

STATE REVIEWS



# Indian Minerals Yearbook 2019

(Part-I)

58<sup>th</sup> Edition

STATE REVIEWS  
(Karnataka)

(ADVANCE RELEASE)

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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 (metal) 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; & **talce/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 copper, diamond & nickel and also by various agencies (MECL) during 2018-19 are furnished in Table - 2.

## STATE REVIEWS

Table-1 : Reserves/Resources of Minerals as on 1.4.2015: 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	
Barytes <sup>#</sup>	tonne	-	-	-	78296	136220	14252	-	-	15175	-	243943	243943	
Bauxite	'000 tonnes	126	1123	3140	4389	2468	864	82	2220	35603	-	41246	45635	
Calcite <sup>#</sup>	tonne	-	-	-	31800	-	15900	-	14400	51547	-	113647	113647	
China clay <sup>#</sup>	'000 tonnes	330	472	-	802	1768	747	220360	443	24803	6030	256834	257636	
Chromite	'000 tonnes	315	340	72	727	300	230	96	20	259	-	905	1631	
Copper														
Ore	'000 tonnes	314	-	557	872	64	-	2445	1750	22701	-	33793	34665	
Metal	'000 tonnes	3.52	-	4.19	7.71	0.49	-	16.04	22	65.77	-	221.79	229.50	
Corundum	tonne	-	-	-	64920	756	53590	13	38	27575	52675	199566	199566	
Dolomite <sup>#</sup>	'000 tonnes	28609	5910	6093	40612	16264	6684	8519	76244	455337	13482	585731	626344	
Dunite <sup>#</sup>	'000 tonnes	3074	18	189	3282	0	34	23909	-	4606	-	28549	31831	
Felspar <sup>#</sup>	tonne	-	-	-	103675	73613	107055	25000	135133	177300	3900	625676	625676	
Fire clay <sup>#</sup>	'000 tonnes	146	-	-	146	247	340	2003	226	8832	-	11648	11794	
Fullers earth <sup>#</sup>	tonne	-	-	-	-	-	-	58200	-	551640	1557156	-	2166996	
Gold														
Ore														
(Primary)	tonne	10395000	2499000	422100	13316100	1270536	1303000	1078661	24979968	8204595	16020324	37673000	90530084	103846184
Metal														
(Primary)	tonne	53.34	7.77	0.42	61.53	5.24	3.85	8.53	120.73	28.67	38.29	43.78	249.09	310.62
Granite <sup>#</sup>														
(Dimension														
Stone)	'000 cum	26363	19389	21836	67587	-	-	238	1231625	8012784	25659	9270306	9337893	
Graphite	tonne	-	-	-	-	140827	18750	48821	-	41605	149403	-	399406	
Gypsum <sup>#</sup>	'000 tonnes	-	-	-	-	-	-	-	-	3784	-	3784	3784	
Iron Ore														
(Haematite)	'000 tonnes	416684	46169	87394	550247	518155	48231	211632	248299	44094	669239	176956	1916607	2466854
Iron Ore														
(Magnetite)	'000 tonnes	319	127	-	446	120022	-	18375	1498957	479372	5345018	340000	7801744	7802190
Kyanite	tonne	-	-	-	-	637460	15930	113630	386247	1610502	10531529	-	13295298	13295298
Limestone	'000 tonnes	461049	2154	1113795	1576998	497136	559903	1355522	1572501	13920771	34952588	-	52858420	54435419
Magnesite	'000 tonnes	1264	125	-	1389	566	190	391	88	3179	168	4592	5981	

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## STATE REVIEWS

Table-1 (Concl.d.)

