Indian Minerals Yearbook 2020

(Part- I)

59th Edition

STATE REVIEWS (Maharashtra)

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
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MAHARASHTRA

Mineral Resources

Maharashtra is the sole producer of fluorite (graded) and the principal producer of bauxite, kyanite, manganese ore, quartzite and sand (others). The principal mineral-bearing belts in Maharashtra are Vidarbha area in the east and Konkan area in the west. Important mineral occurrences are: **bauxite** in Kolhapur, Raigad, Ratnagiri, Satara, Sindhudurg & Thane districts; **china clay** in Amravati, Bhandara, Chandrapur, Nagpur, Sindhudurg & Thane districts; **chromite** in Bhandara, Chandrapur, Nagpur & Sindhudurg districts; **coal** in Nagpur, Chandrapur & Yavatmal districts; **dolomite** in Chandrapur, Nagpur & Yavatmal districts; **fireclay** in Amravati, Chandrapur, Nagpur & Ratnagiri districts; **fluorite** & **Shale** in Chandrapur district; **iron ore (haematite)** in Chandrapur, Gadchiroli & Sindhudurg districts; **iron ore (magnetite)** in Gondia district; **kyanite** in Bhandara & Nagpur districts; **laterite** in Kolhapur district; **limestone** in Ahmednagar, Chandrapur, Dhule, Gadchiroli, Nagpur, Nanded, Pune, Sangli & Yavatmal districts; **manganese ore** in Bhandara, Nagpur & Ratnagiri districts; **corundum & pyrophyllite** in Bhandara district; **quartz & silica sand** in Bhandara, Chandrapur, Gadchiroli, Gondia, Kolhapur, Nagpur, Ratnagiri & Sindhudurg districts; **quartzite** in Gondia & Nagpur districts; and **sillimanite** in Chandrapur district.

Other minerals that occur in the State are: **barytes** in Chandrapur & Gadchiroli districts; **copper** in Bhandara, Chandrapur, Gadchiroli & Nagpur districts; **felspar** in Sindhudurg district; **gold** in Bhandara & Nagpur districts; **granite** in Bhandara, Chandrapur, Dhule, Gadchiroli, Nagpur, Nanded, Nashik, Sindhudurg & Thane districts; **graphite & mica** in Sindhudurg district; **lead-zinc & tungsten** in Nagpur district; **marble** in Bhandara & Nagpur districts; **ochre** in Chandrapur & Nagpur districts; **silver** & **vanadium** in Bhandara district; **steatite** in Bhandara, Ratnagiri & Sindhudurg districts; and **titanium minerals** in Gondia & Ratnagiri districts (Table-1). As per the AMD of the Department of Atomic Energy, Maharashtra state accounted for 5.50 million tonnes of ilmenite resources and 0.01 million tonnes of rutile resources. The coal reserves and resources along with the various coalfields located in the State are shown in Table - 2.

Exploration & Development

The details of exploration activities conducted by GSI and other agencies (DGM) during 2019-20 are furnished in Table - 3

Production

Maharashtra was the sole producer of flourite and kyanite.Coal, bauxite, manganese ore, sillimanite and limestone are the principle minerals produced in Maharashtra State. The value of minor mineral's production is estimated as ₹ 7,109 crores for the year 2019-20. There were 67 reporting mines in 2019-20 in case of MCDR of minerals (Table-4).

Mineral-based Industry

The present status of each Mineral-based Industry is not readily available. However, the important mineral-based industries in the Organised Sector in the State are given in Table-5. .

Table – 2 : Reserves/Resources of Coal as on 1.4.2020 : Maharashtra

(In million tonnes)

Coalfield	Proved	Indicated	Inferred	Total
Total	**7623.74**	**3257.37**	**1846.59**	**12727.70**
Wardha Valley	4567.65	1723.27	1440.98	7731.90
Kamthi	2046.24	937.91	107.21	3091.36
Umrer Makardhokra	308.41	–	160.70	469.11
Nand Bander	691.44	596.19	117.70	1405.33
Bokhara	10.00	–	20.00	30.00

