Indian Minerals Yearbook 2017

(Part- III : Mineral Reviews)

56th Edition

CHROMITE

(FINAL RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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March, 2018

6 Chromite

Chromite (Cr) is the single commercially viable ore of chromium which is chemically known as iron chromium oxide (Fe Cr_2O_4). The properties of chromium that make it most versatile and indispensable are its resistance to corrosion, oxidation, wear & galling and enhancement of hardenability. Chromium is an important alloying metal in ferrous metallurgy, perhaps next only to manganese. It is used in the manufacture of alloys along with other metals, such as, nickel, cobalt, molybdenum, copper, titanium, zirconium, vanadium, columbium and selenium. Chromium is traded primarily as chromium ore or as an alloy of chromium and iron, namely, ferrochrome or charge-chrome. The name of the element is derived from the Greek word '*chrôma'*, meaning colour, because many of its compounds are intensely coloured. It is a steely-grey, lustrous, hard and brittle metal which takes a high polish, resists tarnishing and has a high melting point.

RESERVES/RESOURCES

As per NMI database based on UNFC system, the total reserves/resources of chromite in the country as on 1.4.2015 have been estimated at 344 million tonnes with 102 million tonnes as Reserves (30%) and 241 million tonnes as Remaining Resources (70%). More than 96% resources of chromite are located in Odisha, mostly in Jajpur, Kendujhar and Dhenkanal districts. Minor deposits are scattered over Manipur, Nagaland, Karnataka, Jharkhand, Maharashtra, Tamil Nadu, Telangana and Andhra Pradesh. Gradewise, Charge chrome grade accounts for 31% resources followed by Beneficiable grade (25%), Ferro-chrome grade (18%), and Refractory grade (14%). Low, Others, Unclassified and Not-known grades together account for 12% (Table- 1).

EXPLORATION & DEVELOPMENT

The exploration and development details, if any, are given in the review on Exploration & Development in "General Reviews".

PRODUCTION AND STOCKS

The production of chromite was 3,728 thousand tonnes during 2016-17 which increased by 28% as compared to that in the previous year.

The number of reporting mines was 25 in 2016-17 same as that in the preceding year. The share of public sector in total production was 34% in 2016-17 as compared to 37% in the previous year. About 27% of the total production was reported from captive mines in current year as compared to 32% in the previous year.

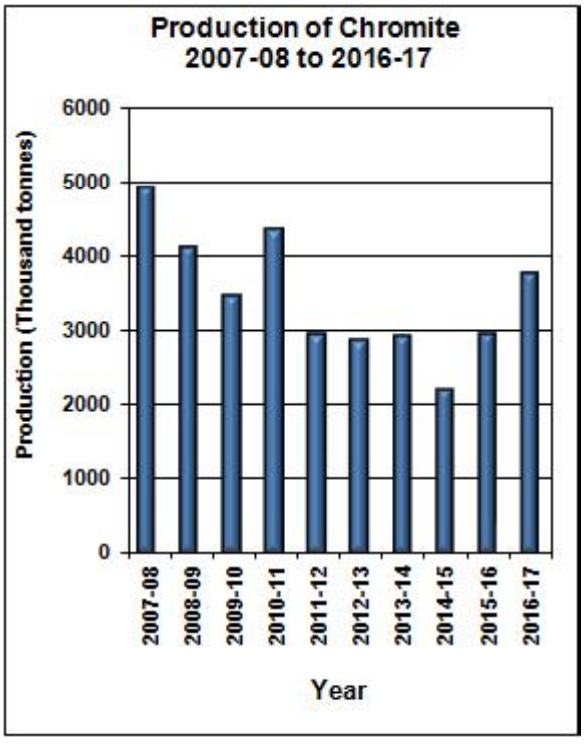

Table – 1 : Reserves/Resources of Chromite as on 1.4.2015
(By Grades/States)

(In '000 tonnes)

Grade/State	Reserves				Remaining Resources								Total Resources (A+B)
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
		STD121	STD122			STD221	STD222						
All India : Total	**64465**	**12815**	**24930**	**102210**	**67618**	**15780**	**33506**	**26914**	**33076**	**44458**	**20452**	**241806**	**344016**
By Grades													
Refractory	26759	2803	416	29978	9234	987	320	3635	550	2958	-	17684	47662
Charge chrome	16476	-	9328	25804	25726	8333	4048	8931	25000	7861	7	79905	105709
Low	-	-	-	-	26	27	-	-	-	3713	-	3765	3765
Beneficiable	12528	10012	9018	31557	17992	2272	10649	6856	6069	10301	-	54139	85697
Ferro-chrome	7809	-	6033	13842	14043	2004	17888	7483	1134	4942	10	47504	61346
Others	133	-	-	133	348	377	-	-	15	-	-	740	873
Unclassified	761	-	135	896	250	1780	602	9	308	14506	19889	37343	38239
Not-known	-	-	-	-	-	1	1	-	-	177	546	725	725
By States													
Andhra Pradesh	-	-	-	-	-	-	-	-	-	-	-	-	-
Jharkhand	-	-	-	-	-	-	-	15	98	623	-	736	736
Karnataka	315	340	72	727	300	230	96	-	20	259	-	905	1631
Maharashtra	-	48	23	71	5	-	5	43	67	418	-	538	609
Manipur	-	-	-	-	3	21	52	-	504	6077	-	6657	6657
Nagaland	-	-	-	-	-	-	-	-	-	3200	-	3200	3200
Odisha	64150	12427	24835	101412	67311	15529	33354	26850	32372	33434	20452	229301	330714
Tamil Nadu	-	-	-	-	-	-	-	7	-	276	-	282	282
Telangana	-	-	-	-	-	-	-	-	15	171	-	186	186

