

STATE REVIEWS



Indian Minerals Yearbook 2016



(Part- I: General Reviews)

55th Edition

**STATE REVIEWS
(Jharkhand)**

(ADVANCE RELEASE)

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

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JHARKHAND

Mineral Resources

Jharkhand is one of the leading mineral producing States. It is the sole producer of flint stone in the country and is one of the leading producers of coal, gold, graphite, bauxite, iron ore & limestone. Uranium ore is mined and processed by Uranium Corporation of India Ltd (UCIL) for supply as fuel to the country's nuclear power reactors through six underground mines, one opencast mine, and two processing plants. The State Jharkhand has the sole resources of Emerald mineral. Jharkhand accounts for about 31% rock phosphate, 23% iron ore (hematite), 30% apatite, 14% andalusite, 20% cobalt ore, 20% copper ore, 9% each granite (dimension stone) & graphite and 5% silver ore resources of the country.

Important minerals that occur in the State are **bauxite** in Dumka, Gumla, Latehar, Lohardaga and Palamu districts; **china clay** in Dumka, Hazaribagh, Lohardaga, East & West Singhbhum, Sahebganj and Ranchi districts; **coal** in Bokaro, Deoghar, Dhanbad, Giridih, Godda, Hazaribagh, Palamau, Pakur and Ranchi districts; **copper** in Hazaribagh and East Singhbhum districts; **dolomite** in Garhwa and Palamu districts; **felspar** in Deoghar, Dhanbad, Dumka, Giridih, Hazaribagh, Jamtara, Koderma, Latehar, Palamu and Ranchi districts; **fireclay** in Dhanbad, Dumka, Giridih, Godda, Hazaribagh, Latehar, Palamu, Ranchi and West Singhbhum districts; **gold** in East Singhbhum district; **graphite** in Palamu district; **iron ore** (hematite) in West Singhbhum district; **iron ore** (magnetite) in Gumla, Hazaribagh, Latehar, Palamu and East Singhbhum districts; **kyanite** in Saraikela-Kharsawan and West Singhbhum

districts; **limestone** in Bokaro, Dhanbad, Garhwa, Giridih, Hazaribagh, Palamu, Ranchi, East & West Singhbhum districts; **manganese ore** in East & West Singhbhum districts; **mica** in Giridih and Koderma districts; **ochre** in West Singhbhum district; **dunite/pyroxenite** in East Singhbhum district; **quartz/silica sand** in Deoghar, Dhanbad, Dumka, Giridih, Godda, Hazaribagh, Jamtara, Koderma, Latehar, Palamu, Ranchi, Sahebganj, Saraikela-Kharsawan and West Singhbhum districts; and **quartzite** in East & West Singhbhum districts.

Other minerals that occur in the State are **andalusite** and **rock phosphate** in Palamu district; **apatite, chromite, cobalt, nickel, gold** and **silver** in East Singhbhum district; **asbestos** in East & West Singhbhum districts; **barytes** in Palamu and East Singhbhum districts; **bentonite** in Pakur and Sahebganj districts; **garnet** in Hazaribagh district; **granite** in Deogarh, Dhanbad, Dumka, Giridih, Godda, Gumla, Hazaribagh, Koderma, Lohardaga, Palamu, Ranchi and East Singhbhum districts; **sillimanite** in Hazaribagh district; **talc/steatite/soapstone** in Giridih, Koderma, Palamu, East & West Singhbhum districts; **pyrophyllite** in Saraikela-Kharaswan district; **titanium minerals** in Ranchi and East Singhbhum districts; and **vermiculite** in Giridih and Hazaribagh districts (Table - 1). The reserve/resources of coal and the various coalfields located in Jharkhand are given in Table - 2.

Exploration & Development

The details of exploration activities conducted by GSI for iron ore, REE and titanium & vanadium mineral and other agencies (MECL) for gold during the year 2015-16 are furnished in Table - 3.

