

STATE REVIEWS



# Indian Minerals Yearbook 2019

(Part-I)

58<sup>th</sup> Edition

STATE REVIEWS  
(Odisha)

(ADVANCE RELEASE)

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## ODISHA

### Mineral Resources

Odisha is the leading producer of chromite, garnet (abrasive), bauxite, manganese ore, iron ore, sillimanite, quartzite and dolomite. The State hosts the country's sole resources of ruby. It accounts for the country's 96% chromite, 93% nickel ore, 90% PGM metal, 69% cobalt ore, 51% bauxite, 44% manganese, 34% iron ore (haematite), 25% sillimanite, 24% fireclay, 23% pyrophyllite, 20% vanadium ore, 17% mica, and 10% dolomite resources. As per AMD of the Department of Atomic Energy, Odisha, accounted for 150.62 million tonnes of rutile resources.

Important minerals that occur in the State are: **bauxite** in Balangir, Kalahandi, Kandhamal, Kendujhar, Koraput, Malkangiri, Rayagada & Sundargarh districts; **china clay** in Bargarh, Boudh, Balangir, Kendujhar, Koraput, Mayurbhanj, Sambalpur & Sundargarh districts; and **chromite** in Balasore, Cuttack, Dhenkanal, Jajpur & Kendujhar districts. Chromite deposits of Sukinda and Nuasahi ultramafic belt constitute 95% of the country's chromite resources. Besides, **coal** occurs in Ib river valley and Talcher coalfield, Dhenkanal district; **dolomite** in Bargarh, Kendujhar, Koraput, Sambalpur & Sundargarh districts; **dunite/pyroxenite** in Kendujhar and Sundargarh districts; **fireclay** in Angul, Cuttack, Dhenkanal, Jharsuguda, Khurda, Puri, Sambalpur & Sundargarh districts; **garnet** in Ganjam, Kalahandi & Sambalpur districts; **graphite** in Bargarh, Boudh, Balangir, Kalahandi, Koraput, Nuapada & Rayagada districts; **iron ore (haematite)** in Dhenkanal, Jajpur, Kendujhar, Koraput, Mayurbhanj, Sambalpur & Sundargarh districts; **iron ore (magnetite)** in Mayurbhanj district; **limestone** in Bargarh, Koraput, Malkangiri, Nuapada, Sambalpur & Sundargarh districts; **manganese ore** in Balangir, Kendujhar, Koraput, Rayagada, Sambalpur & Sundargarh districts; **Pyrophyllite** in Kendujhar district;

**quartz/silica sand** in Boudh, Balangir, Kalahandi, Sambalpur & Sundargarh districts; **quartzite** in Balangir, Dhenkanal, Jajpur, Jharsuguda, Kendujhar, Mayurbhanj, Sambalpur & Sundargarh districts; **sillimanite** in Ganjam & Sambalpur districts; **talc/steatite/soapstone** in Mayurbhanj, Sundargarh & Sambalpur districts; **titanium minerals** in Dhenkanal, Ganjam, Jajpur & Mayurbhanj districts; and **zircon** in Ganjam district.

Other minerals that occur in the State are **asbestos** in Kendujhar district; **cobalt** in Cuttack & Jajpur districts; **copper** in Mayurbhanj & Sambalpur districts; **granite** in Angul, Boudh, Balangir, Cuttack, Deogarh, Dhenkanal, Ganjam, Kendujhar, Khurda, Koraput, Mayurbhanj, Nuapada, Rayagada & Sambalpur districts; **lead** in Sargipalli area, Sundargarh district; **mica** in Sonepur district and **nickel** in Cuttack, Kendujhar & Mayurbhanj districts. Occurrences of **ruby** and **emerald** are reported from Balangir and Kalahandi districts, respectively. **Platinum Group of Metals** occur in Kendujhar district; **silver** in Sundargarh district; **tin** in Koraput & Malkangiri districts; and **vanadiferous magnetite** occurs in Balasore & Mayurbhanj districts (Table-1). The various coalfields along with their reserves/resources are given in Table - 2.

### Exploration & Development

The details of exploration activities conducted by GSI for iron ore, manganese ore, coal & REE and other agencies during 2018-19 are furnished in Table - 3.

### Production

The important minerals produced in the state were coal, bauxite, chromite, iron ore and manganese ore, graphite, limestone and sillimanite etc. during 2018-19.

The value of minor minerals' production was estimated at ₹ 86 crore for the year 2018-19.

The number of reporting mines in 2018-19 was 134 in case of MCDR minerals (Table-4).

