

STATE REVIEWS



Indian Minerals Yearbook 2013 (Part- I)

52nd Edition

**STATE REVIEWS
(Odisha)**

(FINAL RELEASE)

**GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES**

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September, 2015

ODISHA

Mineral Resources

Odisha is the leading producer of chromite, graphite, bauxite, manganese ore, iron ore, sillimanite, quartzite, pyroxenite and dolomite. The State hosts the country's sole resources of ruby and platinum group of metals. It accounts for the country's 95% chromite, 92% nickel ore, 69% cobalt ore, 55% bauxite, 51% titaniferous magnetite, 40% limestone, 36% pyrophyllite, 33% iron ore (hematite), 26% sillimanite, 25% each fireclay & garnet, 24% each coal & zircon and 20% vanadium ore resources.

Important minerals that occur in the State are: **bauxite** in Balangir, Kalahandi, Kandhamal, Kendujhar, Koraput, Malkangiri, Rayagada & Sundergarh districts; **china clay** in Bargarh, Boudh, Balangir, Kendujhar, Koraput, Mayurbhanj, Sambalpur & Sundergarh 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 coalfield, Sambalpur district & Talcher coalfield, Dhenkanal district; **dolomite** in Bargarh, Kendujhar, Koraput, Sambalpur & Sundergarh districts; **dunite/pyroxenite** in Kendujhar and Sundergarh districts; **fireclay** in Angul, Cuttack, Dhenkanal, Jharsuguda, Khurda, Puri, Sambalpur & Sundergarh districts; **garnet** in Ganjam, Kalahandi & Sambalpur districts; **graphite** in Bargarh, Boudh, Balangir, Kalahandi, Koraput, Nuapada & Rayagada districts; **iron ore (hematite)** in Dhenkanal, Jajpur, Kendujhar, Koraput, Mayurbhanj, Sambalpur & Sundergarh districts; **iron ore (magnetite)** in Mayurbhanj district;

limestone in Bargarh, Koraput, Malkangiri, Nuapada, Sambalpur & Sundergarh districts; **manganese ore** in Balangir, Kendujhar, Koraput, Rayagada, Sambalpur & Sundergarh districts; nickel and cobalt in Jajpur district; **Pyrophyllite** in Kendujhar district; **quartz/silica sand** in Boudh, Balangir, Kalahandi, Sambalpur & Sundergarh districts; **quartzite** in Balangir, Dhenkanal, Jajpur, Jharsugada, Kendujhar, Mayurbhanj, Sambalpur & Sundergarh districts; **sillimanite** in Ganjam & Sambalpur districts; **talc/steatite/soapstone** in Mayurbhanj, Sundergarh & 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 and Sambalpur districts; **granite** in Angul, Boudh, Balangir, Cuttack, Deogarh, Dhenkanal, Ganjam, Kendujhar, Khurda, Koraput, Mayurbhanj, Nuapada, Rayagada & Sambalpur districts; **lead** in Sargipalli area, Sundergarh 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 Sundergarh district; **tin** in Koraput and Malkangiri districts; and **vanadiferous magnetite** occurs in Balasore and 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 and various other agencies during 2012-13 are furnished in Table - 3.

Table – 2 : Reserves/Resources of Coal as on 1.4.2013 : Odisha

(In million tonnes)				
Coalfield	Proved	Indicated	Inferred	Total
Total	27283.74	37110.19	9316.08	73710.01
Ib-River	9134.52	9512.61	5108.16	23755.29
Talcher	18149.22	27597.58	4207.92	49954.72

Source: Coal Directory of India, 2012-13.

Table – 1 : Reserves/Resources of Minerals as on 1.4.2010 : Odisha

Mineral	Unit	Reserves				Feasibility				Pre-feasibility				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)	Total resources (A+B)				
			STD121	STD122			STD221	STD222										
Asbestos	tonne	-	-	-	-	-	-	-	10000	37200	9500	-	56700	56700				
Bauxite	'000 tonnes	132314	22855	144354	299523	56667	188316	237723	310224	155081	562924	-	1510934	1810457				
China clay	'000 tonnes	2376	715	811	3901	-	1252	2476	223	35393	236421	1259	277025	280926				
Chromite	'000 tonnes	31263	6725	15085	53073	1116	1189	4335	31722	35796	41431	21359	136948	190021				
Cobalt	Million tonnes	-	-	-	-	-	-	-	31	-	-	-	31	31				
Copper																		
Ore	'000 tonnes	-	-	-	-	-	-	-	1420	2536	2095	-	6051	6051				
Metal	'000 tonnes	-	-	-	-	-	-	-	21.69	21.06	20.69	-	63.44	63.44				
Dolomite	'000 tonnes	119853	44549	2710	167112	19558	27887	76634	40387	39474	268930	33063	505933	673045				
Dunite	'000 tonnes	3337	-	-	3337	-	4717	5267	-	384	627	-	10995	14333				
Fireclay	'000 tonnes	581	278	52	911	2135	11280	3774	26185	42747	83045	-	169166	170076				
Garnet	tonne	-	3185605	-	3185605	5	-	-	-	-	348000	-	348005	3533610				
Granite																		
(Dim. stone)	'000 cum	-	80000	-	80000	-	-	-	330328	-	1432492	240	1763060	1843060				
Graphite	tonne	495296	2172684	622933	3290913	-	1106192	1224811	11179	98665	2923002	19890	5383739	8674652				
Iron ore																		
(Hematite)	'000 tonnes	2422247	569186	321568	3313000	12844	471517	138365	49408	317074	1404450	107978	2617232	5930232				
Iron ore																		
(Magnetite)	'000 tonnes	-	-	54	54	-	102	-	-	-	43	-	145	199				
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	280588	466627	126717	873932	3225	49045	241871	133600	44562	386952	49800	909055	1782987				
Manganese																		
Ore	'000 tonnes	41354	4361	22784	68499	8244	14906	22714	1090	9371	61343	3880	121548	190047				