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

Mineral	Unit	Reserves				Remaining resources					Total resources (A+B)		
		Proved STD 111	Probable		Total (A)	Feasibility STD211	Pre-feasibility STD221	Measured STD331	Indicated STD332	Inferred STD333		Reconnaissance STD334	Total (B)
			STD121	STD122									
Andalusite	'000 tonnes	-	-	-	-	-	-	-	-	4000	1	4001	4001
Apatite	tonne	-	-	-	-	-	-	2110000	1620000	3540000	-	7270000	7270000
Asbestos	tonne	-	-	-	-	-	-	18309	5769	124059	-	154893	154893
Barytes [#]	tonne	-	-	-	-	3871	-	-	-	35900	-	35900	35900
Bauxite	'000 tonnes	54471	219	8049	9734	6154	15117	17883	17397	54106	55930	176321	239061
Bentonite [#]	tonne	-	-	609406	-	3067	-	-	-	367527	-	370594	980000
China clay [#]	'000 tonnes	427	-	6412	9338	2093	4738	3962	7363	149892	18019	195405	202244
Chromite	'000 tonnes	-	-	-	-	-	-	15	98	623	-	736	736
Cobalt	million tonnes	-	-	-	-	-	-	-	2	-	7	9	9
Copper													
Ore	'000 tonnes	5374	-	1940	13195	24511	3990	101168	103484	41726	-	288074	295389
Metal	'000 tonnes	61.33	-	20.54	142.08	255.74	45.92	1183.99	1058.42	507.38	-	3193.53	3275.40
Dolomite [#]	'000 tonnes	4510	-	6720	10620	350	860	-	-	1857	-	13686	24916
Dunite [#]	'000 tonnes	123	-	262	264	-	448	607	780	6121	8637	16857	17242
Emerald	kg.	-	-	-	-	-	0	-	-	-	55869	55869	55869
Feldspar [#]	tonne	68789	15402	19193	-	40766	348792	32510	120388	836061	-	1378517	1654621
Fire clay [#]	'000 tonnes	-	-	3	-	1125	309	139	122	64755	-	66450	66450
Garnet	tonne	-	-	-	-	-	88303	-	-	21768	-	110071	110071
Gold													
Ore	(Primary) tonne	9349	-	-	-	-	-	-	5146952	4203337	767000	10117289	10126638
Metal													
(Primary) tonne	0.07	-	-	0.07	-	-	-	-	3.61	10.26	0.62	14.49	14.56
Granite [#]													
(Dimen. Stone)	'000 cum	-	-	-	-	-	-	-	-	-	-	-	-
Graphite	tonne	1518581	1204423	1450550	4173555	39262	445703	1959747	651300	8197110	26930	8875340	8875340
Iron ore	'000 tonnes	365111	29238	45022	439372	1081242	458866	457724	597413	673009	1371468	4847045	52866417
Iron ore (Haematite)													
(Magnetite)	'000 tonnes	-	-	-	-	-	518	1986	3948	3722	82	10667	10667
Kyanite	tonne	426240	-	-	426240	824472	524467	881313	1754900	3182363	-	7167515	7593755
Laterite [#]	'000 tonnes	-	-	-	-	-	-	-	-	570	-	570	570
Limestone	'000 tonnes	88172	-	29116	117288	95008	13529	29265	13220	354319	11803	606715	724003
Manganese ore	'000 tonnes	1840	-	328	2168	1710	795	1476	178	4177	1126	9461	11629
Mica [#]	kg.	-	-	-	-	-	-	-	-	1494430	170700	1665130	1665130
Nickel ore	million tonnes	-	-	-	-	-	-	-	2	7	-	9	9
Ochre [#]	tonne	-	-	-	-	62	-	4	147	-	-	214	214

(Contd.)

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Table - 1 (Concl.d.)

