Indian Minerals Yearbook 2022

(Part-I)

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STATE REVIEWS (Karnataka)

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MINISTRY OF MINES
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KARNATAKA

Mineral Resources

Karnataka has the distinction of being the principal gold producing State in the country. The State is the sole producer of felsite and one of the leading producer of iron ore, chromite, dolomite, dunite, kyanite and shale. Karnataka hosts the country's 79% vanadium ore, 72% iron ore (magnetite), 65% corundum, 42% tungsten ore, 36% asbestos, 27% limestone, 21% gold ore (primary), 20% granite (dimension stone), 20% manganese ore, 17% dunite, 13% kyanite and 10% PGM resources.

The important mineral-occurrence found in the State are **bauxite** in Belagavi, Chikkamagaluru, Uttara & Dakshina Kannada and Udupi districts; **china clay** in Bengaluru, Belagavi, Ballari, Bidar, Chikkamagaluru, Dharwad, Gadag, Hassan, Haveri, Kolar, Uttara & Dakshina Kannada, Shivamogga & Tumakuru districts; **chromite** in Chikkamagaluru, Hassan & Mysuru districts; **dolomite** in Bagalkot, Belagavi, Vijayapura, Chitradurga, Mysuru, Uttara Kannada and Tumakuru districts; **dunite/pyroxenite** in Chikkamagaluru, Hassan and Mysuru districts; **felspar** in Bengaluru, Belagavi, Chitradurga & Hassan districts; **fireclay** in Bengaluru, Chitradurga, Dharwad, Hassan, Kolar, Shivamogga & Tumakuru districts; **gold** in Chitradurga, Dharwad, Gadag, Kalaburagi, Hassan, Haveri, Kolar, Raichur & Tumakuru districts; **iron ore (haematite)** in Bagalkot, Ballari, Vijayapura, Chikkamagaluru, Chitradurga, Dharwad, Gadag, Uttara Kannada, Shivamogga & Tumakuru districts; **iron ore (magnetite)** in Chikkamagaluru, Hassan, Uttara & Dakshina Kannada and Shivamogga districts; **kyanite** in Chikkamagaluru, Chitradurga, Coorg, Mandya, Mysuru, Shivamogga & Dakshina Kannada districts; **limestone** in Bagalkot, Belagavi, Ballari, Vijayapura, Chikkamagaluru, Chitradurga, Davangere, Gadag, Kalaburagi, Hassan, Mysuru, Uttara & Dakshina Kannada, Shivamogga, Tumakuru & Udupi districts; **magnesite** in Coorg, Mandya & Mysuru districts; **manganese ore** in Belagavi, Ballari, Chikkamagaluru, Chitradurga, Davangere, Uttara Kannada, Shivamogga & Tumakuru districts; **ochre** in Ballari and Bidar districts; **quartz/silica sand** in Bagalkot, Bengaluru, Belagavi, Ballari, Chikkamagaluru, Chitradurga, Davangere, Dharwad, Gadag, Kalaburagi, Hassan, Haveri, Kolar, Koppal, Mandya, Mysuru, Uttara & Dakshina Kannada, Raichur, Shivamogga, Tumakuru & Udupi districts; **Quartzite** in Belagavi district; & **talc/steatite/soapstone** in Ballari, Chikkamagaluru, Chitradurga, Hassan, Mandya, Mysuru, Raichur & Tumakuru districts.

Other minerals that occur in the State are **asbestos** in Chikkamagaluru, Hassan, Mandya, Mysuru and Shivamogga districts; **barytes** & **pyrite** in Chitradurga district; **calcite** in Belagavi, Vijayapura & Mysuru districts; **copper** in Chikkamagaluru, Chitradurga, Kalaburagi, Hassan, Uttara Kannada, Raichur & Shivamogga districts; **corundum** in Bengaluru, Ballari, Chitradurga, kodagu, Hassan, Mandya, Mysuru & Tumakuru districts; **fuller's earth** in Belagavi & Kalaburagi districts; **granite** in Bagalkot, Bengaluru, Bellari, Vijayapura, Chamrajanagar, Chikkamagaluru, Chitradurga, kodagu, Dharwad, Gadag, Kalaburagi, Hassan, Kolar, Koppal, Mandya, Mysuru, Uttara & Dakshina Kannada, Raichur, Tumakuru & Udupi districts; **graphite** in Kolar & Mysuru districts; **gypsum** in Kalaburagi district; **molybdenum** in Kolar & Raichur districts; **nickel** in Uttara Kannada district; **Platinum Group of Metals** in Davangere district**; sillimanite** in Hassan, Mysuru & Dakshina Kannada districts; **silver** in Chitradurga & Raichur districts; **titanium minerals** in Hassan, Uttara Kannada & Shivamogga districts; **tungsten** in Gadag, Kolar & Raichur districts; **vanadium** in Hassan, Uttara Kannada & Shivamogga districts; and **vermiculite** in Hassan, Mandya & Mysuru districts (Table - 1).

Exploration & Development

The details of exploration activities conducted by GSI for molybdenum, gold, base metal, platinum group of elements, nickel, rare earth elements & rare metals and cobalt during 2021-22 are furnished in Table - 2.