**Table – 2: Reserves/Resources of Coal as on 1.4.2019: Odisha**

(In million tonnes)

Coalfield	Proved	Indicated	Inferred	Total
<b>Total</b>	<b>39654.47</b>	<b>33472.75</b>	<b>7713.12</b>	<b>80840.34</b>
Ib-River	15196.72	10812.42	3610.53	29619.67
Talcher	24457.75	22660.33	4102.59	51220.67

*Source: Coal Directory of India, 2018-19.*

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

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	-	-	-	-	-	-	-	10000	37200	9500	-	56700	56700
Bauxite	'000 tonnes	176002	411	148856	325269	166547	66189	280396	365938	155253	590780	44202	1669305	1994574
China clay <sup>#</sup>	'000 tonnes	-	-	-	-	3600	3503	5018	368	35770	236546	1354	286157	286157
Chromite	'000 tonnes	64150	12427	24835	101412	67311	15529	33354	26850	32372	33434	20452	229301	330714
Cobalt	million tonnes	-	-	-	-	-	-	-	30.63	-	0.28	-	30.91	30.91
Copper														
Ore	'000 tonnes	-	-	-	-	-	-	-	1420	2536	2095	-	6051	6051
Metal	'000 tonnes	-	-	-	-	-	-	-	21.69	21.06	20.69	-	63.44	63.44
Dolomite <sup>#</sup>	'000 tonnes	109551	6421	34839	150811	42521	33896	110904	48535	46683	330660	85884	699082	849892
Dunite <sup>#</sup>	'000 tonnes	308	-	-	308	172	1925	6215	686	307	2531	-	11837	12145
Fireclay <sup>#</sup>	'000 tonnes	133	-	40	173	3074	12376	4495	26219	42925	83662	-	172751	172924
Garnet	tonne	8459821	-	585130	9044951	5	-	-	-	-	348000	-	348005	9392956
Granite <sup>#</sup>														
(Dim. Stone)	'000 cu. m	-	80000	-	80000	-	-	-	330328	-	1432492	5160	1767980	1847980
Graphite	tonne	209795	-	249176	458971	9314306	3312065	1415295	696021	838559	2628394	304628	18509268	18968239
Iron ore														
(Haematite)	'000 tonnes	1830569	252615	489034	2572217	1180055	704302	530440	271349	426493	1773077	100730	4986447	7558664
Iron ore														
(Magnetite)	'000 tonnes	74	-	-	74	8	-	-	27	-	43	-	79	152
Laterite <sup>#</sup>	'000 tonnes	-	-	-	-	-	-	-	-	-	-	1227	1227	1227
Lead-Zinc														
Ore	'000 tonnes	-	-	-	-	-	961	119	-	-	670	-	1750	1750
Lead metal	'000 tonnes	-	-	-	-	-	34.32	4.25	-	-	38.39	-	76.96	76.96
Limestone	'000 tonnes	255555	77879	61007	394442	173797	548527	420634	139924	50397	361350	32635	1727264	2121706
Manganese ore	'000 tonnes	16703	10528	3413	30643	32622	23942	37292	16130	15119	48764	11889	185760	216403
Mica <sup>#</sup>	kg	-	-	-	-	-	-	51856000	-	26712000	26712000	-	105280000	105280000
Nickel ore	Million tonnes	-	-	-	-	-	20.84	20.62	30.85	51.06	51.26	-	174.63	174.63
Pt. Group of metals	tonne	-	-	-	-	-	-	-	-	7.7	6.5	-	14.2	14.2
Pyrophyllite <sup>#</sup>	tonne	2781889	1094902	-	3876791	6978702	216661	766105	80	40	1782070	68401	9812058	13688848
Quartzite <sup>#</sup>	'000 tonnes	20050	151	18381	38582	16861	6914	5128	364	274	71503	927	101971	140554
Quartz-														
Silica sand <sup>#</sup>	'000 tonnes	567	109	725	1401	344	2038	2918	93	63308	3944	179	72824	74225
Rare-earth elements	tonne	-	-	-	-	-	-	-	-	6353	19140	-	25493	25493
Ruby	kg	-	-	-	-	-	429	3296	-	-	1623	-	5349	5349
Sillimanite	tonne	-	572868	427705	6156573	-	-	6557013	-	-	4943600	-	11500613	17657186

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Table – 1 (concl'd)

Mineral	Unit	Reserves			Feasibility STD211	Pre-feasibility		Remaining Resources			Total resources (A+B)	
		Proved STD 111	Probable STD121	STD122		Total (A)	STD221	STD222	Measured STD331	Indicated STD332		Inferred STD333
Silver												
Ore	tonne	-	-	-	-	960500	119000	-	-	670000	-	1749500
Metal	tonne	-	-	-	-	27.34	3.4	-	-	34.17	-	64.91
Talc/Steatite/												
Soapstone <sup>#</sup>	000 tonnes	-	-	8	10	89	193	151	-	278	-	817
Tin												
Ore	tonne	-	-	-	-	636	-	-	1166	1000	-	15494
Metal	tonne	-	-	-	-	500.78	-	-	22.2	10	-	567.61
Vanadium												
Ore	tonne	-	-	-	-	1220000	-	-	232000	3412795	-	4864795
Metal	tonne	-	-	-	-	2135	-	-	487.2	10935.74	-	13557.94

Figures rounded off.