Mineral	Unit	Reserves			Remaining resources					Total resources (A+B)			
		Proved STD 111	Probable STD121 STD122	Total (A)	Feasibility STD211	Pre-feasibility STD221 STD222	Measured STD331	Indicated STD332	Inferred STD333		Reconnaissance STD334	Total (B)	
Pyrophyllite#	tonne	858	- 328	1185	-	-	-	-	-	-	-	-	1185
Quartz-Silica Sand#	'000 tonnes	-	- 1070	1070	534	985	4533	137	766	143053	112	150122	151192
Quartzite#	'000 tonnes	181	-	181	763	49	390	197	275	38854	-	40527	40708
Rock Phosphate	tonne	-	-	-	-	-	-	-	-	107370000	-	107370000	107370000
Silver	tonne	-	-	-	-	-	-	-	-	23840000	-	23840000	23840000
Ore	tonne	-	-	-	-	-	-	-	-	5.22	-	5.22	5.22
Metal	tonne	-	-	-	-	-	-	-	-	83000	-	83000	83000
Sillimanite	tonne	-	-	-	-	-	-	-	-	-	-	-	-
Talc-Steatite-Soapstone#	'000 tonnes	336	- 83	419	-	-	54	2	4	243	16	319	739
Titanium minerals*	tonne	-	-	-	-	-	-	-	3630000	755000	-	4385000	4385000
Vermiculite	tonne	-	-	-	-	-	-	-	-	30048	-	30048	30048

Note: The proved and indicated balance recoverable reserves of coal bed methane (CBM) in the state as on 01.04.2016 was 28.91 billion cu m. Figures rounded off.

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

#: Declared as minor mineral vide Gazette notification dated 10.02.2015.

##: Minor minerals before Gazette notification dated 10.02.2015.

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Table – 2: Reserves/Resources of Coal as on 1.4.2016: Jharkhand

(In million tonnes)

Coalfield	Proved	Indicated	Inferred	Total
Total	42322.68	32300.95	6548.38	81172.02
Raniganj	1538.19	466.56	31.55	2036.30
Jharia	15127.97	4302.09	-	19430.06
East Bokaro	3385.77	3903.71	863.32	8152.80
West Bokaro	3761.25	1308.71	33.66	5103.62
Ramgarh	756.11	742.08	58.05	1556.24
North Karanpura	10309.64	6169.37	1864.96	18343.97
South Karanpura	3279.63	1887.48	1469.13	6636.24
Aurangabad	352.05	2141.65	503.41	2997.11
Hutar	190.79	26.55	32.48	249.82
Daltongunj	83.86	60.10	-	143.96
Deogarh	326.24	73.60	-	399.84
Rajmahal	3211.18	11219.06	1691.82	16122.06

Source: Coal Directory of India, 2015-16.

Production

The total estimated value of mineral production (excludes atomic minerals) in Jharkhand during 2015-16 at ₹ 20,606 crore decreased by 6% as compared to the previous year. The State ranked third contributing for about 7% of the total value of mineral production of the country during 2015-16. Jharkhand was the sole producer of flint stone. Coal, the principal mineral produced in the State contributed 91% followed by iron ore with a share of 8% of the total value of mineral production in the State. The important minerals produced in the State were coal, bauxite, copper ore and concentrates, gold, iron ore, manganese ore, graphite, and limestone.

Among the important minerals, production of copper ore and copper concentrates increased by

49% and 45% respectively over the previous year. It also increased for limestone 36%, gold 18% and bauxite 3 percent. However, during 2015-16, the output of iron ore decreased by 1%, coal by 2% and manganese ore by 89% as compared to the previous year. (Table-4).

The value of production of minor minerals was estimated at ₹ 66 crore for the year 2015-16.

The number of reporting mines in Jharkhand during 2015-16 was 199 as against 226 in the previous year.