Mineral	Unit	Reserves				Remaining resources				Total resources (A+B)			
		Proved STD 111	Probable		Total (A)	Feasibility STD211	Pre-feasibility STD221	Measured STD331	Indicated STD332		Inferred STD333	Reconnaissance STD334	Total (B)
			STD121	STD122									
Manganese ore	'000 tonnes	9196	-	150	9346	14003	10225	1498	7306	54333	2923	101718	111064
Molybdenum Ore	tonne	-	-	-	-	-	-	-	-	1320900	-	1320900	1320900
Contained MoS <sub>2</sub>	tonne	-	-	-	-	-	-	-	-	1718.70	-	1718.70	1718.70
Nickel Ore	million tonnes	-	-	-	-	-	-	-	-	0.23	-	0.23	0.23
Ochre	tonnes	-	-	-	-	-	-	-	-	1766367	-	1766367	1766367
Pt. Group of Metals	tonne	-	-	-	-	-	-	-	-	-	1.50	1.50	1.50
Pyrite	'000 tonnes	-	-	-	-	-	-	-	-	3000	-	3000	3000
Quartzite <sup>#</sup>	'000 tonnes	231	-	-	231	69	48	-	-	4914	1730	7353	7584
Quartz-Silica Sand <sup>#</sup>	'000 tonnes	7975	417	1807	10199	15904	6695	94	52	52077	525	84794	94993
Sillimanite	tonne	-	-	-	-	-	-	-	-	982725	-	982725	982725
Silver Ore	tonne	10620000	1730000	-	12350000	-	-	-	-	314150	-	383612	12733612
Metal	tonne	2.71	0.24	-	2.95	-	-	-	-	2.92	-	3.40	6.35
Talc-Steatite-Soapstone <sup>#</sup>	'000 tonnes	46	53	182	280	58	78	11	208	1196	-	1800	2081
Tungsten Ore	tonne	-	-	-	-	-	-	-	15361152	11805499	172921	9338246	36677818
Contained WO <sub>3</sub>	tonne	-	-	-	-	-	-	2915	1775	142	1403	6235	6235
Vanadium Ore	tonne	-	-	-	-	-	500000	-	-	14884430	-	19384430	19384430
Metal	tonne	-	-	-	-	-	700	-	-	43197.55	-	49497.55	49497.55
Vermiculite	tonne	-	-	-	-	13550	22520	-	1562	66658	-	133740	133740

Figures rounded off.

# Declared as minor mineral vide Gazette notification dated 10.02.2015.

## Minor mineral before Gazette notification dated 10.02.2015.

## STATE REVIEWS

Table –2 : Details of Exploration Activities in Karnataka, 2018-19

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq. km)	No. of boreholes	Meterage		
<b>GSI</b>							
<b>Base Metal</b>							
Raichur	Machanur block, Lingasugur Taluk	1:1200	4	8	1616	-	A preliminary exploration (G3) for delineation of copper and REE mineralisation in the area was initiated in field session 2017-18. In total, 4 sq. km area was covered with mapping on 1:2,000 scale and 1,616 m drilling in 8 boreholes (six first-level and two second-level). The mineralised zone in Machanur area was found to occur up to 4 km in length and 50-150 m width. The average thickness of ore zone is 48 m with a strike length of 700 m. Chalcopyrite is the main ore of copper in the area followed by bornite, covellite, and native copper. Analytical results of Borehole KRM-01 showed four mineralised zone with true thickness of 8 m x 0.13% Cu, 17 m x 0.15% Cu, 2.37 m x 0.14% Cu, 9.0 m x 0.10% Cu at 0.1% cut-off; Borehole KRM-02 showed two mineralised zone of 3.68 m x 0.35% Cu and 57.76 m x 0.25% Cu. The borehole intersected two anomalous zones of gold of 3.5 m x 89 ppb and 3 m x 94 ppb Au; KRM 04, a second-level borehole intersected two zones, viz. 3.08 m x 0.10% Cu, and 59.96 m x 0.61 % Cu at 0.1 % cutoff. The Borehole KRM 05 intersected highly disseminated copper mineralisation — only a small zone with true thickness of 2.2 m x 0.1 % Cu and an anomalous Au zone i.e. 2.7 m x 81 ppb Au were observed; KRM 06 intersected a relatively high-grade zone with 8.7 m x 0.86% Cu along with Au of 6.8 m x 287 ppb Au. The area was also covered with magnetic, IP and resistivity surveys with total of 36 L km. Based on the available analytical results of borehole core samples, a total resource of 10.45 million tonnes with 0.39% Cu at 0.1% Cu cut-off grade has been estimated.

