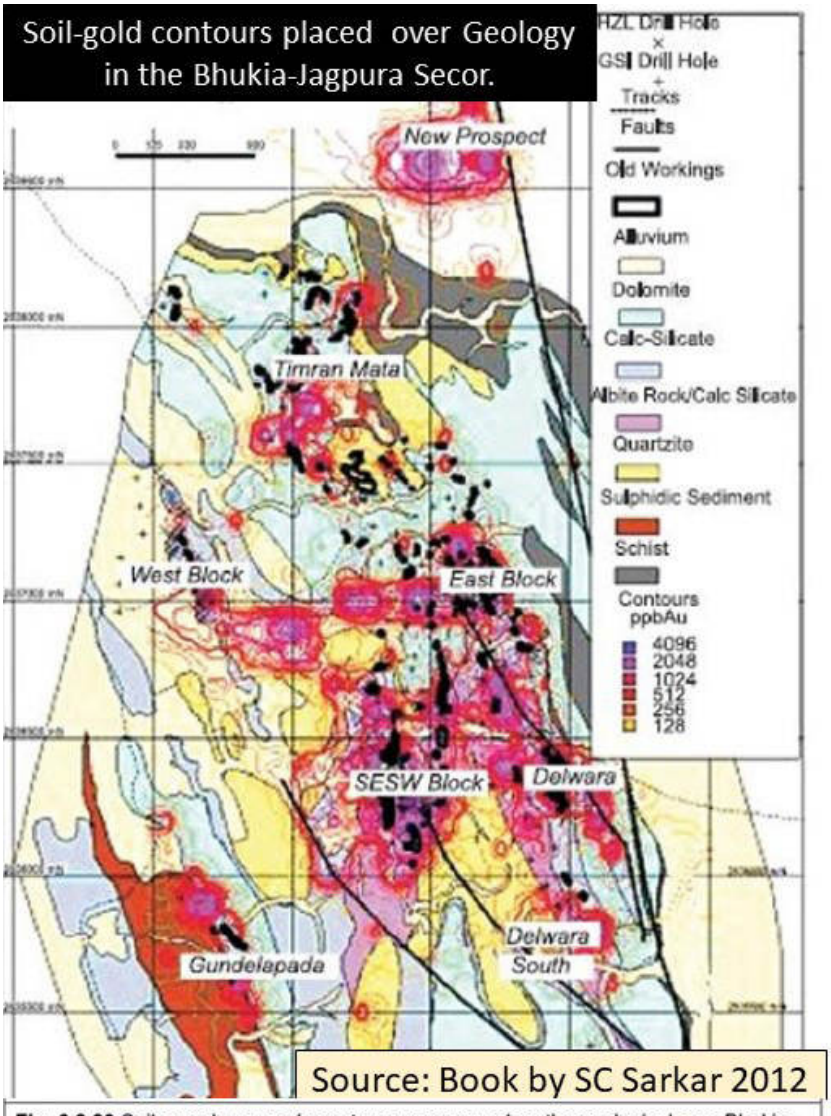


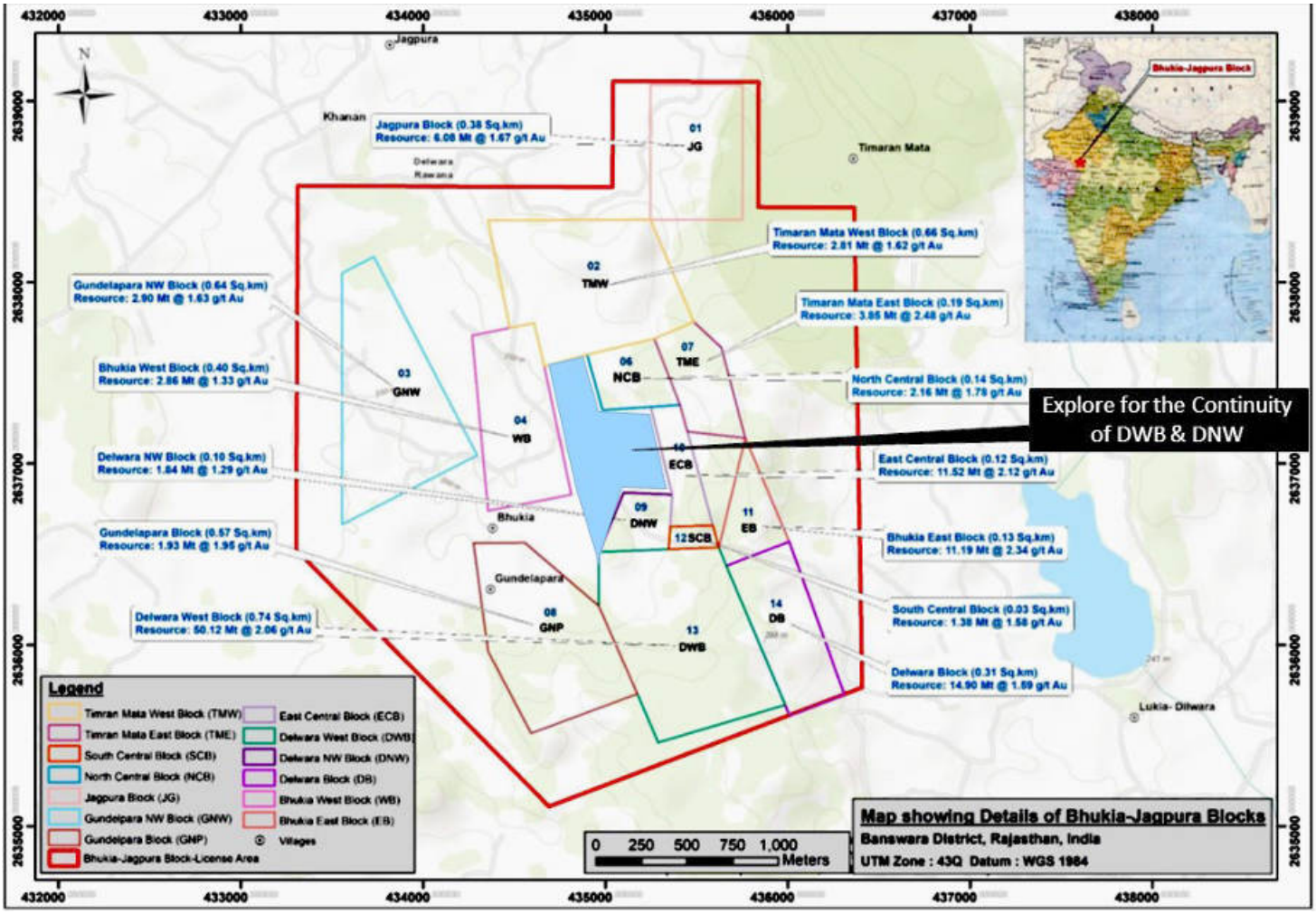
Fig. 6.2.29 Soil sample anomaly contours superposed on the geological map Bhukia-Jagpura prospect (prepared by M/s Indo Gold; www.indogold.com.au)

Exploration Summary: Since the discovery of gold Bhukia area by GSI in year 1993, GSI and MECL have been engaged in exploration of this field. Between years 2003 and 2012, 2 private companies Metal Mining Company India limited and Indo Gold Mines Ltd have carried out geochemical and geophysical surveys and reconnaissance drilling.

Total Core Drilling: 42,942 m in 176 BH (GSI). More than **20,000 samples** were collected and analysed.

Notice the high soil-gold values in the adjoining map-1 to 4g/t (Most values are ~ 0.5g/t (Rs.3000 at the present market rate).

The Mineralized zones continue NNW and SSE beyond the boundary of the ML block.



The Huge Gold Resource Potential of Salumbar-Ghatol Gold Field (SGF)

The SGF covers an area of about 1270 sq km and comprises 8 zones of gold mineralization. The zones have a cumulative length of 200 km and cover an area of 530 sq km. The 8 mineralized zones comprise 26 Gold Prospects. The cumulative length of these Prospects is 93 line km & they cover an area of 137sqkm. These numbers give us an idea about the magnitude of the already known gold-prospective blocks available for detailed exploration. Only one block viz., Bhukia-Jagpura ML block comprising 13 sub-blocks or prospects has drill-proven Gold Resource of 115 Mil.Tonnes of 1.95g/t av.gold grade. The remaining 25 blocks or Prospects await detailed drilling.