Figures rounded off

Table – 2 : Principal Producers of Chromite 2016-17

Name & address of producer	Location of mine	
	State	District
The Orissa Mining Corporation Ltd, 'OMC House', Unit 5, Post Box No. 34, Bhubaneshwar – 751 001, Odisha.	Odisha	Jajpur
The Tata Steel Ltd, Bombay House, 24, Homi Mody Street, Fort, Mumbai – 400 001, Maharashtra.	Odisha	Jajpur
Balasore Alloys Ltd, Balgopalpur, P.O. Rasalpur, Balasore - 756 020, Odisha.	Odisha	Jajpur
Indian Metals & Ferro Alloys Ltd, IMFABuilding,Bomikhal, Rasulgarh, Bhubaneshwar – 751 010, Odisha.	Odisha	Jajpur Kendujhar
Ferro Alloys Corporation Ltd, Laxmi Bhawan, Kuans, Bhadrak – 756 100, Odisha.	Odisha	Jajpur

Odisha continued to be the major chromite producing state accounting for almost the entire production during 2016-17 and nominal production was reported from Karnataka and Maharashtra.

Gradewise analysis of production during 2016-17 reveals that 52% & above Cr_2O_3 fines accounted for 29%, 40 -52% Cr_2O_3 for 40% (Lumps 4% and Fines 36%), below 40% Cr_2O_3 for 18% (Lumps 4% and Fines 14%) and chromite concentrates for 13% of the total production.

Mine-head closing stocks of chromite for the year 2016-17 were at 2,694 thousand tonnes as compared to 2,560 thousand tonnes in 2015-16.

The average daily employment of labour in chromite mines during 2016-17 was 7,066 as against 6,645 in the previous year (Tables- 2 to 8).

Table – 3 : Production of Chromite, 2014-15 to 2016-17 (By States)

(Qty in tonnes; Value in `'000)

State	2014-15		2015-16		2016-17 (P)	
	Qty	Value	Qty	Value	Qty	Value
India	**2164163**	**18800279**	**2915584**	**21214490**	**3727777**	**36438254**
Karnataka	2674	16044	1808	10884	782	4321
Maharashtra	26	79	90	432	1	5
Odisha	2161463	18784156	2913686	21203174	3726994	36433928

Table – 4 : Gradewise Production of Chromite, 2015-16 (By Sectors, States and Districts)

(Qty in tonnes; Value in `'000)

State/ District	No. of mines	Production by Grades : Cr_2O_3 Content						Concentrates	Total	
		Below 40%		40-52%		52% & Above				
		Lumps	Fines	Lumps	Fines	Lumps	Fines		Quantity	Value
India	**25**	**111526**	**545119**	**52457**	**1057598**	**-**	**782097**	**366787**	**2915584**	**21214490**
Public sector	10	2636	173419	-	512552	-	346596	41321	1076524	10301399
Private sector	15	108890	371700	52457	545046	-	435501	325466	1839060	10913091
Karnataka	**3**	**1808**	**-**	**-**	**-**	**-**	**-**	**-**	**1808**	**10884**
Hassan	3	1808	-	-	-	-	-	-	1808	10884
Maharashtra	**1**	**90**	**-**	**-**	**-**	**-**	**-**	**-**	**90**	**432**
Bhandara	1	90	-	-	-	-	-	-	90	432
Odisha	**21**	**109628**	**545119**	**52457**	**1057598**	**-**	**782097**	**366787**	**2913686**	**21203174**
Dhenkanal	2*	-	-	-	-	-	-	-	-	-
Jajpur	15	109628	545119	52457	1057598	-	782097	366787	2913686	21203174
Kendujhar	4*	-	-	-	-	-	-	-	-	-

** Only labour reported*

Table – 5 : Gradewise Production of Chromite, 2016-17 (P)
(By Sectors, States and Districts)

(Qty in tonnes; Value in `'000)

State/ District	No. of mines	Production by Grades : Cr_2O_3 Content						Concentrates	Total	
		Below 40%		40-52%		52% & Above				
		Lumps	Fines	Lumps	Fines	Lumps	Fines		Quantity	Value
India	**25**	**126833**	**530912**	**142026**	**1354054**	**-**	**1101934**	**472018**	**3727777**	**36438254**
Public sector	10	2551	154180	200	696935	-	371048	46980	1271894	19465673
Private sector	15	124282	376732	141826	657119	-	730886	425038	2455883	16972581
Karnataka	**3**	**782**	**-**	**-**	**-**	**-**	**-**	**-**	**782**	**4321**
Hassan	3	782	-	-	-	-	-	-	782	4321
Maharashtra	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**5**
Bhandara	1	1	-	-	-	-	-	-	1	5
Odisha	**21**	**126050**	**530912**	**142026**	**1354054**	**-**	**1101934**	**472018**	**3726994**	**36433928**
Dhenkanal	2*	-	-	-	-	-	-	-	-	-
Jajpur	15	125350	530912	141826	1354054	-	1101934	472018	3726094	36430036
Kendujhar	4	700	-	200	-	-	-	-	900	3892

** Only labour reported*

Table – 6 : Production of Chromite, 2015-16 and 2016-17
(By Frequency Groups)