Source: *Coal Directory of India, 2019-20.*

Table –1: Reserves/Resources of Minerals as on 1.4.2015: Maharashtra

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						
Barytes	tonne	-	-	-	-	-	-	-	14800	89450	18610	-	122860	122860
Bauxite	'000 tonnes	11281	11221	3686	26188	15449	2064	16809	39197	8367	76501	-	158386	184574
China clay#	'000 tonnes	-	-	-	-	418	81	831	-	184	5735	-	7248	7248
Chromite	'000 tonnes	-	48	23	71	5	-	5	43	67	418	-	538	609
Copper														
Ore	'000 tonnes	-	-	-	-	-	-	-	-	9399	4841	150	14390	14390
Metal	'000 tonnes	-	-	-	-	-	-	-	-	89.65	47.48	0.54	137.67	137.67
Dolomite#	'000 tonnes	-	4346	7768	-	-	16036	7371	-	18050	339141	2994	397578	417994
Felspar#	tonne	-	-	-	-	651835	-	323337	-	-	253731	-	1228903	1228903
Fireclay#	'000 tonnes	-	322	388	709	17	44	32	-	-	6652	-	6746	7455
Fluorite	tonne	224824	63860	-	288684	-	-	-	-	-	100000	-	100000	388684
Gold														
Ore (primary)	tonne	-	-	-	-	-	-	-	-	-	1517000	-	1517000	1517000
Metal (primary)	tonne	-	-	-	-	-	-	-	-	-	3.55	-	3.55	3.55
Granite (Dimension Stone)##	'000 cu. m	-	-	-	-	-	6300	-	486925	-	665622	-	1158847	1158847
Graphite	tonne	-	-	-	-	-	-	-	-	-	1160000	-	1160000	1160000
Iron ore (Haematite)	'000 tonnes	11283	3032	2926	17241	9028	6673	8858	75724	71806	72588	32185	276862	294103
Iron ore (Magnetite)	'000 tonnes	359	-	225	583	149	-	63	-	-	90	-	302	885
Kyanite	tonne	212881	-	48958	261839	30085	27808	1187479	1012	45000	1684113	-	2975497	3237336
Laterite	'000 tonnes	-	278	-	278	2215	1393	400	319	-	7577	-	11903	12181
Lead-Zinc														
Ore	'000 tonnes	-	-	-	-	-	-	-	1967	6305	1000	-	9272	9272
Zinc metal	'000 tonnes	-	-	-	-	-	-	-	133.56	428.11	28	-	589.67	589.67
Limestone	'000 tonnes	424035	143115	39905	607055	583978	206162	136835	28595	234518	1056168	-	2246255	2853310

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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						
Manganese Ore	'000 tonnes	10867	1787	1055	13710	1974	4966	7207	-	5350	3369	43	22910	36619
Marble##	'000 tonnes	-	-	-	-	-	324	81	-	-	57642	-	58047	58047
Mica#	kg	-	-	-	-	-	-	65916000	-	-	15120000	-	81036000	81036000
Ochre#	tonne	22260	-	16000	38260	-	-	156740	6010	6010	286000	-	454760	493020
Pyrophyllite#	tonne	-	-	705169	705169	45532	4780000	-	-	-	407160	-	5232692	5937861
Quartz-Silica sand#	'000 tonnes	15188	93	9984	25265	33039	15455	48535	-	355	57077	-	154461	179726
Quartzite#	'000 tonnes	9026	-	-	9026	49172	-	21156	-	-	11344	-	81671	90697
Silver														
Ore	tonne	-	-	-	-	-	-	-	-	-	235000	-	235000	235000
Metal	tonne	-	-	-	-	-	-	-	-	-	0.23	-	0.23	0.23
Sillimanite	tonne	181002	-	22274	203276	-	-	-	-	64	15516	-	15580	218856
Talc/Steatite/ Soapstone#	'000 tonnes	-	-	-	-	-	-	-	-	2565	14262	-	16827	16827
Tungsten														
Ore	tonne	-	-	-	-	-	-	-	610000	5637250	1830000	-	8077250	8077250
Contained WO_3	tonne	-	-	-	-	-	-	-	1903	10304	3828	-	16035	16035
Vanadium														
Ore	tonne	-	-	-	-	276530	-	108100	-	-	-	-	384630	384630
Metal	tonne	-	-	-	-	1106.12	-	432.4	-	-	-	-	1538.52	1538.52

Figures rounded off

 # Declared as Minor Minerals vide Gazette Notification dated 10.02.2015

Minor Mineral before Gazette Notification dated 10.02.2015

Table –3 : Details of Exploration Activities in Maharashtra, 2019-20

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Heavy Mineral							
Ratnagiri and Raigarh	Dighi to Guhagar	1:12500	100.0	-	-	-	Reconnaissance survey (G4) for assessment of heavy mineral concentration in beach sands of near shore region from Dighi to Guhagar, has been carried out by Large Scale Mapping on (a scale 1:12,500) 100 sq km for an area for demarcation of geomorphological units was carried out. About 120 beach (loose beach sand) samples and 20 pit samples (1 cu. m each pit) were collected. The collection of grab samples was carried out along the transect perpendicular to the coast. The petrographical studies showed that the heavy mineral assemblage from the beaches chiefly consisted of ilmenite, magnetite, leucoxene, goethite, limonite and pyroxenes as the major heavy minerals indicating provenance from basaltic terrain. TiO_2 and Fe_2O_3 showed the highest concentration of 33.37% and 55.00% respectively. Total REE ranged within 16.77 to 967.09 mg/kg and 38.45 to 625.5 mg/kg in beach and pit samples respectively. The anomalous values of vanadium were recorded from beaches Harihareshwar (2,330 mg/kg), Kolthare (1,490 mg/kg), Srivardhan (1,221 mg/kg) and Anjarle (1,142 mg/kg). The localisation of vanadium as well as other heavies is restricted within shifting dunes and stabilised dunes. Distribution of heavy minerals showed absolute unimodality of +230 size fraction. While bimodality of +120 and +230 size fraction was restricted to the bay beaches and the beaches adjacent to river or nalas mainly due to mixing and mingling of the sediment. The heavy mineral wt% varies from negligible to 93.21 (in Harihareshwar). The potential beaches for Heavy minerals (wt% varies from 80 - 90) are Anjarle, Karde south, Kelshi, Kolthare, Dabhol, Murud, Ade-Padle etc.