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## STATE REVIEWS

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		
							The investigation in Machanur copper was carried out under G-3 category and the resources has been estimated under 333 Category of UNFC.
Raichur	Gurgunta / Parampur Schist Belt	1:12500	100	-	-	-	During reconnaissance survey (G4), for evaluation of copper and REE along with Rare-metal mineralisation in the area was carried out. A total of 100 sq. km area were covered on 1:12,500 scale mapping. Two hydrothermal alteration zones were identified and mapped; one near Aidabhavi and other fault-controlled alteration zone was observed around Village Phulbhavi, where the N-S trending fault showed brecciation and silicification. The quartz veins also show chloritisation, K-feldspar alteration and haematite-alteration.
Chitradurga	In and around Nerlakere, Maddakere, Gollarahalli, Kanchipura areas,	1:12500	124	-	-	-	Reconnaissance survey (G4) for multimetallic mineralisation in the area involved mapping of 124 sq. km on 1:12,500 scale. The SEM-EDS study revealed the presence of sulphides in the form of pyrite, chalcopyrite, arsenopyrite, pyrrhotite, galena and spalerite in BIF and quartz. Micro grains of Au (<4 µm) mainly associated with chalcopyrite were also observed in the exposed litho-units. Analytical results of BRS samples indicated the presence of Au, Ni and Zn values in the range from 30 to 30 ppb, 10 to 110 ppm and 75 to 150 ppm, respectively. Stream sediment samples showed the maximum value for Zn, Ni & Co as 150 ppm, 130 ppm and 70 ppm, respectively. Similarly, 15 soil samples showed Cu and Ni values ranging from 10 to 75 ppm and 15 to 180 ppm, respectively.
<b>Manganese Ore</b>							
Shivamogga	Tarlagatta	1:2000	2	-	1199	537	G3 level preliminary exploration was taken up to assess manganese and cobalt potential in Tarlagatta

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## STATE REVIEWS

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		
<b>Nickel</b> Tumkur	Jaychamrajapura schist belt	1:2000	1.8	-	-	55	<p>area, Shivamogga district. A total of 2.0 sq. km were mapped on 1:2,000 scale along with collection of 66 trench samples, 91 bedrock samples and 380 core samples for assessing potentiality of manganese, cobalt and other associated elements. Manganese mineralisation was found hosted in the brecciated cherty quartzite and argillite. The cherty quartzite unit was extremely brecciated and the Mn-Fe mineralisation occurs as fracture fill veins of different dimensions. A total of 1,199 m of subsurface drilling were carried out. The thickness of mineralised zone (including argillite and brecciated cherty quartzite) ranged from 12 to 20 m. In one borehole, the thickness of mineralised zone was more than 40 m out of which an enriched manganese zone, 32 m thick, was observed. In other boreholes, the width of mineralised zone ranged from 20 to 35 m. The analytical result received showed the maximum value of cobalt to be in the range of 0.18% to 0.27% with MnO in the range of 14.37% to 32.9 %.</p> <p>Reconnaissance survey for Ni-PGE and gold between Holalkere and Doddaghatta was carried out in Jaychamrajapura schist belt, Tumakuru district. The investigation comprised DM geological mapping of about 1.8 sq. km and contouring of 2.5 sq. km on 1:2,000 scale along with 61 cu.m of trenching and collection of 47 samples. Geophysical magnetic survey of 61 L km and IP/resistivity survey of 37 L km survey were also carried out. A suspected chromite layer (50 cm) was noticed in schistose serpentinite. Amphibolite from the north-eastern part analysed a total PGE of 345 ppb. The contact zone was also sampled.</p>

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## STATE REVIEWS

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		
							Arsenopyrite, chalcopyrite and pyrrhotite were identified in EPMA In Tumakuru district, a reconnaissance survey for Ni-PGE and gold mineralisation between Rampura and Gollarahatti areas was taken up. A total of 3 trenches were excavated across the contact between mafic-ultramafic variants. PGE concentration of 3 stream sediment samples were collected from 1st order streams which indicated PGE concentration of 1,230 to 1,333 ppb (>1000 ppb), PGE concentration of 02 samples ranged from 109 to 153 ppb (>100 ppb). Streams flowing through serpentinite regions around NE of Village Gollarahatti was considered more favourable for PGE mineralisation. Presence of sulphide minerals, namely pyrite, pentlandite and pyrrhotite was noticed during petrographic study. EPMA study reported a single grain of sperrylite (PtAs <sub>2</sub> ; ~1µm) associated with chrome-magnetite in serpentinite.
Mandya	Hadanur- Tagadur belt	1:12500	100	-	-	12	The Reconnaissance survey for Ni-Cu-PGE-Au in the mafic-ultramafic bodies of Hadanur-Tagadur belt, Mandya district involved large-scale mapping on 1:12,500 scale with bed-rock, stream sediment and soil sampling. A total of 100 sq.km area was mapped. South of Sudugadanakoppalu, about 5 m wide chromitite bands were traced within talc-serpentine schist. Intrusive olivine gabbro of Chokkanahalli; meta-orthopyroxenite of Ragimudhanahalli and meta- clinopyroxenite from Doddabhoganahalli were found to contain chalcopyrite, pentlantite, pyrrhotite and pyrite. Near Hadanur, quartz veins in amphibolite were reported to

