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IRON ORE

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GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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28 Iron Ore

Iron & steel is the driving force behind industrial development in any country. The vitality of the Iron & Steel Industry largely influences a country's economic status. The mining of iron ore, an essential raw material for Iron & Steel Industry, is arguably of prime importance among all mining activities undertaken by any country. With the total resources of over 33.276 billion tonnes of haematite (Fe_2O_3) and magnetite (Fe_3O_4), India is amongst the leading producers of iron ore in the world.

RESERVES/RESOURCES

Haematite and magnetite are the most important iron ores in India. About 79% haematite ore deposits are found in the Eastern Sector (Assam, Bihar, Chhattisgarh, Jharkhand, Odisha & Uttar Pradesh) while about 93% magnetite ore deposits occur in Southern Sector (Andhra Pradesh, Goa, Karnataka, Kerala, & Tamil Nadu). Karnataka alone contributes 72% of magnetite deposit in India. Of these, haematite is considered to be superior because of its higher grade. Indian deposits of haematite belong to the Precambrian Iron Ore Series and the ore is within banded iron ore formations occurring as massive, laminated, friable and also in powdery form.

As per NMI database based on UNFC system, the total reserves/resources of haematite as on 1.4.2015 has been estimated at 22,487 million tonnes of which 5,422 million tonnes (24%) are under 'Reserves' category and the balance 17,065 million tonnes (76%) are under 'Remaining Resources' category. By grades, Lumps constitute about 56% followed by Lumps with Fines (17%), Fines (16%), and the remaining 11% are Black Iron ore, Lump low & medium grade, Beneficiable grade, Others, Unclassified, Not-known and Lump & fines & blue dust unclassified grade. Major reserves/resources of haematite are located in Odisha (7,559 million tonnes or 34%), Jharkhand (5,286 million tonnes or 23%), Chhattisgarh (4,858 million tonnes or 22%), Karnataka (2,467 million tonnes or 11%) and Goa (1,189 million tonnes or 5%). The balance 5% resources of haematite are spread in Andhra Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Meghalaya, Rajasthan, Telangana and Uttar Pradesh (Table-1).

Magnetite is another principal iron ore that also occurs in the form of oxide, either in igneous or metamorphosed banded magnetite-silica formation, possibly of sedimentary origin. As per NMI database based on UNFC system, the total reserves/resources of magnetite as on 1.4.2015 has been estimated at 10,789 million tonnes of which 'Reserves' constitute a mere 53 million tonnes while 10,736 million tonnes are placed under 'Remaining Resources'. Classification on the basis of grades shows 20% resources are of Metallurgical grade while 80% resources belong to grades that are categorised as Unclassified, Not-known and Coal Washery. The resources of Others and Foundry grades constitute meagre proportions. India's 98% magnetite reserves/ resources are located in five States, namely, Karnataka (7,802 million tonnes or 72% reserves) followed by Andhra Pradesh (1,392 million tonnes or 13%), Rajasthan (617 million tonnes or 6%), Tamil Nadu (507 million tonnes or 5%) and Goa (226 million tonnes or 2%).Assam, Bihar, Chhattisgarh, Jharkhand, Kerala, Maharashtra, Meghalaya, Nagaland, Odisha and Telangana together account for the remaining 2% resources (Table-2).

EXPLORATION & DEVELOPMENT

In 2015-16, GSI, MECL, NMDC and State DGM, Rajasthan and Maharashtra conducted explorations for iron ore. Details of exploration activities carried out by various agencies in 2015-16 are furnished in Table-3.

PRODUCTION & STOCKS

The production of iron ore constituting lumps, fines and concentrates was at 155.9 million tonnes in the year 2015-16, showing an increase of about 21% as compared to that in the preceding year owing to better utilisation of resources, more demand in Odisha and restarting of production in Goa state.

There were 297 reporting mines in 2015-16 as against 320 in the previous year. Among them, 34 mines were in the Public Sector and 263 in Private Sector. Besides production of iron ore was reported as an associated mineral by 16 mines in 2015-16 as against 20 mines in 2014-15. The contribution of Public Sector to the total production was about 38.9% as against about 46% in the preceding year. The remaining 61.1% of the total production in 2015-16 was from Private Sector. Among 34 iron ore mines and one associated mine in Public Sector, 16 iron ore mines (5 in Chhattisgarh, 4 each in Karnataka and Odisha and 3 in Jharkhand) each producing more than one million tonnes annually accounted for 95.4% of the total output in Public Sector and around 37.1% of the total production in the country during 2015-16. Out of 263 iron ore mines and 15

associated mines in the Private Sector, 22 iron ore mines (17 in Odisha, 2 in Jharkhand and 1 each in Goa, Karnataka and Rajasthan) each producing more than one million tonnes annually accounted for about 79.7% of the total output of Private Sector and about 48.7% of the total iron ore production during the year. Thus, 38 iron ore mines, each producing more than one million tonnes of iron ore annually, contributed about 85.8% of the total output in 2015-16.

Out of 31 captive iron ore mines in the country, 12 were in the Public Sector. The production of captive mines in the Public Sector was 24.2 million tonnes or about 40% of the sectoral output in 2015-16. On the other hand, production of captive mines in Private Sector was 24.4 million tonnes or 25.6% of the output in Private Sector.

Gradewise analysis of the current year's output reveals that out of the total output of 155.9 million tonnes, iron ore lumps constituted 53.8 million tonnes or about 34.5%, fines 101 million tonnes or about 64.8% and concentrates 1.1 million tonnes or about 0.7% of the total output of iron ore. In lumps, about 12.5 million tonnes or 23.2% were of grade 65% Fe & above, about 29.1 million tonnes or 54.1% were of grade 62% to below 65% Fe, 6.4 million tonnes or 12% were of grade 60% to below 62% Fe, 3 million tonnes or 5.7% were of grade 58% to below 60% Fe, about 1.1 million tonnes or 2% were of grade 55% to below 58% Fe, and the rest 1.7 million tonnes or about 3% of the production were of grade below 55% Fe. In the case of iron ore fines, 15.1 million tonnes or 14.9% of the production were of grade 65% Fe & above, 43.7 million tonnes or 43.2% were of grade 62% to below 65% Fe, 22.8 million tonnes or 22.6% were of grade 60% to below 62% Fe, about 6.6 million tonnes or 6.6% were of grade 58% to below 60% Fe, 8.2 million tonnes or 8.1% were of grade 55% to below 58% Fe, and the balance 4.6 million tonnes or about 4.6% were of grade below 55% Fe.

Among the States, Odisha recorded the highest production of 79.9 million tonnes or about 51.3% of the country's production in 2015-16. Karnataka was at the second place with a production of 25 million tonnes or 16% of the total production followed by Chhattisgarh with 24.6 million tonnes or about 15.8% and Jharkhand with 19.1 million tonnes or about 12.2% of the country's production. The remaining 7.3 million tonnes or 4.7% production was reported from Andhra Pradesh, Goa, Madhya Pradesh, Maharashtra and Rajasthan.

STOCKS

The mine-head closing stocks of iron ore for the year 2015-16 were 144.2 million tonnes as compared to 123.7 million tonnes in 2014-15. The stocks relate to iron ore lumps, fines and concentrates in all the states but excludes the quantity taken over by the Govt. of Goa as per the Hon'ble Supreme Court order (WP(C) No. 435/2012).

EMPLOYMENT

The average daily employment of labour during 2015-16 was 39,613 as against 39,243 in the preceding year.

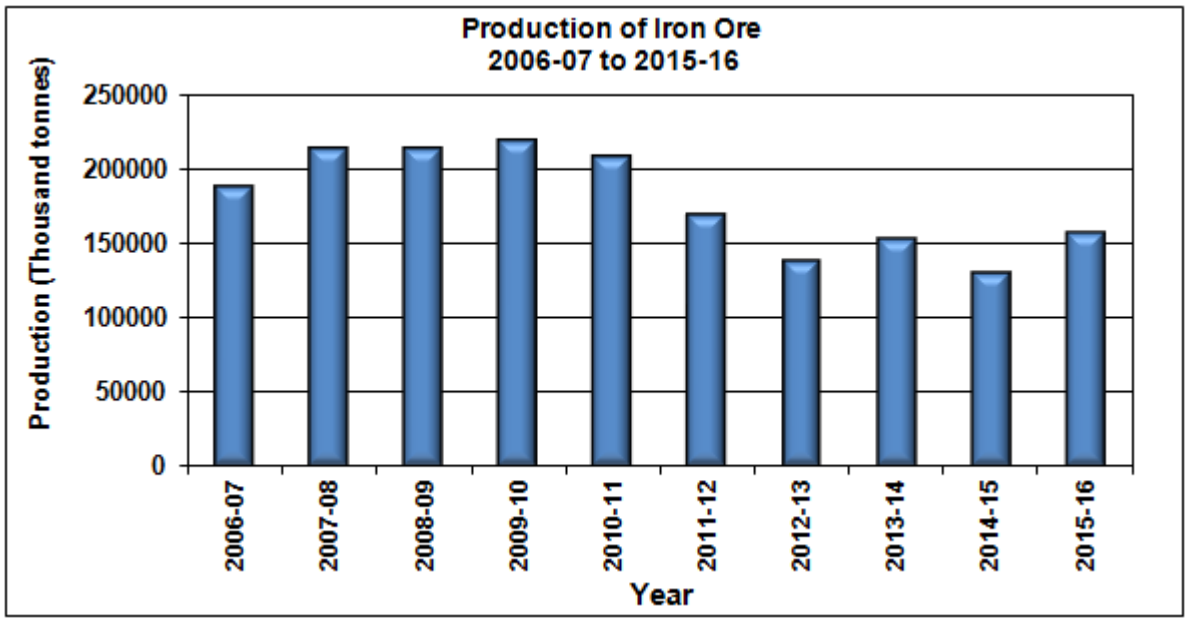

Table – 1 : Reserves/Resources of Iron Ore (Haematite) as on 1.4.2015
(By Grades/States)

(In '000 tonnes)

Grade/State	Reserves				Remaining Resources								
	Proved STD111	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						
All India	**4053032**	**449917**	**918801**	**5421751**	**3444103**	**1573822**	**1496674**	**1762741**	**1798557**	**4498142**	**2491176**	**17065214**	**22486965**
By Grades													
Lump, high grade	1207974	2751	213649	1424375	458544	40887	144840	198115	37065	195774	74865	1150092	2574466
Lump, medium grade	1021112	94231	325808	1441151	1726230	737324	645733	912442	997496	1141891	6039	6167154	7608306
Lump, low grade	122710	50314	89654	262679	195265	78584	132621	39796	127858	925985	225687	1725796	1988474
Lump, unclassified grade	204	28	16	248	56654	-	8791	16969	34488	152248	22800	291951	292200
Fines, high grade	271459	-	79169	350628	18995	1889	4849	146969	11174	25567	4890	214334	564962
Fines, medium grade	120083	62207	6571	188862	50161	265570	49801	337543	286918	494180	932	1485104	1673967
Fines, low grade	237700	31006	41557	310263	196422	119619	120401	11163	94702	401756	6094	950157	1260420
Fines, unclassified grade	389	-	593	982	343	669	130	8624	12908	118978	15200	156851	157833
Lumps & fines high grade	195566	12720	-	208286	84292	94614	67894	9748	8561	61307	112375	438791	647077
Lump & fines medium grade	440515	73933	84121	598568	134534	56987	101242	994	15969	201152	241259	752136	1350705
Lump & fines low grade	166999	5718	37294	210012	270249	73244	87740	27296	64404	431242	160391	1114567	1324579
Lumps & fines unclassified	123828	94850	26131	244809	73134	10373	21754	44082	100360	100693	4088	354485	599293
Black iron ore	-	-	-	-	7017	3014	1355	-	1059	6661	-	19106	19106
Lump low & medium grade	9529	5259	-	14788	-	13865	-	-	-	-	-	13865	28653
Beneficiable grade	31307	11183	714	43204	115078	44183	88181	1538	1003	64982	63708	378673	421877
Others	28413	-	2521	30934	19712	60	10861	708	1432	5197	745	38715	69649
Unclassified	60225	3356	8750	72331	36845	10699	8263	4746	3006	12094	27252	102905	175236
Not-known	2673	614	1148	4434	629	20000	1659	-	151	158432	1524850	1705721	1710155
Lump & fines & blue dust unclassified grade	12345	1746	1106	15197	-	2241	560	2009	-	-	-	4810	20007
By States													
Andhra Pradesh	17664	273	11832	29768	40595	49589	68425	377	4666	147628	13	311293	341062
Assam	-	-	-	-	-	-	-	-	8600	4000	-	12600	12600
Bihar	-	-	-	-	-	-	-	-	-	55	-	55	55
Chhattisgarh	1067636	78071	241730	1387437	255074	61735	47394	921139	613433	801086	770827	3470687	4858124
Goa	297271	34709	26259	358239	301806	214187	134955	15286	11535	141558	11747	831075	1189313
Jharkhand	365111	29238	45022	439372	1081242	458866	457724	207324	597413	673009	1371468	4847045	5286417
Karnataka	416684	46169	87394	550247	518155	48231	211632	248299	44094	669239	176956	1916607	2466854
Madhya Pradesh	44203	3635	14225	62063	48412	3650	36774	23243	9008	146803	10	267900	329963
Maharashtra	11283	3032	2926	17241	9028	6673	8858	75724	71806	72588	32185	276862	294103
Meghalaya	-	-	-	-	-	-	-	-	-	225	-	225	225
Odisha	1830569	252615	489034	2572217	1180055	704302	530440	271349	426493	1773077	100730	4986447	7558664
Rajasthan	2103	2175	380	4658	8764	6105	471	-	11510	6897	-	33745	38404
Telangana	509	-	-	509	973	483	-	-	-	23977	27240	52673	53181
Uttar Pradesh	-	-	-	-	-	20000	-	-	-	38000	-	58000	58000

Figures rounded off.