I sees a huge realistic potential in the SGF for increasing the gold resources from the current estimate of about 220 tonnes of gold (established in the Bhukia Sector) to about 1000 tonnes. Some among the Prospects namely Kankariya Gara and Hinglaz Mata need a lot of infill drilling.

Exploration for defining Gold Resources contained within Gossans should be our first priority. **There is a distinct possibility of locating Colluvial and Alluvial (gravel beds) gold resources within the SGF.**

I see immense scope for developing about 60 gold mines within the Salumbar-Ghatol Gold Field (SGF): Salumbar-Ghatol is a super goldfield in the making. Yes, it has all the Geological and Geochemical potential to progress to become a world-class gold mining region. A small part (10 sq km) of the SGF viz.,the Bhukia-Jagpura block is currently emerging as a gold mining field in the country. Similarities of Geology and mineralization features found in the Bhukia Sector are observed in other Prospects within the SGF. On a consideration of all these characteristics I prognosticate that there is immense scope for developing about 60 gold mines under MSME within the SGF. (Contd.,).

The Huge Gold-bearing Potential of the SGF: (continued): "Bhukia tourmalines contain highest ever reported Gallium content (up-to 1380 ppm Ga)" Cobalt too is high (400 to 1500ppm). High content of Tugsten(scheelite) is found at Mahua Khera in Zone-IV.

Gold Deposits in the SGF have the geological potential to continue beyond 1 km depth from the extant topographic surface. The classification of the Jagpura deposit as an IOCG-IOA type by A. Anand et al (2022) has significant implications for discovering and defining gold resources and deeper levels @ >500m verticle depth. Because the style of gold mineralization in the SGF is Orogenic, structurally-controlled Epigenetic style, the depth continuity of the Lodes/mineralized zones is not at all in doubt. Deep drilling(400 to 800m vertical depth would throw-up additional resources within the already explored Prospects. Orogenic style mineralization associated with a craton-scale shear zone ensures that the underground mines would eventually reach a km to 3km depth from the extant topography akin to KGF and currently operating Hutti Gold Mines in Karnataka.

Forecast of Expenditure on Detailed Exploration over the next 5 years & Development of New Mines & Construction of Mineral Processing Plants

Expenditure on Exploration including Feasibility studies: In India, according my experience, it would cost about Rs.2 crores to discover and define one tonne of mineable gold metal (=Mineral Reserve) from Recce stage to Mining stage. About Rs.1,000 Crore is needed to be spent over a period of 5 years on mineral exploration involving High resolution Mag and Conductivity geophysical surveys, detailed geochem sampling, detailed drilling (250,000 metres combination of RC + Core over 5 years), top-of-the range Logging+Sampling+Assaying including Screen-Fire Assaying, Geological modelling, Resource modelling, Lab & Pilot scale gold-extraction studies and other aspects of a full-fledged bankable feasibility studies to establish mineable Gold Reserves. I have taken the cost of Core drilling+ Logging+Sampling+Assaying @ Rs.20,000 per metre. Concurrently, action should be initiated from year one to progress the existing Resources into Reserves for commercial mining and mineral processing. Potential exist in the SGF to achieve 25 tonnes per annum of Gold production by 2030 beginning, say in Sept. 2024. Copper, Cobalt, Gallium, Bismuth and Tungsten will be co-products or by-products.

Cost of Mine Construction of different scales (open-pit & small u/g mines) at 25 Mineral Reserve Blocks within the SGF: Rs.500 Cr over a period of next 5 years beginning say 2025 to 2030.

Cost of establishment of 15 Mineral Processing Plants (250 tpd to 2000tpd) dotting the 60km Length of the SGF: Rs.1800 Cr.