Table – 1 : Reserves/Resources of Minerals as on 1.4.2020: Karnataka

Mineral	Unit	Reserves				Remaining resources								Total resources (A+B)
		Proved STD 111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
			STD121	STD122			STD221	STD222						
Asbestos	tonne	-	-	-	-	-	-	-	-	2441037	5841420	-	8282457	8282457
Bauxite	'000 tonnes	126	194	4887	5207	2468	864	88	82	2220	35520	-	41242	46449
Chromite	'000 tonnes	176	-	323	499	474	378	54	-	20	392	-	1317	1817
Copper														
Ore	'000 tonnes	-	-	-	-	867	1301	3114	1750	6833	27634	-	41499	41499
Metal	'000 tonnes	-	-	-	-	-	-	15.28	22	65.77	142.81	-	245.86	245.86
Gold														
Ore														
(Primary)	tonne	17050000	3420000	-	20470000	2013000	1964000	174000	4304968	46495718	21773820	5813000	82538506	103008506
Metal														
(Primary)	tonne	74.02	13.44	-	87.46	5.06	5.12	0.64	14.13	44.17	48.91	45.68	165.71	251.17
Graphite	tonne	-	-	-	-	203673	30600	48821	-	41605	667933	-	992632	992632
Iron Ore														
(Haematite)	'000 tonnes	897256	39779	106177	1043212	330334	46621	84816	592180	62882	504234	171714	1792781	2835992
Iron Ore														
(Magnetite)	'000 tonnes	133	185	-	318	120131	-	18375	1498957	479372	5345018	340000	7801853	7802171
Kyanite	tonne	181600	-	-	181600	230660	15930	119368	386247	1610502	10628753	-	12991460	13173060
Limestone	'000 tonnes	1766001	2013	503208	2271221	584131	522239	778646	1776165	15091800	35135248	11008	53899236	56170457
Magnesite	'000 tonnes	997	30	-	1027	802	247	270	88	10	2834	264	4516	5543
Manganese														
Ore	'000 tonnes	15363	-	101	15464	14723	2373	9604	18700	7306	55471	329	108508	123972
Molybdenum														
ore	tonne	-	-	-	-	-	-	-	-	-	1320900	-	1320900	1320900
Contained MoS_2	tonne	-	-	-	-	-	-	-	-	-	1718.7	-	1718.7	1718.7
Nickel ore	Million tonne	-	-	-	-	-	-	-	-	-	0.23	-	0.23	0.23
Pt.Group of														
Metals	tonne	-	-	-	-	-	-	-	-	-	-	1.5	1.5	1.5
Pyrite	'000 tonnes	-	-	-	-	-	-	-	-	-	3000	-	3000	3000

(Contd.)

Table-1 (Concld.)

Mineral	Unit	Reserves				Remaining resources								Total resources (A+B)
		Proved STD 111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
			STD121	STD122			STD221	STD222						
Rare Earth Elements	tonne	-	-	-	-	-	-	-	-	-	3350	384	3734	3734
Sillimanite	tonne	-	-	-	-	-	-	-	-	-	982725	-	982725	982725
Silver														
Ore	tonne	17480000	4640000	-	22120000	-	-	69462	-	1490000	2254150	-	3813612	25933612
Metal	tonne	4.43	1	-	5.43	-	-	0.48	-	0.39	3.42	-	4.29	9.72
Titanium	tonne	-	-	-	-	-	-	-	-	-	13862094	-	13862094	13862094
Tungsten														
Ore	tonne	-	-	-	-	-	-	-	15361152	11805499	172921	9338246	36677818	36677818
Contained Wo_3	tonne	-	-	-	-	-	-	-	2915	1775	142	1403	6235	6235
Vanadium														
Ore	tonne	-	-	-	-	-	500000	4000000	-	-	14884430	-	19384430	19384430
Contained V_2O_5	tonne	-	-	-	-	-	700	5600	-	-	43197.55	-	49497.55	49497.55
Vermiculite	tonne	-	-	-	-	28000	50520	15500	-	1562	66658	-	162240	162240

Figures rounded off.

Table –2 : Details of Exploration Activities in Karnataka, 2021-22

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq. km)	No. of boreholes	Meterage		
GSI							
Gold							
Haveri	Sidlapur Block, Singgaon Taluk	1:1000	42.51	8	671.20	-	An area of 2 sq. km was mapped in detail on 1:1,000 scale along with 186 cu m. trenching and 671.20 m of drilling. Apart from this, Geophysical Survey involving IP, Resistivity and Magnetic methods of 42.5 l km has been also carried out. The DM Block comprises a long BIF band engulfed within thick pile of greywacke and argillite of Ranebennur Formation of Chitradurga Group. The mapping has brought out presence of two major and three minor banded ferruginous quartzite (BFQ) units within a meta-greywacke/ argillite. The general trend of the bedding (S0) are N10°W to S10°E dipping gently towards east. Two sets of cleavages are observed in argillite/greywacke. Mesoscopic folds of S-asymmetric nature have been observed at many places with 10º to 35º plunge towards north. The bands are characterized by intense limonitisation, silicification, ferruginisation and serecitisation and often noticed with disseminated cubic pyrites and stringers of sulphides. Surface sampling includes soil, bedrock and trench. While the soil sampling is carried out in 200 m x 200 m grid pattern, trench and bedrock sampling are carried out along the profile lines laid at 100 m interval across the BIFs. Au values obtained from the bedrock, trench and soil samples vary from 26 ppb to 952 ppb, 26 ppb to 866 ppb and 31ppb to 302 ppb respectively. The Total Field Magnetic anomaly contour map shows high intensity Magnetic signatures along two prominent trends, one is NNW–SSE to NS trending local geological trend. The detailed magnetic survey, IP and Resistivity survey by gradient array has revealed one prominent anomalous zone in the central part of the study area with a strike length of 2km with depth varies from 10-20m. A total of 671.20 m cumulative

