Indian Minerals Yearbook 2019

(Part- I)

58th Edition

STATE REVIEWS (Maharashtra)

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU 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 2018-19 are furnished in Table - 3

Production

Maharashtra was the sole producer of flourite and kyanite. Apart from 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 ` 4,594 crore for the year 2018-19.

There were 65 reporting mines in 2018-19 in case of MCDR 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 1.4.2019 : Maharashtra

(In million tonnes)

Coalfield	Proved	Indicated	Inferred	Total
Total	**7573.20**	**3257.37**	**1846.59**	**12677.16**
Wardha Valley	4517.11	1723.27	1440.98	7681.36
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, 2018-19.*

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

(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						
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, 2018-19

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Base Metal							
Bhandara	In and around Wadegaon area	1:2000	100.0	-	-	-	Reconnaissance survey (G4) for copper and associated base metal mineralisation involved Large-Scale Mapping of 100 sqkm area and detailed mapping (1:2000 scales) of 1 sqkm around SE of Village Dongargaon and SE of Village Mendha. Quartz veins are the locales for base metal mineralisation. The smoky variety quartz veins of thickness 5 cm to 1 m are prominently mineralised. Specks of chalcopyrite, pyrite, magnetite, sphalerite grains within smoky quartz were observed to be present. Occurrence of sulphide mineralisation was also observed in the phyllites of Gaikhuri Formation. A total of 50 pit/ trench samples were collected from the gap area between the smoky quartz veins. Chemical analysis of bedrock samples showed copper values ranging from >10 ppm to 0.81%; lead values ranging from >10 ppm to 290 ppm; zinc values ranging from >10 ppm to 225 ppm and gold values ranging from >25 ppb to 1,090 ppb.
Chandrapur	Chikmara-Tambegadi Mendha area	-	-	-	-	-	Reconnaissance survey (G4) stage investigation was carried out with an objective to identify copper and associated mineralisation around the study areas. The main host rock for copper mineralisation in the explored area was ferruginised gneisses copper mineralisation that was found to occur within numerous secondary ferruginous veins. Two zones (One 700 m and other 300 m) were identified as potential zones for geophysical investigation. At Pathari, surface manifestation of copper was in the form of malachite veins emplaced along the gneisses. The host rock here was gneiss and BMQ.

(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		
Chromite							
Sindhudurg	Vaghmala-Morle area	1:12500	100.0	-	-	85	G-4 stage investigation was carried out in this area, with the objective to assess the potentiality for chromite and nickel, iron and manganese mineralisation in mafic/ ultramafic complex. An area of 100 sqkm was covered on 1:12,500 scale and stream sediment, bedrock and pit samples were collected. The outcrops of banded iron formation were seen in and around Kudase, north of Sasoli, Kumbrol, Sateli-Bhedshi, Mahaduvadi and Morle area. Serpentinite and talc-chlorite schist were the potential rocks for chromium and nickel mineralisation mainly exposed in western part of the mapped area. The analytical results of stream sediment samples showed chromium values ranging from 90 ppm to 32,360 ppm, Ni values from 58 ppm to 1,335 ppm, Fe values between 2.8 % and 30.7 %, Mn values from 640 ppm to 10,000 ppm and vanadium values from less than 25 ppm to 1,040 ppm. Out of the 16 bedrock samples collected from serpentinite, 13 samples showed Cr more than 2,700 ppm and 14 samples showed Ni more than 1,000 ppm. The maximum values of chromium and nickel were 2 % and 0.2 % respectively. Out of 23 BRS collected from talc-chlorite schist, 16 samples showed Ni more than 1,000 ppm and 11 samples showed Cr more than 4,000 ppm. The maximum values of chromium and nickel reported were 6.86% and 0.19% respectively. All twenty-six samples of BIF showed iron values more than 39.66 % and the maximum value was 57.70 %. Out of 26 samples of BIF, 10 samples show Mn more than 3,900 ppm and the maximum value is 23,700 ppm. Out of 39 samples of laterite, 16 samples showed iron values