Mineral-based Industry

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

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Table – 3: Details of Exploration Activities in Jharkhand, 2015-16

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Gold							
West							
Singhbhum	Bisrampur Jaikan area	1:1000	0.5	-	-	226	G-4 stage investigation was carried out in the vicinity of Bisrampur-Jaikan area. Analytical results of 20 bedrock samples and 20 trench samples have been received from chemical laboratory. Bedrock samples do not show any gold value. However, one trench sample from tuffaceous phyllite with quartz vein shows 100 ppb of Au. The mapped area is occupied by Iron Ore Group of rocks which consists of phyllite, tuffaceous phyllite, slaty phyllite, cherty quartzite, chlorite schist, quartz, quartzite, and chert. At places, the tuffaceous phyllite is intruded by numerous quartz veins along the foliation, which show boxwork and limonitisation at places.
Ranchi	Birgaon	1:1000	1.013	-	-	240	G-4 stage investigation with detailed mapping was carried out with reconnaissance survey for gold in Birgaon Block has been initiated in April, 2015. The objective is to assess gold potentiality and to establish the geological and structural control of mineralisation in Babaikundi-Birgaon sector. The value of gold ranges from 0.07 ppm to 0.29 ppm in 3PTS samples and 0.07 ppm in 1 BRS sample in quartzite. Also, the IP results show one 200 m-wide & 1200 m-long anomalous zone of zone of IP values ranging from 10 mV/V to 25 mV/V indicating possible mineralisation.
	Nauhri-Rasuri	-	-	-	-	-	G-4 stage investigation was carried out in this study area comprising of volcano-meta-sedimentary sequences between the Singhbhum Craton in the south and the Chhotanagpur Gneissic Complex in the north, which has undergone low to medium grade metamorphism and belongs to Paleo to Mesoproterozoic age. Sporadic sulphide mineralisation of copper, lead and gold mineralisation are found along these shear zones.

(Contd.)

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Table - 3 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Jharkhand Ranchi (Contd.)	Sindaori East block	-	-	10	1519	650	General exploration was aimed at delineating gold mineralisation in this East block. The work involves collection of 250 trench samples (PTS: both soil & rock from trench) through 12 trenches for establishing the correlation between surface and subsurface mineralised zones in the area. A total of 100 petrological samples were collected from surface and subsurface core samples for the study of petrography including ore petrography. A total of 20 quartz vein samples were collected from subsurface core samples for the study of fluid inclusion. Surface geophysical survey and borehole geophysical logging (both IP & SP) have been carried out in Sindaori East block.
RM/REE Ranchi	Maheshpur- in Kamta- Nawatoli-Jaratoli	1:12500	100.0	-	-	157	G-4 stage investigation of rare metals and REE in Chhotanagpur Gneissic Complex has been carried out by large scale mapping. Bedrock samples, petrological samples, soil samples for heavy mineral studies have been collected. In the area, the pegmatites are coarse-grained with quartz, feldspar (both orthoclase and plagioclase) and muscovite as major constituents and garnet and biotite as minor constituents. The analytical results of 60 bedrock samples received so far show concentration of Li: <5-86 ppm (17 ppm) Ga: 13-29 ppm (19 ppm), Nb: <5-31 ppm (20 ppm), Rb: 15-286 ppm (78 ppm), Sc: <5-10 ppm (22 ppm), Y: 05-198 ppm (31 ppm) and Zr: 8-559 ppm (162 ppm). The values in the brackets show crustal abundance of the elements. The total REE value of 13 bedrock samples received so far ranges from 69-1498 ppm. The mean value of total REE is 293.7 ppm which is higher than the mean total REE concentration of the upper continental crust (179 ppm; Taylor and McLennan, 1985). The total REE values of 40 soil samples received so far range from 158 to 1428 ppm. Other results are still awaited. EPMA analysis of samples shows presence of REE-bearing phases such as allanite, monazite and xenotime. Other important mineral phases identified include sphene, apatite, zircon, magnetite, ilmenite, rutile, uraninite and thorite.