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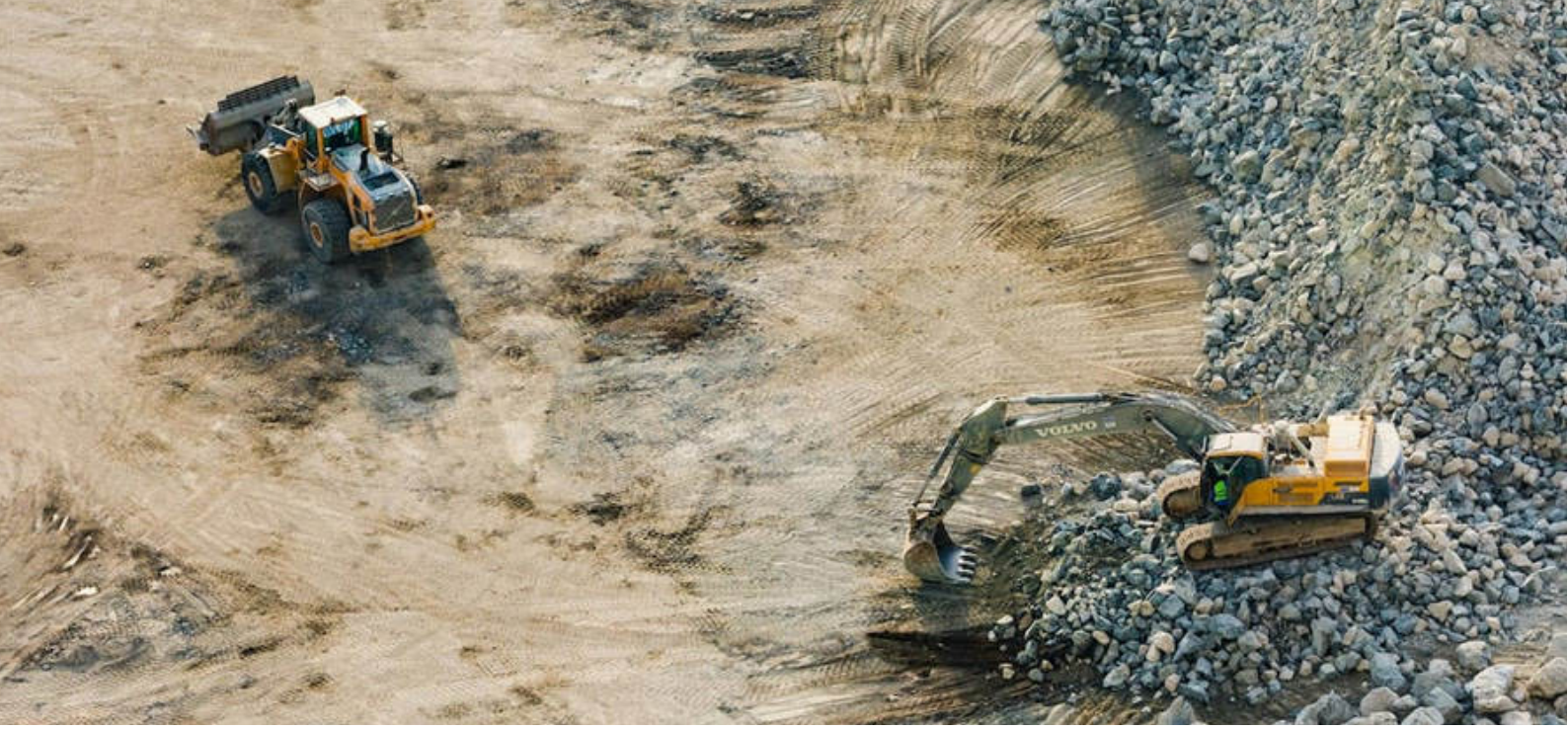
About Author:

Dr. V.N. Vasudev, aged 76, is a Geologist by profession specialising in the exploration for gold and base-metals. PhD from the Indian Institute of Science, Bengaluru. Served as a Senior Mining Geologist of two PSU Copper mines in Karnataka (1972-77) and later served the State Dept of Mines and Geology, Karnataka and voluntarily retired from Govt. service as Deputy Director in 1994. Recipient of the INSA Young Scientist Award in 1980 and Karnataka State Council of Science & Tech Award in 1981. From 1995 to 2015, Vasudev worked as the Chief Geologist and Exploration Director of 2 Companies promoted by a group of Australian Shareholders. Vasudev has travelled extensively including Greenland and Alaska; visited some of the world's deepest gold mines, viz., Kalgoorlie in W.Australia, Ashanti Gold Mines in Ghana, Witwaters Rand gold mine near Johannesburg in South Africa and researched gold mineralization at Hutti Gold Mines and at 3km depth in the Champion Reef Mine of the famous Kolar Gold Fields in Karnataka. He is credited with the discovery of the southern extension of Ingldhal Copper Mines in 1975 and the Ganajur Gold deposit in April 2003 in association with his fellow geologist Dr.Harish Kumar while working for Deccan Exploration Services. Vasudev also specialises in Mineral Policy Matters. Currently serving the Geological Society of India.