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Table - 1 (Concl'd.)

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						
Mica		-	-	-	-	6216000	52024000	-	20328000	26712000	-	105280000	105280000	
Nickel ore	Million tonnes	-	-	-	-	21	21	31	51	51	-	174	174	
Pt. Group of metals	tonne	-	-	-	-	-	7.7	-	-	6.5	-	14.2	14.2	
Pyrophyllite	tonne	3329278	1001802	525100	4856180	194121	3920129	80	40	1331393	17161	7435955	12292135	
Quartzite	'000 tonnes	3629	1151	1783	6563	9834	3744	681	-	34851	523	53837	60400	
Quartz-silica sand	'000 tonnes	438	69	860	1367	1503	2599	90	63385	3836	-	72573	73940	
Ruby		143	-	93	236	-	3165	286	38	1623	-	5113	5349	
Sillimanite	tonne	-	1602228	-	1602228	-	6557013	-	-	4943600	-	11500613	13102841	
Silver														
Ore	tonne	-	-	-	-	960500	119000	-	-	670000	-	1749500	1749500	
Metal	tonne	-	-	-	-	27.34	3.4	-	-	34.17	-	64.91	64.91	
Talc-steatite soapstone	'000 tonnes	123	178	112	414	1	109	-	-	265	-	406	820	
Tin														
Ore	tonne	-	-	-	-	636	-	-	1166	1000	-	15494	15494	
Metal	tonne	-	-	-	-	500.78	-	-	22.2	10	-	567.61	567.61	
Titanium minerals*	tonne	-	4274178	-	4274178	-	-	950000	-	38280000	-	39230000	43504178	
Vanadium														
Ore	tonne	-	-	-	-	1220000	-	-	232000	3412795	-	4864795	4864795	
Metal	tonne	-	-	-	-	2135	-	-	487.2	10935.74	-	13557.94	13557.94	
Zircon*	tonne	-	146085	-	146085	-	-	-	-	-	-	-	146085	

Figures rounded off.

* Resources of Ilmenite, rutile and zircon as per Department of Atomic Energy are provided in the respective Mineral Reviews.

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Table – 3 : Details of Exploration Activities in Odisha, 2012-13

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI Coal (Talcher Coalfield) Angul	Nuagaon North area	-	-	5	1713.85	-	Exploration for coal under G-3 stage was continued in this block to explore the down dip continuity of regional coal seams of Barakar and Karharbari Formations which has already been explored in adjacent Nuagaon-Telisahi and Kudanali north-east blocks. A total 1796.00 m GP logging was completed. Five Barakar and one Karharbari seam zones with cumulative thickness varying from 3.07 m (Seam-I, BH-8) to 37.67 m (Seam-III, BH-11) were intersected within the depth range of 350.25 m (BH-10) and 761.14 m (BH-8). Continuation of coal seams was established for 6 km along strike and 1.5 km along dip direction. Exploration in this block was completed in January, 2013. The investigation was completed on 15.01.2013.
Deogarh and Sambalpur	Chadchadi block	-	4.0	1	327.50	-	Exploration for coal was initiated on 31.01.2013 by scout drilling. Coal bearing Barakar Formation with thin coal and carbonaceous shale bands were intersected in this borehole. The work is under progress.
Jharsuguda	Khariaparha block	-	-	2	814.20	-	Regional exploration under G-2 stage was continued in this area to explore the possible continuity of regional coal seam/seam zones of Raniganj and Barakar Formations towards north-east of already explored Kuraloi (A) North block. The objective of this investigation was to assess the coal resource potentiality and to have preliminary appraisal of CBM potentiality of the area. A total of 971.00 m GP logging has been carried out. Two coal seam zones of Raniganj (R-I & R-II) and five regional coal seam zones of Barakar formations ranging in thickness from 2.38 m to 61.19 m were intersected between 23.48 m and 616.20 m depths. The Lajkura seam zone which is the thickest has cumulative coal thickness of 61.19 m has been intersected at roof depth of 381.20 m. RII, R-I, Belpahar, Parkhani & Rampur seam zones