# Declared as Minor Mineral vide Gazette Notification dated 10.02.2015

## Minor Mineral before Gazette Notification dated 10.02.2015

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Table –3 : Details of Exploration Activities in Odisha, 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>Coal</b>							
Sundargarh	Kendudihi block Ib-river coalfield	-	-	5	2662.50	-	G2 stage General exploration for coal was carried out in this area. The exploration involved a total of 2,662.50 m drilling in 5 boreholes (drilling in 2 boreholes are in progress), and collection of a total of 435.56 m coal sample. The boreholes intersected Raniganj (Max.: 91.35 m), Barren Measures (Max.: 212.75 m), Barakar (Max.: 447.04 m) and Karharbari (Max.: 14.50 m) Formations and basement rocks (Max.: 7.05 m) successively from top to bottom. The exploration work also established the occurrence and continuity of two regional coal seam zones of Raniganj Formation, i.e., R-II, and R-I (from top to bottom) and four regional coal seam zones of Barakar Formation, i.e., Parkhani, Lajkura, Rampur and Ib (from top to bottom). Rampur seam zone was the thickest among the Barakar and important from coal resource point of view. Continuity of regional coal seam zones of Raniganj and Barakar Formations about 2.5 km along strike and 2.5 km along dip direction was established.
Angul	Khandanal	1:10000	4.0	3	1800.10	-	G2 stage general exploration for coal was carried out in Khandanal block, Talcher coalfield. During exploration, an area of around 4.00 sqkm was mapped on 1:10,000 scale and a total of 1,800.10 m were drilled in three boreholes. The litho-units of Kamthi Formation (max. thickness 164.17 m), Barren Measures Formation (max. thickness 133.17 m), Barakar Formation (Max thickness 376.06 m) and Karharbari Formation (max. thickness 51.80 m+) were intersected downward sequentially in the borehole. Coal seam zones only have been intersected in Barakar Formation and no coal seam have been intersected in Karharbari Formation so far.

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## STATE REVIEWS

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		
							Eight regional coal seam zones (II to XI in ascending order) having cumulative coal thickness of 166.27 m were intersected between the depth ranges from 224.09 m to 609.18 m in Barakar Formation. Subsurface data of the block and adjoining area suggested that the cumulative coal thickness gradually showed a decrease from south to north direction. Coal seam zones were seen generally associated with fine clastic-rich sediments, such as, carbonaceous shale, etc. The exploration will continue.
<b>Iron Ore</b> Kendujhar	Nuagan west block	1:2000	0.65	25	2000.0	-	General exploration (G2) for iron ore in Nuagan west block, Kendujhar district, was carried out to assess the iron ore potential. Detailed geological mapping of 0.65 sqkm on 1:2,000 scale along with 25 cu.m pitting/trenching and 2,000 m drilling were carried out. Within the freehold area, ore body was exposed on the surface for a maximum length of 400 m from both across and along the strike. A total of 2,000 m were drilled in 25 boreholes. All the boreholes intersected mineralised zones except five boreholes. The thickness of ore zones (including low-grade ore) intersected as per visual estimation showed variations from 2.00 m to 52.70 m. Maximum and minimum thickness of the ore zones were 52.70 m and 2.00 m. The borehole intersected mineralised zone comprised lateritic ore, reddish to brown powdery ore, hard laminated ore, lateritised hard laminated ore, minor soft laminated ore with intercalations of shale/ferruginous shale and minor pieces of banded haematite chert/ BHJ.
Sundargarh	Alaghat west block	-	0.50	04	251.30	Core samples and 16 other samples	In Alaghat west block in Sundargarh district, detailed mapping of 0.50 sqkm was carried out. An iron ore body of length 300 m with width varying from 30 to 100 m was mapped. A total of 251.30 m

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## STATE REVIEWS

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		
							drilling were carried out in four boreholes. The cumulative thickness of the ore zone intersected in the boreholes was found to vary from 20.00 m to 60.0 m. The maximum and minimum values of total Fe in the borehole cores were 64.62% and 24.66%. Other than the core samples, 5 water samples, 10 nos. of soil samples for abiotic parameter studies and one surface sample for bench-scale beneficiation studies were collected.
Kendujhar	Nuagan west block	1:12500	100.0	-	-	184	Reconnaissance survey (G4) for iron and manganese ore was carried out in Tikiba-Phasimal-Ardapal area. The study area falls within the transition zone of Singhbhum craton and Eastern Ghat mobile belt. The exploration work comprised Large-Scale Mapping of 100 sq km area on 1:12,500 scale and 50 cu. m of pitting and trenching. A total of 108 bedrock, 45 pit/trench sample, 11 PCS, 15 samples for REE and 5 samples for Au were collected for chemical analysis. Four zones (3 zones from BRS samples and 1 from PTS samples) of low-grade iron ore were delineated, i.e., 49.5% Fe over 10 m in south of Tikiba, 50.9% Fe over 10 m in south of Kirmaloi, 54.64% Fe over 5 m in north of Kirmaloi and 46.8% of Fe and 4.88% of Mn over 10 m in Fe-Mn laterite of Fashimal. Surface trenching and pitting as well as field observation in Tikiba and Village Beluamal revealed surfacial nature of iron and manganese mineralisation. Iron ore viz. haematite, goethite, limonite and manganese ore like pyrolusite and psilomelane were observed associated with garnetiferous quartzo-felspathic gneiss of transitional zone.
Kendujhar and Sundargarh	Gandhalpada west block	1:4000	2.0	12	1143.53	-	Preliminary exploration (G3) for iron ore in this area was taken up to assess the iron ore potential for augmentation of resources.