Table – 2 : Reserves/Resources of Iron Ore (Magnetite) as on 1.4.2015(P)
(By Grades/States)

(In '000 tonnes)

Grade/State	Reserves				Remaining Resources								
	Proved STD111	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						
All India : Total	**30352**	**2311**	**20037**	**52699**	**223388**	**15494**	**64091**	**1513195**	**1984566**	**6351286**	**584436**	**10736455**	**10789155**
By Grades :													
Metallurgical	8355	-	3308	11663	165948	-	21530	690596	342792	964399	255	2185521	2197183
Coal washery	16782	-	15847	32629	265	675	11001	411	318	37512	15455	65636	98265
Foundry	-	-	-	-	330	125	-	-	-	381	-	836	836
Others	749	-	443	1192	3796	985	62	-	-	1791	-	6633	7826
Unclassified	4099	2311	196	6606	52978	13709	31493	822188	1641456	5066948	568677	8197449	8204056
Not-known	366	-	243	609	71	-	6	-	-	280254	48	280379	280989
By States													
Andhra Pradesh	-	-	-	-	43105	-	-	13800	1266666	68527	-	1392098	1392098
Assam	-	-	-	-	-	-	-	-	-	15380	-	15380	15380
Bihar	-	-	-	-	-	-	-	-	-	2659	-	2659	2659
Chhattisgarh	8087	-	3096	11183	-	-	42	-	-	-	-	42	11225
Goa	4364	-	626	4990	59509	14516	33512	-	-	151811	1997	261345	266336
Jharkhand	-	-	-	-	-	518	1986	411	3948	3722	82	10667	10667
Karnataka	319	127	-	446	120022	-	18375	1498957	479372	5345018	340000	7801744	7802190
Kerala	-	-	-	-	-	-	-	-	59912	23523	-	83435	83435
Maharashtra	359	-	225	583	149	-	63	-	-	90	-	302	885
Meghalaya	-	-	-	-	-	-	-	-	-	3380	-	3380	3380
Nagaland	-	-	-	-	-	-	-	-	5280	-	-	5280	5280
Odisha	74	-	-	74	8	-	-	27	-	43	-	79	152
Rajasthan	17148	2185	16090	35423	595	460	10113	-	-	554904	15422	581493	616916
Tamil Nadu	-	-	-	-	-	-	-	-	169388	110728	226921	507037	507037
Telangana	-	-	-	-	-	-	-	-	-	71500	14	71514	71514

Figures rounded off.

Table – 3 : Details of Exploration Activity for Iron Ore, 2015-16

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage		
GSI							
Arunachal Pradesh							
West Siang & Upper Subansiri	Bomdila Group	Large Scale	81	-	-	-	The investigation (G-4) was carried to search Iron and associated sulphide mineralisation. Four iron-rich zones, with mineralisation manifested in the form of haematite-goethite-quartz band, thin (1-3 mm) bands and as disseminations of magnetite in quartzite and chlorite-biotite-quartz schist have been delineated.Three sulphide mineralised zones have been delineated at Gadimendi and Tode. Two iron formation-associated sulphide-mineralised bands have been delineated at Karte and Baririjo area. Iron formation with associated sulphide mineralisation at Karte shows an average of 24.87% Fe and 71.15 ppm Cu from channel and trench samples. Channel samples from pyrite-bearing talc-tremolite schist yielded an average of 32.25 ppm Cu and 6.09% Fe. Channel samples from magnetite-bearing chlorite-biotite-quartz schist at Lama Deke yielded average values of 9.31% Fe and 72.90 ppm Cu. Analytical results from the trench at Takam in the haematite-goethite-quartz band yielded average values of 6.61% Fe and 33.875 ppm Cu. Trench samples from iron formation at Baririjo yielded average values of 28.18% Fe, 367.6 ppm Cu, 74.4 ppm Pb and 123.8 ppm Zn.
Chhattisgarh							
Kabirdham	Ranidhara Magarkund area	1:12500	100	-	-	20 (PS) 40 (BR) 10 (OMS)	The investigation (G-4) was carried out for delineation of iron ore occurrence in Bhalapuri-Eklama-Chelikama block of M/s CMDC, Ltd of, Raipur Iron ore in the area is associated with N–S to NNE–SSW trending rocks of Chilpi Group.

(Contd.)

Table – 3 (Contd.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage		
Chhattisgarh							
Kabirdham, (Concld.)	Ranidhara-Magarkund area (Concld.)	1:12500	100	-	-	20 (PS) 40 (BR)	Field study reveals iron ore band is thin (maximum thickness 3 m) and outcrop width is not appreciable (mostly under 10 m). Strike length of the band is not significant enough (average: 100 m, maximum: 160 m). Average grade of iron ore is 5.88% Fe (N=15) for samples analysing greater than 45% Fe content and 35.46% Fe (N=4) for samples analysing Fe content between 30 and 45%. Part of the area lies well within protected and reserved forests.
Karnataka							
Haveri & Shivamogga	Dharwar-Shivamogga Schist Belt of the Dharwar Supergroup	1:12500	100	-	-	100(TS) 110(BR) 50(SSS) 10(PS) 10(PCS) 10(OS)	The investigation (G-4) has been carried out.Eight BMQ bands were delineated. A total of 151 cu m of trenching was done. Eight major BIF bands are delineated in the area. They were numbered from I to VIII from Kanivemane to Dindadahalli area. A total of 75,000 m of BIF band was delineated in 8 BIF Bands, namely I, II, III, IV, V, VI, VII and VIII. These bands are of oxide/sulphide facies, highly oxidised, limonitised at places and show good amount of fresh/ oxidised sulphide. The analytical results received so far indicate Fe value and grade variations from 20% to 51% of Fe_2O_3. One anomalous value of Cu of 1.7% in sample no. BRS-8 (north of Kanivemane) has been obtained.
Madhya Pradesh							
Jabalpur Rewa, Katni, Sidhi, Shahdol, Singrauli	Mahakoshal belt	1:25000	1000	--		450(BRS) 10(PCS) 50(PS)	G4 stage reconnaissance survey has been carried out in parts of toposheet no.s 63 H/ 4,8,11,12,15 and 16. Prominent bands of BIF/BHQ have been demarcated in the study areas. Analytical results show that the grades range from 25% to 70% of Fe_2O_3 (chemical analysis of 121 BRS).

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Table – 3 (Contd.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage		
Madhya Pradesh							
Jabalpur Rewa, Katni, Sidhi, Shahdol, Singrauli (Concld.)	Mahakoshal belt	1:25000	1000	-	-	450(BRS) 10(PCS) 50(PS)	BIF/BHQ bands have an average thickness of 10-50 m and the haematite band ranges from 2 mm to 5 cm along with quartzite. Iron is present in the form of haematite and goethite ores. BHQ bands containing Manganese were also identified. Sulphides in the form of pyrites, chalcopyrite, bornite and malachite stains have been noticed in the study area and samples were collected for analysis. Detailed mapping of some areas such as, Parkhuri, Khaddi, Maura, Chauphal and Lohra may be taken up to know the extent of BIF/BHQ bands on large scale and average grade of iron along with its primary and secondary enrichment. Analytical results obtained so far indicate that major fraction of samples (65-70 BRS) falls in range of 40-60% of Fe_2O_3 and 20-40% of Fe3+.Some of the samples yielding high percentage (>60%) of iron are from secondary-enriched and oxidised iron bands.
Jabalpur	Sihora, Gosalpur Sihora-Kurro-Gughara-Dhanwahi-Mangeli	1:12500	100	-	-	100(TS) 110(BR) 50(SSS) 10(PS) 10(PCS) 10(OS)	G-4 Stage large scale mapping has been carried out.In the present work three types of mineralisation have been noticed: Iron ore in the form of BHQ, manganese as a secondary residual deposit and laterite as detached and isolated patches.The analytical results so far received show Fe_2O_3 values varying from 4.79% to 82.04%. Out of 55 samples, 25 samples were collected from BIQ, 2 samples were collected from BHQ located in secondary-enriched zone and 14 samples were collected from laterite. Fe_2O_3 values of 25 BIQ, 2 BHQ and 14 laterite samples vary from 12.37% to 80.3%, 70.58% to 82.04% and 13.18% to 61.11% respectively.
	Kurro village	1:5000					

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Table – 3 (Contd.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage		
Jabalpur (Concld.)	Sihora, Gosalpur Sihora-Kurro-Gughara-Dhanwahi-Mangeli	1:12500	100	-	-	100(TS) 110(BR) 50(SSS) 10(PS) 10(PCS) 10(OS)	The Fe+3 values in the corresponding BIQ samples are between 8.65% and 56.13% with mean average value of 38.64%. Similarly, 2 BHQ from secondary-enriched zone shows Fe+3 values between 49.4% and 57.43% with mean average value of 53.42%. Fourteen laterite samples show Fe3+ value between 9.21% and 55.79% with mean average value of 30.48%.Two samples of suspected Mn mineralisation were collected from brecciated zone (located near village Tola) that show MnO values between 46.32% and 46.89%.The analytical results of samples are awaited. Based on the field observations, visual estimation and analytical results, three blocks, namely, PB-1, PB-2 and PB-3 have been demarcated for further exploration work.
	Kurro village	1:5000					
Madhya Pradesh							
Gwalior	Motijhil Akbarpur block	-	-	-	-	-	Priliminary investigation (G-3) of iron ore has been carried out.In the study area, impure limestone of Akbarpur Formation occurs as discontinuous bed and as interbedded sequence within Birauli Formation as recorded in drill core. Its thickness varies from 5 to 20 m below iron ore-bearing part of Birauli Formation. All the litho units are horizontally to sub-horizontally disposed with NE-SW strike and 2-4° northwesterly dip. Structurally, this area is less disturbed as faults and joints along with secondary enrichment of iron are very few. Detailed geological mapping has been carried out

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Table – 3 (Contd.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage (m)		
Madhya Pradesh							
Gwalior (Contd.)	Akbarpur Motijhil blocks,	1:2000	1	7 (Scout)	200.30	23(CS)	in SoI toposheet no. s 54J/3 and 4 and geological contacts have been demarcated by Total Station. Geologically, the basic sill occurs in the flat-lying area where intense farming is going on. Birauli Formation overlies basic sill and consists of ferruginous shale, banded iron jasper and chert. In the western side of the block, 2 to 5 m thick succession of cherty limestone is present on the Birauli Formation. Conglomerate is overlain by creamy yellow fine-grained, massive sandstone of Kaimur Group.Thickness of mineralised zone in borehole GA-1 is 21 m, in GA-2 is 28 m, in GA-5 is 5 m, in GA-6 is 8.5 m, in GA-7 is 12 m, in PB-1 is 20 m and in PB-2 is 5 m. Total core samples generated from mineralised part in borehole GA-1 is 12, GA-2 is 12, GA-5 is 5, GA-6 is 7, GA-7 is 11, PB-1 is 12 and PB-2 is 3. Iron (Fe) content in BH No GA-5 is 23.88% (min. 14.3 to max. 32.6%), in GA-6 it is 28.82% (min. 20.6 to max. 36.2%), and in GA-7 it is 28.70% (min. 17.5 to max. 51.8%). Apart from iron mineralisation there is thick band of limestone which is interbedded with thin chert and iron bands. Limestone has been intersected in borehole no. GA-1, GA-2 and PB-1. Ten grab samples of limestone have been collected from the area and twelve core samples from borehole GA-1 have been generated for chemical analysis. Chemical analysis of 17 channel samples that has been received showed Fe content in the range of 20.8-32.36%.

(Contd.)

Table – 3 (Contd.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage (m)		
Odisha							
Sundargarh	Kalamang west block, (Northern part)	-	-	20	2043.85	-	G-3 stage exploration has been carried out. In SoI toposheet no. 73G/5, boreholes *viz*. BH SKN-1 to SKN-20, were drilled at 200 m x 200 m grid interval at G-3 stage during FS 2014-15 and FS 2015-16. Boreholes SKN-1 to SKN-11 have intersected iron ore (powdery ore and laminated ore) with a considerable cumulative thickness of 74.0 m, 67.05 m, 43.0 m, 41.0 m, 44.60 m, 92.10 m, 55.0 m, 48.70 m, 67.40 m, 107.60 m and 67.70 m including low-grade zone. SKN-14 to SKN-19 have intersected cumulative ore zone of 123.30 m, 22.20 m, 13.30 m, 54.95 m, 57.35 m and 53.70 m respectively. During FS 2014-15 and 2015-16, on the basis of cross-section method and with available results of chemical analysis of core samples, a total of 62.97 MT iron ore has been assessed at >55% Fe and 11.90 MT at Fe(T) ~45%- 55% at G-3 stage of exploration, where bulk density of the mineralised zone is considered as 2.7 g/cc. On the basis of encouraging results at G-3 level with positive incidence of medium to high-grade iron ore in seventeen boreholes with a considerable cumulative ore occurrence out of twenty boreholes, the same block has been taken up as an additional item under G-2 stage during FS 2015-16.
	Ghoraburhani South Block			15	1556.65	-	G-3 Stage exploration has been carried out. An iron ore body is exposed all along a nala. The cumulative thickness of the ore zone intersected in borehole SGS-12 is 77.00 m, in borehole (Contd.)

Table – 3 (Contd.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage (m)		
Odisha Sundargarh (Contd.)							SGS-13 is 90.00 m, in borehole SGS-20 is 55.00 m, in borehole SGS-21 is 75.00 m, in borehole SGS-23 is 37.00 m, in borehole SGS-24 is 59.00 m, in borehole SGS-25 is 77.00 m and in SGS-26 is 46.00 m. Boreholes SGS-11, SGS-12, SGS-13, SGS-20, SGS-21, SGS-23 and SGS-25 show encouraging results with Fe content in the range of (total value) 35.66-65.56%, 33-65%, 37-64%, 27-40%, 25-64%, 33-62% and 55-65% respectively.
	Mendhamaruni West Block	1:2000	0.34	4	511.40	-	This area has been mapped in parts of SoI toposheet no. 73 G/5, which comprises Fe-laterite shale and soil.The baseline is N60°E-S60°W-trending and the grid lines are laid perpendicular to it at 200 m interval. The main litho-units intersected in boreholes are Hard Laminated Ore (HLO), Soft Laminated Ore (SLO) powdery iron ore, ferruginous shale, brown to grey shale limonitic shale and banded haematite chert. Mineralised zone has been intersected in the boreholes SMW-1 & 3 in the southeastern part of study area. The cumulative thickness of the ore zone intersected in borehole SMW-1 is 35 m (99.0 m to 134.0 m). The maximum Fe (total) value is 44.04%. The cumulative thickness of the ore zone intersected in borehole SMW-3 is 40.00 m (46.0 m to 86.0 m). The maximum average Fe (total) value is 42.51%. (Contd.)

Table – 3 (Contd.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage (m)		
Sundargarh (contd.)							
	Mendhamaruni Block	1:2000	-	10	1937.10	-	G-2 stage exploration was carried out. Boreholes, OSM-1 to OSM- 7, OSM-9, OSM-10 and OSM-13 have been completed in 100 m x 100 m grid and another three boreholes OSM-8, OSM-11 and OSM-12 are under progress. All the boreholes are vertical in nature and borehole depth varied from 113 m to 181 m. The cumulative thickness of ore zone in Borehole OSM-1 was 167.95 m, and average Fe (total) value ranged between 47.97 and 61.72%. In Borehole OSM-2 cumulative thickness of ore zone was 104.65 m while Fe (total) value ranged from 48.69-63.73%. Cumulative thickness of Borehole OSM-3 was 137.95 m with average Fe (total) value ranging between 39.33 and 64.77%. cumulative thickness of Borehole OSM-4 was 87.10 m and the average Fe (total) value was >59.85%. Cumulative thickness of ore zone intersected in Borehole OSM-5 was 117.00 m, in borehole OSM-6 it was 92.00 m, in Borehole OSM-7 86.00 m, in Borehole OSM-8 55.00 m, in Borehole OSM–9 113.00 m, and in borehole OSM-10 it was 61.00 m.
	Kalamang West Block, (Northern part)	1:2000	-	20	590.40	-	G2 stage exploration has been carried out under Project-Iron Ore after the encouraging results of G-3 investigation. At G-2 level of investigation, the boreholes were drilled at 100 m × 100 m grid interval of area covered through detailed mapping area. The boreholes have intersected

(Contd..)