(Qty in tonnes)

Production group	No. of mines		Production for the group		Percentage in total production		Cumulative percentage	
	2015-16	2016-17 (P)	2015-16	2016-17 (P)	2015-16	2016-17 (P)	2015-16	2016-17 (P)
Total	**25**	**25**	**2915584**	**3727777**	**100.00**	**100.00**	**-**	**-**
Up to 10000	13	13	1898	1683	0.07	0.04	0.07	0.04
10001- 100000	5	3	332418	213506	11.40	5.73	11.47	5.77
100001 - 200000	3	5	340285	750008	11.67	20.12	23.14	25.89
200001 - 300000	1	-	273599	-	9.38	-	32.52	25.89
300001 and above	3	4	1967384	2762580	67.48	74.11	100.00	100.00

Table – 7 : Mine-head Closing Stocks of Chromite, 2015-16
(By States/Grades)

(In tonnes)

State	Stocks by Grades: Cr_2O_3 Content						Concentrates	Total Quantity
	Below 40%		40-52%		52% and above			
	Lumps	Fines	Lumps	Fines	Lumps	Fines		
India	**71816**	**1672474**	**11135**	**398711**	**617**	**249701**	**155600**	**2560054**
Karnataka	20212	-	-	-	-	-	-	20212
Maharashtra	189	-	-	-	-	-	-	189
Odisha	51415	1672474	11135	398711	617	249701	155600	2539653

Table – 8 : Mine-head Closing Stocks of Chromite, 2016-17 (P)
(By States/Grades)

(In tonnes)

State	Stocks by Grades: Cr_2O_3 Content						Concentrates	Total Quantity
	Below 40%		40-52 %		52% and above			
	Lumps	Fines	Lumps	Fines	Lumps	Fines		
India	**45397**	**1563637**	**15824**	**535100**	**617**	**406447**	**127423**	**2694445**
Karnataka	20691	303	-	-	-	-	-	20994
Maharashtra	190	-	-	-	-	-	-	190
Odisha	24516	1563334	15824	535100	617	406447	127423	2673261

MINING & TRANSPORT

At present, mining operations for chromite are restricted in the Sukinda ultramafic belt, in the Baula Nausahi chromite belt in Odisha, in Hassan district of Karnataka and minor quantity is also produced in Maharashtra. The method of exploitation of chromite in the areas includes both opencast and underground mining. Chromite outcrops generally are under overburden cover of 3 to 9 m. The overburden is generally soft, consists of aluminous laterite, murrum and laterite except in areas near the base of the Mahagiri Hill. The ore extracted from Kathpal mine and from all the mines in the Baula Nausahi belt is hard and massive. In all other mines, the ore occurs as friable and powdery.

The excavation of overburden in opencast mines is done by digging with shovels.The overburden generated is then loaded and transported by trucks & dumpers of 10 & 35 tonnes capacity, respectively. In the case of hard overburden of hard murrum or laterite or serpentinised quartzite etc. drilling and blasting procedures are commonly utilised. Drilling is done by jack hammer and blasting with appropriate quantity of explosives to loosen the hard formations which enable removal of overburden. The ores are subsequently excavated, sorted and stacked. In manual mines, ore is extracted manually by using pick axe.

South Kaliapani is the main chrome ore mine of Odisha Mining Corp. Ltd. In South Kaliapani mine nominal blasting is done to loosen the ore which is then transported to stack yard and sorted manually. The ores for dissemination are transported and stacked separately.

Underground mining is practised in four chromite mines viz. , Kathpal mine of M/s FACOR, Nausahi mine of M/s IMFA, Bangur chrome ore mine of Odisha Mining Corp. Ltd and Baula mine of M/s FACOR. The Kathpal chromite mine of M/s FACOR and Mahagiri mine of M/s IMFA are both underground and opencast. Maheswari lode is mined by underground method of mining whereas Balaji lode is mined by opencast method.

ENVIRONMENTAL PROBLEMS

The major problems associated with chromite mining are the pollution and degradation caused to the environment. The hexavalent chromium, especially in friable ore is the major cause of concern as it is carcinogenic in nature. The hexavalent chromium contamination of water bodies is a major issue that requires concerted attention.Viable treatment methods of pumped water, especially with ferrous sulphate solution, before it being discharged must be rigorously implemented as remedial measure. Ferrous sulphate solution converts the hexavalent into trivalent form which is non-carcinogenic. Incidentally, Mining Research Cell, Indian Bureau of Mines, during 2008-09 undertook a study for attenuation of hexavalent chromium in Sukinda chromite belt by bio-remediation technology which is apparently environment-friendly. This study was a S & T Project undertaken in association with the Utkal University. Air pollution by dumping is another major factor that leads to environmental degradation particularly during dry season.

Chromium contamination of air also comes from emissions of coal-based power plants and industrial chimneys of iron & steel and ferro chrome industries, from spray paintings, chrome baths, refractory industries and mining of chromite and magnesite. In rural areas, chromium in atmosphere rarely exceeds 1mg/cu m of air, but in towns with major iron & steel industries the levels may be 1000 times more.

The inhalation of chromium compounds has been associated with the development of cancer in workers in the Chromite Industry. The relative risk for developing lung cancer has been calculated to be as much as 30 times. There is also evidence for an increased risk of developing nasal, pharyngeal, and gastrointestinal carcinomas. Quantitative epidemiological data were obtained by Mancuso and Hueper (1951), who observed increased occurrence of deaths (18.2%; $p<0.01$) from respiratory cancer among chromite workers as compared with 1.2% deaths where controls were at place. In a follow-up study conducted when more than 50% of the cohort died, the observed incidence for lung cancer deaths had increased to approximately 60%.