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## STATE REVIEWS

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		
<b>Diamond</b>							contain significant chalcopyrite. Heavy mineral concentrates recovered a gold nugget from SE of Illenahalli. EPMA of sulphide and PGE phases will be carried out. A total of 12 stream sediment samples showed significant Pd content up to 135 ppb, compared to minimum available bedrock and trench samples. Analytical results are awaited.
Bagalkot	Bagalkot block	1:50000	720	-	-	160	Reconnaissance survey to locate Kimberlites in Bagalkot block, Bagalkot district was commenced in field session 2017-18. During the current field session 2018-19, 750 sq. km of aerial reconnaissance studies and 720 sq. km of reconnaissance survey were carried out on 1:50,000 scale in the area. Stream sediment sampling was carried out for recovery of heavy minerals and analysis of the same for search of any KIMs. The grains studied included garnets, ilmenites, spinels and diopsides. Most of the suspected ilmenites yielded very high amount of manganese, iron enrichment that resembled the character of ferricrete. However, none of the grains indicated their kimberlitic source. A two-year programme of reconnaissance survey was taken up with an objective to search for the Kimberlite clan of rocks in Kotturu block in Bellari and Davanagere districts. An area of about 750 sq. km was covered by aerial reconnaissance PGRS study with the help of ASTER data whereas 720 sq. km were covered by reconnaissance mapping on 1: 50,000 scale. A total of 160 stream sediment samples were collected. and about 160 stream sediment samples collected were thoroughly processed and 369 heavy mineral grains were sent for EPMA study to ascertain their

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## STATE REVIEWS

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		
							kimberlitic origin. The heavy minerals collected during the FS: 2017-18 did not show their kimberlitic affinity. Two old workings, one probably for manganese or gold, were observed 4 km SE of Village Kanivehalli. The petrochemical analysis of the sample collected from Kurudi ultramafic body showed high values of MgO (23.60%), Cu (120 ppm), Zn (100 ppm), Ni (850 ppm) and Cr (2500 ppm).
<b>Gold</b>							
Haveri	Belgalpet-Balambid Balambid block, Hangal taluk	1:12500	100	-	-	153	Reconnaissance survey in part of T.S. No. 48N/1 was taken up under G-4 stage with an objective to assess the potentiality of gold in the area. The exploration work included ASTER image processing of 720 sq. km, large scale mapping of 100 sq. km on 1:12,500 scale, etc. A total of 103 bedrock samples and 50 trench samples were collected and analysed for Au and other associated elements. At Adur, Banded Magnetite Quartzite (BMQ) was recorded for a strike length of approx. 500 m long. The width of iron and siliceous layering varies from 0.2 cm to 1 cm. Both bluish quartz and milky quartz veins were found along the band. The disseminated sulphides of pyrite and arsenopyrite were observed at places. The bluish smoky quartz veins have been observed in the strike direction of the BIF. Gold value in six bedrock samples showed variations from 25 ppb to 196 ppb. The study will continue in field session 2019-20.
	Hotanhalli block, Balambid block, Hangal taluk	1:12500	100	-	-	34	Reconnaissance survey for gold was carried out to assess the gold potential in the area. An area of 100 sq. km was covered by large scale mapping on 1:12,500 scale with pitting and trenching of 65 cu.m and geophysical survey of