(contd)

Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							On the basis of heavy minerals wt% out of 15.97 sq km sandy shore (total mapped area of 100 sq km), 10.11 sq km area was demarcated as potential sandy shore for heavy minerals. The beaches located adjacent to inlets are richer in vanadium which indicates the source of vanadium as lava flows of Deccan basalt which may contain vanadiferous titanomagnetite.
Copper and associated base metal							
Chandrapur	Lal Heti North Block	-	1.0	-	600.0	-	Preliminary exploration (G3) for copper and associated base metal mineralisation in this area has been carried out by detailed mapping which involved 1.0 sq km, geophysical survey, 600 m drilling and 50 cu. m pitting/trenching. The block was found to be dominantly soil covered with undulating topography due to presence of small lateritic mounds which follows the trend of major shear zone. Integrated geophysical survey(Resistivity,Induced Polarisation, Magnetic, and Self Potential) of 6 L km was carried out and a high chargeability zone was established which corroborated with geological observation and analytical results of soil samples. From drill core logging, it has been observed that sulphide mineralisation in Lal Heti north block is mainly associated with the chlorite alteration zones and quartz carbonate veins in the host Mul granite. The nature of mineralisation is in the form of dissemination, stringers and veins along the fractures. The primary copper ore at Lal Heti North Block is chalcopyrite. With a cut-off grade of 0.2% and minimum stopping width of 1.5 m, three mineralised lodes were demarcated in MHCL-1 and one mineralised lode was demarcated in MHCL-2. Preliminary reserves/ resources of 1,34,278.2 tonnes (0.13 mt) over 500 m strike length with an average grade 0.31 % Cu were indicated.

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Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Copper and associated mineralisation							
Gadchiroli	Navgram block	-	1.0	03	140.0	40	Preliminary exploration (G3) for establishing zones of copper and associated mineralisation in this area has been carried out by detailed mapping and geophysical surveying of 1 sq km area along with trenching, sampling, drilling etc. Results from 30 BRS indicated sporadic mineralisation with highest value of 600 ppm Cu, 2,000 ppm Pb and 7,600 ppm Zn. However, these were singular values with no adjacent samples showing similar distribution to form potentialzones. Geophysical surveys including resistivity, magnetic, IP and SP were conducted, of which resistivity and IP maps yielded a fair visualisation of the disposition of the host body and concentration of mineralisation within. Three boreholes were drilled after considering all available results, maps etc. Borehole BH-01 was initiated at the profile of the maximum surface value of copper from BRS results (600 ppm). A total of 140 m was drilled with first level intersection (vertical depth of 60 m) and the target reef was intersected from 78 m to 123 m (45 m apparent width). Chemical results of the 30 core samples yielded no encouraging values or zoning. BH-02 was taken up North of BH-01 along the strike. 125.30 m were drilled at first level intersection and 23.4 m of quartz core was intersected from 92.6 to 116 m. 19 core samples yielded no significant chemical results or zoning. BH-03 was taken up as a final test in collaboration with potential zones suggested by geophysics team. Approximately 125.50 L m were drilled and the target reef was intersected as bifurcated limbs with widths of 4.7m (82.6 to 87.3 m) and 7.3 (114.3to107m).

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Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Gondia	Nawegaon, Dasgaon area,	1:12500	100	-	-	106	Reconnaissance Survey (G4) for Cu and Associated Elements in and around this area has been carried out by large scale geological mapping (1:12,500 scale) of 100 sq km area. Two parallel mineralised quartz veins 60 m apart were found in Ratnara area (northern vein is >500 m X 10 m and southern vein >500 m X 20 m). The mineralisation was seen confined in quartz vein intruded into basement gneiss and quartzite. Ore petrography study of quartz veins showed that the sulphides were mostly chalcopyrite and pyrite with subordinate galena. Strong evidence of secondary Cu enrichment was also found in the area. Base metal sulphide (Cu-Pb) bearing favourable zone associated with hydrothermal quartz vein was identified in: (1) Wirsi (Cu-Pb-Fe)-Chalcopyrite, Galena, Pyrite and Covellite; (2) Pagatola (Cu)-Chalcopyrite and Chalcocite and (3) Ratnara (Cu-Fe-Pb-Zn)-Chalcopyrite, Pyrite, Galena, Bornite, Covellite, Chalcocite, native copper, Sphalerite and Pyrrhotite. Chemical analytical results of 86 bedrock samples showed copper values in the range from 10 ppm to 870 ppm, Pb from 10 to 120 ppm, Zn from 10 to 440 ppm, Cr 50 to 1,400 ppm, Ag from 1 to 3 ppm and Au values below 50 ppb. Chemical results of 20 trench samples showed Cu value ranging from 20 to 270 ppm, Pb from 10 to 80 ppm, Zn from 10 to 150 ppm, Cr 50 to 1,700 ppm and Ag from 1 to 2 ppm while one trench sample (T1-A) yielded tungsten value of 449.31 ppm.
Basemetal &	**REE & gold mineralisation**						
Bhandara	-	-	-	-	-	-	Reconnaissance survey (G4) for basemetal & REE & gold mineralisation in this area has been carried out. Geologically, the area falls within the Sakoli Fold Belt. Ore microscopic studies indicate the presence of pyrite and