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Table-3 (Concl'd)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated	
		Scale	Area (sq km)	No. of boreholes	Meterage			
Titanium and vanadium								
Latehar	Batuatoli bolck Netarhat- Plateau	1:5000	5.0	7	500.65	-	-	G-3 stage investigation for assessment of potentiality of titanium, vanadium, gallium and REE in bauxite around Batuatoli block, has been carried out with detailed mapping. A one-year programme was initiated to assess Ti, V, Ga and REE potentiality. Subsurface data accrued so far revealed that the cumulative thickness of mineralised zone of bauxite varies from 26.80 m (NBBH-4) to 46.35 m (SRBH-7) between the depth range of 1.10 m and 46.35 m. At places, bauxite is exposed on the surface without any laterite or soil cover. Analytical results of core samples from two boreholes are: TiO ₂ (0.47-8.55%), V ₂ O ₅ (0.001-0.064%), Ga (10-80 ppm), SiO ₂ (6.56-71.74%), Al ₂ O ₃ (8.77-47.10%). Considering cut-off grade of Al ₂ O ₃ at 30% and SiO ₂ at 10% two bands of bauxite in NBBH-1(1.50 m and 1.05 m) and NBBH-2 (0.65 m and 1.10 m) are proved.
MECL Gold								
Ranchi	Parasi (West Block)	1:1000	0.50	10	1564.00	1304	Objective of exploration was to establish presence of mineralisation by drilling up-dip and down-dip boreholes for precise correlation of lodes/ore zones. i) To upgrade the reserves/resources estimated by GSI at higher confidence level and to augment gold reserves/resources by deeper drilling. The most commonly occurring rocks comprises of quartz-magnetite-biotite-chlorite-sericite schist, ferruginous quartzite, tuffaceous quartz phyllite with intercalated schistose quartzite, carbon phyllite, acid tuffs, rhyolite, tremolite-actinolite schist, quartz/carbonate veins. Rock exposures are very scanty and are seen as highly weathered banded ferruginous quartzites. About 0.365 tonnes reserves/ resources were estimated with 1.644 g/t Au at 0.50 g/t Au cut off and 0.181 tonnes with 2.644 g/ Au at 1.0 g/t Au cut off under 331 & 332 category, respectively.	

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**Table – 4 : Mineral Production in Jharkhand, 2013-14 to 2015-16
(Excluding Atomic Minerals)**

(Value in ₹ '000)

Mineral	Unit	2013-14			2014-15			2015-16 (P)		
		No. of mines	Quantity	Value	No. of mines	Quantity	Value	No. of mines	Quantity	Value
All Minerals		234		267708722	226		219359985	199		206064546
Coal	'000t	152	113091	240509800	152	124143	193135100	140	121067	187369900
Bauxite	t	19	2282428	1302079	23	2040519	1330002	19	2111226	1096695
Copper Ore	t	-	398537	-	-	179036	-	-	267251	-
Copper Conc.	t	2	13742	475046	2	5903	198641	2	8576	287299
Gold Ore	t	-	7552	-	-	3999	-	-	4153	-
Gold	kg	1	8	22728	1	11	30615	1	13	35871
Iron Ore	'000t	23	22624	23912896	22	19237	23649275	18	19076	16091729
Manganese Ore	t	5	4779	20276	5	4448	20508	5	508	3274
Dolomite [#]	t	1	267146	384957	1	135319	194994	-	-	-
Felspar [#]	t	2	7462	2499	1	3252	714	-	-	-
Fireclay [#]	t	1	3655	329	-	-	-	-	-	-
Flint Stone	t	2	459	136	2	244	79	1	253	76
Graphite (r.o.m.)	t	6	43716	20203	3	41424	22733	2	36270	20636
Kaolin [#]	t	2	600	119	1	70623	17655	-	-	-
Limestone	'000t	8	1678	646546	9	792	355281	11	1076	498054
Mica [#] (waste & Scrap)*	t	-	2110	-	-	-	-	-	-	-
Pyroxenite [#]	t	2	2985	806	-	-	-	-	-	-
Quartz [#]	t	7	32633	8418	3	14730	2940	-	-	-
Quartzite [#]	t	1	1981	436	1	-	-	-	-	-
Minor Minerals@		-	-	401448	-	-	401448	-	-	661012

*Note: The number of mines excludes minor minerals.*** Includes mine waste obtained while dressing of crude mica.**@ Figures for earlier years have been repeated as estimates, wherever necessary, because of non-receipt of data.**# Declared as minor mineral vide Gazette notification dated 10.02.2015.***Table – 5: Principal Mineral-based
Industries in Jharkhand**

Industry/plant	Capacity ('000 tpy)
Alumina	
Hindalco Industries Ltd, Muri.	450
Asbestos Products	
Hyderabad Industries Ltd, Jasidih, Distt. Deogarh.	60
Cement	
ACC Ltd, Chaibasa, Distt. Singhbhum.	870
ACC Ltd, Sindri, Distt. Dhanbad (G).	900

(Contd.)