(contd)

Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							drilling has been achieved in 8 boreholes viz. KHSB-1, 2, 3, 4, 5, 6, 7 and KHSB-8. While boreholes KHSB-1 to 5 were drilled along the five profile lines lying in the northern segment, i.e., north of Sidlapur Village, borehole nos. KHSB-6, 7 and 8 are drilled in the southern segment falling south of Sidlapur. Except borehole KHSB-05, all the boreholes were drilled to test the targeted BIF band at 60 m vertical depth. The borehole No. KHSB-5 was drilled to intersect the band at 30 m vertical depth. Majority of the boreholes intersected a silicified zone is characterised with intense carbonitisation along with presence of pyrites in the form of lamination, chunks, smears, stringers and disseminations. This zone is also demarcated with magnetite laminations in rhythmic fashion and some borehole intersected BFQ also. While the silicified zone ranges in thickness from 2.05 to 6.45 m, portion with magnetite layering vary in thickness from 0.1 to 2.14 m. Based on the intersection a possible potential zone of 1500 m strike length has been established in 8 boreholes in the block. Besides, another sympathetic zone (Zone-II) marked with carbonitisation in the form of secondary veins and veinlets have been marked in for about 300 m in KHSB-1 & 2 in the northern segment. The analytical results received till date reveals that the borehole no. KHSB-1 has showed 0.417 g/t/0.5m for Zone-I. The Zone-II in KHSB-1 shows the average Au value of 0.030g/t/0.5m. The Zone-I of borehole no. KHSB-2 showed auriferous lode averaging 2.8 g/t/2m whereas Zone-II is having only 0.037g/t/0.5m. The corresponding trench i.e., STR-4 in the same profile line is showing the indication of Au value of 0.83g/t/1m. KHSB-3 showed 0.628 g/t/0.5m and KHSB-5 showed average assay value of 0.75g/t/0.5m.

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Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Gold, Ni-PGE and associated mineralisation							
Chikamaglur & Davangere	Hanni, Bukkumbudi and adjoining areas	1:12500	-	-	-	30	The study area falls within the eastern margin of the Shimoga Schist Belt in western Dharwar craton. The area comprises metavolcano- sedimentary suite of rocks unconformably lying over the basement granitic gneiss of the Peninsular Gneissic Complex (PGC). The volcano-sedimentary rocks are represented by basal conglomerate, quartzite, quartz-chlorite carbonate schist, quartz sericite schist belonging to Chitradurga Group. During the geological traverse observed different lithologies are, Granite gneiss, Titaniferous-vanadiferous magnetite (TVM) bands, Meta-pyroxenite, Talc tremolite actinolite schist, Tremolite actinolite schist, Conglomerate, Quartz- Chlorite schist, Quartzite, Quartz sericite schist, Anorthositic gabbro, Serpentinite, gabbro and dolerite dykes. Mineralisation is manifested in the form of presence of pyrite, chalcopyrite, bornite, pyrrhotite/ pentlandite, malachite, azurite stains, magnetite and quartz-carbonate veins hosted in the quartz-chlorite schist, quartz chlorite carbonate schist, serpentinite, talc-tremolite schist and meta pyroxenite. Based on the surface manifestation of magnetite, sulphide Mineralisation and surface alteration fifteen feeble narrow anomalous zones are identified. Zone-I: Sulphides such as pyrite and chalcopyrite in the Anorthositic gabbro of about 10m in width associated along with quartz vein. Zone-II: Malachite associated with carbonate vein in talc tremolite actinolite schist of about 10m in width. Zone-III: Malachite azurite in conglomerate associated with secondary quartz vein of about 10m width. Zone-IV: Well developed magnetite observed within the Anorthositic gabbro of about 15m in width. Zone-V: Malachite along with quartz ankerite vein within the

(contd)

Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							quartz chlorite schist of about 10 in width and length of about 25m roughly. Zone-VI: Sulphides minerals and malachite strains observed within quartz chlorite schist. The width of the Mineralisation is about 20m roughly Zone-VII: Sulphides such as pyrite, pyrrhotite and pentlandite observed as disseminated in nature within the serpentinite of about 5m in width Zone-VIII: Sulphides minerals and malachite strains observed in contact between quartzite and tremolite actinolite schist, it is associated with carbonate vein of about 15m in width. Zone-IX: Sulphides such as pyrite, chalcopyrite associated with quartz-ankerite vein in the quartz-chlorite schist of about 15m in width. Zone-X: Well developed pyrite and magnetite within the talc tremolite actinolite schist and meta pyroxenite about 10m in width. Zone-XI: Well developed magnetite associated with quartz-carbonate vein and malachite within the quartz-chlorite schist, about a width of 20m and length of 100m roughly. Zone-XII: Sulphides and malachite along with quartz vein within the quartz chlorite schist of about 5 in width and length of about 15m roughly. Zone-XIII: Sulphides minerals and malachite strains observed within conglomerate. The width of the Mineralisation is about 20m.Zone-XIV: Sulphides such as sulphides and ankerite vein as thin band in nature within the quartz chlorite schist of about 10m in width. Zone-XV: Pyrite and chalcopyrite and ankerite veins within the quartz chlorite schist of about 20m in width and 30m in length. The chemical analysis for Au has been received for 125 samples out of which five samples analysed>100 ppb (Au), ranging from 25 to 435 ppb in conglomerate, Meta pyroxenite and TVM rocks. The base metal analytical results have been received for 89 samples out of which Cu in