(contd)

Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							magnetite in the Dewarha quartz reef. Both pyrite and magnetite are subhedral with shape pattern of the grains indicating their fracture control origin. Majority of the samples analysed showed Cu 20 to 90 ppm, Pb 10 to 30 ppm and Zn 20 to 90 ppm. The analysis for their indicated very low incidence of sporadic base metal mineralisation. Only one sample in Dewarha quartz vein showed Pb value of 820 ppm and 0.22% Zn. The total REE values in Dewara quartz vein have been analysed to be 9.3 ppm to 431.78 ppm. Results of a few samples from Palora quartz vein indicate Cu up to 10 ppm, Pb up to 20 ppm and Zn upto 40 ppm, thus further denote absence of any basemetal mineralisation. The total REE values in the Palora quartz vein indicated a very low values of REE i.e approx. 2 ppm to 27 ppm. The quartz veins exposed in Nagjhira Reserved Forest area showed total REE values ranging from 17.78 ppm to 285 ppm. Results of few samples from Khadki indicated Cu upto 20 ppm, Pb upto 20 ppm and Zn up to 10 ppm which further denote absence of any base metal mineralisation. Results of a few samples for total REE showed a range from 100 ppm to 120 ppm.
Copper & associated Basemetal							
Gondia	Chikli-Dongargaon area	-	-	-	-	-	Reconnaissance survey (G4) for copper and associated base metal mineralisation in this area was carried out. Geologically, the study area lies along western boundary of Dongargar fold belt. Multiple numbers of quartz veins of different generations were also observed. The western older vein intruding basement gneiss was observed to bear pervasive secondary evidences of sulphide mineralisation like limonitisation, hydrothermal brecciation and abundant presence of boxwork structures. In this vein, sulphide

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Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							minerals occurred in two modes of mineralisation - randomly disseminated chalcopyrite - pyrite grains and fracture filling chalcopyrites. In younger vein, sulphide mineral assemblage is represented by secondary sulphides like covellite-chalcocite ± azurite- tenantite- tetrahedrite suggesting prevailing oxidation condition during remobilisation of primary sulphide minerals from the older vein. In older vein, average concentration of Cu was 120 ppm (ranging between 10 and 1,200 ppm) while that of Pb and Zn were 106 and 54 ppm, respectively. Highest Cu and Pb values were obtained from a single outcrop near Kaulewada signifying non remobilised base metals in original depositional site. In younger veins, average concentration of Cu was 840 ppm (ranging between 10 and 4,000 ppm) while that of Pb and Zn were 40 and 70 ppm, respectively. Higher Cu values were obtained from confluence zones of the older vein and the younger veins near Kolargaon and Kusumghat. Evidences of extensive oxidation and leaching in the older vein indicate probable presence of a supergene enriched base metal sulphide deposit underneath.
RM & REE							
Nagpur	Ronga-Lendejhari	1:12500	100	-	-	-	Reconnaissance survey (G4) for locating RM & REE mineralisation in Granite and associated Pegmatitic veins of Sausar Mobile Belt around this area was carried out which involved 100 sq km Large Scale Mapping on 1:12,500 scale. Geologically, the area was seen to exposed rocks of different litho-units, such as,basement Tirodi biotite gneiss, quartz mica schist, muscovite schist, granite and gondite. Micaschists and biotite gneisses were seen intruded by pegmatites. Locally, at some places the pegmatites were intruded by amphibolites.

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Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							Pegmatites at the contact of these basic rocks have apatites and monazites in large quantity. The bed-rock samples collected in the form of chips from the outcrop have shown REE values of up to 784.85 ppm. Heavy segregation from 2nd order streams sediments have REE values ranging from 303.24 to 1,19,695 ppm. Values in soil samples ranging from 217.05 to 3681.37 ppm. Petrographic sample revealed tremendous fluid activity in the area. Monazite, zircon, apatite phases have been identified under the microscope. Presence of zoned tourmaline suggests multiple phases of fluid intrusion. Xenotime, uraninite, monazite, zircon, apatite phases have also been identified under SEM.
RM & REE							
Bhandara	Sausar mobile belt, Ashti-Kanhargaon area	1:12500	-	-	-	-	Reconnaissance survey for locating RM & REE mineralisation in Granite and associated Pegmatitic veins of Sausar Mobile Belt, has been carried out in this area. The work component involved Large Scale Mapping (on 1:12500 scale), pitting trenching and sampling (BRS, SSS, PS & stalus sampling). The major lithounits mapped in the study area were biotite gneiss and amphibolite of Tirodi Gneissic Complex, muscovite schist with thin bands of quartzite of Sausar Group and the intrusives (granite, pegmatite and quartz vein). A total of 17 pegmatite bodies were mapped and studied in detail. In the south-eastern part of the study area, kyanite mineralisation was observed in E-W trending quartz veins. Pegmatite exposed SW of Village Ramjitola, along Dhoriya Nala. Analytical result (received till date) showed very high concentration of REE in stream sediments samples (after heavy separation) collected from pegmatite terrain (maximum value REE 23.63%). Pitting and