CONSUMPTION

The consumption of chromite in the organised sector decreased by about 12% from 24,47,800 tonnes in 2015-16 to 21,61,400 tonnes in 2016-17. Almost the entire consumption (97%) was by Ferro alloys/Charge chrome Industry. In addition to above, chromite in substantial quantities is also consumed by small-scale ferrochrome units, information for which is scarce. Besides, nominal consumption is reported by Refractory Industry and a negligible amount by others. Data on consumption of chromite and ferrochrome from 2014-15 to 2016-17 are furnished in Tables- 9 & 10.

USES

In metallurgy, chromite is mainly used in the manufacture of ferrochrome, silicochrome, charge chrome and chromium metal. Chromium imparts additional strength, hardness and toughness to its alloys. It also shows resistance to corrosion & prevents steel abrasion, reduces oxidation and flow of electricity. Stainless steel, high-speed tool steel and corrosion & heat-resistant steel are some of the important varieties of chromium steel.

Table – 9 : Consumption* of Chromite 2014-15 to 2016-17 (By Industries)

(In tonnes)

Industry	2014-15	2015-16 (R)	2016-17 (P)
All Industries	**2058200**	**2447800**	**2161400**
Chemical	7800	9700	5500
Concentrates (Chrome ore/ chromite)	33600	43000	47500
Ferro-alloys (including charge-chrome)	1996100	2374300	2103000
Refractory (including iron & steel)	20000	20100	4700
Others (foundry, ceramic, glass)	700	700	700

Figures rounded off.
** Includes actual reported consumption and/or estimates made wherever required. Coverage may not be complete due to paucity of data.*
Whereas, the apparent consumption for chromite was 3,651,472 tonnes.

Table – 10 : Consumption* of Ferro chrome, 2014-15 to 2016-17 (By Industries)

(In tonnes)

Industry	2014-15	2015-16(R)	2016-17 (P)
All Industries	**275600**	**290200**	**15900**
Alloy Steel	16300	30400	13600
Iron & Steel	258800	259200	2200
Others (Electrode Foundry)	500	600	100

Figures rounded off.
** Includes actual reported consumption and/or estimates made wherever required. Coverage may not be complete due to paucity of data.*
Apparent consumption of ferro-chrome is around 3,10,679 tonnes during 2016-17.

Ferro-chrome is of two types: (i) high carbon (containing 4-8% carbon) and (ii) low carbon (containing up to 2% carbon). The amount of chromium used in steel varies with the purpose. Low chromium steels (less than 5% chromium and small amount of nickel) are used in rails, automobiles, armour plates, armour piercing projectiles, etc. Intermediate chromium steels (3-12% Cr and small amounts of W, Mo or Si) are used in high-speed tools, valves for engines and other equipment requiring resistance to abrasion, corrosion and oxidation. Chromium steels include stainless steel (12-18% Cr) and super-stainless steel (12-30% Cr and 7-10% Ni) which are used for cutlery and cooking utensils, in aircraft & high-speed trains, respectively. Chromium (17%) along with iron (83%) is also used as ferritic stainless steel to manufacture coins.

Chromite is used in Refractory Industry because of its high chemical stability, its high temperature resistance and corrosion resistant properties. Further, its high melting point, ability to withstand sudden temperature changes, its chemically neutral character, moderate thermal expansion and mechanical strength besides abundant availability and reasonable price are added advantages for use in Refractory Industry.

Chromite is used for manufacturing important chromium compounds like chromates and bichromates of sodium and potassium, chromium pigments like chromic oxide green and chromic acid, which in turn, are used in chromium-plating solution.

Chromium is an essential trace element for human health. However, some of its compounds are highly toxic and carcinogenic. Environment concerns have reduced the use of chromite refractories and chromium chemicals.

SUBSTITUTES

Development of substitutes for chromium tends to be deterred by cost performance or the customer appeal for chromium. There are no substitutes for chromium in stainless steel or superalloys. Boron, manganese, nickel and molybdenum can be substituted in alloy steels and cast irons. Base metal alloys can sometimes be used in place of stainless steel. Dolomite is an alternative for some refractory bricks. Cadmium yellow is one of the several alternative pigments. However, it is not environmentally acceptable and nickel and zinc are possible substitutes for the protection of decorative coatings.

SPECIFICATIONS

The specifications of chromite vary for different end-use industries. The Cr:Fe ratio is one of the important factors to be considered before deciding the end-use of the mineral. The IS specifications for metallurgical, refractory, chemical and foundry industries are detailed in Tables -11 to 14.