(contd)

Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							bed rock samples yielded maximum of 1655 ppm average 0.1% @ 3m in quartz-chlorite schist rock. Mn values ranging from 90 to 6100 ppm and nine samples analysed >24% for Fe in TVM bands.
Base Metals							
Haveri	Yelvatti block, Shiggaon Taluk	1:2000	2	5	738.15	340	A G3 stage exploration was taken up in the Yelvatti area with an objective to estimate the resource of base metals. During this work detailed mapping of 2 sqkm area on 1:2000 scale, 100 Cu.m trenching with 100 trench samples, 150 no soil samples, 50 bedrock, 20 petrochemical and 20 petrology samples were collected. A total of 5 boreholes were drilled (including 3 first level and 2 second level) covering 738.15m and 150 no drill core samples. The area exposes rocks of Ranibennur Formation of Shimoga Schist Belt. The area comprises rocks of meta-argillite, cherty quartzite which are intruded by later quartz veins. Meta-argillite and cherty quartzite show a general trend of N-S with moderate dip due east. Meta-argillite is highly weathered and forms a low-lying area. Cherty quartzite forms a resistant ridge within the meta-argillite extending over the strike length of 750m with varying width of 5-25m. It is highly jointed, fractured. Two prominent sets of joints observed in the area are N-S with moderate easterly dip and E-W with steep dip on either side. Cherty quartzite is brecciated limonitised, ferruginised, oxidized and also shows presence of sulphide specs (pyrite ±chalcopyrite ±pyrrhotite ±sphalerite ±galena) and pits after sulphides. It is highly brecciated due to later intruded quart-carbonate veins. Sulphides in cherty quartzite and meta-argillite of footwall side occur as disseminated patches, fracture/joint filling and along the quartz-carbonate veinlets. The sulphide content varies from 1-3% VE. Bedrock samples of

(contd)

Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							cherty quartzite analysed Au from 30 to 435 ppb and Pb+Zn from 623 to 4865 ppm, Cu from 197 to 1618 ppm. Soil samples collected in the strike extension of cherty-quartzite analysed Cu from 110 to 1115 ppm, Pb from 65 to 30110 ppm, Zn from 150 to 5230 ppm and Au from 25 to 47 ppb. Four cherty quartzite trench samples analysed Pb+Zn from 990 to 4930 ppm, Cu from 310 to 505 ppm and Au from 35-100 ppb. Trench samples from altered meta-argillite in contact with cherty quartzite analysed Pb+Zn from 525 to 4385 ppm, Cu from 120 to 565 ppm and 5 samples analysed Au from 35 to 110 ppb. Trench samples of non-altered meta-argillite analysed Pb+Zn from 95 to 1090 ppm, Cu from 65 to 140 ppm. The drill core samples of KHY-1B shows 3 m Pb+Zn zone with average grade of 1.5%.
REE and RM mineralisation							
Raichur	Kallingsugur and Niralkeri area	-	100	-	-	51	Large Scale mapping was carried out in an area of 100 sq. km. The objective of the investigation was to delineate the potential of REE and RM Mineralisation in the area. The major lithounits exposed in the investigated area are Pink granite, porphyritic granite, hornblende-granite, Syenite/ Monzonite and dolerite. Younger intrusives occur in the form of K-feldspar and plagioclase rich pegmatite vein and smoky quartz vein. Syenite plugs also occurs at the contact with Pink granite in the south of Kesaratti Tanda. Massive, hard compact syenite is exposed in the west of Anehosur. K-feldspar rich pegmatite vein intruded into Hornblende-biotite granite in the south of Kesaratti Tanda. Porphyritic granite is grey coloured, coarse grained, hard, compact in nature with development of feldspar

(contd)

Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							porphyroclast within it. S-C fabric alongwith dextral shear sense is commonly observed in Mavinbhavi. Under transmitted light, Presence of twin zircon crystals and Iron oxides in Syenite of Anehosur and development of Sericitization and presence of Quartz, plagioclase and microcline in Pink granite of Anehosur. In quartz veins of Anehosur, Mineralisation is mainly identified by different alterations such as ferruginization, radioactive haloes and localization of fine grained dark minerals. Besides this, in pegmatite veins, bluish coloured minerals and presence of allanite, magnetite is also observed at some places such as Anehosur and Rampur village. REE Mineralisation is associated with the smoky quartz vein in association with Syenite and Pink granite. Wall rock alteration is also observed in the form of limonitisation, silicification and brecciation is in quartz veins and pegmatite veins in the north and west of Anehosur village .REE Mineralisation is associated with syenite, pink granite and younger intrusives such as quartz and pegmatite veins. It is lithologically controlled by the wall rock alteration in the form of limonitisation, ferruginisation, silicification and brecciation in smoky quartz veins and pegmatite veins in Syenite and Pink granite. On the basis of geochemical results, five samples of Syenite and Pink granite of Anehosur and Niralkeri area have shown Total REE value ranging from 309.50 ppm upto 390.53 ppm. Ba values ranges from 506ppm – 2085ppm in 28 samples, Sr value ranges from 384-1400 ppm in 18 samples and Li range from 23-104 ppm.