Table – 3 (Contd.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage (m)		
Odisha Sundargarh (Concld.)	Kalamang West Block, (Northern part) (Concld)						mainly medium- to high-grade [Fe(T) ~ >55% as per visual estimation (VE)] iron ore body comprising powdery ore, soft laminated ore, hard laminated ore, blue dust with minor ferruginous shale and occasionally low grade [Fe(T) ~45 to 55% as per VE] ore zone comprising powdery ore, soft laminated ore intercalated with banded haematite jasper/banded haematite quartz and ferruginous shale Boreholes OSKN-1, OSKN-2, OSKN-3 and OSKN-4 have intersected cumulative iron ore zone (including low-grade ore) of 87.10 m, 82.25 m, 76.25 m and 59.90 m respectively. Boreholes OSKN-5, OSKN-7, OSKN-8 and OSKN-9 have intersected medium- to high-grade iron ore body with a considerable cumulative thickness of 18.85 m, nil, 12.0 m and 6.50 m respectively.
Telangana							
Karimnagar	South of Manthani	1:12500	197	-	-	150(BRS) 50(PTS) 20(PS) 5(PCS) 20(OMS)	G-4 stage investigation has been carried out in the area. As part of the investigation(G-4) LSM and sampling was carried out in parts of SoI toposheet no.s 56N/10 and N/11. It was observed that major part of the area is covered by Pakhal metasedimentaries. It is a NW-SE-trending body, bounded by basement granite (PGC-II) in the west and southwest, and Sullavai Sandstone in the NE. LSM has helped to delineate two iron-enriched zones: south of Manthani, in SoI toposheet no. 56N/10 and Shanthinagar in SoI toposheet no. 56N/11. Near south of Manthani ferruginous/ laterite capping is developed over ferruginous shale. This zone has a dimension of 1× 0.5 km (approx.) with an average thickness of 1 m. The Shantinagar Fe-rich zone has an approximate dimension of 0.75 × 0.3 km (approx) with thickness of about 1 m (approx). The

Table – 3 (Contd.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage		
Telangana Karimnagar (Contd.)							approximate thickness of the iron-enriched zone at these places is estimated by the numerous cliff faces made by recent excavation in the area and by pitting and trenching as part of this work. These iron enriched zones are also being sampled for assessing their Fe content. The average specific gravity of the specimen is 3.52 to 4.5. Chemical analyses of 150 samples showed that Fe_2O_3 ranged from 0.74 wt% to 91.88 wt% and the calculated Fe varies from 0.51% to 64.25%. The higher Fe values are from the float iron ore present within laterite. Apart from iron ore, dolomite has been extensively developed over the entire area and samples have been submitted for analysis. CaO content of the samples varied from 24.78 to 51.26 wt% and SiO_2 varied from 6.12 to 11.01 wt%.
Khammam & Warangal	Bayyaram area	1:12500 1:2000	100	17	1168.6	262 (BRS) 67 (PS) 111 (PCS) 47 (ORM)	G2 Investigation in an area of 100 sq km was carried out between Bayyaram Cheruvu to Motla Timmapuram (SoI toposheet no. 65 C/2) on 1:12500 scale including mapping of eight blocks with cumulative area of 4.54 sq km on 1:2000 scale.Both haematitite and specks of magnetite are present. The core samples from 18.5 m to 47 m, totalling 20 samples at an interval of 1 m to 2 m analysed high The values ranging from 43 ppm to 1992 ppm and £LREE values from 239 to 8395 ppm while £HREE is 47 ppm to 286 ppm. La, Ce, Pr and Nd are the dominant REEs in the samples. The samples are also high in Zr ranging from 115 ppm to 2183 ppm. However, low U content (1 ppm to 31 ppm) is recorded. The surface sample of the mineralized zones in the area has an average density ranging from 1.09 to 5.09. Petrographic studies indicate occurrences of brecciated haematite clasts along with folded BIF clasts. Magnetite grains are also present that show transformation from magnetite to haematite (martitization).

(Contd.)

Table – 3 (Contd.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage		
MECL							
Karnataka							
Chitradurga	Hosadurga	1:1000	0.0757	02 04	100.00 273	-	3.179 million tonnes with avg. grade of 51.73% Fe. reserves/resources have been estimated .
	Hosadurga	1:1000 - do -	0.7514	04 27	194.5 1027.00	-	9.880 million tonnes with avg. grade of 55.08% Fe. reserves/ resources have been estimated during the year.
Ballari	Ballari	1:1000 - do -	0.4442	02 13	129.50 775.00	845	9.224 million tonnes with avg. grade of 53.26% Fe. reserves/ resources have been estimated during the year.
	Sandur/Tumakuru	1:1000 - do -	0.2949	02 13	101.00 798.00	863	10.024 million tonnes with avg. grade of 58.67% Fe. reserves/resources have been estimated during the year.
	Sandur	1:1000 - do -	0.3380	02 21	94.50 1344.00	1424	31.531 million tonnes with avg. grade of 56.60% Fe. reserves/resources have been estimated during the year.
	Sandur/Tumakuru	1:1000 - do -	0.2404	02 09	94.00 625.00	680	2.137 million tonnes with avg. grade of 50.39% Fe. reserves/resources have been estimated during the year.
	Sandur	1:1000 - do -	0.4038	02 24	72 1568	1613	4.296 million tonnes with avg. grade of 48.51% Fe. reserves/ resources have been estimated during the year.
	Sandur	1:1000 - do -	1.2558	04 36	157.50 2431.00	2528	33.89 million tonnes with avg. grade of 57.87% Fe. reserves/ resources have been estimated during the year.
	Sandur	1:1000 - do -	0.3397	01 07	48.00 326.00	353	6.939 million tonnes with avg. grade of 59.52% Fe. reserves/resources have been estimated during the year.

(Contd.)

Table – 3 (Concld.)

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/ Resources Estimated
		Scale	Area (sq km)	No. of Boreholes	Meterage		
NMDC Ltd							
Chhattisgarh							
South Bastar (Dantewada)	Bailadila Iron ore Mine						Exploratory drilling and reserves estimation are under process.
	Dep 14 ML	1:2000	-	13	1070	-	
	Dep-14NMZ ML	1:2000	-	11	1080.3	-	
	Dep-11ML	1:2000	-	-	-	-	
	11C	-	-	3	190	-	
	D.10 /11A	-	2	-	192	-	
	Bacheli complex	-	-	33	2245	-	
Karnataka							
Ballari	Donimalai DIOM-BMMX, 3 E & 2E- Deposits	-	-	35	2621.60	1187	(111)-18.36 MT, (122)-7.53 MT.
DGM							
Rajasthan							
Bhilwara	N/v Undwa	1:10000	5	-	-	24	Regional Mineral Survey has been conducted for clay, red ochre, iron ore, blockable granite and other economic minerals near villages Ojhara, Hamirgarh, Renwas, Barliyas tehsil Hamigarh & Kotri, district Bhilwara.
	Ojhara	1:4000	25	-	-		
	Bhakaliya Chandgarh	1:10000	10	-	-		
	Jiwakhera	1:10000	5	-	-		
	Hamirgarh	-	-	-	-		
Alwar	Shyampura, Mejorh	-	100	-	-	42	Regional Mineral Survey has been conducted for iron ore, red/yellow ochre, quartz and other economic minerals.
	Raipura, Ramjikaguda, Balwas etc.						
Maharashtra							
Chandrapur	Bhisi	1:50000	5	12	458.40	30	Exploration of iron ore deposit to delineate the iron ore body with the extension of the earlier identified area has been carried out. Analysis result is awaited.
		1:5000	2				

Table - 4 :Principal Producers of Iron ore 2015-16

Name & address of producer	Location of mine	
	State	District
National Mineral Development Corporation Ltd, 10-3-311/A, Khanij Bhavan, Castle Hills, Masab Tank, Hyderabad –500 028,	Karnataka Chhattisgarh	Ballari Dantewada
Steel Authority of India Ltd, Ispat Bhavan, Lodhi Road, New Delhi – 110 003.	Jharkhand Chhattisgarh Odisha	Singhbhum (West) Durg Keonjhar, Sundargarh
Tata Steel Ltd, Bombay House, 24, Homi Mody Street, Fort, Mumbai –400 001, Maharashtra.	Jharkhand Odisha	Singhbhum (West) Keonjhar
Rungta Mines (P) Ltd, 8A Express Tower, 42A-Shakespeare Sarani, Kolkata – 700 017, West Bengal.	Jharkhand Odisha	Singhbhum (West) Keonjhar
Serajuddin & Co., P-16, Bentink Street, Kolkata-700 069, West Bengal.	Odisha	Keonjhar
Vedanta Ltd., Sesa Ghor, EDC complex, Patto, Panaji, 403 001 Goa.	Goa Karnataka	North Goa South Goa Chitradurga
Rungta Sons (P) Ltd., 8A Express tower,42A-Shakespeare Sarani, Kolkata-700 017, West Bengal.	Odisha	Sundargarh
Odisha Mining Corporation Ltd, OMC House, Unit-5, P.B. No.34 Distt. Khurda, Bhubaneswar-751 001 Odisha.	Odisha	Keonjhar
Kamaljeet Singh Ahluwalia, Near MMTC Weigh Bridge P.B.No. 3, Barbil-758 035, Distt. Keonjhar, Odisha.	Odisha	Keonjhar

(Contd.)

Table - 4 : (Concld.)

Name & address of producer	Location of mine	
	State	District
Indrani Patnaik, A/6, Commercial Estate, Civil Township, Rourkela - 769 004 Odisha.	Odisha	Keonjhar
Mysore Minerals Ltd, Ballari No. 39, M.G. Road, Bengaluru - 560 001, Karnataka.	Karnataka	
Kaypee Enterprises, Near MMTC Weigh Bridge, P.B. No.3, At/PO-Barbil-758 035, Dist. Keonjhar, Odisha Bengaluru-560 001, Karnataka.	Odisha	Keonjhar
Jindal Steel & Power Ltd., O.P. Jindal Marg, Delhi Road, Hissar-125 005 Haryana.	Odiaha	Sundargharh
Aryan Mining & Trading Corpn. (P) Ltd., 61, Strand Street, Kolkatta-700 006, West Bengal.	Odisha	Sundargarh
Essel Mining & Industries Ltd, Industry House, 18th Floor, 10, Camac Street, Kolkata- 700 017 West Bengal	Odisha	Sundargarh
Khatau Narbheram & Co., N.V. Ram Complex, Barbil-758 035, Distt. Keonjhar, Odisha.	Odisha	Keonjhar
Usha Martin Ltd, Mangal Kalash, 2A Shakespeare Sarani, Kolkata-700 071, West Bengal.	Jharkhand	Singhbhum (West)

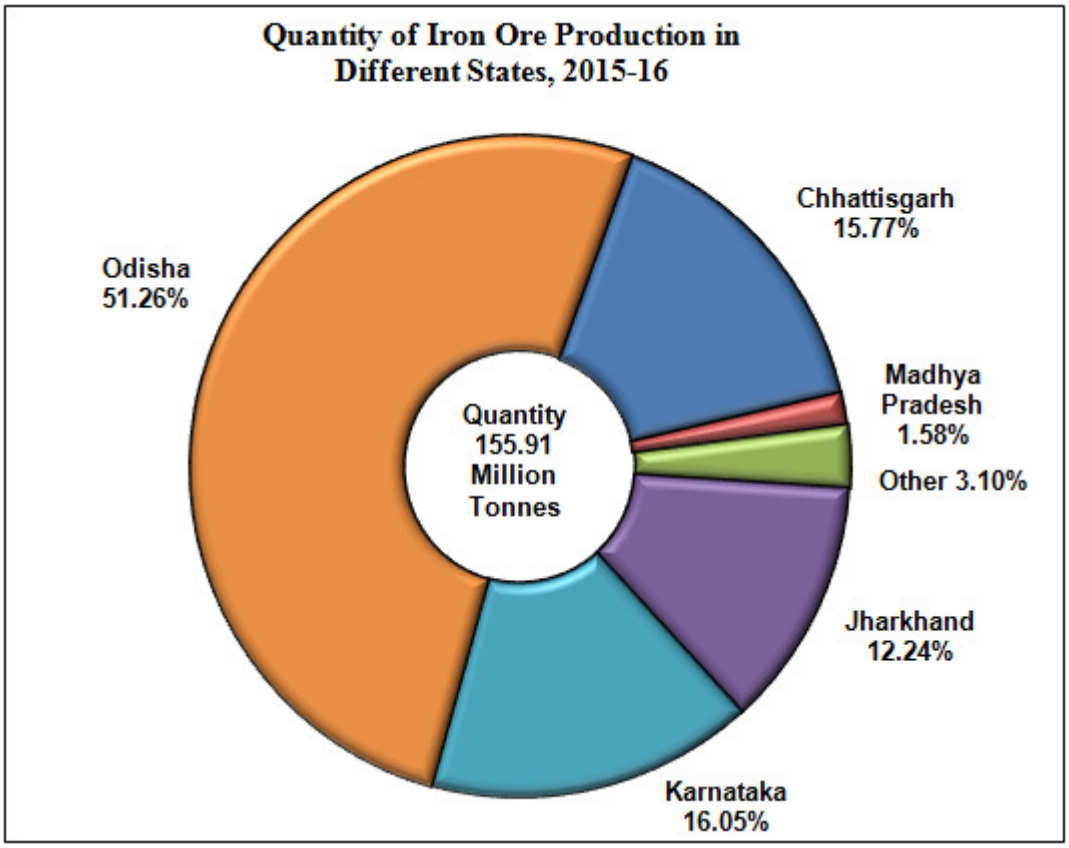
Table 5 : Production of Iron Ore, 2013-14 to 2015-16

(By States)

(Quantity in '000 tonnes; Value in ₹'000)

States		2013-14		2014-15		2015-16 (P)	
		Quantity	Value	Quantity	Value	Quantity	Value
India	**Total**	**152183**	**316491777**	**129321**	**276636789**	**155910**	**221158219**
	Lumps	58495	168586933	47331	126896782	53761	101543175
	Fines	92946	145738162	80912	146560518	101058	118071110
	Concentrates	742	2166682	1078	3179489	1091	1543934
Andhra Pradesh #	**Total**	**709**	**403897**	**916**	**504259**	**494**	**283711**
	Lumps	483	325020	637	425241	313	227958
	Fines	226	78877	279	79018	181	55753
Chhattisgarh	**Total**	**29250**	**89293192**	**29388**	**85391078**	**24592**	**48868377**
	Lumps	10929	43879092	10617	35702422	9233	23430131
	Fines	18321	45414100	18771	49688656	15359	25438246
Goa	**Total**	**-**	**-**	**-**	**-**	**1779**	**2112245**
	Lumps	-	-	-	-	260	379608
	Fines	-	-	-	-	1519	1732637
Jharkhand	**Total**	**22624**	**23912896**	**19237**	**23649275**	**19076**	**16091729**
	Lumps	7390	10459724	6904	9470862	6193	6281350
	Fines	15234	13453172	12333	14178413	12883	9810379
Karnataka	**Total**	**18684**	**50484086**	**20205**	**55165630**	**25020**	**36802912**
	Lumps	7896	24305739	6799	22759146	7983	16683294
	Fines	10788	26178347	13406	32406484	17037	20119618
Madhya Pradesh	**Total**	**2090**	**1246385**	**4193**	**2464797**	**2464**	**1424601**
	Lumps	333	289067	654	794722	265	181721
	Fines	1757	957318	3539	1670075	2199	1242880
Maharashtra	**Total**	**1888**	**1962604**	**2143**	**2601529**	**1423**	**1552105**
	Lumps	401	454850	407	626507	202	373008
	Fines	1487	1507754	1736	1975022	1221	1179097
Odisha	**Total**	**76188**	**147262824**	**52022**	**103636933**	**79921**	**112540508**
	Lumps	30970	88832708	21152	57013083	29205	53946188
	Fines	45130	58147799	30831	46548984	50657	58492161
	Concentrates	88	282317	39	74866	59	102159
Rajasthan	**Total**	**708**	**1901189**	**1180**	**3201253**	**1141**	**1482031**
	Lumps	52	16239	124	82779	107	39917
	Fines	2	585	17	13851	2	339
	Concentrates	654	1884365	1039	3104623	1032	1441775
Telangana #	**Total**	**42**	**24704**	**37**	**22035**	**-**	**-**
	Lumps	41	24494	37	22020	-	-
	Fines	1	210	++	15	-	-

Figure mentioned against 2013-14 are of districts which are part of present Andhra Pradesh & Telangana states.