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Table – 3 : (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Coal							
Jharsuguda	Khariaparha block	-	-	2	814.20	-	show maximum cumulative thickness of 3.98 m, 5.86 m, 24.79 m, 20.84 m and 45.98 m. The seam zone consists of two to nine splits ranging in thickness from 0.50 m to 27.25 m. Ib seam is impersistent in nature and has cumulative thickness of 2.38 m with 2 splits sections. Extension of regional Barakar coal seam zones has been established for about 2.5 km along strike and 2 km along down dip direction. Coal seams are of power (E to G mainly) grade with superior grade coal (Grade A to E) occur only in Ib seam. The investigation has been completed.
-do-	Grindola block	1:10,000	7.00	3	1896.90	-	Regional exploration under G-2 stage in Ib River Coalfield. Jharsuguda was continued with an objective to explore the possible continuity of regional coal seam/ seam zones of Raniganj and Barakar formations encountered in already explored neighbouring Kuraloi (A) North block, to assess the coal resources potentiality of the area. Four Raniganj coal seam zones and four regional Barakar coal seam zones ranging in thickness from 2.15 m to 57.67 m were intersected between 27.62 m and 655.54 m depths. Seam zones R-I (17.20 m to 22.48 m), Belpahar (16.31m to 21.50 m), Parkhani (22.88 m to 31.81 m), Lajkura (18.94m to 57.67 m) and Rampuar (35.38m) are important for their thickness and regional extension. The Raniganj seam zones are intersected at a very shallow depth range.

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Table – 3 : (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Coal							
Jharsuguda	Bandbahal block	1:10,000	3.0	2	771.20	-	Regional exploration under G-2 stage commenced in 2012-13 in this block (Ib River Coalfield).with an objective (a) to explore the possible continuity of the regional coal seam zones of Raniganj and Barakar formations of ongoing Kharia-parha block (b) to establish structural set up and stratigraphy of the area and (c) to assess the coal resource potentiality of the area. Four regional Raniganj coal seam zones and two regional coal seam zones of Barakar with thickness varying between 1.75 m and 18.78 m were intersected between 66.92 m and 406.00 m depths. Seam zone R-1 (cumulative coal thickness of 18.53 m to 18.78 m) are most important Raniganj seam for thickness and lateral persistence. The seam zone Belpahar (cumulative thickness 11.64 m to 12.27 m) is also important for thickness. CBM desorption study revealed the presence of 0.01cc/gm of desorbed gas in regional seam zone R-1 intersected in borehole. The work is in progress.
Iron ore							
Sundergarh	Kalamang West Block	1:2,000	1	12	1083.90	-	Prospecting stage (G-3) investigation was carried out for assessment of iron ore potential in the eastern continuity of the area between Ghoraburhani and Kalamang for augmentation of resources. This was a new item taken up to probe the laterite covered area in the eastern part of Ghoraburhani & Sagasahi blocks to locate hidden ore bodies up to 120 metres vertical depth. The area is mostly covered by ferruginous laterite with minor iron ore. All the boreholes excepting BH-7 and BH-11 have intersected mineralised bodies. The details of intersections in the boreholes are as follows: (Depth of intersection of the mineralisation) BH-1 (0.00 m to 85.55 m) & (31.10 m to 47.15 m) BH-2 (64.70 m to 66.90 m) & (67.90 m to 90.00 m) BH-3 (0.00 m to 76.35 m) BH-4 (28.45 m to 66.30 m) BH-5 (18.55 to 80.75 m) BH-6 (42.90 to 91.10 m) & (0.90 to 10.50 m) BH-8 (18.35m to 72.10 m) & (78.50 m to 81.25 m) BH-9 (32.35 m to 44.05 m) BH-10 (24.80 m to 29.30 m) BH-12 (24.45 m)