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Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Chamrajnagar	Gundlupet and Annurkeri areas	1:12500	50	3	469.50	-	Large scale mapping on 1:12500 scale was carried out in parts of toposheet no 58A09 covering an area of 50 sq. km along with systematic sampling, scout drilling of 469.50 m and Geophysical survey. The objective was to delineate the potentiality of REE and RM Mineralisation in carbonatite-syenite and granitoids in the area. The present study area is located at the junction of three major shear zones i.e., NNE-SSW trending Kollegal shear zone(KSZ) to the East, Moyar shear zone (MSZ) to the South and Sargur shear zone (SSZ) to the West. Granite gneiss ± Garnet (Peninsulargneissic complex (PGC) is the dominantlithology exposed in the area. Sargur Group ofrocks (Calc gneiss ± graphite, amphibolite, pyroxenite, quartzite ± fuchsite, BMQ and garnetbiotite gneiss) occur as enclaves within PGC. Both the Group of rocks later intruded by younger acidic and basic intrusives. Carbonatite and syenite exposed West of Gundlupet town isintrusive into PGC. Syenite contains enclaves of PGC and amphibolite confirming its later intrusion. Carbonatite occur as linear detached bodies over a strike length of 1.7 km, there are six continuous carbonatite body with length varying from 300-1000 m and variable thickness and numerous small detached discontinuous bodies. The carbonatite is of sovite variety with monazite, allanite and apatite as the visible REE bearing phase. Magnetite occur as oxide and pyrite as sulphide phase. Syenite is medium to coarse grained with amphibole and biotite as mafic minerals and sphene, monazite and allanite occur as accessory elements. The TREE content in carbonatite from surface samples varies between 3295 ppm to 12,735 ppm (n=26). Three scout boreholes have been drilled to check the subsurface continuity of the mineralised body. Borehole KCGA-

(contd)

Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							1 intersected 29.80m REE zones with 0.56% cutoff of total REE. KCGA-2 and KCGA-3 have intersected cumulative TREE zones of 15m and 12m respectively as per visual estimation. Mineralisation can be divided into three parts and the REE content is highest in carbonatite and then in carbonatite with syenite and after that syenite with carbonatite. As per the analytical results of borehole KCGA-1 LREE varies from 3604 ppm to 8529 ppm in carbonatites. Geophysical survey (magnetite and radiometric) has been carried out in Gundlupet block. There is magnetic low over the carbonatite body trending ENE-WSW, thus magnetic anomaly well corroborates with the geology of the area. Magnetic anomaly map has helped in delineating two faults or lineaments bounding the mineralised body. Variation of radiometric concentration could interpretated the presence of REE Mineralisation in Carbonatite and associated syenite body. High concentration of Thorium and Uranium along with Low concentration of Potassium is corresponding to Carbonatite and associated syenite. Carbonatite and syenite from surface and subsurface have similar petrographic characteristics. Carbonatite shows beautiful mosaic texture in the calcite grains. Rounded apatite, irregular monazite and euhedral to anhedral allanite are present as REE phase. Three types of monazite are present; one occurring as dissemination within carbonatite, other at the rim and inclusion in apatite. Breakdown reaction in amphiboles can be seen in carbonatite. Syenite is medium to coarse grained dominantly composed of K-feldspar and amphiboles with rare apatite, allanite and monazite. Fenitization at the contact of carbonatite and syenite can be seen in surface samples, core samples and also in microscopic scale.

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Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Molybdenum							
Yadgir	Bowanahalli and Devarapalli areas	1:12500	100	-	-	306	An area of 100 sq. km was covered by LSM on 1:12,500 scale with 50 cu. m of trenching and collected 150 nos. of BRS, 50 nos. of PTS, 56 nos. of SS, 15 nos. of PCS, 25 nos. of TPS and 10 ORM samples. The LSM area comprises dominantly of granitoids and gneisses with lenses of amphibolite, BIF, acid & basic dykes and Deccan Volcanics. The BIF, talc actinolite schist and tremolite schist of Dharwar Supergroup (Archean) are seen as small linear outcrops within PGC-II. Older amphibolites are seen as smaller enclaves and xenoliths within the gneisses and granites. The granitoids include gneisses of PGC-II and variants of Closepet Granite. Linear bodies of basic intrusive like hornblendite, pyroxenite, dolerite/ gabbro dykes and acidic intrusive like pegmatite veins and quartz veins belonging to Younger Intrusives (Paleoproterozoic) intrude to all the older rocks in the area. The Deccan basalt and intertrappean belonging to Upper Cretaceous to Palaeocene age overlies the rocks PGC-II and Closepet granite. Dykes of lamprophyres and kimberlites of limited extensions are also reported in several places of the study area. The granitoids show extensive chloritisation and epidotisation mainly observed in the western and north-eastern parts of the study area. Quartz, epidote, chlorite, titanite and hematite are the main hydrothermal mineral phases observed in the system (propylitic alteration). There is wide spread pervasive potassic alteration along with specularite veinlets were observed in the southern part of the area occupied by granitoids and quartz-pegmatite veins. Hence, these veins are considered to be potential target zones for Mo and associated elements. One such pegmatite vein carries Mo mineralisation in the form of stringer observed in northeast of Kamalanagar. However, no significant Mo occurrences is observed in the area.