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## STATE REVIEWS

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		
							42.85 L km. Five sulphide-bearing BIF zones were identified with variable dimensions in east of Yelvatti (750 m length x 5 to 50 m width), Gundur (750 m x 3 – 50 m and 300 m x 2-25 m), Belvatti (2.3 km x 5 to 70 m and 1.7 km x 0.5 m to 50 m), Bhingapur to Sidlapur sector (8.75 km x 0.5 m to 80 m) and two isolated BMQ/BFC bodies were also identified in Valgeri area. Among these zones, Gundur block was seen as a potential zone for gold based on the analytical results which indicated Au value between 1.009 ppm and 51.733 ppm from 9 samples, 37 ppb and 404 ppb from 17 samples and < 25 ppb from 8 samples consistent with high chargeability. The potentiality of the area for gold mineralisation will be assessed after complete receipt of chemical results.
	Hosa Hulihalli, Halageri	1:2500	100	-	-	-	During reconnaissance survey for gold, an area of 100 sq.km was mapped on 1:12,500 scale. Sulphide mineralisation is manifested in the form of pyrite, chalcopyrite, pyrrhotite and arsenopyrite in the BIF and quartz vein. Surface alterations like oxidisation, limonitisation, silicification and carbonate vein intrusion were noticed in the BIF, metabasic rock and quartz vein. Three possible blocks were identified based on the surface manifestation of sulphide mineralisation and surface alteration, i.e., Kakol south-west block hosted in BIF, Yerekoppi block hosted in quartz vein and Salagudda block hosted in BIF. The chemical analysis of stream sediment samples, soil samples and Bedrock samples showed Au values ranging up to 31 ppb, 85 ppb and 592 ppb in Kakol southwest block, respectively. BRS of Salagudda block showed Au value up to 1,230 ppb. Trench samples reported gold values from 32 ppb to 114 ppb.

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## STATE REVIEWS

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		
Tumkur	Ajjanahalli Block-I	1:1000	2	-	-	244	Preliminary exploration for gold was carried out in Ajjanahalli Block-I with detailed mapping of 2.0 sq. km on 1:1,000 scale, trenching, drilling, sampling and ground geophysical survey. Alteration zones (carbonates, chlorite and silica), shearing features, the important evidences of mineralisation, were delineated during the study. A total of 117 trench samples and 127 bedrock samples were collected for gold analysis. Encouraging results were observed in trench samples. Ground geophysical survey of 20 Line km was carried in the eastern part of the study area. Integration of geological and geophysical maps helped in identification of two discrete N-S trending IP anomaly zones. Five boreholes were drilled to a cumulative depth of 653.25 m. All the boreholes have intersected the targeted mineralised zones in BIF and quartz veins. Mineralisation in the area is confined to sheared and brecciated BIF with quartz-carbonate, chlorite veins with sulphides minerals, i.e., pyrrhotite, pyrite, arsenopyrite and chalcopyrite. The study will continue in field session 2019-20.
Davanagere and Ballari	Kanivehalli	1:12500	100	-	-	-	Reconnaissance survey was taken up in Kanivehalli and adjoining area to evaluate the potentiality of gold and associated minerals with special emphasis to understand nature and control of mineralisation. An area of 100 sq.km was mapped on 1:12,500 scale. The Cu values varying from 200 ppm to 2,700 ppm was reported from the PGC hosted giant quartz veins. The mineralisation is characterised by the presence of malachite, chalcopyrite, pyrite, arsenopyrite with ferruginous, K-feldspar and epidote alterations. The Au values

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## STATE REVIEWS

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		
							reported from the BIFs intruded by fine quartz veins vary between 25 ppb and 216 ppb.
Koppal & Bagalkot	Ilhal area	1:12500 1:2000	35 0.30	-	-	-	A two year programme on reconnaissance survey for gold mineralisation was taken up during 2018-19. During the field season, 35 sq.km large scale mapping on 1:12,500 scale, 0.30 sq.km detailed mapping on 1:2,000 scale and 36 cu.m of trenching were carried out. The major rock types exposed in the area were massive metabasalt, pillowed hornblende gabbro, metagabbro, metapyroxenite, dolerite, pegmatite, quartz vein, etc. A Few thin silicified zones observed at SW of Tallikeri, SE of Kellur and NW of Ilhal villages, were observed to contain pyrite. Surface mineralisation in the form of dissemination of pyrites were noticed in thin quartz vein, massive metabasalt and schistose metabasalt at several places. Four old workings (20 m x10 m, 3 m x 2 m, 6 m x 4 m and 5 m x 2 m) were observed. During survey, bedrock samples, trench samples and stream sediment samples were collected to find out the gold concentration. The exploration will continue in 2019-20.
<b>Limestone</b> Kalaburagi	NE of Ravur Sheriyakhan area, Mangrol Taluka	1:4000	7.1	20	877.0	709	A G3 stage preliminary exploration for limestone was carried out in Northeast of Ravur area. The litho-units in exploration area were mainly limestones. The bedrock samples were micritic and mainly were composed of calcite as major mineral and quartz as minor mineral. The chemical analysis of bedrock samples indicated Portland and Blendable Cement-grade limestone. All the boreholes were drilled at 650-700 m x 600 m grid intervals, up to 40 m depth, except one borehole. Drilling data indicated that limestone beds lie below 0.6 to 4.0 m of thick