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Table – 3 : (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Iron ore							
Sundergarh	Sagasahi East Block	-	-	6	-	-	Prospecting stage (G-3) investigation was carried out to assess the potential of iron ore in the northern contiguous area of Ghoraburhani block for augmentation of resources. The borehole BH-8 & BH-11 have intersected iron ores bands for 42.1 m and 65.3 m, respectively, capped by overburden of 55 m and 48 m. The boreholes BH-9, 10 & 13 have not intersected iron ore bands below shale and laterite cover. The mineralised zone is not continuing further north and hence the northern boundary of Sagasahi block has been delineated with certainty. On the basis of analytical results, the average iron, silica and aluminium content of the iron ores are as follows: Fe-(63.79%), SiO ₂ -(1.83%) & Al ₂ O ₃ (3.53%). The investigation has been completed.
Kendujhar	Nayagarh- Suakati area	1:25,000	-	6	-	-	Reconnaissance stage (G-4) investigation was carried out around Nayagarh-Suakati area to search for new occurrence of detrital iron ore and to work out structural disposition and to correlate them with the iron ore bodies along the southern margin of Horse Shoe basin. Large scale mapping was done in southern, northeastern and northwestern part of the area. The area is occupied by rocks of Older Metamorphic Group, granite, quartzite, metabasalt with tuffaceous shale at various places, gabbro, dolerite dykes and ferruginous shale laterite/latosol and their contact have been delineated detrital iron ore deposit (DID) of Kolihan sequence has not been encountered in the area. The investigation has been completed.

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Table – 3 : (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI PGE							
Dhenkanal	Kamakhyanagar- Chandar	1:12,500	150.0	-	-	150	Reconnaissance stage investigation was carried out in the marginal zone between Eastern Ghat Mobile belt and Singhbhum craton, to search for potential PGE mineralisation and identify potential blocks for targeting follow up investigation. The quantum of field achievement includes coverage of 150 sq km by Large Scale Mapping followed by collection of 50 nos. each of GCS, BRS and SS. In addition to these 50 cu.m of pitting / trenching along with collection of 50 nos. of PTA were accomplished. A total 100 nos. of samples were collected for petrographic studies. The evaluation of analytical results is in progress. The investigation has been completed.
Manganese							
Kendujhar	Bolani NE block	-	-	8	500.0	81	Prospecting stage (G-3) investigation for manganese ore was carried out in the identified Bolani NE Block, Bonai-Kendujhar belt. Exploration was taken up as a new item of one-year duration based on encouraging analytical results of the samples collected in FS.2008-09 and presence of abandoned quarries in the block. A total of eight boreholes (BNE-1 to BNE-8) have been completed with a total meterage of 500 m. All the boreholes have intersected the mineralised zones at expected depth. A total of 69 core samples and 12 nos. of petrological samples have been taken into account for further studies. The investigation has been completed.

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Table – 3 : (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Gold							
Mayurbhanj	Barkeram- Chalkadisahi & Champani- Hatia block	1:12,500-	100	-	-	-	Reconnaissance stage (G-4) investigation was carried out in Badanpahar-Gorumahisani belt, to search for potential blocks for gold mineralisation. LSM was carried out in Hatia-Champani block. The area is occupied by rocks belonging to the Pre-Cambrian Badampahar/Goruma-hisani Group fringed by the granitoids belonging to Singhbhum granite complex. Mineralisation in the form of sulphide specks are recorded in metagabbro and smoky quartz veins. The oxidized patches with sulphide minerals (pyrite-chalcopyrite-pyrrhotite & arsenopyrite) are present in most of the litho units of the schist belt and in the gneissic granite near the contact in the western part. Thin quartz-carbonate veins permeating almost all the rock carry oxidised patches with sulphide minerals. Bed rock and soil sampling has been carried out on 500 m x 100 m grid. In Hatia-Champani block 600 nos. of both bed rock and soil samples were collected. The investigation will be continued in F.S.2013-14.
DGM							
Chromite							
Dhenkanal	Kandhara & Kandadahad	1:2,000	0.125	-	-	64	The objective of exploration was to locate chromiferous ultramafics and HMI rocks in the unexplored western extension of Sukinda ultramafic complex. The area represents iron ore Super Group of rocks comprising of litho-units like quartzite, quartz mica schist, amphibolite, hornblende schist, talc-tremolite schist, mica schist, granite, granite gneiss, andalusite schist and dolerite. Three ultramafic bands having NW-SE trend were encountered around Village Karadapal. Investigation is continued. Resource has not been estimated.

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Table – 3 : (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DGM Chromite							
Jajpur	Telang Chromite mine	-	-	01	42.5	86	The objective of exploration was to assess the additional chrome reserve for future mine planning. The area forms a part of Sukinda Ultramafic Complex having litho-units like quartzite, shale, ultramafics volcanics/tuff of Iron Ore Super Group. Ultramafics are represented by serpentinised dunite and peridotite hosting chrome ore bands. The general trend of ultramafics is ENE-WSW dipping at high angle in southerly direction. Cumulative thickness of friable chromite band is 10.06 m as revealed from drilling in one borehole. Estimation of resource is in progress.
-do-	-do-	1:1,000	0.0054	-	-	170	The objective of exploration was to assess the low grade chromite (with threshold value + 10% Cr ₂ O ₃) and nickel (with 0.6 of nickel) associated with the overburden dump of Sukinda valley. The entire dump was grided in 20 m x 20 m interval and the dump was delineated by geological mapping. Resources were not estimated.
Diamond							
Nuapada	Darrimunda	1:2,000	0.5	-	-	02	The objective of exploration was to locate and delineate the suspected primary source diamond and the lamproite bodies to examine diamond incidence in them. Two lamproite bodies have been delineated having individual length of 400 m and width varying from 0.5 - 3.5 m. Depth persistence has not been proved. Samples are under investigation. Resources will be estimated only after receipt of analysis report, if any.