(contd)

Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling	Remarks
		Scale	Area (sq km)	No. of boreholes	Meterage	(No.)	Reserves/Resources estimated
Molybdenum-Tungsten and associated mineralisation							
Chitradurga	Doddaularthi area	1:12500	100 500	-	-	-	An area of 100 sq.km area has been mapped on 1:12,500 scale, 500 sq. km Aster studies along with collection of chemical samples. The study area forms the eastern part of the Western Dharwar Craton (WDC), represented by biotite gneiss & migmatite gneiss of Peninsular Gneissic Complex-I (PGC-I), granodiorite, younger intrusives of dolerite, pegmatite and quartz vein. Sargur rocks are represented by Amphibolite, garnet biotite ± sillimanite schist and Banded Magnetite Quartzite (BMQ) occur as enclaves within the biotite gneiss in varies dimensions from few mm to few meters. Two sets of dolerite dykes in mapped area. Earlier one is intruded along NNW-SSE direction and later one intruded along the E-W direction. Pegmatite vein and Quartz veins are intruded in the gneissic rock along the shear plane foliation plane, fracture planes and along the fracture plane of granodiorite. The trend of the gneissic plane varies from N-S to NW-SE dipping moderate to steeply towards NE. At-least three sets of fracture plane are noticed out of which two sets of very prominent, first set of fracture plane is NW-SE dipping moderately towards northeast and second set of fracture plane NNE-SSE dipping very steeply towards northwest. Few specks of fine grained molybdenite identified in the quartz vein associated k-feldspar alteration and iron oxide alteration intruded along the shear plane hosted in the biotite gneiss. Copper Mineralisation noticed in the form of presence of chalcopyrite and malachite staining hosted in K-feldspar altered of Thippareddihalli. A total of 67 nos. of soil samples are collected; 26 nos. soil sample results are available out of which only one reported Mo values of 10.28 ppm. A total of 105 nos. of BRS are collected; 63 nos. of BRS results are available out of

(contd)

Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							which three samples reported Mo values from 10.09 to 27.58 ppm and seven samples analysed W value from 10.90 ppm to 75.30 ppm. A total of 76 nos. of trenching samples have been collected, all the trench samples analytical results are available out of which one sample reported 12.31 ppm of Mo and 16 nos. of samples reported W values from 10.37 to 48.98 ppm.
Cobalt							
Shimoga	Gilalagundi area	1:12500	100	-	-	-	The Gilalagundi investigated block, forms parts of TS. No. 48N/8, Shimoga District, Karnataka was mapped on 1:12,500 scale and covers an area of 100 sq.km. The meta volcano-sedimentaries exhibit gradational contact among each other. The entire study area can be divided into 04 parts, the western, the central, the eastern and the north / north east part. The eastern part is dominated by quartz-chlorite-schist and its variants. The central by ferruginous phyllite, interbanded with brecciated chert / cherty quartzite and banded iron formations. The western domain is mainly characterised by meta-argillite-chert-volcanic suite. Also, development of laterites was observed over this meta-argillite-chert-volcanic suite package. In the north / north east domain acidic volcanics in the form of meta-rhyolite, quartz-sericite-schist, ignimbrite and tuffaceous rocks were observed. The Mineralisation is confined to ferruginous phyllite and brecciated chert / cherty quartzite. Botryoidal, box work, cavity fillings, replacement structures were observed in the investigated block. A total of 19 samples have shown the assay values of Co more than 125 ppm, the maximum being 0.26% reported from sample collected from brecciated chert / cherty quartzite, Arasalu RF, falls in central domain of studied block and 03 samples have shown the assay

(contd)

Table –2 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling	Remarks
		Scale	Area (sq km)	No. of boreholes	Meterage	(No.)	Reserves/Resources estimated
							value of manganese more than 10 %. The analytical results of trench samples have shown the assay value of Cobalt in trench no. 04 maximum up to 0.44 % with an average of 772 ppm x 10 m, carried out at Arasalu RF. The XRF analysis of petrochemical samples corroborated with BRS. A total of 11 numbers of pockets of Mn / Fe oxides were identified in the investigated block, making the Arasalu, Gilalagundi and Konehosuru segments.
Nickel, PGE and gold mineralisation							
Mandya	Sindhughatta area	1:12500	-	-	-	-	Large scale mapping was carried out on 1:12500 scale and mapped lithologies in the study area include PGC comprise - migmatites and leucosomal granite gneiss and pegmatites defines marginal rocks; while ultramafic consists of talc tremolite schist ± chlorite-actinolite, Birbiritized Talc tremolite chlorite schist, meta pyroxenite; rafts of hornblendite ± quartz epidote veins/ amphibolite and quartz grunerite garnet schist marks major enclaves within shear zones hosting marginal facies. Basic intrusive, epidosite, chromitiites and tourmaline-rich pegmatite manifests deep crustal fault/ shear zones. Basic intrusion in the form of gabbro/dolerite dyke were noticed with NW-SE trend. In the Mineralisation point of view Birbirite outcrops are seen prominently near Sindugatta, while chromite bearing Talc tremolites were observed near Jaginakere and Marenhalli. Based on systematic sampling and LSM, few areas reported chromite bands (few cm to 1.5m) within talc-tremolite schist near south of Sindhughatta and Jagginakere areas. The chromiferous metapyroxenites occur as discontinuous along major tectonic planes associated with epidosites. Evidence of mylonite development is ubiquitous. Probable areas of Ni enrichment zones near Sindhughatta over birbiritized talc tremolite chlorite schist unit were sampled and sent for analysis. The complete analytical result can only reveal the extension and quality of mineralisation at Sindhughatta block.