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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		
							Detailed mapping of 2.00 sqkm was carried out on 1:4,000 scale. The mapped area comprised lateritised hard laminated iron ore, fragmentary iron ore, shale, laterite and soil. Out of the twelve boreholes drilled to a cumulative depth of 1,143.55 m, 6 boreholes intersected cumulative ore zone of 34.00 m, 13.00 m, 11.00 m, 21.00 m, 10.00 m and 5.00 m. In the two boreholes, thick zones of 46.00 m and 18.00 m of peat/lignite were intersected. Resins, seed and wood materials were also observed in both the boreholes. This is the first reported occurrence of peat/lignite zone in the Bonai-Kendujhar Belt. Preliminary iron ore resources estimated over two cross-sectional lines in the block (as per the available chemical data and also by visual estimation) was placed at 27.60 MT at 45% Fe cut off.
Sundargarh	Kedesala NE block	1:4000	1.0	1	41.70	-	Preliminary exploration (G3) for iron ore in this area comprised mapping of 1.00 sqkm area on 1:4,000 scale, drilling of 41.70 m and pitting/trenching of 50 cu.m. The iron ore was found to occur as capping and as isolated lenses over the BHJ or as gently dipping bands over ferruginous shale and occasionally over volcanics. At places near hinge of folds, small lensoidal bodies of lateritic and massive iron ore were developed. The iron ore in the block were in the form of SLO, powdery ore, blue dust, lateritic iron ore and ferruginous shale. As noticed in some boreholes, the soft laminated ore was found underlain by ferruginous shale and blue dust zone, followed by BHJ & BHQ, whereas in others it directly was observed to rests on BHJ. The iron ore in the block extends for a strike length of about 2 km with a maximum width of 400 m but the average width showed variations from 250 to 300 m. Analytical result of one borehole showed high-grade iron ore of 6 m

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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		
							with average grade of 57.91 % Fe and low-grade iron ore of 22 m with average grade of 49.47 % Fe.
<b>Manganese Ore</b>							
Bolangir	Balikhamar block						Preliminary exploration (G3) for manganese was carried out in this area. The area that forms the southeastern part of the Precambrian Eastern Ghat Granulite belt exposed major rock types, such as, granite gneiss, quartzite, khondalite and calc-silicate. Laterite was found to occur as a thin veneer over the khondalite. The manganiferous zone/horizon follows the regional foliation of the area. The manganiferous zone was seen confined to Khondalite suite of rocks. The ore body exposed near Balikhamar village was of width around 10 m. The mineralisation was found as structure controlled following the foliation of the rock. A total of 785 m of drilling in 13 boreholes along with pitting and trenching of 100 cu. m were carried out to know the strike and depth persistence of Mn band. In the boreholes, manganese mineralisation up to 3 m has been intersected at different depths. The ore minerals are mostly pyrolusite and psilomelane.
Ganjam	Boirani-Sadabartan area	1:2000	2.0	03	205.30	78	G3 stage preliminary exploration for manganese was carried out in Boirani-Sadabartan area, Ganjam district with an objective to delineate the potential zones of manganese mineralisation and evaluate the economic potentiality for future exploration. An area of 2 sqkm was mapped on 1:2,000 scale along with bedrock sampling (78 nos.), pitting/trenching (120 cu. m) and drilling to understand the nature and disposition of different litho-units and to assess their potentiality for manganese mineralisation. A total of 205.30 m drilling were carried out in 3 boreholes. The boreholes were drilled at 100 m interval along the strike. Three boreholes were planned on

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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		
<b>REE</b> Angul	Kangula Adiaghai area	1:10000	100.0	-	-	266	<p>eastern and western part of the block near Boirani-Sadabartan area, mapped during field session 2018-19, to establish the sub-surface continuity of manganese ore band that was established on the surface by way of trenches over 500 m strike length but no ore zone was intersected. Detailed Geological mapping revealed two discontinuous manganese ore bands which were exposed in outcrops and in trenches. Its width showed variations from 3 m to 4 m and its strike continuity was established for 110 m and 30 m respectively. The ore body within this zone occurred in the form of lenses, stringers, pockets and as fragmented bands.</p> <p>Reconnaissance survey for Columbite-Tantalite and REE in pegmatite was carried out in an area of over 100 sqkm through Large-scale Mapping on 1:10,000 scale. The petrographic and ore microscopy studies of pegmatites revealed that microcline and albite were the dominant feldspars with subordinate muscovite and quartz. Accessory minerals viz. garnet, tourmaline, apatite, rutile, zircon, beryl and monazite were also seen in petrographic studies. The REE analysis of a BRS sample (BRS-9) showed total REE value as 1,492.64 ppm and the samples BRS-5 and BRS-14 showed the total value of REE as &gt; 500 ppm. The REE analysis of BRS samples (BRS-30 and BRS-07) showed REE (Ce) value as 494.497 ppm and 991.844 ppm. A few Channel samples collected from the Bauli Nadi pegmatite body showed total value of REE ranging between 469 ppm and 730 ppm. Soil samples did not show any significant anomaly for REE, etc.</p> <p>During G4 stage reconnaissance survey, Large-scale Mapping, pitting-trenching (100 sqkm) and</p>