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## STATE REVIEWS

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		
							<p>overburden soil. From top to bottom, the litho-units consisted of light grey limestone unit with a thin stylolitic and glauconitic limestone horizon, grey stylolitic limestone, light grey limestone with thin shale intercalation and chocolate brown intercalated limestone and shale. Specks of pyrite and glauconite were noted in split cores. The Rabanpalli Formation of about 27 m thickness in the area was reported to comprise purple and green shale. The analytical results indicated that the grey stylolitic limestone unit is generally Blast Furnace (BF) grade; whereas, the light grey limestone horizon is of Blendable and Portland Cement (PC) grades. The quality of limestone was seen to gradually deteriorate with increasing shale lamellae. The analytical results of Borehole no. 02 indicated PC-grade limestone from 2.60 to 5.50 m depth followed by BF-grade from 5.50 to 29.50 m, PC from 29.50 to 32.50 m and Blendable Beneficial cement (BBC) grade from 32.50 to 38.45 m. The Borehole no. 03 revealed BBC Grade limestone from 0.6 m to 1.5 m depth, PC from 1.5 m to 3.00 m, BF from 3.00 m to 27.00 m, PC from 27.00 to 28.50 m and BBC from 28.50 to 34.25 m. The Borehole no. 05 indicated BBC from 1.0 to 9.0 m depth followed by BF from 9.0 to 37.0 m and BBC from 37.0 to 40.0 m. The Borehole KGR-06 also revealed BBC from 1.5 to 11.0 m depth followed by BF from 11.0 to 37.0 m and PC from 37.0 to 40.0 m. It was observed that in the analysis of core samples of 4 boreholes, the thickness of BF grade limestone unit was more than 20 m. The resources of explored block have been approximately estimated at 380 million tonnes</p>

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## STATE REVIEWS

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		
							of BF-grade limestone and approximately 450 million tonnes of Cement-grade limestone within 40 m depth range. The average grade of limestone resource and tonnage can be ascertained after the receipt of analysis of all the core samples. The project will continue in field season 2019-20.
Kalaburagi	South of Chittapur	-	-	18	733.0	583	Based on the earlier work in the area, the block of 3.6 sq. km was proposed for G3 stage preliminary exploration to find out the potential for limestone resources. The thickness of the Sedam limestone member having grey limestone and grey glauconitic limestone bands was about 22 m to 30 m and was of inferior grade. The grey limestone can be used as a blending material in cement industries. This unit was found to be followed by the stylolitic limestone (Wadi Limestone) from an average depth of 25 m to 30 m. There were two stylolitic limestone units, i.e., upper and lower stylolitic limestone. Upper stylolitic unit was of limited thickness of 5 to 10 m and the lower one was 25 to 30 m thick. This limestone was to be of economic significance due to its high grade and could be of use in the production of Portland cement and may also qualify for flux grade. The study will continue in next field season 2019-20.
<b>Heavy Minerals</b> off Nethravati		-	250	-	-	-	Evaluation of placer mineral and sand resources off Nethravati river mouth, beyond TW of India, Karnataka was taken up. An area of 250 sq. km in the middle shelf off Nethravati river mouth was covered to evaluate heavy minerals and sand resource potential. 273 lkm of bathymetric survey was carried out and reveals the presence of discontinuous

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## STATE REVIEWS

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		
							ridge along the western part of the investigation area. Total heavy mineral concentration of seabed in the surface is not encouraging.
<b>MECL Iron Ore</b>							
Chitradurga	Shri M D Rami Reddy	1:1000	19.46	-	-	-	Since part of the area falls in forest land, no exploratory drilling was done.
<b>Gold</b>							
Kolar	BGML leasehold area	1:2000	1.33	21	8395	2931	G2 level exploration in BGML leasehold area for McTaggart's west lode Kolar Gold Field (KGF) was carried out with the objectives, to (i) know the continuity of lode/mineralised zones encountered in the mine development as indicated in logitudinal vertical section of Nandydoorg mine for McTaggart's west and east lodes, (ii) estimate gold resources in gap areas of earlier mines for McTaggart's west and east lodes, etc. The exploration work comprised mapping of 1.33 sq. km area on 1:2,000 scale, drilling of 8,395 meterage in 21 boreholes and collection of 2,931 samples. The total resources estimated were at 1.296 million tonnes with an average grade of 2.64 g/t Au at 0.50 g/t Au cut-off. Of which, Measured, Indicated and Inferred categories resources were 0.185, 0.387 and 0.724 million tonnes with average grade of 2.52 g/t Au, 2.75 g/t Au and 2.61 g/t Au, respectively. At 1.00 g/t Au cut-off, the total resources was estimated at about 1.044 million tonnes with an average of 2.97 g/t Au. Out of these, Measured, Indicated and Inferred categories resources were 0.180, 0.305 and 0.559 million tonnes with average grade of 2.52 g/t Au, 3.18 g/t Au and 3.18 g/t Au, respectively. The McTaggart's west lode was found to hold 0.809 million tonnes resources with an average grade of