Production

Gold ore and bullion (metal), Iron Ore, Manganese ore, Limestone, and Magnesite are the important minerals produced in Karnataka State. The value of minor minerals' production is estimated as ₹ 2216 crores for the year 2021-22. There were 132 reporting mines in 2021-22 in case of MCDR of minerals.(Table-3).

Mineral-based Industry

The present status of each mineral-based industry is not readily available. However, the important mineral-based industries in organised sector in the State are given in Table - 4.

Table – 3 : Mineral Production in Karnataka, 2019-20 to 2021-22 (Excluding Atomic Minerals)

(Value in ₹ '000)

Mineral	Unit	2019-20			2020-21			2021-22 (p)		
		No. of mines	Quantity	Value	No. of mines	Quantity	Value	No. of mines	Quantity	Value
All Minerals		**148**		**100582716**	**141**		**127485054**	**132**		**197871132**
Bauxite	t	1	-	-	-	-	-	-	-	-
Chromite *	t	2	-	-	2	-	-	2	-	-
Gold Ore	t	-	590704	-	-	434810	-	-	486629	-
Gold	kg	4	1724	6431034	3	1116	5422160	4	1239	5955409
Iron Ore	'000t	61	31392	67326043	65	34500	94390860	56	40332	158769382
Manganese Ore	t	9	336745	2194098	9	371045	2359787	8	380004	3311881
Silver #	kg	-	187	8066	-	120	7244	-	127	8168
Graphite (r.o.m.) *	t	2	-	-	2	-	-	2	-	-
Kyanite	t	1	400	880	1	3780	7397	1	5075	9084
Limestone	'000t	64	34165	6672035	54	33188	6095069	54	39405	7611350
Limeshell	t	1	1017	3051	-	-	-	1	100	220
Magnesite	t	3	7198	48309	4	6611	39237	3	7057	50138
Vermiculite	t	-	-	-	1	-	-	1	-	-
Minor Minerals		-	-	17899200	-	-	19163300	-	-	22155500

Note: *The number of mines excludes Minor minerals.*
 # Recovered at Raichur and Tumkur during refining of gold.
** Only labour reported.*

Table – 4 : Principal Mineral-based Industries

Industry/plant	Capacity ('000 tpy)
Abrasives	
Grindwell Norton Ltd, Bengaluru.	NA
Alumina	
Hindalco Industries Ltd, Belagavi	350 (alumina) 40(paste) 0.090(Vanadium)
Cement	
ACC Ltd, Wadi (Wadi & Wadi New), Distt. Kalaburagi	5450
ACC Ltd, Kudithini, Ballari (G).	1100
	(contd)

Table - 4 (contd)

Industry/plant	Capacity ('000 tpy)
ACC Ltd, Thondebhavi, Distt. Chikaballapur (G).	1660
Bagalkot Cement Industries Ltd, Distt. Bagalkot.	600
Chettinad Cement, Kallur, Distt. Kalaburagi.	2500
Dalmia Cement, Yadwad, Distt. Belagavi	4000 2600(Clinker)
Heidelberg Cement India Ltd, (Formerly Mysore Cements Ltd) Ammasandra, Distt. Tumakuru.	510
J. K. Cement Ltd, Muddapur, Distt. Bagalkot	3000
	(contd)

Table - 4 (contd)

Industry/plant	Capacity ('000 tpy)
JSW Cement, Vijaynagar, Distt. Ballari.	3200
Kesoram Industries, Vasavadatta Cement, Sedam, Distt. Kalaburagi	8565(OPC) 8565(PPC)
Kalaburagi Cement Pvt Ltd (formerly Viratsagar) Gulbargha, Distt. Kalaburagi	2750
Kalaburagi Cement Pvt Ltd Karchikhed, Chincholi	3500 2750 (Clinker)
Orient Cement Ltd.Itagi, Chittapur	3000
Ramco Cement Ltd, Mathodu, Distt. Chitradurga.	290
Shree Cement Ltd.Benekanahalli, Kodla Sedam, Kalaburagi	3000
Ultratech Cement, Raj Shree Cement, Malkhed, Distt. Kalaburagi.	6100
Ultratech Cement, Ginigera, Distt. Koppal (G).	1300
Orient Cement Chittapur, Kalaburagi	**3000**
Ceramic	
Ceramic Products Ltd, Khanapur, Distt. Belagavi.	NA
H&R Johnson (India) Ltd, Hubballi.	47.72
Murudeshwar Ceramics Ltd, Dharwad.	8.4 mill.sqm
The Mysore Spongware Pipes Potteries Ltd, Solandavanahalli, Bengaluru.	NA
Chemical	
Solaris Chem Tech Industries Ltd, Bhinga, Distt. Uttara Kannada.	59.4 (caustic soda), 52.3 (Cl), 133.7 (HCl) 24.0 (H_3PO_4)
Magnesium & aallied Product Hurugalavadi , Mandya	3 (Magnesium Carbonate) 1.875 (Magnesium Oxide)
Shivam Minerals , Honaga Belgaum	4.6(Magnesium Carbonate) 4.6 (Magnesium Oxide)
Fertilizer	
K. P. R. Fertilizers Ltd Halvarthi, Koppal.	60 (SSP)
Mangalore Chemical & Fertilizers Ltd, Panambur, Mangaluru.	379.5 (Urea) 260 (DAP) 40 (Complex)
Tungabhadra Fertilizers & Chemicals Ltd, Munirabad, Koppal.	45 (SSP)
Iron & Steel	
JSW Steel Ltd, Tornagallu Sandur Distt. Ballari	9200 (pellets) 12100 (pig iron) 12000 (crude/liquid steel) 12950 (sinter) 4618(Coke)