(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		
							from 28 % to maximum of 37.42 % and 19 samples showed Mn more than 0.3% and maximum Mn value was 2.56 %. Out of 20 pits, 6 pits have been done in serpentinite and 14 pits in talc-chlorite schist. Samples from 10 pits in talc-chlorite schist showed the value of chromium to be more than 5,000 ppm and Ni to be more than 1,000 ppm and the maximum value of Cr was 8.2 % and the maximum value of nickel was 0.19%. Pits (2 nos.) in serpentinite showed chromium to be more than 5,000 ppm and only one pit showed Ni to be more than 1,000 ppm. Based on analytical results, 8.96 sqkm area in serpentinite and talc-chlorite schist have been demarcated as an anomalous/potential zone for chromium and nickel mineralisation.
REE							
Tumsar	Dongarla-Mohgaon block	1:12500 1:2000	50.0 2.0	35	410.0	15	Preliminary investigation (G3 stage) for locating REE & RM mineralisation in intrusive granite associated with Central India Tectonic Zone (CITZ) in the Dongarla-Mohgaon block of Tumsar area was carried out with Large-Scale Mapping of over 50 sqkm area, detailed mapping of over 2 sqkm and cumulative drilling of 410 m in 35 boreholes. Large tourmaline-bearing pegmatite (800 m x 35 m) near Dongarla area and number of discordant veins of pegmatite having approximate thickness from 1 to 15 m in the Yerli area were mapped and studied. REE-bearing mineral phases like monazite, xenotime and zircon were identified in the petrographic studies of this pegmatite. A total of 35 boreholes were drilled with two boreholes drilled in Dongarla pegmatite and 33 boreholes drilled in secondary loose material. The maximum drilling depth in loose

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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		
							material was 10 m and the minimum depth was 3.5 m. The principal rare earth-bearing minerals observed in petro-mineralogical studies in the heavy concentrate of auger samples have been identified as the rare-earth phosphates monazite (Ce, La, Y, Th, PO_4) and xenotime (YPO_4) along with zircon, garnet, tourmaline and ilmenite. Lithium concentration up to 210 ppm was observed from mica-rich zones of this pegmatite. The highest concentration of TREE of 745 ppm and in bedrock sample was found from the weathered pegmatite sample from north of Pachara area along with tungsten value of 448 ppm. Higher values of rubidium, i.e., 0.19% and that of niobium, i.e., 226 ppm were recorded in the pegmatite samples from the southeast of Village Dongarla. The secondary mineralisation was associated with the heavy fractions of alluvial/ illuvial material. Out of the 15 samples taken for geochemical analysis, 04 samples showed total REE (TREE) between 1.1% and 1.13%, one sample showed 2.43% TREE, one samples yielded 3.04% TREE, four sample yielded 0.1% to 0.3 TREE and five samples yielded 0.35% to 0.84 TREE.
Tungsten							
Nagpur	Lodhatola–Garra area,	1:2000	1.5	-	-	125	Reconnaissance survey for locating tungsten and associated mineralisation within the intrusive granite and associated pegmatites of Sausar Mobile Belt was taken up in and around Lodhatola–Garra area, Nagpur district. The exploration work comprised detailed geological mapping of 1.5 sqkm area on 1:2,000 scale in different blocks i.e., Dolara (0.4 sqkm), Chawari (0.6 sqkm) and Garra (0.5 sqkm). During mapping, the major litho-units mapped in Dolara and Chawari DM block were