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## STATE REVIEWS

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		
							<p>2.18 g/t Au at 0.50 g/t Au cut-off. Parallel lode holds 0.487 million tonnes resources with an average grade of 3.4 g/t Au at 0.50 g/t Au cut-off. At 1.00 g/t Au cut-off, McTaggart's west lode was found to hold 0.743 million tonnes resources with an average grade of 2.22 g/t Au at 1.00 g/t Au cut-off. The parallel lode was found to hold 0.301 million tonnes resources with an average grade of 4.73 g/t Au at 0.50 g/t Au cut-off. The total metal content in the block is 3.417 tonnes at cut-off of 0.50 g/t Au. Out of these, 1,763 tonnes of metal were estimated in McTaggart's west lode and 1.654 tonnes of metal in Parallel lode. Similarly, at cut-off 1.00 g/t Au, the total gold metal estimated were at 3.105 tonnes in this area. Out of which, 1.682 tonnes of metal were estimated in McTaggart's west lode and 1.423 tonnes of metal in Parallel lode. A G3 level exploration was also carried out in BGML leasehold area for Oriental &amp; McTaggart's west block. The total resources estimated in this area was placed at about 1.008 million tonnes with an average grade of 1.14 g/t Au at 0.50 g/t Au cut-off. The Oriental lode (ORL) was found to hold the highest resources of 0.47 million tonnes with an average grade of 0.92 g/t Au at 0.5 g/t Au cut-off and rest of the quantity of 0.141 million tonnes was in McTaggart's west lode. The Uncorrelatable Lode (UC) was found to hold the highest grade of 1.49 g/t Au and the total resources of the lode was estimated at 0.393 million tonnes with an average grade of 1.49 g/t Au at 0.50 g/t Au cut-off. The gold content in the block was estimated at 1,148.888 kg. The resources estimated for ORL were the highest among all the three lodes, however, gold content of UC was the highest, i.e.,</p>

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## STATE REVIEWS

Table -2 (Concl'd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							583.713 kg. The McTaggart's west lode was found to hold the least gold content of 128.996 kg.
<b>NMDC</b>							
<b>Iron Ore</b>							
Ballari	Kumaraswamy iron ore mine- B and C block	-	-	51	3553.00	1166	Total resources as on 1.4.2019 are estimated at 225.06 million tonnes.
<b>Karnatraka State Mineral Corporation Ltd ( Formerly MML)</b>							
<b>Magnesite &amp; Dunite</b>							
Ballari	Kumaraswamy iron ore mine- B and C block	-	-	51	3553.00	1166	The exploration is carried out to know the depth and lateral persistence of magnesite for futuyre mining. Based on earlier exploration resources has been estimated at 182135 tonnes of maqgnosite and 2851708 tonnes of dunite.
<b>Clay</b>							
Hassan	Nandihalli mine (ML 2188A), Manjenahalli Kaval, N/v Nandihalli Asikere Taluka	-	-	-	-	-	The exploration is carried in the form of 13 trial pits. Clay resources has been estimated at about 624375 tonnes.
<b>Hutti Gold Mines Company Limited(HGML)</b>							
<b>Gold and other associated minerals</b>							
Raichur	Hutti village, Lingasugur taluka	-	-	-	-	-	HGML has taken up exploration work in Hutti Gold Mine, Hutti village, Lingasugur taluka, Raichur district with an objective of explotationof gold and other associated minerals. An area of 2772 sq.m underground mapping was carried out on 1:400 scale and 15 boreholes were drilled to a cumylative depth of 521.00 m which includes 2 surface and 13 underground boreholes. A total of about 16.88 million tonnes reserves were estimated including 16.30 million tonnes at 4.41 g/t Au content under proved and 0.58 million tonnes at 4.58 g/t Au content under probable categories.