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Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							trenching samples and soil samples collected from pegmatite terrain also show moderate to high concentration of REE. Maximum concentration observed in Pitting and trenching sample (after heavy separation) was REE 2.1% and maximum concentration observed in soil sample was REE 3,146.78 ppm. LREE concentration is much higher in comparison to HREE concentration. Bedrock samples of foliated granite showed maximum value of REE at 1,276.1 ppm and soil sample showed maximum value of REE as 1,767.49 ppm. Maximum concentration of zirconium at 2,977 ppm was observed in soil sample collected from pegmatite terrain.
Vanadium							
Bhandara	Kanholi-Suratoli area	1:25000	60	-	-	-	Reconnaissance survey (G4) for locating Vandadiferous titanomagnetite (V-Ti) magnetite mineralisation in ultramafic-mafic complexes of Dongargarh Supergroup of rocks in this area was been caried out. A total 60 sq km area was geologically mapped on 1:12,500 scale and samples were collected for rock and mineralogical studies to ascertain the mineralisation potentiality. The study area, located in eastern part of western Bastar Craton (BC) of Central India, geologically exposed the rocks of Amgaon Gneissic Complex, Sakoli Group, Nandgaon Group, Dongargarh granitoids, dolerite dyke, pegmatite and quartz veins. Interest for exploration was confined to gabbroic rocks belonging to Pitepani Formation of Nandgaon Group. The vanadiferous titanomagnetite (VTM) mineralisation was seen very closely associated with small scattered intrusive bodies of gabbro, exposed intermittently for about 1.5 to 2 km in length and 500 to 700 m in width. The mineralisation could be genetically linked with intergrowth of magnetite and ilmenite. The

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Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							goldmanite, a vanadium-bearing garnet and mukhinite, a vanadium-bearing epidote mineral have been newly reported from the study area.
Vanadium							
Sindhudurg	Ghavnale-Pulas area	1:12500	100	-	-	-	Reconnaissance Survey for chromium, vanadium and Associated Mineralisation in Gabbroid Plutons and Mafic Dykes of Ghavnale-Pulas Areas of Sindhudurg District, Maharashtra (G4) was carried out. An area of 100 sq km was mapped on 1:12,500 scale. The mapped area forms the northern continuation of the Western Dharwar Craton and comprises biotite gneiss as the country rock and amphibolite and Banded Iron Formation (Older Supracrustals) as enclaves within the biotite gneiss. Granitoid, dolerite and gabbronorite are present as intrusives. The bedrock samples of target lithologies, i.e., gabbronorite and dolerite yielded chromium values ranging from 29 to 3,340 ppm. The analytical data of channel-cum-chip samples of gabbronorite showed Cr values ranging from 43 to 3,196 ppm, vanadium values from 150 ppm to 336 ppm and nickel values between 66 and 847 ppm. The pit samples of gabbronorite showed chromium value ranging from 45 to 3,181 ppm, vanadium ranging from 132 to 338 ppm and nickel values between 43 ppm and 734 ppm. On the basis of overlay studies of analytical value Cr, V, Ni of BRS, CS and PTS on geological map of LSM block, an area of 0.5 sq km (1.6 km x 0.31 km) was delineated NW of Nilelichiwadi as potential area for Cr and Ni mineralisation.
Iron Ore							
Sindhudurg	Ambadgaon-Matna area	-	100	-	-	160	Reconnaissance survey (G4) for Iron Ore in BIFs (BMQ) of Ambadgaon-Matna area has been carried out by LSM which included LSM of 100 sq km, collection of 160 bedrock samples,

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Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							etc. The mapped area falls in the north-western most part of Western Dharwar Craton. The area exposed TTG gneiss, quartzite, Banded Magnetite Quartzite (BMQ), meta-greywacke, meta-argillite and intrusive viz. granitoid, dolerite and gabbro. The main exposures of BMQ have been observed in south-western part of the area. It is partially leached and has formed laterite as weathered product at most of the places. The iron mineralisation in the area is manifested in the form of intense ferruginisation, iron encrustation in laterites and presence of iron oxides, such as, magnetite, haematite, goethite and limonite along with manganese mineralisation. Out of 55 samples from BMQ, 22 samples showed Fe value of more than 30% and 9 samples showed manganese values as >3,000 ppm. The maximum value of Fe and Mn was observed as 54.34% and 8,570 ppm respectively. Out of 105 samples of laterite, 54 samples showed Fe value more than 28% (low-grade ore) and 59 samples showed manganese as >3,000 ppm. The maximum value of Fe and Mn in laterite was 53.16% and 17.31% respectively. Out of 50 pits, 27 pits showed iron value as more than 28% with maximum value as 55.12% whereas 22 pits showed manganese at >0.3% with maximum value as 15.40 %. The weighted average of BMQ calculated on the basis of 20 channel-cum-face samples was found out to be 30.91%. The overlay studies have indicated that there are six zones which have anomalous value of iron along with/without manganese mineralisation. The cumulative area of the six zones was 1.09 sq km and was delineated as potential area for iron. There is also an area of 1.5 sq km between Dhat and Ambadgaon showing potential for iron ore where BMQ recorded 30.91% (weighted average) Fe content.