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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		
<b>Graphite</b> Angul	Adeswar- Ambasarmunda- Dhauragoth area	1:12500	100.0	5	419.45	-	drilling were carried out in Adeswar, Ambasarmunda and Dhauragoth area. Geophysical anomalies observed in previous field studies were demarcated during Large-scale Mapping and through trenching. Anomalies were demarcated near Village Bandagan (about 100 m strike length), Bandagan-Talamaliha road (50 m strike length), near south of Village Ambasarmunda (300 m strike length) and Village Akharkata (50 m strike length). Besides, 3 new graphite bands are identified in south of Village Talamaliha (50 m strike length), near Bandhagan school (50 m strike length) and near Village Mindol (200 m strike length). Total of 419.45 m drilling has been completed (5 boreholes completed and one is in progress). All the boreholes intersected graphite of variable width at different depth. Part analytical results of pitting-trenching samples collected along the profile of borehole ODADW-01 showed a zone of 3.0 m x 6.93% F.C., ODADW-02 (PTS 4) showed a zone of 4.0 m x 5.1025% F.C. and the analytical results of PTS-03 (along the profile of borehole ODADW-05) showed 2.0 m x 5.41% FC and 2.0 m x 4.84% F.C. The analytical results of 25 BRS samples showed <1% F.C to 27.53% F.C. From these, 11 samples showed more than 5% F.C value. The exploration will continue in field season 2019-20.
<b>DGM Coal</b> Jharsuguda	Madhupur block of Ib Valley coalfield	-	7.56	07	14702.0	-	Exploration for coal over an area of 7.56 sqkm was continued from previous field session in Madhupur block of Ib Valley coalfield, Jharsuguda district. A total of 1,472.00 m drilling in 7 boreholes and sampling of 257.94 m core was carried out during the year 2018-19. So far, 318.919 million tonnes of net proved resources and 134.281 million tonnes

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## STATE REVIEWS

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		
							gross Indicated resources of coal have been estimated in this block. Exploration will continue in the area.
<b>Chromite</b>							
Keonjhar	Madhuban area	-	0.8	03	150.66	11	Directorate of Geology continued exploration for chromite in Madhuban area in Keonjhar district. The work included geophysical mapping of 0.8 sqkm area, drilling of 3 boreholes to a cumulative depth of 150.60 m and collection of 11 core samples for chemical analysis. There was no significantly perceptible chromite mineralisation noticed in the area.
Dhenkanal	Mathkargola area	1:12500 1:5000	150.0 1.05	-	-	41	During exploration for chromite in Mathkargola area, Dhenkanal district, an area of 150.00 sqkm was mapped on 1:25,000 scale & 1.05 sqkm area on 1:5,000 scale. About 74.16 cu. m material was excavated in 15 pits and 41 samples were collected for chemical analysis. The area has been recommended for geophysical prospecting.
<b>Iron Ore</b>							
Sundargarh	Dholtapahar	1:2000	0.61	19	982.25	366	During 2018-19, Directorate of Geology, Odisha, has continued exploration to assess iron ore resources in Dholtapahar, Sundargarh district. An area of 0.605 sqkm was mapped on 1:2,000 scale and 10.00 cu m material were excavated in one pit. Cumulative drilling of 982.25 m was completed in 19 boreholes and 366 samples were collected for chemical analysis. The total resources estimated was placed at about 23.922 million tonnes.
	Ganua area	1:2000	1.10	04	31.91	15	In Sundargarh district, exploration for iron and manganese ore in Ganua area was carried out by mapping of 1.10 sqkm area on 1:2,000 scale. A total of 4 boreholes were drilled to a depth of 31.91 m and 15 samples were collected. The holds isolated patches of lateritic iron ore and Fe content were found