Quantity of Iron Ore Production in Different States, 2015-16
Chhattisgarh 15.77%
Odisha 51.26%
Madhya Pradesh 1.58%
Other 3.10%
Quantity 155.91 Million Tonnes
Jharkhand 12.24%
Karnataka 16.05%

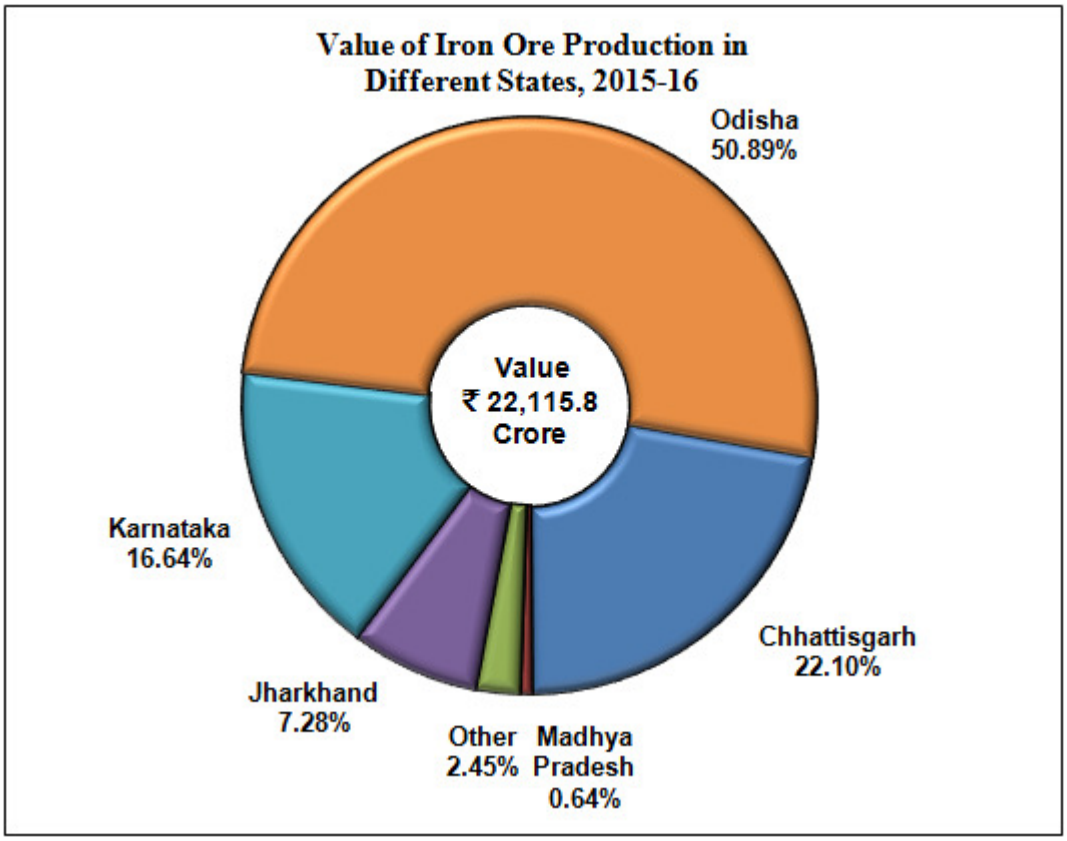

Value of Iron Ore Production in Different States, 2015-16
Odisha 50.89%
Value ₹ 22,115.8 Crore
Karnataka 16.64%
Chhattisgarh 22.10%
Jharkhand 7.28%
Other 2.45%
Madhya Pradesh 0.64%

Table – 6 (A) : Production of Iron Ore, 2014-15
(By Sectors/States/Districts/Grades)

(Quantity in '000 tonnes; Value in ₹'000)

Sector/ State/ District	No. of mines	Lumps								Fines								Concentrates		Total	
		Below 55% Fe	55%- below 58% Fe	58%- below 60% Fe	60%- below 62% Fe	62%- below 65% Fe	65% Fe & above	Total		Below 55% Fe	55%- below 58% Fe	58%- below 60% Fe	60%- below 62% Fe	62%- below 65% Fe	65% Fe & abvoe	Total					
								Qty	Value							Qty	Value	Qty	Value	Qty	Value
India	**320(20)**	**2865**	**1506**	**2715**	**5992**	**21840**	**12413**	**47331**	**126896782**	**6580**	**6179**	**4409**	**16662**	**32097**	**14985**	**80912**	**146560518**	**1078**	**3179489**	**129321**	**276636789**
Public Sector	34(1)	5	163	257	2907	12249	6358	21939	60858345	63	1306	2170	9689	18177	6118	37523	80205692	-	-	59462	141064037
Private Sector	286(19)	2860	1343	2458	3085	9591	6055	25392	66038437	6517	4873	2239	6973	13920	8867	43389	66354826	1078	3179489	69859	135572752
Andhra Pradesh	**29(1)**	**637**	**-**	**-**	**-**	**-**	**-**	**637**	**425241**	**279**	**-**	**-**	**-**	**-**	**-**	**279**	**79018**	**-**	**-**	**916**	**504259**
Anantapur	3	6	-	-	-	-	-	6	2541	-	-	-	-	-	-	-	-	-	-	6	2541
Cuddapah	4	338	-	-	-	-	-	338	236954	238	-	-	-	-	-	238	60160	-	-	576	297114
Krishna	3	++	-	-	-	-	-	++	2	1	-	-	-	-	-	1	726	-	-	1	728
Kurnool	18(1)	293	-	-	-	-	-	293	185744	40	-	-	-	-	-	40	18132	-	-	333	203876
Prakasam*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chhattisgarh	**14**	**220**	**41**	**39**	**56**	**4073**	**6188**	**10617**	**35702422**	**126**	**134**	**299**	**3113**	**8835**	**6264**	**18771**	**49688656**	**-**	**-**	**29388**	**85391078**
Dantewada	3	-	-	-	12	897	6133	7042	28681849	8	116	285	1114	6678	6113	14314	42937823	-	-	21356	71619672
Durg	5	-	-	-	-	3104	-	3104	6031021	-	-	-	1984	2149	-	4133	6035155	-	-	7237	12066176
Kanker	4	168	1	6	6	41	55	277	428016	23	-	4	8	7	151	193	476286	-	-	470	904302
Rajnandgaon	2	52	40	33	38	31	-	194	561536	95	18	10	7	1	++	131	239392	-	-	325	800928
Goa*	**76**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
North Goa*	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Goa*	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jharkhand	**22(1)**	**293**	**265**	**1034**	**2090**	**2637**	**585**	**6904**	**9470862**	**200**	**1087**	**51**	**3315**	**5877**	**1803**	**12333**	**14178413**	**-**	**-**	**19237**	**23649275**
Singhbhum (West)	22(1)	293	265	1034	2090	2637	585	6904	9470862	200	1087	51	3315	5877	1803	12333	14178413	-	-	**19237**	**23649275**
Karnataka	**67(2)**	**359**	**457**	**506**	**1611**	**3672**	**194**	**6799**	**22759146**	**768**	**1891**	**2927**	**4501**	**3266**	**53**	**13406**	**32406484**	**-**	**-**	**20205**	**55165630**
Bagalkot*	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ballari	49(2)	359	437	456	1548	3520	194	6514	21817133	696	1646	2661	4485	3146	53	12687	30897264	-	-	19201	52714397
Chitradurga	7	-	20	50	35	152	-	257	869359	72	245	266	16	120	-	719	1509220	-	-	976	2378579
Tumakuru	8	-	-	-	28	-	-	28	72654	-	-	-	-	-	-	-	-	-	-	28	72654

(Contd.)

Table - 6 (A) : (Concld.)

Sector/ State/ District	No. of mines	Lumps								Fines								Concentrates		Total	
		Below 55% Fe	55%- below 58% Fe	58%- below 60% Fe	60%- below 62% Fe	62%- below 65% Fe	65% Fe & above	Total		Below 55% Fe	55%- below 58% Fe	58%- below 60% Fe	60%- below 62% Fe	62%- below 65% Fe	65% Fe & abvoe	Total					
								Qty	Value							Qty	Value	Qty	Value	Qty	Value
Madhya Pradesh	**19(12)**	**630**	**23**	**1**	**-**	**-**	**-**	**654**	**794722**	**3466**	**69**	**4**	**-**	**-**	**-**	**3539**	**1670075**	**-**	**-**	**4193**	**2464797**
Balaghat	1	-	6	-	-	-	-	6	4332	-	-	-	-	-	-	-	-	-	-	6	4332
Gwalior	2	-	-	-	-	-	-	-	-	18	-	-	-	-	-	18	10144	-	-	18	10144
Jabalpur	14(12)	611	17	1	-	-	-	629	770760	3448	69	4	-	-	-	3521	1659931	-	-	4150	2430691
Sagar	2	19	-	-	-	-	-	19	19630	-	-	-	-	-	-	-	-	-	-	19	19630
Maharashtra	**14**	**217**	**75**	**63**	**52**	**-**	**-**	**407**	**626507**	**1417**	**52**	**202**	**65**	**-**	**-**	**1736**	**1975022**	**-**	**-**	**2143**	**2601529**
Chandrapur	2	2	49	++	-	-	-	51	124542	17	++	20	-	-	-	37	51802	-	-	88	176344
Gondia	4	8	-	-	-	-	-	8	9425	4	-	-	-	-	-	4	2168	-	-	12	11593
Sindhudurg	8	207	26	63	52	-	-	348	492540	1396	52	182	65	-	-	1695	1921052	-	-	2043	2413592
Odisha	**68(3)**	**348**	**645**	**1072**	**2183**	**11458**	**5446**	**21152**	**57013083**	**307**	**2946**	**926**	**5668**	**14119**	**6865**	**30831**	**46548984**	**39**	**74866**	**52022**	**103636933**
Keonjhar	41(2)	121	42	846	228	8108	4764	14109	33602206	77	1987	70	2909	10448	5581	21072	31442960	39	74866	35220	65120032
Mayurbhanj	3	141	414	207	14	158	361	1295	5032177	59	225	68	98	83	-	533	856982	-	-	1828	5889159
Sundargarh	24(1)	86	189	19	1941	3192	321	5748	18378700	171	734	788	2661	3588	1284	9226	14249042	-	-	14974	32627742
Rajasthan	**8**	**124**	**-**	**-**	**-**	**-**	**-**	**124**	**82779**	**17**	**-**	**-**	**-**	**-**	**-**	**17**	**13851**	**1039**	**3104623**	**1180**	**3201253**
Bhilwara	2	2	-	-	-	-	-	2	465	-	-	-	-	-	-	-	-	1039	3104623	1041	3105088
Jaipur	2	54	-	-	-	-	-	54	14950	-	-	-	-	-	-	-	-	-	-	54	14950
Jhunjhunu	3	41	-	-	-	-	-	41	16179	17	-	-	-	-	-	17	13851	-	-	58	30030
Sikar	1	27	-	-	-	-	-	27	51185	-	-	-	-	-	-	-	-	-	-	27	51185
Telangana	**3(1)**	**37**	**-**	**-**	**-**	**-**	**-**	**37**	**22020**	**++**	**-**	**-**	**-**	**-**	**-**	**++**	**15**	**-**	**-**	**37**	**22035**
Karimnagar*	2	++	-	-	-	-	-	++	70	++	-	-	-	-	-	++	15	-	-	++	85
Khammam	1	++	-	-	-	-	-	++	197	-	-	-	-	-	-	-	-	-	-	++	197
Warangal	(1)	37	-	-	-	-	-	37	21753	-	-	-	-	-	-	-	-	-	-	37	21753

++ Negligible
** Only labour reported.*

Table – 6 (B) : Production of Iron Ore, 2015-16 (p)
(By Sectors/States/Districts/Grades)

(Quantity in '000 tonnes; Value in ₹'000)