(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		
							that of magnetite-tourmaline-bearing quartz-mica-rich vein within the dolomitic marble. Length of the quartz-mica-rich vein showed thickness ranging from a few metres to 30 m with length extending up to approx. 400 m in Dolara block and approx. 900 m in the case of Chawari block. A few small pegmatites and quartz veins were also noticed. Besides, 75 bedrock samples were collected from Dolara, Chawari and Garra block by both grab and channel sampling along with pit/ trench samples (50 nos.). Chemical results of 75 bedrock samples indicated poor tungsten values ranging from 0.54 to 19.05 ppm except one sample which showed tungsten value of 85 ppm and low tin values of 0.39 to 9.28 ppm.
Chandrapur	Chandankheda and Parodhi area	1:12500 1:2000	50.0	01	145.0	30	Reconnaissance survey for tungsten and associated mineralisation in and around Chandankheda and Parodhi area, Chandrapur district comprised Large-Scale Mapping of over 50 sqkm area on 1:12,500 scale and detailed mapping on 1:2,000 scale. One scout borehole of 145 m was drilled to delineate the mineral potential zone for tungsten in the area. A prominent quartz reef was seen in the mapped area. Iron staining was common in the quartz reef. Silicification was noticed along the strike of quartz reef. About 50 cu.m pitting & trenching and sampling were carried out to delineate the depth persistence and the continuity of the brecciated quartz vein and granite gneiss, respectively. Channel sampling each of 50 cm length was also collected. The desired brecciated quartz vein intersected at 54.40 m depth was observed to continue up to 99.20 m in the borehole. Out of 30 samples,

(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		
							15 samples were analysed and the highest tungsten value were reported as 2.59 ppm. During EPMA study, 10 micron size gold and silver were observed. In SEM study, pyrite magnetite and one REE phase monazite were identified in chlorite core samples.
Heavy Minerals off Maharashtra (Block-VI)		-	-	-	-	-	Preliminary assessment of lime mud in the continental margin off Maharashtra (Block-VI) was taken up to determine the distribution of lime mud, its nature, quality and quantity in the area. Bathymetry, sub-bottom profiling, gravity and magnetic surveys along with sediment sample collection with gravity corer, vibro corer and piston corer were carried out over an area of 12,060 sqkm. An area of 991 sq.km was earmarked for resource calculation and the thickness of lime mud showed variations from <13 m to >39 m. The resource calculated from the area was 7,212 million tonnes underValidated category and 6,658 million tonnes under Inferred category.
DGM							
Bauxite							
Kolhapur	Ibrahimpur	1:25000	20	-	-	30	Objective of exploration was to locate occurrences of bauxite mineral in this area. Most of the area was found covered by Deccan Trap of basalt formation of Upper Cretaceous to Lower Eocene Age. At some places it was found overlained by laterite. Scattered floats of laterite/bauxite was noticed all along hill slopes, but the density of floats was less. Exploration is in progress.
Ratnagiri	Sheel Taralwadi	1:5000	1.44	36	483.5	346	Objective of exploration was to locate occurrences of bauxite mineral in this area. Most of the area was seen covered by Deccan Trap of Basalt Formation of Upper Cretaceous to Lower Eocene Age with gentle dips. At some places (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		
							it was found overlained by laterite. Laterite & bauxite occurring in this area were residual deposit. The occurrences were in the form of pockets & lenses. All over the plateau they were seen associated with laterite cappings & owe their origin to Deccan Trap. Occurrences of irregular but conspicuous development of medium to low-grade bauxite were also noticed in the form of pockets and lenses. In the exploration area, occurrences of laterite were traced between 150 m and 250 m. Exploration is in progress.
Iron Ore							
Chandrapur	Metapar block	1:125000	2.6	17	2571.5	253	Objective of exploration was to explore the iron ore deposit to delineate the iron ore body with the extension of the earlier identified during G4 reconnaissance survey. The deposit indicated strike extension, depth persistence, structural behaviour etc. The BMGQ showed alternate bands of quartz (silica) rich layer and magnetite layer (ferruginous layer). Grunerite was observed between these two layers. The disseminated pieces of these BMGQ were found on the surface, however no surface outcrops are seen as such. Reserves/resources are yet to be calculated.
	Shiwra block	1:125000	0.24	4	489.0	41	Objective of exploration was to to explore the iron ore deposit to delineate the iron ore body with the extension of the earlier identified during G4 reconnaissance survey. The deposit indicated strike extension, depth persistence, structural behaviour etc. . The investigation area broadly comprised of granite gniesses belonging to the Archean Bengpal/Amgaon Gneissic Complex with enclaves comprising ultramafic bodies, banded magnetite grunerite quartzite (BMGQ), amphibolites 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		
							pyroxenite with vanadiferous magnetite bands. The major litho-units of the area under study were chiefly gneiss and migmatite gneisses in close association with migmatites which were well-exposed in the southern part of the area viz. Doma, Kawadsi, Jambhulghata and Bhisi. The Bengpal gneiss hosts many enclaves of older supracrustal, i.e., Sukma Group of rocks.
Limestone							
Chandrapur	Janguguda	1:50000 1:5000	1.00- 0.18	11	942.5.50	-	Objective of exploration was to continue the exploration of limestone deposit present near the Janguguda area in details.The Limestone-bearing zones were noticed to be lenticular in shape with the dominant strike towards NW. The limestone strikes NWW-SEE with varying dip from 200-300° due SW however in some places it is almost vertical.
	Khirdi-	1:50000 1:5000	2.90 1.47	2	276.5	29	Objective of exploration was to explore limestone deposit with the extension in detail near Village khirdi. The limestone bearing zones were observed to be lenticular in shape with the dominant strike towards NW. The limestone strikes NWW-SEE with varying dip from 200-300° due SW however in some places it is almost vertical.
	Ruyad-Aheri	1:50000	15.43	6	336.0	-	Objective of exploration was to continue the detailed exploration of limestone deposit present near the Ruyad-Aheri area. The block geology was ovserved to be dominated by Penganga Group of Meso to Neo Proterozoic in age. The limestone was found to occur as thin, linear or curvilinear bands within Satnala shale with faulted contact forming synclinorium. The limestone exposed on the surface were intercalated with thin marl bands, dolomitic bands and thin argillaceous/mudstones which were calcareous in nature.