INDIA'S MINERAL DIPLOMACY VS CHINA'S CONTENTIOUS TIBET MINING: A COMPARATIVE ANALYSIS

India is particularly focused on mining lithium and copper in Chile, with negotiations underway for a Free Trade Agreement (FTA).

In recent years, India and China have intensified their mining activities abroad, adopting markedly different strategies with significant implications. While India focuses on securing critical minerals through international collaborations, China's expansion in Tibet has sparked considerable environmental and cultural concerns.

The Indian government is proactively seeking mining opportunities overseas, led by a team of Secretary-level officials under the SGOS-3 framework. Key entities in this initiative include Khanij Bidesh India Limited (KABIL), National Mineral Development Corporation (NMDC), Coal India, and ONGC Videsh Ltd. Their primary goal is to secure vital minerals essential for India's industrial growth.

Recent efforts have seen Indian delegations, including representatives from Hindustan Aluminium Corporation Limited and Adani Enterprises Limited, visiting countries such as Chile, Argentina, Australia, and Belarus. India is particularly interested in mining lithium and copper in Chile, with negotiations underway for a Free Trade Agreement (FTA). In Argentina, mining operations are set to begin across five lithium blocks. Additionally, Coal India is contemplating lithium mining in Chile, while KABIL is conducting feasibility studies for potential projects in Belarus. Four Indian Public Sector Undertakings (PSUs) are expected to commence operations in Belarus shortly.

China's controversial mining expansion in Tibet

In contrast, China's mining expansion in Tibet under President Xi Jinping has raised widespread alarm over its environmental and cultural impact. Tibet, rich in mineral resources and ecological diversity, faces extensive mining operations that threaten its delicate environment and cultural heritage.

The Gyama Copper Polymetallic Mine in Tibet, notorious for a disastrous landslide that buried over 80 miners, exemplifies the risks associated with these ventures. The Central Tibetan Administration (CTA) has repeatedly warned about potential disasters linked to such mining activities. The Julong Copper Mine, one of the world's largest, is set for significant expansion, exacerbating environmental concerns. Reports of worker disappearances underscore the severe human risks involved in these operations.

Critics argue that China's aggressive mining practices in Tibet are driven by commercial exploitation with little regard for local ecological and cultural significance. They call for sustainable practices and the inclusion of local communities to mitigate the ecological and social impacts of mining in this sensitive region.

Conclusion

India's overseas mining endeavours aim to secure essential minerals through strategic international partnerships, while China's approach in Tibet has drawn substantial criticism for its environmental and human costs. India's efforts, emphasising collaboration and sustainable resource acquisition, stand in stark contrast to China's controversial practices in Tibet. This juxtaposition highlights the differing priorities and methodologies of these two Asian powerhouses in their quest for mineral resources.

Source: Zee Busniess

WHY IS GLOBAL DEMAND FOR INDIAN IRON ORE EXPLODING? MC EXPLAINS

According to BigMint data, exports of iron ore pellets increased nearly 80% y-o-y to 11.3 mnt in FY'24 as against 6.3 mnt in FY23.

India achieved a record-high iron ore production of approximately 280 million metric tons (mn t) in the recently concluded fiscal year.

India's exports of iron ore fines and lump hit a three-year high of 36.5 million tonne (mt) in FY24 compared with around 15 mt in FY23, an increase of about 145 percent year on year, according to data collected by market analytics firm BigMint. Exports of iron ore pellets, likewise, increased nearly 80 percent y-o-y to 11.3 mt in FY24 as against 6.3 mt in FY23, data show. According to reports, over 90 percent of the exports are made to China followed by Malaysia and Qatar.

But why is there a spike in iron exports, Moneycontrol explains:

Why is there an increased Chinese appetite for Indian iron ore?