Sector/ State/ District	No. of mines	Lumps								Fines								Concentrates		Total	
		Below 55% Fe	55%-below 58% Fe	58%-below 60% Fe	60%-below 62% Fe	62%-below 65% Fe	65% Fe & above	Total		Below 55% Fe	55%-below 58% Fe	58%-below 60% Fe	60%-below 62% Fe	62%-below 65% Fe	65% Fe & abvoe	Total					
								Qty	Value							Qty	Value	Qty	Value	Qty	Value
India	**297(16)**	**1685**	**1053**	**3044**	**6427**	**29104**	**12448**	**53761**	**101543175**	**4618**	**8233**	**6642**	**22828**	**43646**	**15091**	**101058**	**118071110**	**1091**	**1543934**	**155910**	**221158219**
Public Sector	34(1)	6	140	183	2466	13359	6487	22641	44258924	82	777	1817	12925	17194	5202	37997	46978952	-	-	60638	91237876
Private Sector	263(15)	1679	913	2861	3961	15745	5961	31120	57284251	4536	7456	4825	9903	26452	9889	63061	71092158	1091	1543934	95272	129920343
Andhra Pradesh	**25(1)**	**313**	**-**	**-**	**-**	**-**	**-**	**313**	**227958**	**181**	**-**	**-**	**-**	**-**	**-**	**181**	**55753**	**-**	**-**	**494**	**283711**
Anantapur	2	25	-	-	-	-	-	25	12083	-	-	-	-	-	-	-	-	-	-	25	12083
Cuddapah	5	167	-	-	-	-	-	167	114656	155	-	-	-	-	-	155	40962	-	-	322	155618
Krishna	1	-	-	-	-	-	-	-	-	++	-	-	-	-	-	++	102	-	-	++	102
Kurnool	15(1)	76	-	-	-	-	-	76	70935	26	-	-	-	-	-	26	14689	-	-	102	85624
Nellore	1	45	-	-	-	-	-	45	30284	-	-	-	-	-	-	-	-	-	-	45	30284
Prakasam*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chhattisgarh	**15**	**216**	**91**	**73**	**238**	**2679**	**5936**	**9233**	**23430131**	**209**	**20**	**91**	**2687**	**7020**	**5332**	**15359**	**25438246**	**-**	**-**	**24592**	**48868377**
Bastar*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dantewara	3	-	-	-	2	405	5700	6107	16880875	4	7	60	584	5165	4903	10723	18933293	-	-	16830	35814168
Durg	5	-	-	8	205	2247	228	2688	5794791	-	-	-	2014	1683	284	3981	5545244	-	-	6669	11340035
Kanker	4	41	8	53	27	26	8	163	314110	8	-	20	48	135	145	356	643756	-	-	519	957866
Rajnandgaon	2	175	83	12	4	1	-	275	440355	197	13	11	41	37	++	299	315953	-	-	574	756308
Goa	**71(1)**	**144**	**68**	**4**	**43**	**1**	**-**	**260**	**379608**	**394**	**598**	**331**	**149**	**47**	**-**	**1519**	**1732637**	**-**	**-**	**1779**	**2112245**
North Goa	33	7	1	4	2	1	-	15	23453	89	20	20	38	15	-	182	148372	-	-	197	171825
South Goa	38(1)	137	67	-	41	-	-	245	356155	305	578	311	111	32	-	1337	1584265	-	-	1582	1940420
Jharkhand	**18**	**180**	**27**	**842**	**1486**	**2828**	**830**	**6193**	**6281350**	**87**	**1356**	**40**	**3683**	**4769**	**2948**	**12883**	**9810379**	**-**	**-**	**19076**	**16091729**
Singhbhum (West)	18	180	27	842	1486	2828	830	6193	6281350	87	1356	40	3683	4769	2948	12883	9810379	-	-	19076	16091729
Karnataka	**59**	**90**	**345**	**465**	**2067**	**4544**	**472**	**7983**	**16683294**	**443**	**2836**	**2477**	**7325**	**3807**	**149**	**17037**	**20119618**	**-**	**-**	**25020**	**36802912**
Bagalkot*	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ballari	46	90	337	356	1345	4441	472	7041	15046007	429	744	2272	7317	3576	149	14487	18382660	-	-	21528	33428667
Chitradurga	7	-	8	109	722	103	-	942	1637287	14	2092	205	8	231	-	2550	1736958	-	-	3492	3374245
Tumakuru*	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Contd..

Table - 6 (B) : (Concld.)

Sector/ State/ District	No. of mines	Lumps								Fines								Concentrates		Total	
		Below 55% Fe	55%- below 58% Fe	58%- below 60% Fe	60%- below 62% Fe	62%- below 65% Fe	65% Fe & above	Total Qty	Total Value	Below 55% Fe	55%- below 58% Fe	58%- below 60% Fe	60%- below 62% Fe	62%- below 65% Fe	65% Fe & above	Total Qty	Total Value	Qty	Value	Qty	Value
Madhya Pradesh	**17(11)**	**251**	**++**	**14**	**-**	**-**	**-**	**265**	**181721**	**2162**	**14**	**23**	**-**	**-**	**-**	**2199**	**1242880**	**-**	**-**	**2464**	**1424601**
Balaghat	1	-	++	-	-	-	-	++	49	-	-	-	-	-	-	-	-	-	-	++	49
Gwalior	1	-	-	-	-	-	-	-	-	20	-	-	-	-	-	20	9215	-	-	20	9215
Jabalpur	15(11)	251	++	14	-	-	-	265	181672	2142	14	23	-	-	-	2179	1233665	-	-	2444	1415337
Maharashtra	**15**	**92**	**67**	**4**	**39**	**-**	**-**	**202**	**373008**	**848**	**91**	**274**	**8**	**-**	**-**	**1221**	**1179097**	**-**	**-**	**1423**	**1552105**
Chandrapur	2	-	41	-	-	-	-	41	85728	21	-	18	-	-	-	39	44702	-	-	80	130430
Gadchiroli	1	-	-	-	1	-	-	1	2790	-	-	-	-	-	-	-	-	-	-	1	2790
Gondia	4	8	-	-	-	-	-	8	15968	2	-	-	-	-	-	2	1688	-	-	10	17656
Sindhudurg	8	84	26	4	38	-	-	152	268522	825	91	256	8	-	-	1180	1132707	-	-	1332	1401229
Odisha	**64(3)**	**292**	**455**	**1642**	**2554**	**19052**	**5210**	**29205**	**53946188**	**292**	**3318**	**3406**	**8976**	**28003**	**6662**	**50657**	**58492161**	**59**	**102159**	**79921**	**112540508**
Keonjhar	37(2)	119	1	555	158	14605	4943	20381	36009744	161	1957	531	4042	21996	6252	34939	42776739	59	102159	55379	78888642
Mayurbhanj	4	33	71	264	9	82	103	562	1312241	11	78	53	20	43	1	206	218951	-	-	768	1531192
Sundargarh	23(1)	140	383	823	2387	4365	164	8262	16624203	120	1283	2822	4914	5964	409	15512	15496471	-	-	23774	32120674
Rajasthan	**12**	**107**	**-**	**-**	**-**	**-**	**-**	**107**	**39917**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**339**	**1032**	**1441775**	**1141**	**1482031**
Bhilwara	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1032**	**1441775**	**1032**	**1441775**
Jaipur	3	80	-	-	-	-	-	80	24990	-	-	-	-	-	-	-	-	-	-	80	24990
Jhunjhunu	5	8	-	-	-	-	-	8	3797	2	-	-	-	-	-	2	339	-	-	10	4136
Sikar	2	19	-	-	-	-	-	19	11130	-	-	-	-	-	-	-	-	-	-	19	11130
Telangana *	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Khammam*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

++ Negligible

** Only labour reported.*

Table – 7 : Production of Iron Ore, 2014-15 and 2015-16
(By Frequency Groups)

Production Group (in tonnes)	No. of mines		Production for the Group (in '000 tonnes)		Percentage in total production		Cumulative percentage	
	2014-15	2015-16(p)	2014-15	2015-16 (p)	2014-15	2015-16(p)	2014-15	2015-16 (p)
Total	**320 (20)**	**297(16)**	**129321**	**155910**	**100.00**	**100.00**	**-**	**-**
Up to 50,000	218 (11)	197 (10)	1016	937	0.79	0.60	0.79	0.60
50,001 – 1,00,000	18 (4)	12 (5)	1566	1263	1.21	0.81	2.00	1.41
1,00,001 – 5,00,000	38 (5)	36 (1)	10754	9461	8.32	6.07	10.32	7.48
5,00,001 – 10,00,000	17	14	12129	10428	9.38	6.69	19.70	14.17
10,00,001 –15,00,000	6	7	7172	8296	5.54	5.32	25.24	19.49
15,00,001 – 20,00,000	1	3	1544	4862	1.19	3.12	26.43	22.61
20,00,001 and above	22	28	95140	120663	73.57	77.39	100.00	100.00

Table – 8 (A) : Mine-head Closing Stocks of Iron Ore, 2014-15 (By States/Grades)

(In '000 tonnes)

State	Lumps							Fines							Concentrates	Total
	Below 55% Fe	55%-below 58% Fe	58%-below 60% Fe	60%-below 62% Fe	62%-below 65% Fe	65% Fe & above	Total	Below 55% Fe	55%-below 58% Fe	58%-below 60% Fe	60%-below 62% Fe	62%-below 65% Fe	65% Fe & above	Total	Total	Lumps, 58% & Fines & Concentrates
India	**6890**	**2285**	**1996**	**1941**	**6728**	**1842**	**21682**	**28830**	**28615**	**5014**	**20235**	**15389**	**3811**	**101894**	**129**	**123705**
Andhra Pradesh	519	9	-	-	-	-	**528**	467	-	-	-	-	-	**467**	-	**995**
Chhattisgarh	35	8	8	7	75	166	**299**	179	113	56	332	1267	934	**2881**	-	**3180**
Goa	315	56	144	++	1	-	**516**	1442	552	317	199	272	-	**2782**	5	**3303**
Jharkhand	373	541	83	63	172	80	**1312**	2031	20282	47	607	898	150	**24015**	-	**25327**
Karnataka	3843	426	607	966	1982	141	**7965**	1583	634	1483	1193	1327	39	**6259**	29	**14253**
Madhya Pradesh	682	160	21	-	-	-	**863**	2835	470	54	-	-	-	**3359**	-	**4222**
Maharashtra	23	7	7	32	++	-	**69**	345	4	++	3	-	-	**352**	-	**421**
Odisha	998	1078	1126	873	4498	1455	**10028**	19906	6560	3057	17901	11625	2688	**61737**	83	**71848**
Rajasthan	50	-	-	-	-	-	**50**	17	-	-	-	-	-	**17**	12	**79**
Telangana	52	-	-	-	-	-	**52**	25	-	-	-	-	-	**25**	-	**77**

++ *Negligible*

Table – 8 (B) : Mine-head Closing Stocks of Iron Ore, 2015-16 (P) (By States/Grades)

(In '000 tonnes)

State	Lumps							Fines							Concentrates	Total
	Below 55% Fe	55%-below 58% Fe	58%-below 60% Fe	60%-below 62% Fe	62%-below 65% Fe	65%-Fe & above	Total	Below 55% Fe	55%-below 58% Fe	58%-below 60% Fe	60%-below 62% Fe	62%-below 65% Fe	65% Fe & above	Total	Total	Lumps, Fines & Concentrates
India	**7205**	**2239**	**2005**	**2386**	**6417**	**2372**	**22624**	**28086**	**44285**	**4705**	**23788**	**16897**	**3701**	**121462**	**102**	**144188**
Andhra Pradesh	569	10	-	-	-	-	**579**	516	-	-	-	-	-	**516**	-	**1095**
Chhattisgarh	19	9	10	14	52	439	**543**	645	110	3	419	1502	658	**3337**	-	**3880**
Goa	231	8	17	3	1	-	**260**	700	314	28	6	1	-	**1049**	5	**1314**
Jharkhand	393	530	93	40	114	276	**1446**	1796	34285	45	797	431	439	**37793**	-	**39239**
Karnataka	3985	454	506	1252	1714	104	**8015**	1251	446	790	1333	528	104	**4452**	18	**12485**
Madhya Pradesh	702	157	21	-	-	-	**880**	2752	450	53	-	-	-	**3255**	-	**4135**
Maharashtra	80	3	++	25	++	-	**108**	338	++	12	-	-	-	**350**	-	**458**
Odisha	1141	1064	1358	1052	4536	1553	**10704**	20049	8680	3774	21233	14435	2500	**70671**	65	**81440**
Rajasthan	52	-	-	-	-	-	**52**	14	-	-	-	-	-	**14**	14	**80**
Telangana	33	4	-	-	-	-	**37**	25	-	-	-	-	-	**25**	-	**62**

++ *Negligible*

MINING, MARKETING & TRANSPORT

Iron ore mining is carried out by opencast method by manual, semi-mechanised and mechanised operations.

The method of mining and deployment of machinery vary from place to place depending upon characteristics of iron ore as per geological set up. Large mechanised mines are mostly in the Public Sector. Manual and semi-mechanised mines are mainly in Private Sector. Some mechanised mines in Goa, Jharkhand and Odisha are also operated by the Private Sector.

Manual Mines

Generally, these mines are confined to float ores where mining is done by digging the ore with pick axes, crow bars, chisels and spades. The mined material is screened manually to separate +10 mm float ore which is then stacked separately. The waste is backfilled into the pits. In some reef workings, 35-40 mm diameter holes are drilled to 0.6 m depth by hand-held jackhammers at a spacing of about 0.6 m and each hole is charged with 150-200 g gunpowder or special gelatine cartridges. Blasted tonnage per kg gunpowder is usually 2.5-3 tonnes. Blasted ore is manually loaded into trucks for transport to either railway sidings or to buyer's destination directly. Output per man shift (OMS) is normally between 1.5 and 2 tonnes.

Mechanised Mines

Most of the mechanised mines are captive belongings of different steel plants and have been developed to cater to specific requirements. Mining is done by formation of systematic benches in overburden and ore. The height of the benches normally varies from 10 to 12 m and width up to 20 m in the ore. Drilling holes of 300 mm diameter and till 12 m depth by crawler drills and use of explosives, such as, ANFO, SMS and emulsion explosives for blasting are in practice. Loading is done by earth-moving machinery powered by diesel or electric engines, such as, hydraulic excavators in the range from 1.9 cu m to 10 cu m. Ripper dozers and motor graders are also deployed for excavation and levelling purposes.

In some Goan mines, where ore is predominantly in powdery form, hydraulic shovels with boom height of 9 m are used for excavation and loading. Heavy-duty Ripper-Dozers are preferred for mining as Goan ores are soft. Height of the benches is restricted to 7 m for safe and efficient operations. Width of working benches is maintained at more than 15 m and bench slope is maintained at about 80°. The ore produced is transported to short distances by dumpers up to 40-tonne capacity. For longer distances and barge loading, dumpers/trucks up to 10-tonne capacity are used. The barges carry the ore to harbours. The ore from the barges is loaded to ships either through berth or through transshippers.

Almost all the Public Sector mines including Kiriburu, Barsua, Gua, Bailadila, Donimalai, Daitari and Dalli-Rajhara operated by SAIL, NMDC and OMC are fully mechanised. Kudremukh iron ore mine of KIOCL closed since December 2005 was also mechanised. In Private Sector, mines operated in Goa region and Tata Steel's captive mines are mechanised. Approximately, 90% iron ore production comes from mechanised mines. NMDC operates a couple of large mechanised iron ore mines in the country at Bailadila (Chhattisgarh) and Donimalai (Karnataka). With a strategic vision to augment production, the development of Deposit 11B mine at an enhanced capacity of 7.0 million tonnes ROM per annum has been taken up.The development of Kumaraswamy Iron Ore Mine with capacity of 7.0 million tonnes per annum is being taken up.The entire project is being executed through six packages. Orders have been placed for all the packages and the major works have been completed. To augment the production capacity of Kirandul complex, construction of 12.0 million tpy screening plant with loading facilities is envisaged. This plant caters to both Deposit 11-B & Deposit 14 of Kirandul complex. The entire project has been planned to be executed in seven packages.