(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		
Yavatmal	Adegaon-Yedad	1:25000	15	48	4548.68	2994	Objective of exploration was to delineate the limestone deposit and to calculate the reserves/ resources of limestone. In the field season 2017-18, total 14 sqkm area were covered under reconnaitory mapping during which a total of 91 grab samples were collected. Analysis results of all 91 grab samples were received. The results showed CaO % ranging from 21.20 % to 54.9 %; MgO from 0.82 % to 20.74 % and SiO_2 ranging from 1.33% to 30.03 %. Rurther prospecting was undertaken to cover the area in G3 level as per Framework guidelines (UNFC) during the FS 2018-19. The Penganga Group of rocks were found to compris dark gray limestone, dolomite, shaly limestone and shale trending NE-SW to N-S direction with varying dips of 5°-10° due west to SW, showed that the area was intensely folded. A total of 48 boreholes were completed during the field season 2018-19 with 4,548.68 m of drilling. Out of the 48 boreholes, analysis results of 24 boreholes were received and the average grade was calculated. On the basis of results it was observed that CaO, MgO and SiO_2 content in the limestone, rangeed from 34.00-46.73%, 1.22-4.49% and 4.58-24.16% respectively.
	Borgaon-Khandala	-	-	11	778.50	554	The limestone occurring in the area were found to be associated with dolomite and dolomitic limestone belonging to Penganaga group of Precambrian Age and were seen trending N30°W-S30°E with a dip of 10° to 20° due west. Boargaon-Khandla block seems to be North-west extension of Kurai and Kurli area. During the field season 2018-19, a total of 11 boreholes were drilled with the total drilling of 778.50 m. Cumulatively, a otal of 34 boreholes were drilled (FS 2017-