(contd)

Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Directorate of Geology and Mining, Maharashtra							
Bauxite							
Sindhudurg	Mouje, Kudopi villages, Malvan tehsil	-	-	-	-	-	During 2019-20, G4/G3 level exploration to locate occurrences of Aluminous-Laterite and bauxite deposit over an area of 27.0 km in Mouje, Kudopi villages, Malvan tehsil, Sindhudurg district, Maharashtra was carried out. A total of 49 samples were collected during the field study. In Ratnagiri district at Sheel Taralwadi an village, Rajapur tehsil, an area of 40.0 sq.km was mapped on 1:12,500 scale and 0.41 sq km on 1:5000 scale. A total of 41 boreholes were to a cumulative depth of 498.5 m and collected and analysed 192 samples. Further exploration of G3/G2 level is being carried in the area.
Manganese Ore							
Nagpur	Tangla - Salai-Ghoti-Chachada block	-	-	-	-	-	During 2019-20, exploration for manganese ore was carried out in Nagpur district. Objective was to delineate the manganese deposit & to calculate the reserves/ resources of manganese ore. In Nagpur district at Tangla - Salai-Ghoti-Chachada block, Ramtek tehsil, an area of 102.82 sq km was mapped on 1:25,000 scale & 11.63 sq km area on 1:5000 scale. In all total 15 samples were collected from two trenches each admeasuring10 m x 4 m x 2 m. Area has been proposed for further exploration in field season 2020-2021.
DGM, Maharashtra							
Limestone							
Chandrapur	Chandrapur	1:25,000	393.44	-	-	-	-
Yavatmal	Murti block	1:25,000	7.00	7	391.00	254	-
	Kundra Krushnapur block, Wani Tahsil	1:25,000	10.00	3	157.00	135	-
	Kolgaon-Wegaon block Zari-Jamni Tahsil	1:25000	7.00	3	111.00	90	G2 level exploration work has been proposed to further investigate the extent of limestone beds in the area.

(contd)

Table – 3 (contd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Limestone/ MSH							
Chandrapur	Lkhmapur-Dhunki-Karwa village Korpana Tahsil	1:5,000	1.46	18	1120.50	482	The exploration work was taken up to identify and prove occurrences of limestone deposit in the area. Further, a G3 level exploration work will be taken up after obtaining permission from forest department.
Limestone/ MSH							
Chandrapur	Borgaon-Khairgaon-Karwa village Korpana Tahsil	1:12,500	38.65	-	-	52	-
Building stone/construction material /MSH							
Jalna	Ambad Tehsil	1:50000	110.00	-	-	-	-
MOIL							
Manganese Ore							
Bhandara	Dongri Buzurg & Chikla	-	-	-	-	-	During 2019-20, a total of 7,307.5 m exploratory drilling involving 72 boreholes in 10 manganese ore mines were carried out. Among these 10 mines, two mines viz, Dongri Buzurg & Chikla manganese mines are situated in district Bhandara & seven mines viz, Kandri, Mansar, Gumgaon, Parsoda and Old Satuk mines are situated in district Nagpur, Maharashtra State. Two mines viz, Tirodi and Bharweli mines are situated in district Balaghat, Madhya Pradesh. The reported reserves/resources of manganese ore as on 1.4.2020 of all the 13 mines of MOIL were estimated at 90.20 million tonnes. Ukwa (13.71 million tonnes), Bharweli (24.60 million tonnes), Tirodi (0.68 million tonnes), Sitapatore & Sukli (0.11 million tonnes & 0.14 million tonnes), Chikla (4.62 million tonnes), Dongri Buzurg (18.46 million tonnes), Kandri (12.04 million tonnes), Mansar (5.55 million tonnes), Parsoda (0.49 million tonnes), Beldongri (0.13 million tonnes), Old Satuk (0.49 million tonnes), New Satuk (0.22 million tonnes) and Gumgaon (8.95 million tonnes).
Nagpur	Kandri, Mansar, Gumgaon, Parsoda and Old Satuk	-	-	-	-	-	

(contd)

Table – 3 (concld)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
MECL							
Tungsten							
Nagpur	Kuhi-Khobna-Agargaon	-	-	-	-	501	In Maharashtra, a G4 stage exploration for tungsten mineralisation was carried out with an objective to prove the occurrence of ore body in the intervening area in the Kuhi-Khobna-Agargaon gap area block,established the consistency and reliability of the grade zone over a promising strike length and upto 50 m verticle depth in Nagpur district. Exploration involved mapping of 57.0 sq. km. on 1:12,500 scale along with collected 449 samples for chemical analysis of different elements and 52 samples for petrographic/mineragraphic/etc studies. Besides, a total of 5 borholes were drilled to a cumulative of of 945.0 m.