(contd)

Table - 4 (contd)

Industry/plant	Capacity ('000 tpy)
Visvesvaraya Iron & Steel Ltd, Bhadravati, Distt. Shivamogga.	205 (pig iron) 118(crude/liquid steel) 4.8 (refractory bricks)
Sunvik Steels Pvt. Ltd, Jodidevarahally, Distt. Tumakuru.	60 (sponge iron) 60 (TMT bar)
	36(-------)
Pellets	
BMM Ispat, Danapur, Distt. Ballari.	2400 (pellets)
KIOCL, Mangaluru	3500 (pellets) 6700 (conc.)
Minera Steel & Power Pvt. ltd., Sandur	600
SLR Metalliks Ltd. Narayan Devera Kera Hagari Bommanahalli	343.2(Sinter)
Xindia Steel, Koppal.	800 (pellets)
Pig Iron	
Uni-Metal Ispat Ltd, Ballari.	75
Kalyani Ferrous Ind. Ltd, Koppal	500(Sinter) 289.6
Kirloskar Ferrous Industries Ltd, Bevinahalli, Distt. Koppal.	500 (Sinter) 720
Mukund limited, Ginigera, Kopopal	500 (Sinter) 410.3
Sponge Iron	
Agrawal Sponge & Energy (P) Ltd, Kuduthini, Distt. Ballari.	90
Balakundi Premium Steels Pvt. Ltd, Halakundi, Distt. Ballari.	34
Bellary Ispat (P) Ltd, Halakundi Distt. Ballari.	52.5
Ballary Steel & Alloys Ltd, Ballari.	60
Benaka Sponge Iron Pvt. Ltd, Belagal, Distt. Ballari.	84
BMM Ispat Ltd., Danapur	600 2400 (pellet)
BRU Industries, Anekal Taluk	1.2 (cast Iron)
Dhruvdesh Metasteel Pvt. Ltd, Hirebaganal, Distt. Koppal.	72
Divya Jyoti Steel Ltd, Taranagar, Distt. Ballari.	30
Gayatri Metals Pvt Ltd, Belagal, Distt. Ballari.	5000
Hindustan Calcined Metal Pvt. Ltd., Janekunnte Ballari	60
Jairaj Ispat Limited Belagal village	60
Haryana Steel and Power, Shanthigrama, Distt. Hassan.	35

(contd)

Table - 4 (contd)

Industry/plant	Capacity ('000 tpy)
Hare Krishna Metallics Pvt Ltd, Hire Baganal, Distt. Koppal.	144
Hospet Ispat Pvt. Ltd, Allanagar Bagnal Road, Distt. Koppal.	60
Hothur Ispat Pvt. Ltd, Veniveerpur, Distt. Ballari.	300 TPD
Minera Steel & Power Pvt. Ltd, Yerabanahally, Distt. Ballari.	120
M.S.Metals & Steels PVT. Ltd. Hirebagnal Koppal	105 109.5(TMT Bars)
Noble Distillaries & Powers Ltd, Sirivar, Distt. Ballari.	200 TPD
PGM Ferro Steel Pvt. Ltd, Hariganadani, Distt. Ballari.	60
Popuri Steels Ltd, Halakundi, Distt. Ballari.	30
Padmawati Ferrous Metal, Chikantpur Sandur, Ballari.	150
Rayon Steel Pvt Ltd, Veniverapur, Distt. Ballari.	60
Rengineni Steel Pvt. Ltd, Halakundi, Distt. Ballari.	25.5
Shree Venkteshwara Sponge & Power Ltd, Halakundi, Distt. Ballari.	60

(contd)

Table - 4 (concld)

Industry/plant	Capacity ('000 tpy)
Yashshvi Steel & Alloys Ltd, Halakundi, Distt. Ballari.	30
Ferro Alloys	
Ani Smelters Yaradakatla, Hariyur	1.5
Dandeli Steel & Ferro Alloys Ltd, Dandeli.	6
Padmawati Ferrous Metal, Chikantpur	30
Ballari	5 (Ferro - manganese) 5 (Silico-manganse) 2 (Ferro-silicon)
Sandur Manganese & Iron Ore Ltd, Mariyammanahalli Hospet	36 (SiMn)
Refractories	
T. S.Ranganath & Company, Keshavapurahuliyar, Chikkanayakanahalli	1.0 (Clay tiles & Block)
S.R. Chemicals & Ferro Alloys Ltd, Honaga, Distt. Belagavi.	0.3
Thermit Alloys Pvt. Ltd, Shivamogga.	1.2
Petroleum Refinery	
MRPL, Mangaluru.	15000

G; Grinding Unit

Note: *Data for fertilizer and cement industries is taken from Indian Fertilizer Scenario, FAI Statistics, and Survey of Cement Industry & Directory, respectively.*