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Table – 3 : (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DGM Heavy minerals (Ilmenite, rutile garnet, monazite, zircon, sillimanite, etc.)							
Puri	Balarampur	1:20,000	0.92	321	2280	-	The objective of exploration was to assess resource and grade of heavy minerals and identification of unexplored blocks along Ganjam & Puri coast. The area comprises of loose clayey sand, fine to medium sand and sticky clay. Heavy minerals occur within the sandy horizon upto a depth of 10 m. The mineralisation was observed to have been associated with inland dunes. Resources were not estimated.
Iron ore							
Kendhujhar	Karhakala & Surhang	1:25,000	65	-	-	07	Objective of exploration was to locate and assess potentiality of iron ore. The area is comprised of litho-units like quartzite, basic lavas, shale/tuffaceous shale, laterite and quartz vein. No BHJ as well as iron ore body was encountered. Resources were not estimated.
Limestone/Dolomite							
Sundergarh	Around Badulpani, Karamtoli & Tangargaon	1:25,000	105	-	-	-	Objective of exploration was to locate possible occurrence of limestone/dolomite. The area was comprised of quartzite-mica-schist/mica schist, quartzite, granite, pegmatite and quartz vein. Occurrences of dolomite was not encountered. However, granite occurrences were noticed around Villages Tangargaon, Karamtoli and Deobahai which is suitable for decorative stone.
Sundergarh	North of Surgura & Lephripara & Surgura	1:25,000	-	-	-	-	Objective of exploration was to locate & assess limestone/dolomite along with other economic minerals. The area comprised of litho units like conglomerate, quartzite, carbonaceous, phyllites/slates, limestone, dolomite, staurolite-garnet-schist. Dolomite occurrences were located to the North of Village Lephripara and is exposed for 1300 m x 100 m while other dolomite occurrence located around Village Surgura exposed for 30 m x 25 m. One Goethitic Iron ore occurrence was also noticed with dimension of 150 m x 20 m to the North of Village Kulabira. Estimation of resources is under progress.

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Table – 3 : (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
OMC Chromite							
Jajpur	Kaliapani	-	-	07	1992.0	157	In this area dunite-peridotite mineralisation is highly serpentinised or limonitised. Lease-hold area is covered with laterite and alluvium except a quartzite boulder patch N/v Gurujang & Patna. The chromite mineralisation is confined to the eastern part of the lease. Out of six chromite bands delineated in Sukinda valley, northern flank of three bands (Band-I, II & IV) were traced in this area. Main objective of exploration is to prove both the strike extension of chromite lodes as well as their depth persistence. The resources will be estimated after detailed exploration & correlation with the ore band.
-do-	South- Kaliapani	1:2,000	102.0 (ha)	08	805.0	336	The chrome ore mineralisation is in the form of five continuous bands in this area which are 300 m (ave) apart from each other. These five bands have different physical & chemical characters. Band-V:- Moderately thick, hard lumpy, lensoid, irregular in strike direction. Band-IV:- Medium to high grade, moderately thick, lenticular but fairly continuous associated with chert bands (10-15 m), Band-III:- Thin, lenticular, partly lumpy (1-6 m), Band-II:- Moderately thick, lenticular (15-25 m) and Band-I:- Very thick, continuous, friable (50-70 m). During the year 0.35 million tonnes resources under (111) were estimated.
		1:1,000	16.0 (ha)				
Kendujhar	Bangur	1:2000	-	02	410.0	202	The objective of exploration was to prove the ore continuity & potential below the open cast quarry down to a depth of -180 MRL for long term planning of underground mining. About 12,500 tonnes chromite resources were estimated.
Jajpur	Kaliapani	-	-	14	2739.00	146	The main objective of exploration was to prove both the strike extension as well as depth persistence of chromite lode. Mostly for proving barren lands. The resource estimated is under process.

(Contd.)