Table – 4: Mineral Production in Maharashtra, 2017-18 to 2019-20 (Excluding Atomic Minerals)

(Value in ₹'000)

Mineral	Unit	2017-18			2018-2019			2019-20 (P)		
		No. of mines	Quantity	Value[$]	No. of mines	Quantity	Value[$]	No. of mines	Quantity	Value[$]
All Minerals		**77**		**54757349**	**72**		**59045818**	**67**		**82328653**
Coal	'000t	-	42219	-	-	49818	-	-	54746	-
Bauxite	t	14	2028765	955340	14	1424865	736127	12	595562	385700
Chromite	t	1	17	82	1	-	-	-	-	-
Iron Ore	'000t	15	940	1029104	12	660	836022	13	1131	1280677
Manganese Ore	t	24	731457	7243631	23	761985	7999939	19	721520	6127232
Fluorite (graded)	t	1	1314	8646	1	1079	8117	1	1315	8769
Kyanite	t	4	7818	23277	4	4889	15757	4	3097	10863
Sillimanite	t	1	3194	10904	1	13404	49477	2	13236	36322
Limestone	'000t	17	14152	3134365	16	14991	3459779	16	14614	3385790
Sulphur[#]	t	-	58904	-	-	46967	-	-	55659	-
Minor Minerals		-	-	42352000	-	-	45940600	-	-	71093300

Note: *The number of mines excludes Fuel and Minor minerals.*
$ Excludes the value Fuel minerals.
 # Recovered as by-product from oil refinery.

Table – 5 : Principal Mineral-based Industries

Industry/plant	Capacity ('000 tpy)
Abrasives	
Grindwell Norton Ltd, Mora, Uraon, Raigad	NA
Aluminium products	
Hindalco, Recycling plant, Taloja	50
Hindalco, Mouda, Distt Nagpur	30 (rolling mill) 14 (conductor rod)
Asbestos Products	
Everest Building Products Ltd, Mulund	NA
Hyderabad Industries Ltd, Musarane	60.0
Newkem Products Corp, Mumbai	9.9
Swastik Industries, Pune	NA
Cement	
ACC Ltd, Ghugus, Distt Chandrapur	3800
Ambuja Cement Ltd, (Maratha Cement Works), Upparwahi, Chandrapur	4750
India Cement, Vaijnath, Parli, Distt Beed (G)	1100
JSW Cement, Dolvi, Distt Raigad	1000 (slag cement)
Manikgarh Cement, (I) Korpana, Distt Chandrapur	2000
Manikgarh Cement, (II) Korpana, Distt Chandrapur	4000
Murli Industries Ltd, Naranda, Distt Chandrapur.	3000
Orient Cement, Jalgaon (G)	2000
Birla Corpn. Ltd, Butibori, Distt Nagpur (G)	500
UltraTech Cement, Hotgi, Distt Solapur (G)	4000
UltraTech Cement Ltd, Awarpur, Distt Chandrapur	6000 4500 (Clinker)
UltraTech Cement Ltd, Ratnagiri Works (G), Distt Ratnagiri	480
UltraTech Cement Ltd, Nagpur	2000
Zuari Cement, Solapur	1200
Ceramics	
H & R Johnson (India) Ltd, Pen	154.8
Joglekar Refractory & Ceramics Pvt. Ltd, Rabale, Distt Thane.	364.8
Jyoti Ceramic Industries Pvt. Ltd, Satpur	0.16 (Ref. coating) 1.0 (Ceramic Product)
NITCO Tiles Ltd, Raigad	66 lakh (sq. m)
Chemicals	
Borax Morarji Ltd, Ambarnath	25 (borax) 8 (boric acid)
Century Rayon, Shahad, Distt Thane	25 (rayon yarn) 20 (caustic soda)

(contd)

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
Foseco India Ltd, Sanswadi	15 (foundry chemicals)
Gargi Huttenes Albertus Pvt.Ltd, Kukshet,Navi Mumbai	12 (Foundary Chemical)
National Peroxide Ltd, Kalyan, Distt Thane.	1.4 (sodium per borate)
Star Earth Minerals Pvt. Ltd, Tanjola, Panvel	0.6 (zirconium basic carbonet)
Sudarshan Chemical Ind. Ltd, Roha, Distt Raigad	5.2 (pigments)
Tecil Chemical & Hydro Power Ltd, Mumbai.	30 (calcium carbide)
Zirconium Chemicals Pvt. Ltd, Taloja, Distt Raigad	0.3 (zirconium salt)
Copper Wire Rods	
HCL, Copper project, Taloja	60
Electrode	
GEE Ltd, Thane.	4.02 (Mill. m)
Weldfast Electrode Pvt. Ltd, Nagpur	15.9
Weldstrong Electrode Pvt. Ltd,	0.90
Butibori, Higna Nagpur	0.15 (Welding flux)
Electrolytic Manganese Dioxide	
MOIL, Dongri Buzurg, Distt Bhandara	1
Fertilizers	
Balaji Fertilisers Pvt. Ltd, Nanded	20 (SSP)
Basant Agro Tech (India) Ltd, Barshi Takli, Akola	120 (SSP)
Basant Agro Tech (India) Ltd, Jalgaon.	132 (SSP)
BEC Fertilizer (Unit of Bhilai Engg. Corpn. Ltd,), Gunjakheda, Wardha	66 (SSP)
Bharat Agri Fert & Realty Ltd, Kharivali, Thane	132 (SSP)
Coromandel International Ltd, (Formerly, Liberty Phosphate Ltd,), Pali, Raigad	66 (SSP)
Deepak Fertilizers & Petrochemical Corporation Ltd, Taloja	230 (ANP)
Rama Krishi Rasayan (A division of Rama Phosphates Ltd), Loni Kalbhor, Pune	132 (SSP)
Shiva Global Agro Industries Ltd, (Formerly, Shiva Fertilizers Ltd), Nanded	120 (SSP)
Shri Bhavani Mishra Fertilizers Pvt. Ltd, Vazirabad, Nanded	30 (SSP)
Shree Pushkar Chems & Fertiliser Ltd, Lote Porshuram, Khed, Ratnagri	100 (SSP)
Zuari Fertilizers and Chemicals Ltd, Mahad, Distt Raigad	216 (SSP)
RCF, Trombay	330 (Urea) 690 (Complex)