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## STATE REVIEWS

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		
							to vary from 42.59 to 59.02%. The area is not potentially mineralised.
<b>Iron Ore &amp; Manganese Ore</b>							
Keonjhar		-	-	111	6076.0	2119	During exploration for iron and manganese ore in SGB mines in Keonjhar district, 111 boreholes were drilled to a total depth of 6,076.00 m and 2,119 core samples were collected for analysis. Exploration in the area will continue after clearance from MoEF.
<b>Limestone</b>							
Bolangir	Telipadar	1:2000	1.10	29	773.00	338	Thickness of limestone was found to vary from 5.4 m to 34.88 m. The limestone was observed to extend over a length of 1,114.0 m with width of about 1064.0 m. A total of 288.39 m of hard crystalline limestone were encountered in 16 boreholes. Exploration will continue.
<b>MECL</b>							
<b>Iron Ore</b>							
Rayagada and Kalahandi	Ambadala- Sunakhunti area	1:12500	100.0	-	-	202	G4 level exploration in Ambadala-Sunakhunti area, Rayagada and Kalahandi districts was carried out with the broad objectives to (i) map and demarcate mineralisation & other geological features, (ii) collect samples and analyse them for copper, gold & molybdenum, etc. The study involved mapping of 100.00 sqkm area on 1:12,500 scale with bedrock samples of (102), trench samples (6) alongwith 228.5 cu. m of excavation. Surface channel samples (11), trench/channel samples (89) were collected for analysis. All samples were analysed and the block did not seem promising for further exploration.
<b>Iron Ore</b>							
Sundargarh	Jhumka- Pathriposhi	1:2000	157.00	56	3967.60	5701	A total of 145.50 million tonnes iron ore resources under UNFC code 332/331 were estimated with the average grade of 56.14% Fe, 6.36% SiO <sub>2</sub> and 6.52% Al <sub>2</sub> O <sub>3</sub> over a strike length of 2,387 m.

(contd)

## STATE REVIEWS

Table – 3 (concl'd)

Agency/ Mineral/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
<b>Heavy Minerals</b>							
off Chilka							
Evaluation of placer minerals resource of the territorial waters off Chilka, Odisha was taken-up to assess the heavy mineral concentration in closed grid vibro-coring (1 km × 1 km). An area of 55 sq. km was covered and total of 94 lkm bathymetry survey was carried out. A total of 66 core samples were collected with core length varying from 0.68 m to 4 m with an average core length of about 2.10 m. Heavy mineral weight percentage varies from 0.3 to 2.1% and is not encouraging for placer mineral resource evaluation.							

**Table - 4 : Mineral Production in Odisha, 2016-17 to 2018-19  
(Excluding Atomic Minerals)**

(Value in ₹'000)

Mineral	Unit	2016-17			2017-18			2018-19 (P)		
		No. of mines	Qty	Value <sup>\$</sup>	No. of mines	Qty	Value <sup>\$</sup>	No. of mines	Qty	Value <sup>\$</sup>
<b>All Minerals</b>		<b>135</b>		<b>161051823</b>	<b>134</b>		<b>196957766</b>	<b>134</b>		<b>302559015</b>
Coal	'000t	-	139359	-	-	143328	-	-	144312	-
Bauxite	t	3	11990006	7238829	5	11447741	7781436	5	15413642	10803688
Chromite	t	22	3726994	31933702	21	3480924	32036923	22	3970688	35836111
Iron Ore	'000t	66	99617	115628185	62	102186	150845108	63	113055	249545424
Manganese Ore	t	32	587517	3547363	33	516862	3497593	30	464665	3197782
Garnet (abrasive)	t	*	22076	133979	*	34170	242504	*	38376	393288
Graphite (r.o.m.)	t	4	16374	10684	5	14674	7172	3	23200	17500
Iolite	kg	-	-	-	-	-	-	3	86	988
Sillimanite	t	1	15572	103865	1	16698	111376	1	17035	138279
Limestone	'000t	7	4752	1598449	7	4968	1578887	7	5289	1769188
Sulphur <sup>#</sup>	t	-	86734	-	-	231075	-	-	239344	-
Minor Minerals <sup>@</sup>		-	-	856767	-	-	856767	-	-	856767

Note: The number of mines excludes fuel and minor minerals.

\$ Excludes the value of Fuel minerals.

\* Associated with Sillimanite.

# Recovered as by-product from oil refinery.

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

## STATE REVIEWS

**Mineral-based Industry**

The present status of each mineral-based industry is not readily available. However, the important large and medium mineral-based industries in organised sector in the State are given in Table - 5.