Table – 11 : IS Specifications of Chromite for Metallurgical Industry (IS : 10818-1984) (Reaffirmed in Jan. 2014)

Sl No.	Characteristic (on dry basis)	Grade (%)			
		Low carbon ferrochrome	High carbon ferrochrome	Silicochrome	Charge chrome
1.	Cr_2O_3 percent, min.	48	48	48	44
2.	Total iron percent, max. (as FeO)	15	16	15	18
3.	Al_2O_3 percent	13	13	13	10
4.	SiO_2 percent, max.	5	8	10	12
5.	CaO percent, max.	5	5	5	5
6.	MgO percent, max.	14	16	14	12
7.	Sulphur* (as SO_3) percent, max.	0.1	0.1	0.1	0.14
8.	Phosphorus* (as P_2O_5) percent, max.	0.005	0.02	0.02	0.2
9.	Cr:Fe, min.	3:1	2.8:1	3:1	1.6:2
10.	MgO:Al_2O_3 (range)	–	1.2:1.4	–	–

* *Sulphur* (as SO_3) *and phosphorus* (as P_2O_5) *may be determined as agreed upon by the supplier and the purchaser.*

Table – 12 : IS Specifications of Chromite for Refractory Industry(IS : 10819-1999) (First Revision Oct. 2011)

a) Chemical

Sl No.	Characteristic (on dry basis)	Grade - I (percent by mass)	Grade - II (percent by mass)	Grade - III (percent by mass)
1.	Loss on ignition	1.5 max.	1.5 max.	1.5 max.
2.	Cr_2O_3	52 min.	50 min.	48 min.
3.	Total iron (as FeO)	16 max.	18 max.	18 max.
4.	SiO_2	3 max.	7 max.	9 max.
5.	MgO	15 max.	15 max.	15 max.

b) Physical

All the refractory grades of chromite are hard, massive, fine-grained, serpentine-free lumpy ores and in the size range -50 mm to + 50 mm.

Table - 13: IS Specifications of Chromite for Chemical Industry (IS : 4737-1982) (First Revision, Reaffirmed 2011)

Sl No.	Characteristic (on dry basis)	Requirement (%)
1.	Chromic oxide (as Cr_2O_3), percent by mass, min.	44.0
2.	Total iron (as FeO), percent by mass, max.	20.0
3.	Alumina (as Al_2O_3), percent by mass, max.	14.0
4.	Silica (as SiO_2), percent by mass, max.	7.0
5.	Lime (as CaO), percent by mass, max.	3.0
6.	Magnesia (MgO), percent by mass, max.	14.0

Table – 14 : IS Specifications of Chromite Sand for Foundries (IS : 6788-1973) (Reaffirmed Feb. 2014)

a) Chemical

Sl No.	Constituent (on dry basis)	Requirement (%)
1.	Cr_2O_3	44 min.
2.	Fe_2O_3	26 max.
3.	SiO_2	4 max.
4.	CaO	0.5 max.
5.	MgO	As agreed
6.	Clay	0.75 max.
7.	LOI	1.0 max.
8.	Moisture	0.5 max.
9.	pH value	Between 7.0 and 9.0

b) Physical

The material shall be of two grades, namely, fine and coarse. The shape of grains should be mostly sub-angular and the fusion point should not be below 1800^0C. The fineness of the two grades of chromite sand shall conform to the following requirement :

I.S. Sieve	Fraction Retained on	
	Fine Grade (F) (%)	Coarse Grade (C) (%)
710 micron	–	5 max.
500 micron	–	10 max.
355 micron	–	10-25
250 micron	3 max.	10-25
212 micron	18 max.	10-20
150 micron		10-20
106 micron	70 min.	7-20
75 micron		12 max.
Pan	12 max.	6 max.

INDUSTRY

Chromite is mainly used in Metallurgical Industry for manufacture of ferro-alloys, e.g., ferro chrome, charge chrome and silico-chrome which are used as additives in making stainless steel and special alloy steel. Ferro-alloys are the essential ingredients for the production of high quality special alloy steel as well as mild steel. The demand for ferro-alloys is associated with the production of alloy steel.

Production of ferro chrome/chargechrome was mainly reported by Ferro Alloys Corp. Ltd, Shri Vasavi Industries Ltd, Balasore Industries Ltd, Tata Steel Ltd, Indian Metals & ferro-Alloys Ltd and Indian Charge-chrome Ltd (merged with Indian Metals & Ferro alloys Ltd in 2006) were amongst the major producers of charge chrome in India. Charge chrome contains 50 to 60% chromium and 6 to 8% carbon. Hard lumpy chromite is used for high carbon ferro-chrome while friable ores and fine briquettes are used for low carbon ferrochrome. Briquette fines along with lumpy ores were also consumed in charge chrome plants.

The important plants which produce chromite based refractories are Tata Steel Ltd (formerly OMC Alloys), Orissa Industries Ltd, Bhilai Refractories Ltd, Burn Standard Co. Ltd, Joglekar Refractories and Ceramics (P) Ltd and Associated Ceramics Ltd.

Ferrochrome when added to steel imparts hardness, strength and augments its stainless characteristics. Carbon content classifies the ferrochrome alloy into high carbon (6-8%), medium carbon (3-4%) and low carbon (1.5-3%), although chromium content in all the three grades is around 60-70 percent. Around 2.5 tonnes chrome ore with an estimated power consumption of 4,500 kWh is required to produce one tonne of ferrochrome.

Ferro Alloys Corpn. Ltd, Garividi, Andhra Pradesh; GMR Technologies & Ind. Ltd, Srikakulam, Andhra Pradesh; Jindal Steel & Power Ltd, Raigarh, Chhattisgarh; Standard Chrome Ltd, Raigarh, Chhattisgarh; SAL Steel, Kachchh-Bhuj, Gujarat; Balasore Alloys Ltd, Balasore, Odisha; IDCOL Ferro Chrome Plant, Jajpur Road, Odisha; Indian Metals & Ferro Alloys Ltd, Theruballi, Odisha; Jindal Stainless Ltd, Duburi, Odisha; Nava Bharat Ferro Alloys Ltd, Dhenkanal, Odisha; Rawat Ferro Alloys, Cuttack, Odisha; Rohit Ferro Tech. P. Ltd, Bishnupur, West Bengal; and Sri Vasavi Ind. Ltd, Bishnupur, West Bengal are the major ferrochrome producers in the country. A sizeable quantity of ferrochrome is also produced by units in the Small-scale Sector.