## STATE REVIEWS

**Production**

Gold ore, iron ore, manganese ore limestone and magnesite are the important minerals produced in Karnataka State. The value of minor mineral's production is estimated as ₹ 915 crore for the year 2018-19. There were 137 reporting mines in 2018-19 in

case of MCDR 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, 2016-17 to 2018-19  
(Excluding Atomic Minerals)**

(Value in ₹ '000)

Mineral	Unit	2016-17			2017-18			2018-19 (P)		
		No. of mines	Quantity	Value	No. of mines	Quantity	Value	No. of mines	Quantity	Value
<b>All Minerals</b>		<b>155</b>		<b>63249191</b>	<b>148</b>		<b>95961664</b>	<b>137</b>		<b>96571270</b>
Bauxite	t	2	386	171	2	-	-	1	-	-
Chromite	t	3	785	3768	3	-	-	3	-	-
Gold Ore	t	-	576699	-	-	545065	-	-	563531	-
Gold	kg	3	1580	4316986	3	1640	4738070	3	1661	5233808
Iron Ore	'000t	63	26483	44516153	57	28691	74742826	54	29796	74094496
Manganese Ore	t	9	261372	1159755	10	294261	1541069	9	332162	2090722
Silver *	kg	-	169	6639	-	173	6609	-	204	7775
Graphite (r.o.m.)	t	1	-	-	-	-	-	2	-	-
Kyanite	t	1	-	-	1	-	-	-	-	-
Limestone	'000t	69	29751	5475530	68	30059	5725156	60	34303	5927068
Limeshell	t	2	4003	7779	2	4537	12806	2	3538	10704
Magnesite	t	2	8391	34997	2	8419	42682	3	9108	54251
Minor Minerals @		-	-	7727413	-	-	9152446	-	-	9152446

*Note: The number of mines excludes minor minerals.*

\* Recovered at Raichur and Tumkur during refining of gold.

@ Figures for earlier year have been repeated as estimates because of non-receipt of data for 2018-19.

**Table – 4 : Principal Mineral-based Industries**

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

(Contd)

Table - 4 (Contd)

Industry/plant	Capacity ('000 tpy)
ACC Ltd, Thondebhavi, Distt. Chickballapur (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)

STATE REVIEWS

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,Gulbargha	3000
Ultratech Cement, Raj Shree Cement, Malkhed, Distt. Kalaburagi.	6100
Ultratech Cement, Ginigera, Distt. Koppal (G).	1300
Orient Cement Chittapur, Gulbargha	<b>3000</b>
<b>Ceramic</b>	
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
<b>Chemical</b>	
Solaris Chem Tech Industries Ltd, Bhinga, Distt. Uttara Kannada.	59.4 (caustic soda), 52.3 (Cl), 133.7 (HCl) 24.0 (H <sub>3</sub> PO <sub>4</sub> )
Magnesium & aalled Product Hurugalavadi , Mandya	3 (Magnesium Carbonate) 1.875 (Magnesium Oxide)
Shivam Minerals , Honaga Belgaum	4.6(Magnesium Carbonate) 4.6 (Magnesium Oxide)
<b>Fertilizer</b>	
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)
<b>Iron &amp; Steel</b>	
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(-----)
<b>Pellets</b>	
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)
<b>Pig Iron</b>	
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, Koppal	500 (Sinter) 410.3
<b>Sponge Iron</b>	
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)
Dhruvdesht 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, Shanthigram, Distt. Hassan.	35

(Contd)

## STATE REVIEWS

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 Venkateshwara Sponge & Power Ltd, Halakundi, Distt. Ballari.	60

(Contd)

Table - 4 (Concl'd)

Industry/plant	Capacity ('000 tpy)
Yashshvi Steel & Alloys Ltd, Halakundi, Distt. Ballari.	30
<b>Ferro Alloys</b>	
Ani Smelters Yaradakatta, Hariyur	1.5
Dandeli Steel & Ferro Alloys Ltd, Dandeli.	6
Padmawati Ferrous Metal, Chikantpur Ballari	30 5 (Ferro - manganese) 5 (Silico-manganese) 2 (Ferro-silicon)
Sandur Manganese & Iron Ore Ltd, Mariyammanahalli Hospet	36 (SiMn)
<b>Refractories</b>	
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
<b>Petroleum Refinery</b>	
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.*