**Table – 5: Principal Mineral-based Industries**

Industry/plant	Capacity ('000 tpy)
<b>Aluminium/Alumina</b>	
Hindalco Industries Ltd, Hirakud	215 (aluminium)
Hindalco Industries Ltd, Aditya Aluminium, Lapanga, Distt Sambalpur	360 (aluminium)
NALCO, Damanjodi, Distt Koraput	2275 (alumina)
NALCO, Angul	460 (aluminium)
Utkal Aluma, Rayagada	1500 (alumina)
Vedanta Aluminium Ltd, Lanjigarh, Distt Kalahandi	2000 (alumina) 1500(Venadium)
Vedanta Aluminium Ltd, Jharsuguda, Distt Sambalpur	1750 (aluminium)
<b>Asbestos Products</b>	
UAL Industries Ltd, Korian, Distt Dhenkanal	NA
Konark Cement & Asbestos Industries Ltd, Bhubaneshwar	NA
<b>Cement</b>	
ACC Ltd, Bargarh Cement Ltd, Bargarh	2140
Ultra-Tech Cement Ltd, Jharsuguda (G)	2600
OCL India Ltd, Rajgangpur, Distt Sundargarh	4000 1064(Refractory) 2900(Clinker)
OCL India Ltd, Kapilas (G), Cuttack	1350
Toshali Cements Pvt Ltd, Ampavalli, Distt Koraput	200
<b>Ceramics</b>	
Prabhu Ceramics & Minerals Pvt Ltd, Majhipali, Rengali, Sambalpur	24( Acidic Ramming Mass) 9.6(EBT Filling Mass)
<b>Chemical</b>	
Arrow Minerals & Metals Pvt. Ltd, Vejidihi, Banspal	1.8(Manganese Oxide) 2.25(Manganese dioxide powder)
<b>Chrome Concentrate</b>	
K L Resources PVT. Ltd, Sundaria, Dharmasala	74.7

(contd)

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
Maharaja Minerals Pvt. Ltd, Soso Hatadidi	60
Anand Exports, Nimmapali, Sukinda	60
<b>Fertilizer</b>	
IFFCO, Paradeep	NA
Paradeep Phosphates Ltd, Paradeep	NA
SAIL Fertilizer Plant, Rourkela, Distt Sundargarh	NA
Graphite Concentrate Pradhan Industries , Katra, Kana Laxmipur	2.88
<b>Iron &amp; Steel</b>	
SAIL, Rourkela Steel Plant, Rourkela, Distt Sundargarh	5300 (sinter) 3470(pig iron) 4400 (crude/liquid steel) 85 (tin plates)
Bhushan Power & Steel, Sambalpur	1000 (sinter) 2420(crude steel)
Bhushan Steel Ltd, Dhenkanal	5625 (crude Steel) 6680(Sinter) 3200(Finished steel)
Jindal Stainless Steel Ltd, Kalinganagar, Gadapur	1000 (Stainless steel) 250 (ferro alloys)
Neelachal Ispat Nigam Ltd, Khurunti, Godigotha, Sarangapur	1710 (sinter) 855 (pellets) 1100(Pig Iron) 920 (crude/liquid steel) 900(Semifinished Steel) 13 (A/S) 35(Crude Tar)
OCL India Ltd, Lamloi, Distt Sundargarh	120 (sponge iron) 85 (billets)
Orissa Sponge Iron Ltd, Palaspanga, Distt Keonjhar	250(Ssponge iron) 100 (steel ingot)
Shree Jagannath Steel & Power Ltd Uliburu Barbil	115.5 (Sponge iron) 112.86( M S billets)
Visa Steel Ltd, Kalinganagar, Distt Jajpur	225 (pig iron) 300 (sponge iron) 500 (special steel)
Tata Steel Ltd Duburi Sukinda	3200(pig iron) 3000 (crude/liquid steel) 5750 (sinter)
Manhole Cover Utkal Modular, Cover) Kaurnundu	10.752(GI. Manhole Cover) 2.73(DI. Manhole Cover)
<b>Pellet</b>	
Arya Iron & Steel Co. Pvt Ltd, Barbil.	1200 (pellets)
Essar Steel Ltd, Paradip	6000 (pellets)

(contd)

## STATE REVIEWS

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
Jindal Steel & Power Ltd, Barbil.	9000 (pellets)
Pro Minerals Pvt. Ltd, Basantpur, Jhumpura	1000 (pellets)
Rexon Strips Ltd, Kumakela, Distt Sundargarh	300 (pellets) 60 (sponge iron) 25 (M. S. ingots)
Shivom Mineral Limited Kusumdi, Koira	120 (Lump CLO)
Tata Steel Ltd, Kalinga nagar works, Kalinganagar, Odisha	2800
<b>Pig Iron</b>	
IDCOL Kalinga Iron Works Ltd, Barbil, Distt Keonjhar	180
IKIW. Ltd, Matkambada Barbil	170
<b>Sponge Iron</b>	
Action Ispat & Power (P) Ltd, Pandripathar, Distt Jharsuguda	250
Adhunik Metaliks Ltd, Chandrihariharpur, Distt Sundargarh	270
Aarti Steel limited, Ghantikhal, Athagarh, Cuttack	320
Bhaskar Steel & Ferroalloys Pvt. Ltd, Badtumkela Rajamunda	120
Beekay Steel & Power Ltd, Uliburu, Distt Barbil.	115.5
Bhusan Steels Ltd, Meramandali, Distt Dhenkanal	900
Brand Steel & Power Pvt. Ltd, Murusuan, Keonjhar	60
Crackers India (Alloy) Ltd, Gobardhanpur, Distt Keonjhar	73
Dinabandhu Steel & Power Ltd, Kalinganagar, Distt Jajpur.	60
Ganesh Sponge Pvt Ltd, Krushnachandrapur, Distt Angul	90
Jay Iron & Steel Ltd, Balanda, Rourkela, Distt Sundargarh	60
Jindal Steel & Power Ltd, Nisha, Dist. Angul	1800
Kamaljit Singh Alluwalia Steel & Power Div. Barpada, Barbil	300
L. N. Metallics Ltd, Sripura Jharsuguda	60
MGM Minerals Ltd, Forest Park, Bhubaneswar	105
Rungha Mines Ltd, Unit-I, Karakola, Barbil, Distt Kendujhar	180
Unit-II, Kamand, Koira Distt Sundargarh	556.5
	277.2 (Semi Fin. Steel)