In February 2017, Greenfield Ferro-chrome plant of 55,000 TPA capacity at Gopalpur of M/s Tata Steel Ltd commenced production. Chromite mine at Sukinda became the first unit to obtain Integrated Management System (IMS) certification (ISO 9001:2015, ISO 14001:2015 and OHSAS 18001:2007). Tata Steel Ltd, FACOR and Indian Metals & Ferro Alloys Ltd (IMFA), the three major producers of chargechrome in the country are 100% export-oriented, having a total capacity of 1,82,500 tpy. Tata Steel with its chargechrome plant at Bamnipal, Odisha has a capacity of 55,000 tpy, while FACOR has a capacity of 65,000 tpy chargechrome at its Randia Plant, Bhadrak district, Odisha. Indian Metals & Ferro Alloys Ltd, (IMFA), Cuttack district, Odisha has an installed capacity of 62,500 tpy.

As per Annual Report 2015-16 of M/s Tata Steel Ltd, the construction of the first phase of the ferro-chrome plant of 55,000 TPA in Gopalpur is in full swing and is expected to be commissioned in 2017-18.

An agreement has been executed between Odisha Mining Corp. Ltd (OMC) and M/s MBE-LMT (Formerly HWIPL) on 30-10-2009 for a new standalone chrome ore beneficiation plant of feed capacity 1.5 lakh TPA at South Kaliapani to upgrade low grade chrome ore to high grade. Vishnu Chemicals Ltd has plants at Medak, Visakhapatnam (Andhra Pradesh) and Bhilai (Chhattisgarh) which produces chromium products, such as, sodium dichromate (70,000 tpy), basic chromium sulphate, chromic acid (1,000 t) and Potassium Dichromate (1,000 t). There were two producers of chromium chemicals in small quantities in the organised sector, namely, Tamil Nadu Chromates and Chemicals Ltd and Krebs & Cie (India) Pvt. Ltd, Kolkata.

Commercially, chrome ore can be divided into three categories: (i) high-grade, containing >48% chromite, (ii) medium-grade with > 40% chromite and (iii) low-grade containing less than 40% chromite. Chromite with less than 40% is not exported under present trade policy.

Chromium metal and the alloy ferrochromium are commercially produced from chromite by silicothermic or aluminothermic reactions, or by roasting and leaching processes. Chromium metal assumes high value due to its properties, such as, high corrosion resistance and imparting of hardness.

The discovery that steel could be made highly resistant to corrosion and discolouration by adding metallic chromium to form stainless steel led to major developments in the Steel Sector. This application, along with chrome plating (electroplating with chromium) are currently the major commercial use for the element. The element also finds application in the production of chromium compounds, albeit to a minor extent.

The strengthening effect of forming stable metal carbides at the grain boundaries and the strong increase in corrosion resistance has made chromium an important alloying material for steel. The high-speed tool steels contain between 3 and 5% chromium. Stainless steel, the main corrosion-proof metal alloy is formed when chromium is added to iron in sufficient concentrations usually above 11%.

User's specifications of chromite in Major Consuming Industries are furnished in Table-15.

Table – 15 : User's Specifications of Chromite in Major Consuming Industries

Industry/Name and location of plant	Specifications of ore consumed
FERROCHROME/CHARGE CHROME	
Andhra Pradesh/Telangana	
Andhra Ferro Alloys Ltd, Kothavalasa, Distt. Vizianagaram.	N.A.
Cronimet Alloys India Ltd, Ravivalasa Distt. Srikakulam.	Lumps : Cr_2O_3 40% to 50% Fines : Cr_2O_3 40% to 52% Concentrates : Cr_2O_3-40%
Ferro-Alloys Corp. Ltd, Shreeram Nagar, Distt. Vizianagaram.	Lumps : Cr_2O_3 38% to 40% Fines : Cr_2O_3 38% to 40% Friable : Cr_2O_3 48% to 50% Concentrates : Cr_2O_3 48% to 50%
JSL Ltd, (formerly Jindal Stainless Steel Ltd,) Jindal Nagar, Distt. Vizianagaram.	Lumps : Cr_2O_3 38% Cr:Fe : 2 : 9
Metkore Alloys & Industries Ltd, Ravivalasa, Distt. Srikakulam.	N.A.
Nav Bharat Ventures Ltd, Paloncha, Distt. Khammam.	Lumps: Cr_2O_3 28-42% Fines: Cr_2O_3 48-50%, 52-54%
GMR Technologies & Industries Ltd, Ravivalasa, Distt. Srikakulam.	Lumps: Cr_2O_3 38-45% Fines: Cr_2O_3 45-55 %
VBC Ferro Alloys Ltd, Rudragram, Distt. Medak, Telangana.	Lumps: Cr_2O_3 36-52%
Chhattisgarh	
Jindal Steel & Power Ltd, Raigarh.	Lumps : Cr_2O_3+38% Cr:Fe : 2 : 9 Fines : Cr_2O_3+52%, Cr:Fe : 2:6
Deepak Ferro Alloys Ltd, Urla, Distt. Raipur.	Lumps : Cr_2O_3 36-40% Fines : Cr_2O_3 48-52%
Gujarat	
S.A.L. Steel Ltd, Bharapur, Gandhidham..	N.A.
Jammu & Kashmir	
Shree Sitaram Industries Pvt. Ltd Distt. Samba.	Lumps : $Cr_2O_3$40% to 52% Fines : $Cr_2O_3$40% to +52%,
Tawi Chemicals Industries Distt. Samba.	N.A.
Odisha	
Balasore Alloys Ltd, (formerly Ispat Alloys Ltd,) Balgopalpur, Distt. Balasore.	Lumps : Cr_2O_3 -40% Fines : Cr_2O_3 -40 to +52%
Ferro Alloys Corp. Ltd, Charge Chrome Division, Randia, Distt. Bhadrak.	Lumps : Cr_2O_3 N.A.; Friable : Cr_2O_3 40% & above; Concentrates : N.A.
IDCOL Ferro Chrome & Alloys Ltd, Jajpur Road, Distt. Cuttack.	Cr_2O_3 : 42-52% SiO_2 6% max.
Indian Metals & Ferro Alloys Ltd, (Formerly, Indian Charge Chrome Ltd) Choudwar, Distt. Cuttack.	Lumps: Cr_2O_3 : -40 to >52% SiO_2 : 15% max. Fines: 40 to 50% & above
Indian Metals & Ferro Alloys Ltd, Therubali, Distt. Raygada	Lumps: Cr_2O_3 : -40 & 40 to 52% Fines: Cr_2O_3 : -40 & 40 to >52% Concentrates: N.A.
Rohit Ferro Tech. Ltd, (Unit 2) Duburi, Distt. Jajpur.	Lumps, fines & concentrates