STATE REVIEWS

Table – 3 : (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
OMC							
Chromite							
Jajpur	Sukrangi	1:500	12.00 (ha)	24	6040.00	672	The main objective of exploration was to prove both the strike extension as well as depth persistence of chromite lode, mostly in barren lands areas. The estimation of resource is under process.
-do-	South-Kaliapani	1:2000 1:1,000	105.0 16.0	9	723.0	255	The main objective of exploration was to prove both the strike extension as well as depth persistence of iron ore body. About 1,17,500 tonnes resources were estimated under (221) category.
Iron ore (Haematite)							
Kendujhar & Jajpur	Daitari	1:2,000	30.0	-	-	1782	A total of 187.15 million tonnes of iron ore resources were estimated. Out of which 86.47 million tonnes & 100.68 million tonnes iron ore resources were estimated under (111) & (122) category, respectively.
Iron ore							
Kendujhar	Balda-palso Jajang	1:1,000	86.25	7	297.70	105	The main objective of exploration was to prove both the strike extension as well as depth persistence of iron ore body. About 2.59 lakh tonnes resources were estimated during the year and about 93.01 lakh tonnes at the end of the year.
-do-	Dubna- Sakradih	1:1,000	42.0	-	-	4	About 361.28 lakh tonnes of iron ore resources were estimated upto the end of the year 2012-13.
-do-	Seremda Bhadrasahi	1:500	21	4	198.30	204	The main objective of exploration was to prove both the strike extension as well as depth persistence of iron ore body. About 0.42 million tonnes resources were estimated during the year. Out of which 0.3 million tonnes and 0.12 million tonnes iron ore resources were estimated under (111) & (211 & 221) category, respectively. At the end of the year, about 11.67 million tonnes iron ore (+58% Fe) resources were estimated.
-do-	Bhanjpali Koira & Banel	1:2,000	59.0	5	601.0	424	The main objective of exploration was to delineate the ore body disposition & assessment of iron ore reserves. About 10.80 million tonnes (+58% Fe) were estimated during the year.

(Contd.)

STATE REVIEWS

Table – 3 : (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
OMC							
Iron ore							
Kendujhar	Kasira, Koira & Banel	1:2,000	53.0	8	819.80	712	The main objective of exploration was to delineate the ore body disposition & assessment of reserves. About 22 million tonnes (+58% Fe) were estimated during the year.
Sundergarh	Kumritar, Barsuan & Banel	1:2,000	17.0	-	-	-	A total of 129.15 million tonnes of iron ore resources were estimated up to 2012-13. Out of which 101.78 million tonnes (+58% Fe), 27.30 million tonnes (45-58%), 0.06 million tonnes (+58%Fe) & 0.06 (45-58%) under (111), (121), (122) & (222) category, respectively.
Manganese							
Kendujhar	Dubna-Sakradih	1:1,000 1:500	16.0	-	-	4	About 4.46 lakh tonnes manganese ore resources were estimated upto the end of the year,2012-13.
Iron ore (Hematite)							
Sundergarh	Rantha, Barsuan Banel	1:500	89.0 (ha)	26	1578.60	491	About 4.25 million tonnes (58-65% Fe) under (111) category, 21 million tonnes (+45% Fe) under (222) category and 10.36 million tonnes under (334) category iron ore resources were estimated.
Kendujhar	Seremda Bhadrasah	1:500	12	08	200.30	201	About 0.323 million tonnes of iron ore resources were estimated during the year.
Sundergarh	Dubuna/Sakradih	1:1,000	39.25	-	-	-	At the end of the year total iron ore resources were estimated at 32.01 million tonnes.
-do-	Koira-Bhaniapalli	1:2,000	60.0 (ha)	-	-	-	About 5.62 million tonnes (58-63% Fe) of iron ore resources under (122) category were estimated.
Manganese ore							
Sundergarh	Dalki	1:4,000	20	03	182.0	165	At the end of the year, a total of 0.27 million tonnes manganese ore resources (+25% Mn) grade were estimated.
-do-	Dubuna-Sakradih	1:500	15.55	13 59	709.80 3130.0	452	A total of 0.08 million tonnes of manganese ore resources were estimated during the year. Out of which, 45,459 tonnes were of (+25% Mn) grade and 35,012 tonnes of (15-25% Mn) grade.
-do-	Seremda Bhadrasah	1:500	21	01	30.50	16	-

(Contd.)

STATE REVIEWS

Table - 3 (Concl'd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
MECL							
Dunite/ Serpentine							
Sundergarh	Rajabasa block	1:1,000	1.00	8	770.0	544	In this area ultramafic body comprises of serpentinised & talcose dunite occurring as a mega-enclaves within Bonai granite. The main objective of exploration was to trace the continuity of dunite & harzburgite suitable as flux in steel industry. About 41.12 million tonnes of high MgO flux grade rock were estimated with 28.59% MgO & 34.30 SiO ₂ over an average thickness of 36.33 m at >25% MgO & <5% SiO ₂ cut off. Also about 15.36 million tonnes of high MgO flux grade rock were estimated with 31.69% MgO & 33.82% SiO ₂ over an average thickness of 19.02 m at >30% MgO & <50% SiO ₂ cut off.