The processing of iron ore in the country involves crushing, screening, washing and in some cases beneficiation and agglomeration. Crushing and screening are adopted mainly for sizing the ore and also for removing the adherent gangue minerals. Dry and wet grinding is also resorted to

in some cases.

The lumps and fines of iron ore are marketed after washing, screening and beneficiation. Fines are converted into sinters for use in steel plants while pellets made from concentrates/fines are predominantly exported and also are utilised for internal consumption in sponge iron units.

ENVIRONMENTAL FACTORS

Afforestation, waste dump management, top soil management, management of sub-grade minerals, mechanical beneficiation, dust suppression, monitoring of water & air quality, vibration survey, publicity and propaganda are some common environmental restoration efforts pursued by all mechanised and semi-mechanised iron ore mines. Mining and beneficiation of ores carried out on large-scale cause environmental problems. A specific problem in iron ore mining is the disposal of tailings and other deleterious silica minerals and phosphorus. To safeguard the environment and prevent ecological degradation, thrust has been laid on green belt development, solid waste management, monitoring of liquid & air effluents and other crucial environmental parameters.

Goa region is prone to siltation of agricultural fields, nallahs, riverbeds and creeks due to wash off from iron ore dumps in rainy season. Loss in crop yield and reduction in fish population in streams and navigation difficulties are the problems caused by silting. To overcome these problems, check dams and water filter beds at higher contours have been constructed. Tailing ponds are also being maintained at some mines. Afforestation is the mainstay in reclaiming the mined out areas in Goa. In a few cases, pits are used as water reservoir for pisciculture.

In Ballari-Hosapete area, Karnataka, dust concentration (suspended particulate matter) is the main environmental problem. Environmental concerns had led to closing down of mining operations at Kudremukh iron ore mine of KIOCL in December 2005 in compliance with the order passed by the Hon'ble Supreme Court in this regard. In Bailadila Sector, Chhattisgarh, forest is fairly widespread and dense, supported by good rainfall and rich flora and fauna. The deforestation taking place due to mining and waste dumping needs to be compensated continuously by afforestation at suitable slopes and in township areas. In Jharkhand, afforestation of land is the main recourse adopted for reclamation of degraded lands or improvement in land uses.

INDUSTRY

Iron ore is the basic raw material used for making pig iron, sponge iron and finished steel. The iron ore is used mainly in blast furnaces, mini-blast furnaces (MBF), DRI & sintering and pelletisation plants.

Pelletisation

In general, the pelletisation process involves mixing of iron ore and required limestone with water which later is ground in ball mills to the desired size. The discharged slurry from ball mills is filtered in pressure filters. The filter cake from filters is then mixed with dry-ground coke fines to which bentonite is mixed in suitable proportion to form green pellets in pelletising discs. The coke fines and bentonite are ground separately.The green pellets are then dried, heated and fired in indurating machine to produce iron ore pellets. There is an increasing trend for utilisation of pellets or sinters in the recent years. The use of pellets as feed in the blast furnace has several advantages because of their uniform size, known composition and strength. Iron ore pellet is a kind of agglomerated fines which has better tumbling index as compared to that of parent ore and can be used as a substitute used in blast furnaces in countries where lump ore is not available.

The twenty pelletisation plants in the country, about which information is available have a total capacity of 59.30 million tonnes per annum. The JSW Steel Ltd has a manufacturing capacity of 9.2 million tonnes of pellets annually at Vijayanagar. The pellet production unit consists of India's first dry process pelletising plant, ideally suited for the soft iron ore of Ballari-Hosapete region. Amba River Coke Limited a wholly subsidiary Company of JSW Steel has set up a 4 million tpy pellet plant at Dolvi.

Jindal Steel & Power Ltd has a total installed capacity of 9 MTPA pellet plant at Barbil for production of different grades of pellets. The plant includes dry grinding facility that harnesses recuperation type of straight grate technology.

Essar Steel Pelletisation plant at Visakhapatnam has installed capacity of 8 million tonnes per annum. The plant receives iron ore slurry which after pelletisation is provided as vital raw material for their steel plant at Hazira (Gujarat). Setting up of integrated pelletisation facility of 12 million tpy is under progress at Paradip, Odisha, and is implemented in two phases by Essar Steel. Successful commissioning of Phase I (6 million tpy) has been completed, while the second phase is under construction. The Ist Phase pellet plant at Paradip has an assured supply of high-quality iron ore from the beneficiation plant at Dabuna. The plant's proximity to the Paradip port ensures expeditious shipment of pellets to their steel plant in Hazira. After completion of second phase, the capacity of pellet plant at Paradip, Odisha, would get scaled up to 12 million tpy and the total pellet plant capacity of the Company would get augmented to 20 million tpy.

NMDC is in the process of setting up two pellet plants, one at Donimalai in Karnataka with 1.2 million tpy capacity by using slimes of tailing dam of Donimalai and the second at Nagarnar with 2 million tpy capacity, along with 2 million tpy beneficiation plant at Bacheli interconnected by a slurry pipeline between Bacheli and Nagarnar in Chhattisgarh.

The construction of the above said 1.2 MTPA Pellet Plant at Donimalai has been completed and trial production is said to have commenced. Regarding the 2 MTPA Pellet Plant at Nagarnar, all the statutory clearances have been received and site development work has begun. Statutory clearances for slurry pipeline system and Ore processing plant at Bacheli are at various stages of completion.

As a diversification measure, the Government approved the construction of a 3 million tonnes per year capacity pellet plant in Mangaluru in May, 1981. The capacity of the pellet plant was enhanced to 3.5 million tonnes with additions/modifications. The plant went into commercial production in 1987 and is now catering to both domestic and international customer.

The following Memoranda of Understanding (MoU) regarding pellet plant were signed in the presence of Hon'ble Prime Minister, Hon'ble Minister for Steel & Mines and the Chief Minister, Chhattisgarh on 09th May, 2015 :

1. An MoU was signed between Government of Chhattisgarh and NMDC for slurry pipeline and 2 MTPA pellet plant at Nagarnar in Bastar District involving an investment of ₹ 4,000 crore.

2. An MoU was signed between Government of Chhattisgarh and SAIL for setting up 1 MTPA pellet plant at Dalli-Rajhara, Balod District with an investment of ₹ 826 crore.

The installation of a 1.8 MTPY pelletisation plant by M/s Monnet Ispat and Energy Ltd has been completed and is at commissioning stage.

To ensure gainful use of the extra-fine iron ore fines which are generated while mining and processing, Tata Steel has implemented a 6 million tpy pelletising plant in Jamshedpur with capabilities to convert these fines into pellets for use as replacement of iron ore lumps as a blast furnace feed. This not only is aimed at contributing significantly to energy savings in the blast furnace operations but also at cutting the cost of operations. The Eastern region accounts for 55% of the total number of iron ore pellet units in the country, the rest 45% is equally divided between the Southern and Western parts. The Northern region is devoid of any presence as far as the Iron Ore Pellet Industry is concerned – a key feature of this Industry, which is in sync with the pattern of spread of the Indian Sponge Iron Industry.

Steel plants are likely to increase usage of pellets in their production process to reduce pollution and increase productivity. Moreover, the forecast of spike in growth in Infrastructure, Real Estate and Automobile Sectors in the ensuing years is expected to augment demand for steel, which in turn would raise the demand and prices of pellets in the near future.

To encourage beneficiation and pelletisation of iron ore fines in the country, basic customs duty (Import Duty on Iron Ore @ 2.5 %) on the plants

and equipment required for initial setting up or for substantial expansion of iron ore pellets plants and iron ore beneficiation plants has been reduced from 7.5% to 2.5% w.e.f 17th March 2012. To ensure easy availability of raw material in domestic market at reasonable prices, export duty on iron ore at 30 % for >58% Fe iron ore and 0% for <58% Fe iron ore and iron ore pellets was imposed.

Sintering

In sintering process, iron ore fines, other iron bearing wastes and coke dust are blended and combusted. The heat fuses the fines into course lumps that can be charged to a blast furnace. The twenty-six sintering plants in the country, about which information is available, have a total capacity of about 70.05 million tonnes per annum. Most of the Integrated Steel Plants (ISP) in the country have their own sintering plants. Sinter plants receive raw material mostly from their captive mines. Steel Authority of India Ltd (SAIL) had started its commercial production in December 2012 at IISCO steel plant in West Bengal, with a capacity of 3.8 million tonnes per annum.The installation of a 0.75 MTPY sinter plant by M/s Monnet Ispat and Energy Ltd has been completed and is at commissioning stage. Pellets along with sinters have resulted in growth in utilisation of iron ore fines and blue dust. Information on capacity and production of pellets and sintering plants is provided in Table-9.

Pig Iron

Pig iron is one of the basic raw materials required by Foundry and Casting Industry for manufacturing various types of castings for the engineering section.The post-liberalisation regime has witnessed Expression of Interest from a large number of entrepreneurs for setting up mini-blast furnaces for production of hot metal/ pig iron. Commissioned pig iron units are mostly of stand-alone type.

KIOCL also has its Pig Iron Complex (Blast Furnace Unit) at Mangaluru for manufacturing and supplying pig iron of Foundry Grade to the domestic market. However, the operation of this Unit is kept under suspension since 2009 due to negative contribution.

India is an important producer of pig iron**.** The production for sale of pig iron in the country in 2015-16 was 9.228 million tonnes. Post-liberalisation, with setting up of several units in the Private Sector, not only imports have drastically reduced but also India has turned out to be a net exporter of pig iron. The Private Sector accounted for 92% of total production for sale of pig iron in the country in 2015-16. The production for sale of pig iron has increased from 1.6 million tonnes in 1991-92 to 9.228 million tonnes in 2015-16. As per National Steel Policy 2017, the demand for pig iron for merchant use, such as for castings and supplementary metallic in the electric arc or induction furnaces, is projected to increase to 17 MT by 2030- 31.

Spong iron

India is the world's largest producer of sponge iron or Direct Induced Iron (DRI) with a host of coal-based units located in the mineral-rich states of the country. Over the years, the coal-based route has emerged as a key contributor and accounted for 79% of the total sponge iron production in the country in 2015-16 .The growth of Sponge Iron Industry during the last few years in terms of capacity has been substantial. The installed capacity of sponge iron increased from 1.52 million tonnes per annum in 1990-91 to around 43 million tonnes in 2015-16. Production has increased from 0.9 million tonnes in 1990-91 to 22.43 million tonnes in 2015-16. India has been the world's largest sponge iron producer every year since 2003. As per National Steel Policy 2017, the demand for sponge iron is projected to increase to 80 million tonnes by 2030-31.

Sponge iron is a good substitute for scrap which is required by the electric arc furnaces and induction furnaces or mini-steel plants in the country. The availability of indigenous metal scrap is scarce, and therefore, to meet the domestic demand, scrap is usually imported. Sponge iron is a viable alternative for scrap and is produced by direct reduction of high-grade iron ore or pellets to metallic iron ore in solid state by using coal or natural gas as reductant. It is also known as Direct Reduced Iron (DRI) or Hot Briquetted Iron (HBI).

Iron & Steel

The details of the Iron & Steel Industry are provided in the Review on "Iron & Steel and Scrap".

Ferro-alloys

Iron is an important constituent of ferro-alloys, like ferro-manganese (high carbon, medium carbon and low carbon), ferro-silicon, ferro-chrome (high carbon and low carbon)/charge-chrome, ferro-molybdenum, ferro-vanadium, ferro-tungsten, ferro-silicon-magnesium, ferro-aluminium, ferro-silicon-zirconium, ferro-titanium, etc. Ferro-alloys in turn are either used in Steel Industries to impart some special qualities or are exported. The details about the Ferro-Alloys Industry are provided in the Review on 'Ferro-Alloys'.

Cement

Iron ore lumps and powder containing +58% Fe, are normally used in the Cement Industry as they improve burning properties, impart colour and balance the composition of the mix. Further details about the Cement Industry are provided in the Review on 'Cement'.

Coal Washeries

Magnetite ore is used as heavy media in coal washeries. As information available in Energy Statistics 2016, there are 18 washeries for coking coal and 34 washeries for non-coking coal with 29.69 million tpy and 101.55 million tpy installed capacity, respectively. Details on coal washeries are provided in the Review on 'Coal & Lignite'.

USES & SPECIFICATIONS

Iron ore is mainly used for manufacturing pig iron, sponge iron and steel. It is also used in cement, coal washeries, ferro-alloys, foundry, vanaspati and glass industries. The specifications of iron ore consumed by major sponge iron plants are furnished in Table-10 and by major steel plants in Table-11.

Table – 9 : Installed Capacity & Production of Pellets/Sinters, 2015-16 (By Plants)

(In '000 tonnes)

Name & location of plant	Annual installed capacity	Production		Iron ore fines consumed		General specifications of concentrates/fines used	
		2014-15	2015-16 (P)	2014-15	2015-16 (P)		
A) Pellet Plants							
i) Rashmi Metaliks Ltd, Shyamraipur, Gokulpur, West Midnapore, West Bengal	2100	969	1082	791	1723	1410	NA
ii) JSW Steel Ltd, Vijaynagar Works, Vidyanagar, Toranagally, Ballari, Karnataka	9200	4710	5456	13602	14083	NA	
iii) Arya Iron and Steel Company (AISCO) Barbil, Odisha	1200	687	494	757	544	NA	
iv) Ardent Steel Ltd Phuljhar, Keonjhar, Odisha	600	NA	NA	NA	NA	NA	
v) Sarda Energy and Minerals Ltd, Siltara Raipur, Chhattisgarh	600	NA	495	NA	769		

(Contd.)

Table - 9 (Contd.

(In '000 tonnes)

Name & location of plant	Annual installed capacity	Production		Iron ore fines consumed		General specifications of concentrates/fines used
		2014-15	2015-16 (P)	2014-15	2015-16(P)	
vi) KIOCL Ltd, Panambur, Mangaluru, Karnataka.	3500	785	100	745	128	
vii) Tata Steel Limited, Jamshedpur	6000	5409	5941	13777*	15346*	
viii) Essar Steel Ltd, Visakhapatnam, Andhra Pradesh.	8000	NA	NA	NA		
ix) Essar Steel Ltd, Paradip Port, Odisha.	6000	NA	NA	NA		
x) Jindal Steel & Power Ltd, Barbil	9000	NA	NA	NA		
xi) Godawari Power & Ispat Ltd Siltara, Chhattisgarh	2100	1532	1581	1646	1650	NA
xii) BMM Ispat, Karnataka.	2400	NA	NA	NA		
xiii) Mandovi Pellets Ltd, Near Borim Bridge, Shiroda, Goa – 403 103.	1800	NA	NA	NA	NA	Fe 62%, SiO_2 2 to 3.5%, Al_2O_3 1.35 to 2%, Size - 10 mm
xiv) Jayaswal Neco Industries Ltd, Siltara, Raipur, Chhattisgarh.	1200	NA	NA	568	1292	
xv) Shri Bajarang Power & Ispat Ltd, Borjhara, Tilda & Gondwara, Raipur Chhattisgarh.	1200	NA	NA	NA	NA	
xvi) Xindia Steels Ltd, Kunikere & Hirebaganal Ginigera, Koppal, Karnataka.	800	NA	NA	NA	NA	
xvii) Rexon Strips Ltd, Kumakela, Lathikata Rourkela, Sundargarh, Odisha	300	NA	NA	3748	3748	
xviii) Orissa Manganese & Minerals Limited (OMML), Kandra Saraikela Kharsawan, Jharkhand	1200	NA	NA	NA	NA	
xix) MSP Steel & Power Ltd, Raigarh, Chhattisgarh	900	NA	NA	797	775	
xx) Usha Martin Ltd, Usha Alloy & Steel Division, Jamshedpur	1200	671	402	2461	2255	NA
B) Sintering Plant						
i) Bokaro Steel Plant, Jharkhand.	6900	5062	4695	3806	3482	
ii) Bhilai Steel Plant, Bhilai, Chhattisgarh.	6334	6797	7737	4792	5451	Fe 62.6% (min.), Size 0-10 mm or <10% & 1mm or >75%.