(contd)

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
SMC Power Generation Ltd, Jharsuguda	200 350 (Billet)
Scaw Industries Pvt. Ltd, Gundichapara, Distt Dhenkanal	100
Sponge Udyog Pvt. Ltd, Jai Bahal, Lathikata	60
Sree Metallic Ltd, Loidapada, Distt Kendujhar	300
Suraj Products Ltd, Barpalli, Distt Sundargarh	36
Swastik Ispat pvt. Ltd	45
Tata Sponge Iron Ltd, Joda, Distt Kendujhar	465
Vikram Pvt Ltd, Tumkela, Distt Sundargarh	60
Viraj Steel & Energy Ltd, Gurupali, Rengali	220
Vishal Metallics Pvt. Ltd, Barahamusa, Bonai	60
Yedani Steel & Power Ltd, Manitra Donagadi	60
<b>Ferro Alloys</b>	
Aarti Steel limited, Ghantikhal, Athagarh, Cuttack	50 (Ferrochrome) 200 (Finished Steel)
Balasure Alloys Ltd, Balgopalpur, Distt Balasure	145 (H. C. Ferro chrome)
FACOR, Charge Chrome Plant, Randia, Distt Bhadrak	65
Ferro alloy Corporation Ltd, Bhadrak	75
IDCOL Ferro Chrome & Alloys Ltd, Distt Jajpur	18
Indian Metal & Ferro alloys Ltd (Indian Charge Chrome Ltd, Choudwar	168
Indian Metals & Ferro Alloys Ltd, Therubali, Distt Cuttack	116.4
Jeypore Sugar Co. Ltd, Rayagada	22.5
Jindal Stainless Ltd, Kalingnagar, Jajpur	250
Nav Bharat Ventures Ltd, Ferro Alloys Plant, Khargprasad, Distt Dhenkanal	75
Rohit Ferro-Tech Ltd, Kalinganagar, Distt Jajpur	110
Sagar Mining & Metal Industries Pvt. Ltd, Nayagarh, Barbil	3.6 (L.C. Fe/mn) 6.0 (M. C Fe/mn)
Stork Ferro & Mineral Industries Pvt. Ltd, Somanthpur, Remuna	25 (Ferro chrome)
Tata Steel Ltd (Ferroalloys and Minerals Div.), Joda, Distt Kendujhar	50.4
Tata Steel Ltd (Ferroalloys and Minerals Div.), Bamnipal, Distt Kendujhar, Jhumpura	65
Tata Steel Ltd (Ferroalloys and Minerals Div.), Distt Cuttack	50

(contd)

## STATE REVIEWS

Table - 5 (contd)

Industry/plant	Capacity ('000 tpy)
Tata Steel Ltd (Ferro Chrome plant Chamakhandi.), Chatrapur	55
T.S.Alloys Ltd, Anantpur, (Rawmet Ferrous Industries Ltd), Cuttack	52
Visa Steel, Kalinganagar (Manganese oxide)	180
<b>Refractory</b>	
IFGL Refractory Ltd, Kalunga, Distt Sundargarh	80000 pc (continuous casting refractories)
Khemka Refractories (P) Ltd, Khatukhura, Dhenkanal	35.4
Orissa Industries Ltd, Lakhikata, Distt Sundargarh	125
Kalinga Refractories, Brundammal, Badmal, Jharsuguda	7.2 (Fire Bricks) 1.2 (F. C. Mortar)
Maruti Monolithics Pvt. Ltd, Gopalpur, Tangi Choudwar	2.0( Basic fettling Mass) 2.75(Basic mortar)

(contd)

Table - 5 (concl'd)

Industry/plant	Capacity ('000 tpy)
Total solution, Piplimal, Lakhanpur	10 (Mag- chrome Powder) 10 (Mag- chr. Powder, normal) 10 (Mill scale Powder)
Orissa Industries Ltd, Barang, Distt Cuttack	19 5 (DBM)
TRL Krosaki Refractories Ltd, Belpahar, Distt Jharsuguda.	247.89 18 (Taphole clay)
<b>Silicon Carbide</b>	
Indian Metals & Carbide Ltd, Therubali	NA
<b>Synthetic Rutile</b>	
IREL, Orissa Sands Complex, Ganjam	100
<b>Petroleum Refinery</b>	
IOCL Paradeep Odisha	15000

*(G): Grinding units.**Note: Data, not readily available for fertilizer and cement industries on respective websites.*