Production

The value of mineral production in Odisha at ₹24,196 crore in 2012-13 decreased by about 16% as compared to the previous year. The state contributed about 8% of the total value of mineral production and claims fourth position among the states in the country during the year under review. The important minerals produced in Odisha were coal, bauxite, chromite, iron ore, manganese ore, dolomite and graphite which together accounted for almost entire value of mineral production of the state in 2012-13.

Odisha was the leading producer of chromite with a share 99.8%, iron ore 47% and bauxite 36% in the total production of respective mineral in the country, during the year 2012-13. The state was also the second largest producer of sillimanite with a share of 28% and third largest producer of manganese ore, coal, dolomite and graphite (r.o.m.) with a share of 23%, 20%, 13% and 5% of the respective mineral.

Of the important minerals, production of quartzite increased manifold, while it increased for limestone 29%, garnet (abrasive) 20%, quartz 14%, bauxite 8%, coal 4% and chromite about 1% as compared to that in the previous year. However, the production of iron ore and manganese ore decreased 5% each, dolomite 20%, sillimanite by 30% and graphite (r.o.m.) 65% during the year 2012-13. No production of pyroxenite was reported from the State in the current year. (Table-4).

The production value of minor minerals was estimated at ₹86 crore for the year 2012-13.

The number of reporting mines in 2012-13 was 184 as against 183 in the previous year.

The index of mineral production in Odisha (base 2004-05 = 100) was 144.8 in 2012-13 as compared to 144.5 in the previous year.

STATE REVIEWS

**Table – 4 : Mineral Production in Odisha, 2010-11 to 2012-13
(Excluding Atomic Minerals)**

(Value in ₹'000)

Mineral	Unit	2010-11			2011-12			2012-13 (P)		
		No. of mines	Qty	Value	No. of mines	Qty	Value	No. of mines	Qty	Value
All Minerals		192		259380019	183		286834937	184		241963373
Coal	'000t	28	102565	73545300	28	105476	96399000	28	110132	47256800
Bauxite	t	4	4856808	2305022	4	5055269	2313176	4	5460035	2675535
Chromite	t	18	4317159	25930985	20	2917750	24220976	21	2943287	24453534
Iron Ore	'000t	77	76128	150907681	74	67414	158852994	71	64308	162335394
Manganese Ore	t	32	655984	3805668	29	562013	2373264	38	531115	2362301
Dolomite	t	3	1358156	551985	4	1114724	414535	3	888322	448547
Garnet (abrasive)	t	-	18474	65620	-	19889	88208	-	23898	128038
Graphite (run of mine)	t	12	20472	10394	6	18859	8793	3	6530	3719
Iolite	kg	2	4	40	2	-	-	2	-	-
Kaolin	t	1	2601	2692	-	-	-	-	-	-
Sillimanite	t	1	17889	175742	1	17489	134945	1	12314	107020
Limestone	'000t	11	3923	1102597	10	3136	1153269	8	4058	1309996
Pyroxenite	t	*	198219	111201	*	23284	13738	-	-	-
Quartz	t	1	11414	5262	2	6241	2091	2	7138	3934
Quartzite	t	2	4608	3063	3	4715	3181	3	25806	21788
Minor Minerals@	-	-	-	856767	-	-	856767	-	-	856767

*Note: The number of mines excludes minor minerals.*** Associated with chromite.**@ Figures for earlier years have been repeated as estimates because of non-receipt of data.*

STATE REVIEWS

Mineral-based Industry

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 in Odisha

Industry/plant	Capacity ('000 tpy)
Aluminium/Alumina	
Hindalco Industries Ltd, Hirakud *(Proposed expansion to 213 th. tonnes per year).	161.4* (aluminium)
NALCO, Damanjodi.	2100 (alumina)
NALCO, Angul.	460 (aluminium)
Vedanta Aluminium Ltd, Lanjigarh, Dist. Kalahandi.	1000 (alumina)
Vedanta Aluminium Ltd, Jharsuguda, Dist. Sambalpur.	500 (aluminium)
Asbestos Products	
UAL Industries Ltd, Korian, Dist. Dhenkanal.	30
Cement	
Bargarh Cement Ltd, Bargarh.	960
Ultra-Tech Cement Ltd, Jharsuguda (G).	800
OCL India Ltd, Rajgangpur, Dist. Sundergarh.	2000
Toshali Cements Pvt Ltd, Ampavalli, Dist. Koraput.	180
Fertilizer	
OCF-Paradeep.	325.20 (N ₂) 802.8 (P ₂ O ₅)
Paradeep Phosphates Ltd, Paradeep.	129.6 (N ₂) 331.2 (P ₂ O ₅)
SAIL Fertilizer Plant, Rourkela, Dist. Sundergarh.	360 (CAN)

(Contd.)

Table - 5 (Contd.)