(Contd.)

Table - 9 (Contd.) (In '000 tonnes)

Name & location of plant	Annual installed capacity	Production		Iron ore fines consumed		General specifications of concentrates/fines used
		2014-15	2015-16 (P)	2014-15	2015-16 (P)	
iii) Durgapur Steel Plant, West Bengal.	3009	3170	2980	2425	2212	Fe >63%, SiO_2 2.17 to 4.54%, Al_2O_3 2.57 to 3.03%, Size +10 mm <10% , 1mm>75%
iv) Rourkela Steel Plant, Odisha.	5300	4009	4935	4517	5196	Fe 62.80%, SiO_2 2.28%, Al_2O_3 3.04%, Size -10 mm
v) RINL, Visakhapatnam Steel Plant, Plant No.-1 & 2,Visakhapatnam Andhra Pradesh.	5256	5101	NA	3791	NA	Fe 64.50% (min.), Al_2O_3 3.0% (max.), SiO_2 3%, (max.), Size (-) 10 mm
vi) RINL, Visakhapatnam Steel Plant, , Plant No.-3, Visakhapatnam, Andhra Pradesh.	3600	NA	NA	NA	NA	NA
vii) Tata Steel Ltd, Jamshedpur, Jharkhand.	8000	7370	7863	13777*	15344*	* Including lumps
viii) Usha Martin Ltd (Usha Alloys and Steel Division), Jamshedpur.	715	630	NA	1466	NA	NA
ix) JSW Ispat Steel Ltd, Dolvi, Raigad, Maharashtra 402 107.	2800	NA	NA	NA	NA	NA
x) Neelachal lspat Nigam Ltd, Kalinga Nagar, Industrial Complex, Duburi-755 026, Distt. Jajpur, Odisha.	1711	NA	NA	897	914	Fe 63% (min.), Size + 10 mm
xi) Jindal Steel & Power Ltd, Raigarh, Chhattisgarh.	2300	NA	NA	NA	NA	NA
xii) Jayaswal Necco Industries Ltd, Siltara Growth Centre, Raipur-493 221, Chhattisgarh.	792	-	568	-	1292	Fe 56.5 %, CaO 9.0%, MgO 2.25%.
xiii) Bhushan Power & Steel Ltd, Sambalpur, Odisha.	1000	NA	NA	NA	NA	NA
xiv) JSW Steel Ltd Salem works , Pottaneri, Salem, Tamil Nadu.	1180	1245	1275	775	578	NA
xv) Kirloskar Ferrous Industries Ltd, Bevinahalli, Hitnal, Karnataka.	500	449	382	403	354	NA
xvi) Sunflag Iron and Steel Co. Ltd, Bhandara, Nagpur, Maharashtra.	250	296	337	552	535	NA
xvii) JSW Steel Ltd Vijaynagar works, Vidyanagar -583 175, Tornagallu, Ballari, Karnataka.	12950	13386	13155	13602	14083	NA
xviii) Kalyani Steel Ltd, M/s Hospet Steels Ltd., Ginigera, Koppal, Karnataka	500	247	256	162	119	Fe: 60 - 62%
xix) Mukund Ltd, M/s Hospet Steel Ltd, Ginigera, Koppal, Karnataka	500	336	336	184	166	Fe: 60 - 62%

(Contd.)

Table - 9 (Concld.) (In '000 tonnes)

Name & location of plant	Annual installed capacity	Production		Iron ore fines consumed		General specifications of concentrates/fines used
		2014-15	2015-16 (P)	2014-15	2015-16 (P)	
xx) Rashmi Metaliks Ltd, Shyamraipur, Gokulpur, West Midnapore, West Bengal.	580	199	251	1723	1410	NA
xxi) IISCO Steel Plant, Steel Authority of India, Burnpur, West Bengal.	3800	2190	663(up to June)	453	576	NA
xxii) Tata Metaliks Ltd, Kharagpur, West Bengal.	528	476	475	362	434	NA
xxiii) KIC Metaliks Ltd, Raturia, Angadpur, Durgapur. West Bengal.	336	194	188	238	234	NA
xxiv) Gerdau Steel India Ltd, Tadipatri, Anantpur	470	447	485	286	308	NA
xxv) SBQ Steel Ltd, Gudur, Nellore, AP	240	-	-	-	-	-
xxvi) Sri Kalahasthi Pipes Ltd, Dipipe Sri Kalahasthi.	500	333	364	-	-	-

*Incluudes iron ore lumps & low-grade iron ore

Table - 10 : Specifications of Iron Ore Consumed by Major Sponge Iron Plants

Sl. No.	Name of the Plant	Specifications				
		Size	Fe	$Al_2O_3 + SiO_2$	P	S
1.	Orissa Sponge Iron Plant	5-18 mm	65% min.	4.5% max.	0.03% max.	N. A.
2.	Welspun Max Steel Ltd	9-16 mm	66%	2.6% max.	0.05%	0.01%
3.	Sunflag Iron & Steel Ltd	5-20 mm	67.5%	–	–	–
4.	NMDC Ltd (Sponge iron unit)	6-20 mm	55-58% & 64-66%	–	–	–
5.	Essar Steel Ltd	10-40 mm	67%	2.60% max.	0.05%	0.01%
6.	Jindal Steel & Power Ltd	10-30 mm	65% min.	3% max. (SiO_2)	0.05%	–
7.	Tata Sponge Iron Ltd	5-18 mm	65% min.	5% max.	–	–
8.	Steel Exchange India Ltd	10-40 mm	62%	–	–	–
9.	Sarda Energy & Minerals Ltd	5-18 mm	65-66%	–	–	–
10.	OCL Iron & Steel Ltd	Sized	62% min.	–	–	–
11.	Nalwa Steel & Power Ltd	5-20 mm	63% min.	–	–	–
12.	Shri Bajrang Power & Ispat Ltd	5-18 mm	64% min.	–	–	–
13.	Jai Balaji Industries Ltd	5-18 mm	65%	5%	0.05%	0.03%
		10-30 mm	–	–	–	–
		10-150 mm	–	–	–	–

Table – 11 : Consumption and Specifications of Iron Ore, 2014-15 and 2015-16 (By Steel Plants)

(In '000 tonnes)

Steel plant	Iron ore consumption 2014-15		2015-16 (P)		Specifications
	Lumps	Fines	Lumps	Fines	
Bokaro Steel Plant, Bokaro, Jharkhand.	2635	3806	2099	3481	Lumps: Fe-63.40%, SiO_2:2.25%, Al_2O_3 2.39%, Size: 10-40 mm Fines: Fe - 62.24%, SiO_2 - 3.36%, Al_2O_3 - 3.45%
Durgapur Steel Plant, Durgapur, West Bengal.	1244	2425	1178	2212	Lumps : Fe - 62.48%, Al_2O_3 - 2.42%, Size: 10-50 mm Fines: Fe - 62.8%, SiO_2 - 2.28%, Size : -10 mm
IISCO Steel Plant, Burnpur, West Bengal.	453	577	576	1865	Lumps: Fe - 62.86%, SiO_2 - 2.56%, Al_2O_3 - 2.56% (max.), Size: 10-40 mm
Bhilai Steel Plant, Chhattisgarh	3174	4792	2893	5451	
Rourkela Steel Plant SAIL, Rourkela, Odisha.	1761	3406	1835	3361	-
Tata Metaliks Ltd Kharagpur West Bengal.	277	362	260	434	-
Gerdau Steel India Ltd, Tadipatri, Anantpur	168	286	130	308	
Kirloskar Ferrous Industries Ltd, Bevinahalli, Hitnal, Karnataka.	185	403	178	354	
Mukund Ltd, M/s Hospet Steel Ltd, Ginigera, Koppal, Karnataka.	306	184	273	166	-
JSW Steel Ltd Salem works, Pottaneri, Salem, Tamil Nadu.	4669	13602	4315	14083	-
Kalyani Steel Ltd, M/s Hospet Steels Ltd., Ginigera, Koppal, Karnataka.	219	162	213	119	-
SAIL Durg Chhattisgarh	3174	2893			

TRADE POLICY

As per the Foreign Trade Policy (FTP) for 2015-20 and the amended Export and Import Policy incorporated in the FTP, the present export policy for iron ore as construed is furnished below in brief. As per the policy, imports of iron ore lumps, fines, concentrates and agglomerated pellets are freely allowed.

HS Code	Item	Export Policy	Nature of restrictions
26011100	Iron ore other than those specified under Free category.	STE	Export through MMTC
26011100	Iron ore of Goa origin when exported to China, Europe, Japan, South Korea and Taiwan, irrespective of the Fe content.	Free	
26011100	Iron ore of Redi origin to all markets, irrespective of the Fe content.	Free	
26011100	All iron ore of Fe content up to 64%.	Free	
26011150	Iron ore concentrate prepared by beneficiation and/or concentration of low-grade ore containing 40% or less of iron produced by KIOCL Ltd.	STE	KIOCL Ltd, Bengaluru
26011210	Iron ore pellets manufactured by KIOCL Ltd.	STE	KIOCL Ltd, Bengaluru
26011290	Rejects of iron ore chips and like generated from the manufacturing process after using imported raw material.	Free	The quantity of export of such rejects shall not be more than 10% of the imported raw materials i.e. pellets. The size of the rejected pellets chips (fines) shall be less than 6 mm.

***Source**: Export-Import Policy, 2015-20 ; STE: State Trading Enterprise*

Table – 12: Consumption* of Iron Ore@ 2013-14 to 2015-16 (By Industries)

(In tonnes)

Industry	2013-14	2014-15 (R)	2015-16(P)
All Industries	**107913600**	**114680000**	**122619300**
Alloy steel	2600	10600	12000
Cement	1154300	1186500	1089600
Ferro-alloys	3700	3100	7300
Coal washery **	30800	30800	30800
Iron & steel	77598200	85525000	92884500
Sponge iron	29120000	27920000	28592000
Others (electrode, foundry, oil well drilling, paint, refractory)	4000	4000	3100

Figures rounded off.
**Includes actual reported consumption and /or estimates made wherever required.*
@ Does not include consumption of pellets & sinters; includes consumption of iron ore (fines) consumed in the production of pellets & sinters.

CONSUMPTION

In 2015-16, about 122.62 million tonnes iron ore were consumed in various industries like Iron & Steel, Sponge Iron, Ferro-alloys, Alloy-steel, Coal Washery and Cement. Iron & Steel (76%) including Sponge Iron industries (24 %) were the major consumer of iron ore and accounted for over 99% of the consumption. Plantwise consumption of iron ore in steel plants about which information is available is furnished in Table-11. Industrywise consumption of iron ore from 2013-14 to 2015-16 is detailed in Table-12.

WORLD REVIEW

The world reserves of crude iron ore are estimated to be around 170 billion tonnes. In terms of iron content, the iron ore reserves are estimated to be around 82 billion tonnes. The world reserves of crude iron ore and iron content by principal countries are furnished in Table - 13.

In 2015, the world production of iron ore was 3,328 million tonnes as against 3,415 million tonnes in the previous year. China (41%), Australia (25%), Brazil (12%), India (5%) and Russia (3%) were the principal producers. These five countries accounted for about 86% of the world production of iron ore. The world production of iron ore is provided in Table-14.

Australia

Australia's reported Economic Demonstrated Resources increased by year end 2014 to 54.4 Gt with 24.6 Gt of contained iron; however, the estimated resource life decreased to 75 years from the 85 years estimated in 2013.

The three leading miners in Australia—BHP Billiton Ltd., Fortescue Metals Group Ltd., and Rio Tinto Group—were three of the four leading iron ore mining companies in the world and accounted for over 70% of production in Australia in 2014. Operations in Australia were affected by seasonal cyclone. All three mining companies focused on adding capacity while reducing production costs, which ranged from less than $20 per metric ton to around $35 per metric ton for iron ore mined in situ.

BHP Billiton's share of production among Australian operations in FY 2014 rose to 193 Mt, a 21% increase from 159 Mt in FY 2013.

Fortescue's production in FY 2014 increased to 140 Mt, a 48% increase over the 94.6 Mt produced in FY 2013.

Rio Tinto's share of production among Australian operations in 2014 was 225 Mt, a 12% increase compared with the 200 Mt produced in 2013. Rio Tinto completed its first-phase expansion at Pilbara to reach a 290-Mt/yr capacity with a second-phase expansion planned to reach 330 Mt/yr in 2015 and 350 Mt/yr in 2017. The company continued investing in automated technologies to lower costs and improve efficiencies, which included converting four drills to an autonomous drilling system, expanding automated haulage systems, and testing autonomous heavy-haul rail system.

Brazil

Vale S.A.'s production in 2014, including Vale's share of production at the Samarco Mine was 332 Mt, 7% greater than the 311 Mt produced in 2013. Of the total ore produced, pellets accounted for 55.1 Mt in 2014, an increase from 49.6 Mt in 2013. The Samarco Mine began operations at a fourth pellet plant, increasing capacity by 8.3 Mt/yr to 30.5 Mt/yr. Anglo American plc completed the Minas-Rio project. The Minas-Rio Mine, an open pit mine and processing facility, was expected to produce 11 to 14 Mt (wet basis) at 67% Fe in 2015 and 24 to 26.5 Mt in 2016.

China

In 2014, stockpiles of iron ore in China surpassed 100 Mt for the first time since 2012. Traders reportedly increased stockpiles of iron ore to use as collateral for credit. The China Metallurgical Mining Enterprise Association reported that 20% to 30% of iron ore mines in China closed or were idled in 2014 owing to low prices.Credit Suisse Group AG estimated that production in China will decline by 16% to 310 Mt in 2014 and to 275 Mt in 2015. Some mines in China, notably those owned by steel mills or central Government enterprises were expected to maintain operations despite price forecasts ranging from $70 to $90 per ton. A study by the China Iron and Steel Association indicated that more than 20 major iron ore mines in China that were owned by major steel mills maintained consistent production rates throughout 2013. Producers in China's larger Provinces, such as Anhui, Guangdong, Hubei, and Sichuan, increased production in 2014 .