(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		
							18 & 2018-19) and core samples were collected and sent for chemical analysis. Core samples of Limestone were analysed to have CaO and MgO ranging from 34.10 to 47.10% and 2.14 to 8.17% respectively, while SiO_2 ranging from 7.15 to 22.14%. The strike length of the limestone in the area was about 2.50 km and width was seen ranging from 300 m to 600 m. The width of limestone belt was about 300 m and towards northern portion of the block the limestone was of low grade (CaO 26.60 to 29.60% and MgO 6.21 to 14.01%).
	Kurai block	-	-	5	517.0	505	Objective of exploration was to delineate the limestone deposit and to calculate the reserves/ resources of limestone. 1) The Velabai – Kurai belt was about 20 km SSE of Wani town. The investigated belt showed a strike length of about 5.5 km from East of Velabai to East of Kurai with width varying from 2 km to 2.5 km. The limestone bands were observed alternately with dolomite. The general strike of the limestone and dolomite bands was N 30° W – S 30° E with dips varying from 10° to 30° towards SW. The limestone band were observed to range in length from 600 m to a kilometer with width in the range of 10 m to 40 m. The thickness of limestone beds in these bands was in the range from 01 to 15 m.
	Kurli block	-	-	7	448.50	270	Objective of exploration was to delineate the limestone deposit and to calculate the reserves/ resources of limestone. The investigated belt was about 5.5 km in strike length from East of Velabai to East of Kurai with width varying from 2 km to 2.5 km. The limestone bands were observed alternately with dolomite.The general strike of the

(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 and dolomite bands was N 30° W – S 30° E with dips varying from 10° to 30° towards SW. The limestone band was found to range in length from 600 m to a kilometer with a width ranging from 10 m to 40 m. The thickness of limestone beds in these bands was in the range from 01 to 15 m.
Manganese ore							
Bhandara	Alesur-Gonditola	1:25000 1:5000	9.0 3.72	2	374.0	13	Objective of exploration was to delineate the manganese deposit and to calculate the reserves/ resources of manganese ore. The area covered fall in Alesur, Gonditola and Village Itapur. Regionally, the area indicates ENE–WSW trend. The prominent topographic features are the Chikla and Sitasaongi hills marked by the presence of Manganese ore horizons. The surrounding low lying area was found mostly underlain by Tirodi gneisses, with linear bands of Mansar and Sitasaongi Formation. In the area, the exposed rock formation belongs to Tirodi, Sitasaongi and Mansar Formations and manganese ore horizon with intrusive quartz veins and pegmatities. The manganese ore horizon was found to occur in the lower part of the sequence of meta-sedimentary rocks of Sausar group of Pre-Cambrian Age.
	Hiwra block	-	-	3	247.0	5	Objective of exploration was to delineate the manganese deposit of Hiwra block and to calculate the reserves/resources of manganese ore. The Hiwra block in Mohadi tehsil of Bhandara district was a part of Sausar belt in Maharashtra known for manganese occurrences. G4 exploration was done with the objective of demarcating the rock types of manganese-bearing Mansar Formation and assessing the manganese ore resource in the block.

(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		
Nagpur	Madri-Panchala	-	-	4	261.0	6	Objective of exploration was to delineate the manganese deposit of Madari-Panchala area and to calculate the reserves/resources of manganese ore. MECL carried out regional exploration (G4 level) and concluded that the manganese mineralisation and associated gondite occur as four discontinuous bands trending WNW-ESE, separated by quartz muscovite biotite schist. Four scout boreholes were undertaken by MECL in the area to know the strike and dip continuity of Manganese ore lenses. Among the four boreholes drilled by MECL, mineralised zone was encountered in three boreholes MMLM-1, MMLM-2 and MMLM-3. In MMLM-1, mineralised zones were encountered at the depths of 59.50 m and 66.73 m the thickness of 2.00 m & 2.97 m respectively. The mineralised zones encountered in MMLM-2 were at the depths of 47.75 m and 50.50 m with thickness of 1.50 m & 0.50 m respectively. In MMLM-3, the mineralised zone encountered was at the depth of 33.00 m with thickness of 1.20 m.
MECL							
PGM							
Chandrapur	Pathri Saoli block	1:12500	160.0	2	261.0	117	G4 stage exploration was taken up in Pathri Saoli block in Saoli tehsil, Chandrapur district. Exploration comprised mapping of 160.00 sqkm area on 1:12,500 scale, sampling and analysis of 43 bedrock samples, 50 soil samples, 19 stream sediments samples and 5 whole rock study. Analysis of samples showed weak sporadic mineralisation in the block. The values of PGE and Cr in a few samples were notable in isolated patches. No further study has been proposed in this block.