Industry/plant	Capacity ('000 tpy)
Iron & Steel	
Rourkela Steel Plant, Rourkela, Dist. Sundergarh.	3070 (sinter) 2000 (pig iron) 1671 (saleable steel) 1900(crude/liquid steel) 85 (tin plates)
Visa Steel Ltd, Kalinganagar, Dist. Jajpur.	225 (pig iron) 300 (sponge iron) 50 (charge-chrome)
OCL India Ltd, Lamloi, Dist. Sundargarh.	120 (sponge iron) 85 (billets)
Orissa Sponge Iron Ltd, Palaspanga, Dist. Keonjhar.	250 (sponge iron) 100 (steel ingot)
Neelachal Ispat Nigam Ltd, Dubri, Dist. Jajpur.	1711 (sinter) 1110 (pig iron) 1100(crude/liquid steel) 13 (fertilizer)
Pig Iron	
IDCOL Kalinga Iron Works Ltd, Barbil, Dist. Keonjhar.	170
Sponge Iron	
Action Ispat & Power (P) Ltd, Pandripathar, Dist. Jharsuguda.	250
Adhunik Metaliks Ltd, Chandrihariharpur, Dist. Sundergarh.	180
Beekay Steel & Power Ltd, Uliburu, Dist. Barbil.	105
Bhusan Steels & Strips Ltd, Meramandali, Dist. Angul and Dhenkanal.	300
Crackers India (Pvt) Ltd, Bobardhanpur, Dist. Keonjhar	60
Deepak Steel & Power Ltd, Topadihi, Dist. Keonjhar.	144
Dinabandhu Steel & Power Ltd, Kalinganagar, Dist. Jajpur.	60
Jay Iron & Steel Ltd, Balanda, Rourkela, Dist. Sundergarh.	60

(Contd.)

STATE REVIEWS

Table - 5 (Contd.)

Industry/plant	Capacity ('000 tpy)
MGM Steel Ltd, Nimidha, Dist. Dhenkanal.	100
Ganesh Sponge Pvt Ltd, Krushnachandrapur, Dist. Angul.	30
Kusum Powermet Pvt. Ltd, Kutugaon, Dist. Kendujhar.	100
Mayur Electro Ceramics Pvt. Ltd, Pratapgarh, Dist. Mayurbhanj.	15
Neepaz Metaliks Pvt Ltd, Sundergarh.	60
Rexon Strips Ltd, Kumakela, Dist. Sundergarh.	60
Rungta Mines Ltd, Unit-I, Karakola, Barbil, Dist. Kendujhar Unit-II, Kamando, Dist. Sundergarh.	330
Scan Sponge Iron Ltd, Rambahal, Dist. Sundergarh.	60
Scaw Industries Pvt. Ltd, Gundichapada, Dist. Dhenkanal.	100
Sponge sales (India) Pvt Ltd, Kutugaon, Dist. Kendujhar.	60
Sree Metallic Ltd, Loidapada, Dist. Kendujhar.	174
Suraj Products Ltd, Barpalli, Dist. Sundergarh.	45
Surya Sponge Iron Ltd, Budhakendua, Dist. Jajpur.	84
Tata Sponge Iron Ltd, Joda, Dist. Kendujhar.	390
Vikram Pvt Ltd, Tumkela, Dist. Sundergarh.	60
Ferro Alloys Balasore Alloys Ltd, Balgopalpur, Dist. Balasore.	100

(Contd.)

Table - 5 (Concl.)

Industry/plant	Capacity ('000 tpy)
FACOR, Charge Chrome Plant, Randia, Dist. Bhadrak.	65
IDCOL Ferro Chrome & Alloys Ltd., Dist. Jajpur.	18
Indian Charge Chrome Ltd, Choudwar, Dist. Cuttack.	62.5
Indian Metals & Ferro Alloys Ltd, Therubali, Dist. Cuttack.	190
Nav Bharat Ferro Alloys Ltd, Khargprasad, Dist. Dhenkanal.	75
Rohit Ferro-Tech Ltd, Kalinganagar, Dist. Jajpur.	110
Jaypore Sugar Co. Ltd, Rayagada	22.5
Superb Metals Alloys Pvt. Ltd, Rairangpur.	0.3
Tata Steel Ltd, Ferro-Manganese Plant, Joda, Dist. Kendujhar.	30.5
Tata Steel Ltd, Charge Chrome Plant, Bamnipal, Dist. Kendujhar.	55.2
Refractory IFGL Refractory Ltd, Kalunga, Dist. Sundergarh.	0.3
Orissa Industries Ltd, Lakhikata, Dist. Sundergarh.	125
Orissa Industries Ltd, Barang, Dist. Cuttack.	19
Tata Refractories Ltd, Belpahar, Dist. Jharsuguda.	172
Silicon Carbide Indian Metals & Carbide Ltd, Therubali.	NA
Synthetic Rutile IRE, Orissa Sands Complex, Ganjam (Presently non-operational).	100

(G) : Grinding units.