Canada

The Mary River Mine began shipping iron ore to its port site for stockpiling in preparation for exporting in the summer of 2015, when the weather is favourable . Rio Tinto's subsidiary, Iron Ore Co. of Canada, completed the second stage of its concentrate expansion plan by installing new equipment and upgrading infrastructure, enabling an additional 1.3 Mt of concentrate capacity.

ArcelorMittal Mines Canada completed the transition of the Fire Lake Mine to year-round operations, increasing production to 6.26 Mt of crude ore from 2.5 Mt in 2013, which was shipped to the Mont-Wright Mine for concentrating . Cliffs Natural Resources Inc. idled its Wabush Scully Mine in Newfoundland and Labrador in March and began closure 5.6-Mt/yr-capacity facility, produced concentrates for pelletizing at the company's Pointe Noire plant in Quebec, which had been idled in the second quarter of 2013.

In November 2014, the company also began pursuing exit options for the Bloom Lake Mine, a 7.2-Mt/yr-capacity concentrate facility, owing to unfeasibility of the Phase 1 expansion and the mine's unprofitability. In December 2014, the mine was idled and its owners entered restructuring proceedings under Canada's Companies' Creditors Arrangement Act in January 2015.

India

The Honourable Supreme Court of India lifted mining bans in Goa after 19 months, although production was capped at 20 Mt/yr of iron ore . Steel Authority of India Ltd. announced a $1.4 billion investment for expanding iron and steel operations, specifically at the Rowghat and Chiria Mines; the mines were expected to increase capacity to 14 Mt/yr and 15 Mt/yr, respectively, after completion.

Mexico

Authorities in Mexico closed 11 mineral loading docks, seized $15 million worth of mining equipment, and confiscated 119,000 t of iron ore being exported by an organized crime group at the Port of Lazaro Cardenas in March 2014. About 300,000 t of iron ore was stolen from mining companies in Michoacan in 2013, with an additional 100,000 t stolen from the nearby Port of Manzanillo in Colima in the first quarter of 2014. Authorities estimated that additional funds averaging $15 per ton of iron ore, were being surrendered by miners, shippers, and foreign traders throughout the supply chain to the cartels.

Liberia

Arcelor Mittal S.A. delayed the $1.7 billion expansion of its iron ore mine in Liberia, owing to volatile iron ore pricing and regional effects of the Ebola virus disease.

Cameroon

Noble Group Ltd. signed a 10-year contract, pending financier approvals, to purchase all iron ore produced at Sundance Resources Ltd.'s Mbalam-Nabeba project in Cameroon and the Republic of Congo that is not allocated to project equity participants. The project has reserves containing an estimated 436 Mt of iron ore at 62.6% Fe, and will have a planned 35-Mt/yr production capacity.

Pakistan

The Metallurgical Corp. of China signed an agreement with the Government of Punjab Province to explore iron ore deposits in Chiniot. The Chiniot district was estimated to contain 600 Mt of iron ore resources, including 500 Mt of inferred or undiscovered resources and 100 Mt of indicated resources, of which 27 Mt was measured reserves. A study carried out by the Geological Survey of Pakistan indicated that the deposit contained iron grades ranging from 44% to 77% Fe.

Table – 13 : World Reserves of Iron Ore (By Principal Countries)

(In million tonnes)

Country	Reserves	
	Crude ore	Iron content
World : Total (rounded off)	**170000**	**82000**
Australia	52000	23000
Brazil	23000	12000
Canada	6000	2300
China	21000	7200
India	8100	5200
Iran	2700	1500
Kazakhstan	2500	900
Russia	25000	14000
South Africa	1200	770
Sweden	3500	2200
Ukraine	6500	2300
USA	3000	790
Other countries	18000	9500

Source: *Mineral Commodity Summaries, 2017.*
Note : Total may not tally as figures are rounded off.

** India's reserves/resources of iron ore (Haematite) as per NMI data base based on UNFC system as on 1.4.2015 were estimated at 22,487 million tonnes.*

India's reserves/resources of iron ore (Magnetite) as per NMI data base based on UNFC system as on 1.4.2015 were estimated at 10,789 million tonnes.

Table – 14 : World Production of Iron Ore (By Principal Countries)

(In million tonnes)

Country	2013	2014	2015
World : Total	**3195**	**3415**	**3328**
Australia	616	751	817
Brazil	317	346	389
Canada *	43	44	46
Chile	17	19	15
China	1451	1514	1381
India**	152	129	156
Iran	57	69	58[e]
Kazakhstan	52	52	37
Mauritania	13	13	12
Mexico	29	25	21
Norway	10	11	11[e]
Russia	102	102	101
South Africa[@]	72	81	73
Sweden	37	36	30
USA**	53	56	43
Ukraine	70	68	67
Venezuela	11	11	12
Other countries	95	88	59

Source: *World Mineral Production, 2011-2015.*
Note : Total may not tally as figures are rounded off.

** Including by-product iron ore.*
@: Including by-product magnetite.
*** Including by-product iron ore and beneficiated and direct shipping ore*
**** India's production of iron ore in 2013-14, 2014-15 and 2015-16 was 152.18 million tonnes 129.32 million tonnes and 155.91 million tonnes respectively.*

FOREIGN TRADE

Exports

Exports of iron ore considerably decreased to 5.44 million tonnes in 2015-16 from 7.30 million tonnes in the previous year. In terms of value, the iron ore exports decreased to ₹ 1,264 crore in 2015-16 from ₹ 3,144 crore in 2014-15. The exports of iron ore in 2015-16 in terms of volume comprised iron ore fines (85%), iron ore pellets (13%) , iron ore lumps (2%), and very negligible quantity of iron ore non-agglomerated concentrate and iron ore pyrites. Exports were mainly to China (93%) & Iran (5%) and the remaining 2% of the exports were to UAE, Malaysia, Nepal, Vietnam, Kuwait, Oman, Saudi Arabia, Japan etc. (Tables- 15 to 20).

Imports

Imports of iron ore decreased drastically to 7.09 million tonnes in 2015-16 as compared to 12.09 million tonnes in the previous year. The imports in 2015-16 comprised iron ore non-agglomerated concentrates (36%), Fines (36%), lumps (24%), iron ore pellets (4%) and negligible quantity of iron ore pyrites, etc. Imports of iron ore were from South Africa (60%), Oman (28%), Brazil (10%), Baharain & Australia (1% each) (Tables-21 to 27).

Table – 15 : Exports of Iron Ore : Total (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**7297**	**31436684**	**5441**	**12639631**
China	4288	11902072	5060	10320476
Iran	535	4831542	290	2028133
UAE	1	11889	22	102915
Malaysia	++	92	21	83767
Nepal	1	5051	43	73939
Vietnam	++	342	5	20000
Kuwait	-	-	++	2186
Oman	28	43779	++	1799
Saudi Arabia	++	7184	++	1474
Japan	1882	11246552	++	1383
Other countries	562	3388181	++	3559

Table – 16 : Exports of Iron Ore : Lumps (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**662**	**2559524**	**112**	**185059**
China	386	1059165	110	178652
Nepal	1	3689	2	6407
Japan	275	1496670	-	-

Table – 17 : Exports of Iron Ore : Fines (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**5807**	**22120939**	**4635**	**8763002**
China	3726	9568735	4594	8695498
Nepal	++	877	41	67408
Russia	-	-	++	96
Japan	1541	9460702	-	-
Korea, Rep. of	512	3046799	-	-
Oman	28	43779	-	-
USA	++	47	-	-

Table – 20 : Exports of Iron Ore : Pyrites (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**++**	**8579**	**++**	**7746**
Japan	-	-	++	1383
Netherlands	++	390	++	1265
Iran	++	1094	++	1203
Nigeria	-	-	++	1018
UAE	++	1260	++	1008
Vietnam	++	342	++	730
Uganda	++	50	++	530
Sri Lanka	-	-	++	298
New Zealand	-	-	++	147
Pakistan	-	-	++	115
Other countries	++	5443	++	49

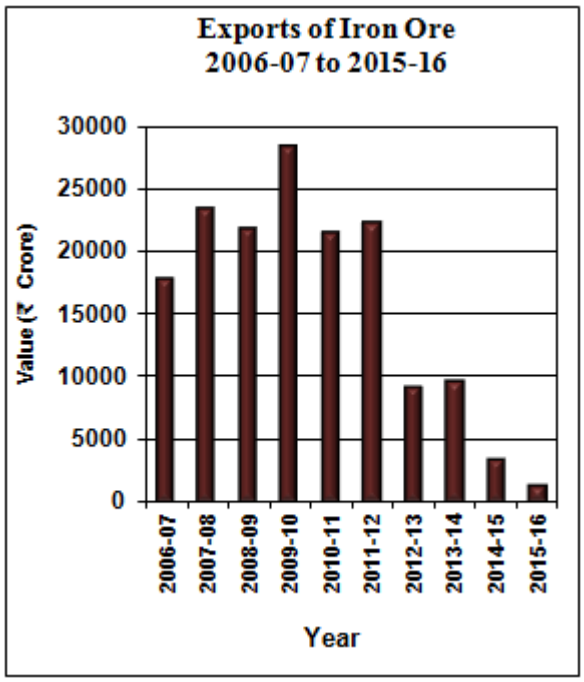


Table – 18 : Exports of Iron Ore: Concentrates Non-Agglomerated (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**70**	**312791**	**++**	**8031**
UAE	1	10629	++	2408
Kuwait	-	-	++	2186
Oman	-	-	++	1799
Saudi Arabia	++	6743	++	1474
Nepal	++	485	++	124
South Africa	-	-	++	21
Canada	-	-	++	10
Finland	-	-	++	5
Austria	-	-	++	4
Japan	66	289178	-	-
Other countries	3	5756	-	-

Table – 19 : Exports of Iron Ore: Pellets (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**758**	**6434851**	**694**	**3675793**
Iran	535	4830448	290	2026930
China	173	1268415	356	1446326
UAE	-	-	22	99499
Malaysia	-	-	21	83767
Vietnam	-	-	5	19271
Other countries	50	335988	++	1

Table – 21 : Imports of Iron Ore: Total (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**12093**	**65947375**	**7099**	**31971445**
South Africa	5044	28973403	4252	19578175
Oman	207	1297227	1965	8146494
Brazil	3419	17634296	694	3151415
Baharain	-	-	105	720561
Australia	1995	9929559	67	248124
Singapore	-	-	7	48698
Saudi Arabia	-	-	6	29633
Turkey	2	16915	2	17109
Finland	7	65756	1	10736
China	10	75819	++	8354
Other countries	1409	7954400	++	12146

Table – 22: Imports of Iron Ore Concentrates: Non-agglomerated (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**4939**	**24964666**	**2565**	**11462874**
South Africa	1708	9117925	2060	9439580
Brazil	1910	8935947	505	2020499
Netherlands	-	-	++	1274
Sweden	++	1405	++	1097
Nigeria	-	-	++	177
Germany	++	24	++	82
UAE	-	-	++	77
Iran	-	-	++	40
Niger	-	-	++	30
Sudan	++	98	++	18
Other countries	1321	6909267	-	-

Table – 23 : Imports of Iron Ore : Pellets (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**656**	**5151575**	**279**	**1907301**
Brazil	323	2491750	122	833511
Baharain	-	-	105	720561
Oman	93	822907	52	353229
Australia	79	585207	-	-
Ukraine	53	457406	-	-
Russia	49	448662	-	-
Qatar	44	232472	-	-
China	10	68840	-	-
Finland	5	44331	-	-
Other countries	-	-	-	-

Table – 24 : Imports of Iron Ore : Pyrites (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**4**	**52397**	**3**	**46031**
Turkey	1	12258	2	17109
Finland	2	21425	1	10736
China	++	6832	++	8354
Italy	++	3853	++	4598
Pakistan	1	6982	++	2477
Albania	-	-	++	1671
Australia	-	-	++	482
Austria	-	-	++	453
USA	++	32	++	151
UAE	++	1015	_	_
Other countries	-	-	-	-

Table – 25 : Imports of Iron Ore : Pyrites Roasted (By Countries)

Country	2014-15		2015-16(P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**++**	**247**	**++**	**208**
USA	-	-	++	151
China	++	247	++	57
Other countries	-	-	-	-

Table – 26: Imports of Iron Ore : Lumps (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**1657**	**10498110**	**1709**	**8162529**
South Africa	1476	9424348	1629	7836556
Australia	133	826496	67	247642
Singapore	-	-	7	48698
Saudi Arabia	-	-	6	29633
Qatar	44	232472	-	-
Senegal	2	12174	-	-
Nicaragua	2	2620	-	-
Other countries	-	-	-	-

Table – 27 : Imports of Iron Ore Fines (By Countries)

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**4837**	**25280627**	**2543**	**10392710**
Oman	114	474319	1913	7793266
South Africa	1860	10431130	563	2302039
Brazil	1186	6206599	67	297405
Australia	1448	6966257	-	-
Mauritania	148	776977	-	-
Venezuela	80	420558	-	-
Turkey	1	4658	-	-
Malaysia	++	123	-	-
Qatar	++	6	-	-

FUTURE OUTLOOK

India is one of the leading producers of iron ore in the world. Among the consuming industries, Cement Industry is the second major consumer of iron ore after Iron & Steel Industry (including Sponge Iron Industry). In order to conserve iron ore resources of the country for long term domestic value addition, export duty on all varieties of iron ore (except pellets) has increased from 20% to 30% ad valorem.

The Ministry of Steel under Government of India has recently introduced that new National Steel Policy 2017 and with the roll out of the National Steel Policy 2017 and the DMI & SP policy, it is envisaged that the industry can be steered with appropriate policy support in creating an environment for promoting domestic steel and thereby ensuring a scenario where production meets the anticipated pace of growth in consumption. Thus, the Indian Steel Sector is all set to achieve its vision thereby setting a global benchmark in terms of quality, standards and technology. It is anticipated that crude steel

capacity of 300 million tonnes will be required by 2030-31. However, achieving crude steel capacity up to 300 million tonnes will require extensive mobilisation of natural resources, finances, manpower and infrastructure including land.

Availability of raw material (iron ore) at iron ore, intensive & deeper exploration would have to be promoted for augmenting the resource base. Eco-friendly viable underground mining technique for optimal utilisation of magnetite ore deposits locked in Western Ghats would also have to be explored in conjunction with mining research institutes. The Government has already promulgated the Mines and Minerals (Development and Regulation) Amendment Act, 2015 and therein has laid great emphasis on time bound mine development with increased stress on mineral exploration and sustainable mining operations. The Act has brought clarity on mine allocation process (through auction) and procedures for mining lease renewal. The Act, further, provides for reservation of any particular mine for a particular end use and put conditions permitting auction among such eligible end users.

Ministry of Steel in conjunction with Ministry of Mines will facilitate creation of a uniform countrywide sales platform for bringing transparency and predictability in the process of sale of iron ore.