Table - 5 (Contd.)

Industry/plant	Capacity ('000 tpy)
Bokaro Cement Plant (formerly JV of Jaypee Cement & SAIL), Bokaro (G). Lafarge, Jojobera, Distt. Singhbhum.	2100 4600
Ceramic	
Bihar Industrial Corp. Ltd, Madhupur, Distt. Deogarh.	0.48
Maithan Ceramics Pvt. Ltd, Dhanbad.	NA
Chemicals	
Bihar Caustic & Chemicals Ltd, Garhwa Road, Distt. Palamu.	92.75 (caustic soda lye)

(Contd.)

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Table - 5 (Contd.)

Industry/plant	Capacity (^{'000 tpy})
Copper Smelter	
HCL, ICC, Ghatsila, Distt. Singhbhum (East).	20.5 (copper smelting) 18.5 (copper cathode) 84 (fabricated wire bar) 54(H ₂ SO ₄), 390 t (NiSO ₄) 480 kg (CuSO ₄) 14.6 kg (selenium) 9868 kg (Ag), 698 kg (Au)
Iron & Steel	
Bokaro Steel Plant, Bokaro.	6900 (sinter) 4585 (pig iron) 4360(Crude/liquid steel) 35.5 (H ₂ SO ₄) 27.2 (ammonium sulphate)
Tata Steel Ltd, Jamshedpur.	6000 (pellets) 7700 (sinter) 9700 (Crude/liquid steel)
Usha Martin Ltd, Jamshedpur.	500 (Sponge iron) 1200 (pellets) 715 (sinter)
Orissa Manganese & Minerals Ltd, Kandra, Sarai Kharsawan.	1200 (pellets)
Pig Iron	
Usha Martin Industries, Jamshedpur.	110
Sponge Iron	
Ashirwad Steel & Industries Ltd, Gamharia, Jamshedpur.	30
Bihar Sponge Iron Ltd, Chandil, Distt. Saraikela-Kharsawan.	210
Brahmaputra Metallics Limited, Kanta, Gola, Distt. Ramgarh.	105
Jai Durga Iron Pvt. Ltd, Jhumari Tellaiya, Distt. Koderma.	36

(Contd.)

Table - 5 (Concl.)

Industry/plant	Capacity (^{'000 tpy})
Zoom Vallabh Steels Ltd, Dugdha, Distt. Saraikela-Kharsawan.	120
Ferro Alloys	
Anjaney Ferro Alloys Ltd, Mihijam.	12
Gautam Ferro Alloys Ltd.	5.5
Tin Plates	
The Tin Plate Co. of India Ltd, Jamshedpur.	379
Glass	
IAG Co. Ltd, Bhandainagar.	66.8
Refractory	
Allied Refractories (P) Ltd, Amaghata.	7.2
SAIL Refractory Unit (formerly Bharat Refractories Ltd), Ranchi Road, Ramgarh.	7.5
SAIL Refractory Unit (formerly Bharat Refractories Ltd), IFICO, Ramgarh.	4.2
SAIL Refractory Unit (formerly Bharat Refractories Ltd), Bhandaridah, Distt. Bokaro.	2.6
Jharia Firebricks Pottery Works (P) Ltd, Dhansar, Distt. Dhanbad.	20
Mineral & Chemical Products, Kendposi, Distt. West Singhbhum.	1.5 (calcined china clay)
Raj Refractory (P) Ltd, Hardag, Distt. Ranchi.	6

*G; Grinding Unit**Note: Data not available for Cement Industries on respective websites, is taken from Survey of Cement Industry & Directory, 2016.*