China's iron ore imports saw an 8.1 percent increase in the initial two months of 2024, according to reports, compared to the previous year, attributed to steelmakers replenishing stocks to fulfil production requirements during and after the Lunar New Year holiday. The surge in Indian iron ore fines exports to China was driven by robust pre-Chinese New Year restocking and encouraging economic signals in China. Additionally, the elevated costs associated with high-grade iron ore imports from alternative sources, coupled with narrow profit margins for Chinese mills, raised the demand for India's competitively priced lower-grade ore.

What's happening with the domestic iron ore demand?

India's iron ore production, a key steel making ingredient, comprises both low-grade and high-grade ores, but the country has significant reserves of low-grade iron ore. Low-grade iron ore typically contains a lower percentage of iron content and higher levels of impurities compared to high-grade ores, leading steel companies to opt for higher-grade ores, which have over 62 percent Fe (the chemical sign of iron).

How did the removal of duty boost exports?

The elimination of the 50 percent export duty on iron ore and 45 percent duty on pellets, along with the cessation of the 15 percent levy on finished steel exports in November 2022, significantly boosted export activities. The imposition of these levies had rendered exports economically unfeasible. There was a surge in shipments from India immediately after their removal. China emerged as the primary destination for approximately 90 percent of total exports, underscoring the consistent demand for low-grade Indian iron ore from China, despite the constrained profit margins of Chinese steel manufacturers, which have remained stable over the years.

What are the production levels of Indian iron ore?

India achieved a record-high iron ore production of approximately 280 mt in the recently concluded fiscal year, a notable 10 percent jump y-o-y. With the rise in domestic iron ore production, its availability for exports has also expanded.

- By: Aishwarya Nair

Source : Money Control

TOP-10 IRON PRODUCING COUNTRIES IN THE WORLD 2024

Australia with the iron production of 880 million tons, holds the title of the largest iron producer in the world. Know the names of top-10 iron producing countries in the world 2024.

Iron, a fundamental element in the construction of modern civilization, is a crucial component in the manufacturing of steel, machinery, infrastructure, and countless other industrial applications. As of 2024, several nations stand out as major contributors to the global iron production landscape. Here's a comprehensive overview of the top 10 iron producing countries in the world for the year 2024.

Worldwide Iron Production

Worldwide iron production, as per the latest data from the US Geological Survey, is led by Australia, Brazil, and China. Despite global economic uncertainties stemming from COVID-19 lockdowns and geopolitical tensions like the Russia-Ukraine conflict, iron ore prices have shown volatility. From a record high of nearly US$220 per metric ton in May 2021, prices plummeted to US$84.50 in November of the same year due to increased supply and decreased Chinese demand. However, factors such as supply shortages in key producing nations and resurgent Chinese demand are expected to drive prices to the US$120–US$130 range in 2024, maintaining a positive outlook for the iron ore market.

Largest Iron Producer in the World 2024

Australia emerged as the world's largest iron ore producer, yielding 880 million MT of usable iron ore, with BHP leading the pack, followed by Rio Tinto and Fortescue Metals Group. The Pilbara region in Western Australia remains the primary source, with additional mines scattered across regions like Wheatbelt, Kimberley, and Midwest. Rio Tinto operates twelve mines, including two at Fortescue and seven at BHP, all concentrated in Pilbara. Iron ore transportation primarily occurs via Port Hedland, Dampier, and Cape Lambert, with Rio Tinto exclusively utilizing the latter two ports.

Top-10 Iron Producing Countries in the World 2024

Australia with the iron production of 880 million tons, holds the title of the largest iron producer in the world, followed by Brazil, China, India and Russia.

Here is the list of top-10 iron producing countries in the world 2024:

Top-10 Iron Producing Countries in the World 2024		
Rank	**Country**	**Iron Production (in million tons)**
1	Australia	880
2	China	810
3	Brazil	310
4	India	250
5	Russia	100
6	South Africa	75
7	Ukraine	70
8	United States	65
9	Canada	60
10	Iran	55

Largest Iron Producer in the World – Australia

Iron Production: 880 million tons

Australia, the leading iron ore producer globally, yielded 880 million MT of usable iron ore in 2022, primarily from the Pilbara area in Western Australia. BHP stands as the largest producer, followed by Rio Tinto and Fortescue Metals Group. About 90% of Western Australia's iron ore output is attributed to Rio Tinto and BHP, with Rio Tinto operating twelve mines in Pilbara. Iron ore transportation is facilitated through ports like Port Hedland, Dampier, and Cape Lambert, with Rio Tinto exclusively utilizing the latter two.