(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		
Sindhudurg	Dhanoli bazar block	1:12500	171.0	-	-	153	G4 level exploration was taken up in Dhanoli bazar block with the objective to carry out mapping and to demarcate the Au, Fe Ni, Cr and PGE-bearing formation and to evaluate the resource estimation. An area of 171.00 sqkm was mapped on 1:12,500 scale and 153 different types of samples were collected. Samples were analysed for Fe, Au, Ag, PGE (Pt, Pd, Ir, Ru, Rh & Os) and Cr & Ni. Higher values of Ni (>1000 ppm), Cr (>1000 ppm) and PGE (Pt>100 ppb) were reported in areas of ultramafic bodies and one laterite body. Four tentative potential zones for Ni, Cr and PGE were found near Gholawadi, Parpoli, Amboli and Fansawade areas. The values of Ni, Cr and PGE showed higher concentration in some utramafic and latertite bodies (up to 2,297 ppm Ni in a lateritic body in eastern part of the block; 3,298 ppm Cr & 255.01 ppb Pt in Olive gabbro in the SE corner of the block). Reserves/resources of the block have not been estimated. The block does not seem promising for Fe, Au & Ag. The area falls in ecologically sensitive zone.
Barium, Gold, Silver, Copper, Lead & Tungsten							
Nanded	Aurala-Sawali block	1:12500	100.00	-	-	444	No evidence of direct mineralisation were noticed as most of the area is covered by black cotton soil. Outcrops of granite are also devoid of any mineralisation. Except for high Ba values reported from dug well situated north of Kotala and Aurala and in areas near by Village Torna, rest the analysis of rest of the bedrock, stream and soil samples was indicative of poor mineralisation for barium in the study area. The geochemical analysis results for Cu, Pb, Au, Ag & tungsten showed very discouraging results.

Table – 4: Mineral Production in Maharashtra, 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$
All Minerals		**73**		**57375391**	**77**		**54757349**	**65**		**59118321**
Coal	'000t	-	40559	-	-	42219	-	-	49818	-
Bauxite	t	13	1946032	942724	14	2028765	955340	12	1424864	721898
Chromite	t	1	1	5	1	17	82	1	-	-
Iron Ore	'000t	16	1321	1152442	15	940	1029104	11	660	888797
Manganese Ore	t	19	604300	6181596	24	731457	7243631	20	761424	8225757
Fluorite(graded)	t	1	1175	6733	1	1314	8646	1	1079	8483
Kyanite	t	4	3253	13458	4	7818	23277	4	4889	15228
Sillimanite	t	1	6196	22739	1	3194	10904	1	13404	49907
Limestone	'000t	18	12124	2840194	17	14152	3134365	15	14991	3267651
Sulphur #	t	-	48991	-	-	58904	-	-	46967	-
Minor Minerals		-	-	46215500	-	-	42352000	-	-	45940600

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

(contd)

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
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)

(contd)

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
Century Rayon, Shahad, Distt Thane	25 (rayon yarn) 20 (caustic soda)
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)

(contd)

Table - 5 (Concld.)

Industry/plant	Capacity ('000 tpy)
RCF, Trombay	330 (Urea) 690 (Complex)
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
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)

(contd)

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
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

(contd)

Table - 5 (Concld.)

Industry/plant	Capacity ('000 tpy)
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.*