(contd)

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
RCF, Thal, Distt Raigad	2000 (Urea)
Pesticides	
Hindustan Insecticides Ltd, Rasaini, Distt Raigad	13.2
Paint	
Jespco, Irechwara, Miraj	8 (Zircon Paint)
Glass	
Ace Glass Containers Ltd, Pimpri, Distt Nashik	NA
Empire Industries Ltd, (Vitrum Glass), Vikroli, Mumbai	37.5
Hindustan National Glass & Industries Ltd, Nashik	320 TPD
Iron & Steel	
JSW Ispat Steel Ltd, Dolvi, Raigad	5400 (Sinter) 1600 (Sponge iron) 5040 (Crude/Liquid steel) 3500 (pig iron)
Lloyds Steel Ltd, Wardha	600 (HRC) 350 (CRC) 250 (GPC)
Indian Seamless Steel & Alloys Ltd, Jejuri, Distt Pune	450 (seamless tubes) 350 (alloy & carbon steel)
Sunflag Iron & Steel Co. Ltd, Warrthy, Mohadi	262 (sponge iron) 250 (Pig iron) 250 (sinter) 505 (Finished steel)
Uttam Galva Metallics Ltd, Bhugaon,Wardha	886.95 (Sinter) 525 (pig iron)
Lime	
Hetendra Lime Products, Rajur, Wani	5.5
Swastic Lime Factory, Rajur, Wani	5.5
Swastic Mineral & Lime Industries, Rajur,Wani	5.5
Pellet	
Amba River Coke Ltd, Dolvi, Pen	4000
Pig Iron	
Ispat Metallics India Ltd, Dolvi, Raigad.	2000
Lint Export Pvt. Ltd, Chincholi, Mohol	0.25
Tata Metaliks Ltd, (Usha Ispat Ltd, Redi), Distt Sindhudurg.	300

(contd)

Table - 5 (concld.)

Industry/plant	Capacity ('000 tpy)
Sona Alloys Pvt. Ltd, Satara.	314
Usha Ispat Ltd, Redi.	300
Uttam Galva Metallics Ltd, Bhugaon, Wardha	225 389.95 (Sinter)
Gopani Iron Ore Ltd, Chandrapur.	144 75 (Semi-Finished Steel)
Lloyds Metals & Engineers, Ghugus, Chandrapur.	300
JSW Steel Salav Ltd, Welspun Max Steel Ltd, (formerly Vikram Ispat), Distt Raigad	900
Ferroalloys	
Chandrapur Ferro Alloys Plant (SAIL), (formerly Maharashtra Elektrosmelt Ltd,), Chandrapur.	100
Minex Metallurgical Co. Ltd, Nimji, Kalmeshwar	0.250 (Fe-Ti)
Natural Sugar & Allied Industries Ltd,	16.5 (Si-Mn)
Sai Nagar, Ranjani, Distt Osmanabad	16.5 (H. C.Si-Mn)
SRC Chemical Pvt. Ltd, Borieandi, Daund, Pune	6.0
Welspun Maxsteel Ltd, Salav, Raigad.	90
Refractory	
ACE Refractories, Nagpur.	60
NECO Ceramics	NA
Ceraflux India Pvt. Ltd,	2.7 (Ref. Die releasing Agent)
Gokul Shirgaon, Kholapur	2.7 (Ref. Coating)
Calderys India Refractories Limited Nagpur Refractory Works, Ruikhairi Butibori, Nagpur	58 (castable)
Joglekar Refractories Pvt. Ltd,	4.8 (Ramming Mass)
Rabale, Navi Mumbai	0.54 (Chrome Ore +60) 0.15 (Chrome Ore -60) 0.15 (DBM Magnetite)
Petroleum Refinery	
BPCL, Mumbai.	12000
HPCL, Mumbai.	7500

(G) : *Grinding units.*

Note: *Data, for fertilizer and cement industries besides their respective websites, have been taken from Indian Fertilizer Scenario, FAI Statistics and Survey of Cement Industry & Directory respectively.*