World's Second Largest Iron Producer – China

Iron Production: 810 million tons

China, ranking as the world's second-largest iron ore producer, contributed 380 million MT of usable iron ore in 2022, with a reduction of 14 million MT compared to previous years. Despite its significant production, China stands as the largest consumer of iron ore globally. The nation's immense demand for iron ore is driven by its position as the leading producer of stainless steel, although domestic output struggles to meet requirements. Over 70% of iron ore transported by sea is imported into China. Forecasts suggest a decline in iron ore prices to $90-100/t in 2023 due to subdued demand from Chinese steelmakers, with Goldman Sachs lowering price projections by 12% to $90/t for the second half of the year. Analysts at ING anticipate prices to stabilize at $105/t in the third quarter and $100/t in the fourth.

World's Third Largest Country in terms of Iron Production – Brazil

Iron Production: 310 million tons

Brazil, the world's third-largest iron ore producer, contributed 410 million MT of usable iron ore in 2022, with Para and Minas Gerais states being the primary production hubs. The renowned Carajas mine, operated by Vale in Para, stands as the world's largest iron ore mine. Vale, headquartered in Rio de Janeiro, leads global iron ore pellet manufacturing. Key producers include Anglo-American, Arcelormittal, Vale, and Companhia Siderurgica Nacional, with notable output increases in fiscal year 2020–2021. Forecasts anticipate further growth in Brazil's iron ore output in 2023, positioning Brazil and India to dominate global supply, while Australian shipments maintain stability.

- Source : geeksforgeeks.org

VEDANTA'S HINDUSTAN ZINC, 4 OTHERS TO COMPETE FOR TWO GOLD MINES IN RAJASTHAN

Besides Hindustan Zinc, Ramgad Minerals and Mining Ltd, Hirakund Natural Resources Ltd, Jindal Power, Saiyyed Owais Ali have emerged as technically qualified bidders for Bhukia-Jagpura gold block in Rajasthan

Vedanta subsidiary Hindustan Zinc is one of the 'technically qualified bidders' for gold and associated mineral blocks put up for auction by the Government of Rajasthan. A notice dated May 13, 2024, issued by the Directorate of Mines & Geology, Government of Rajasthan, stated that the company has been declared as one of the 'Technically Qualified Bidder' for the blocks - Bhukia-Jagpura and Kankriya Gara Block.

Besides Hindustan Zinc, Ramgad Minerals and Mining Ltd, Hirakund Natural Resources Ltd, Jindal Power, Saiyyed Owais Ali have emerged as technically qualified bidders for Bhukia-Jagpura gold block in the desert state.

For Kankriya Gara gold block, the technically qualified bidders are Hirakund Natural Resources, Poddar Diamond, Owais Metal and Minerals Processing, Hindustan Zinc and JK Cement, according to the website of Department of Mines and Geology (DMG) of the Rajasthan government.

The auction process started in March of this year. According to the website, the auction of both the gold blocks will be held this week.

The full-scale production of the country's first large private gold mine in Andhra Pradesh will begin by the end of 2024, Deccan Gold Mines Managing Director Hanuma Prasad had earlier said

The Jonnagiri gold project, in which the pilot-scale operation has already started, will produce about 750 kilograms of gold per year once it begins its full-scale production.

The mine, in which an investment of Rs 200 crore has been made so far, is producing about one kg of gold per month at present.

For Q4 FY24, Hindustan Zinc reported a 21% drop in consolidated net profit to Rs 2,038 crore versus profit after tax (PAT) of Rs 2,583 crore recorded in the corresponding quarter of the last financial year. The revenue from operations stood at Rs 7,285 crore in the reported quarter, down 12% from Rs 8,281 crore reported in the year-ago period.

Vedanta Ltd reported a 27 per cent decline in fiscal fourth-quarter profit, driven by surging finance costs and weak prices of metals such as zinc, copper, and aluminium. Net profit fell to Rs 1,369 crore for the quarter ended March 31 from Rs 1,881 crore in the year earlier. It reported a Rs 2,013 crore profit in the preceding December quarter.

Snapshot of India's Critical mineral import

CRITICAL MINERALS: INDIA'S NET IMPORT RELIANCE (2020)		
Critical Mineral	**%age**	**Major Import Sources**
Lithium	100%	Chile ,Russia,China,Ireland,Belgium
Cobalt	100%	China, Belgium,Nethrlands,US, Japan
Nickel	100%	Sweden,China,Indonesia,Japan, Philippines
Vanadium	100%	Kuwait,Germany,South Africa, Brazil,Thailand
Niobium	100%	Brazil,Australia,Canada, South Africa, Indonesia
Germanium	100%	China, SouthAfrica,Australia,France,US
Rhenium	100%	Russia, UK,Netherlands,South Africa,China
Beryllium	100%	Russia, UK,Netherlands,South Africa,China
Tantalum	100%	Australia,Indonesia,SouthAfrica,Malaysia,US
Strontium	100%	China,US,Russia,Estonia,Slovenia
Zirconium (zircon)	80%	Austalia,Indonesia,South Africa,Malaysia, US
Graphite (natural)	60%	China, Madagascar,Mozambique,Vietnam,Tanzania
Manganese	50%	South Africa,Gabon,Australia, Brazil,China
Chromium	2.50%	South Africa,Mozambique,Oman,Switzerland,Turkey
Silicon	<1%	China,Malaysia,Norway,Bhutan,Netherlands

Source: "Unloking Australia-India Critical Minerals Partnership Potential' Australian Trade and investment Commission, July 2021

Source: Busniess Today

THE FOLLY OF WORRY: RISE ABOVE WORRY , SOAR WITH OPTIMISM

Omar Khayyam, a Persian mathematician,astronomer,and poet was grimly right :

"The moving finger writes,and,having writ,
Moves on;nor all thy piety nor wit
Shall lure it back to cancel half a line,
Nor all thy tears wash out a word of it."

i) Worry is needless, useless and even actively injurious:

Worry cannot affect the past, for the past is past. It is not that a man can or ought to dissociate himself from his past; but he ought to use his past as a spur and a guide for better action in the future, and not as something about which he broods until he has worried himself into a paralysis of action. Hence to carve deep down in our journey of existence-Worry is needless.

Equally, worry about the future is useless. Alistair Mac Lean, a Scottish Novelist, tells of a story which he had read. A London doctor was the hero. " He was paralyzed and bed-ridden, but almost outrageously cheerful, and his smile so brave and radiant that everyone forgot to be sorry for him. His children adored him, and when one of his sons was leaving the nest and starting forth upon life's adventure, the doctor father, gave him good advice: " Johnny,' he said, ' the thing to do, my lad, is to hold your own end up, and to do it like a gentleman, and please remember the biggest troubles you have got to face are those that never come?" Worry about the future is wasted effort, and the future of reality is seldom as bad as the future of our fears.

But worry is worse than useless; it is often actively injurious. The two typical diseases of modern life are the stomach ulcer and the coronary thrombosis,commonly called as a Heart Attack, and in many cases both are the result of worry.

It is a medical fact that he who laughs most lives longest. The worry which wears out the mind wears out the body along with it. Worry affects a man's judgment, lessens his powers of decision, and renders him progressively incapable of dealing with life. Let a man give his best to every situation he cannot give more-and let him leave the rest to Universe.

ii) Worry is blind:

Worry refuses to learn the lesson of nature. It bids men to look at the birds, and see the bounty which is behind nature, and trust the love that lies behind that bounty.

Worry refuses to learn the lesson of life. The lesson of life is that somehow we have been enabled to bear the unbearable and to ,do the undo-able and to pass the breaking-point and not to break. The lesson of life is that worry is unnecessary.

(iii) Worry is essentially irreligious:

Worry is not caused by, external circumstances. In the same circumstances one man can be absolutely serene, and another man can be worried to death. Both worry and serenity come, not from circumstances, but from the heart. Many religions across teach their followers about the secret to a blissful life as shifting focus from past as well as future and focusing entirely on the present moment . Some say that there may be other thoughts and actions much grave, but there is nothing more disabling than worry.

So worry is rightly said as a folly and everyone must rise above worry and soar with optimism, because it is not the only way to peace, but also to power.

ABOUT AUTHOR

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