(Contd.)

Table - 16 (Concld.)

Industry/Name and location of plant	Specifications of ore consumed
Tata Steel Ltd, (Formerly OMC Alloys Ltd) Bamnipal, Distt. Keonjhar.	Cr_2O_3 : 47% min. Size : 0-40 mm
West Bengal	
Rohit Ferro Tech Ltd, (Unit 1) Bishnupur, Distt. Bankura.	Lumps, fines & concentrates
Shri Vasavi Industries Ltd, Distt. Bankura.	N.A.
REFRACTORY	
Chhattisgarh	
SAIL Refractories Unit, Marauda, Distt. Durg.	Friable lumps : Cr_2O_3 : 52-54% min. SiO_2 : 5% max.
Vishva Vishal Engineering Ltd, Bhilai, Durg.	Cr_2O_3 : 50%, SiO_2 : 4.5% max. Fe_2O_3 : 8%
Maharashtra	
Joglekar Refractories & Ceramics (P) Ltd, Rabale, Distt. Thane.	Lumps Cr_2O_3 44% min. CaO < 2%, Fe_2O_3 < 21% Imported sand - 30 to +85 mesh, Cr_2O_3 45% min. SiO_2 < 1%, Fe_2O_3 < 27%
Odisha	
Aarti Steels Ltd, Plot No. 18/1B, Sector-10, CDA, Cuttack-753 014.	N.A.
Balasore Alloys Ltd, Balgopalpur, Balasore	N.A.
Orissa Industries Ltd, Lathikata Works, Distt. Sundargarh.	Cr_2O_3 : 52-54% Fe_2O_3 : 15-18% max. SiO_2 : 3-5%
IFGL Refractories Ltd, Kalunga, Distt. Sundargarh.	Cr_2O_3 : 55% min. -16 to +22 mesh
Maruti Monolithics (Pvt) Ltd, Choudwar, Distt. Cuttack.	N.A.
TRL Krosaki Refractories Ltd, Belpahar Distt. Jharsududa.	Cr_2O_3 : 48-50% min.
Shree Chem Industries (Pvt) Ltd, Mandiyakudar, Distt. Sundargarh.	Cr_2O_3 : 54% SiO_2 : 5-9% min.
Kalinga Ferro Ispat Pvt Ltd, Mandia, Distt. Jajpur	Fines Cr_2O_3 : 40-52% & 52% & above,
Khemka Refractories Pvt. Ltd, Kamakhyanagar - 759 018, Distt. Dhenkanal.	Cr_2O_3 : 52% min., Fines
Larsen & Toubro Ltd, Kansbahal - 770 034, Distt. Sundergarh.	N. A.
T. S. Alloys Ltd, Anantpur, Distt. Cuttack.	N.A.
Tamil Nadu	
Burn Standard Co. Ltd, Salem.	Cr_2O_3 : 52-54% min., SiO_2 : 3-5% max. Fe_2O_3 : 15-18% max.
C. Nataraj Ceramics & Chem. Industry Dalmiapuram, Distt. Tiruchirapalli.	Lumps, Cr_2O_3 + 44%. Fe_2O_3 -25%
West Bengal	
National Refractories, P.O. Salampur - 713 357, Distt. Burdwan	Cr_2O_3 : 52% min., above fines
CHEMICALS	
Odisha	
Krebs & Cei (India) Ltd, Kalma, Distt. Mayurbhanj.	Cr_2O_3 : 48-55%

TRADE POLICY

The Ministry of Commerce and Industry, Department of Commerce had come out with the new Foreign Trade Policy (FTP) for the period 2015-2020. As per the present Export-Import Policy, the imports of chromium ore lumps, friable ores and concentrates are freely allowed. The export policy on chromite is stated as follows:

Tariff Item HS Code		Item	Export Policy	Nature of Restriction
26100000	(a)	Chrome ore other than (i) beneficiated chrome ore fines/concentrates (maximum feed grade to be less than 42% Cr_2O_3); and (ii) those categories of chrome ores mentioned as permitted through STEs (State Trading Enterprises)	Restricted	Exports permitted under licence other than categories given below
26100030 26100040	(b)	Beneficiated chrome ore fines/concentrates (maximum feed grade to be less than 42% Cr_2O_3)	STE	Export through MMTC Ltd
26100030	(c)	Chrome ore lumps with Cr_2O_3 not exceeding 40%	STE	Export through MMTC Ltd
26100090	(d)	Low silica friable/fine ore with Cr_2O_3 not exceeding 52% and silica exceeding 4%	STE	Export through MMTC Ltd
26100090	(e)	Low silica friable/fine chromite ore with Cr_2O_3 in the range from 52 to 54% and silica exceeding 4%	STE	Export through MMTC Ltd

WORLD REVIEW

World resources of shipping-grade chromite are about 5.1 billion tonnes in terms of chromium metal content. Countries that possess sizeable quantities of resources are Kazakhstan (45%) and South Africa (39%). These two countries together hold about 84% of world's chromium resources. Whereas, India possesses 11% of world resources of chromite. The available data on world reserves of chromite (shipping grade) is shown in Table-16.

Table – 16 : World Reserves of Chromite (Shipping Grade) (By Principal Countries)

(In '000 tonnes of chromium content)

Country	Reserves
World: Total (rounded off)	**5,10,000**
India	54,000
Kazakhstan	2,30,000
South Africa	2,00,000
Turkey	26,000
USA	620
Other countries	NA

Source: *Mineral Commodity Summaries, 2018.*
Shipping grade - Deposit quantity and grade normalised to 45% Cr_2O_3.

South Africa is by far the largest producer of chromite ore and concentrates followed by Turkey, Kazakhstan and India. Finland, Brazil and Albania are other important producers. In Europe, Finland and Albania are the major producing countries.

The world production of chromite ores and conc. was 35 million tonnes in 2016 same as during the previous year. South Africa was the leading producer, contributing about 42% to the total world production, followed by Turkey (19%), Kazakhstan (16%), and India (11%). Other significant producers were Finland, Brazil and Albania (Table-17).

Upgradation of technology and advancement in beneficiation processes, such as, agglomeration of ore, pre-heating and pre-reduction of furnace feed, closed-furnace technology and recovery of chromium from slags have brought about significant changes and are now followed worldwide.

Table – 17 : World Mine Production of Chromium Ores and Concentrates (By Principal Countries)

(In '000 tonnes)

Country	2014	2015	2016
World: Total (rounded off)	**33100**	**34800**	**34800**
Albania	684	640	713
Brazil	717	700e	700e
Finland a	1035	946	1070
India	2164	2916	3728
Iran	359	277	275e
Kazakhstan	5411	5383	5546
Oman	751	443	451
Pakistane	350	330	230
Russia	380	503	503e
South Africa	14038	15684	14705
Turkey	6611	6600e	6600e
Zimbabwe	408	208	112
Other countries	202	144	137

Source: *World Mineral Production, 2012-16.*
e:- Estimated
a:- Concentrates

FOREIGN TRADE

Exports

Exports of chromite increased sharply to 230 thousand tonnes in 2016-17 from 72 thousand tonnes in the previous year. Out of total chromite exported in 2016-17, the share of about 65% was of chromite concentrate, while chromite ore (others) accounted for 35%. There were no export of chrome ore lumps in 2016-17. Exports were mainly to China (93%) and Japan (7%). In 2016-17, 80 tonnes of chromium & alloys (scrap) were exported registering increase of 38% from that of the preceding year. Exports of chromium & Alloys (scrap) were mainly to USA (47%), Italy (30%), Peru (11%) and Brazil (5%)(Tables-18 to 25).

The exports details of ferro chrome are furnished in the Review entitled, 'Ferro-alloys'.

Table – 18 : Exports of Chromite : Total (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**71839**	**1314085**	**230531**	**3657700**
China	57696	1024967	213373	3320174
Japan	14128	288683	17158	337519
Australia	-	-	++	7
South Africa	10	228	-	-
Egypt	5	193	-	-
Chile	++	14	-	-

Table – 19 : Exports of Chrome Ore Lumps (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**++**	**14**	-	-
Chile	++	14	-	-

Table – 20 : Exports of Chrome Ore Concentrates (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**69972**	**1287852**	**149029**	**2566395**
China	55844	999169	131871	2228876
Japan	14128	288683	17158	337519

Table – 21 : Exports of Chrome Ore (Others) (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**1867**	**26219**	**81502**	**1091305**
China	1852	25798	81502	1091298
Australia	-	-	++	7
South Africa	10	228	-	-
Egypt	5	193	-	-

Table – 22 : Exports of Chromium & Alloys (Scrap) (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**58**	**50866**	**80**	**63279**
USA	-	-	38	22282
Italy	20	19860	24	22219
Peru	5	4659	9	8012
Brazil	5	5749	4	4589
Netherlands	-	-	++	2787
Indonesia	4	2757	2	1171
Egypt	1	372	1	668
Pakistan	1	411	1	619
Kenya	1	510	++	208
Chile	++	78	++	182
Other countries	21	16470	1	542

Table – 23 : Exports of Chromium Articles, Nes (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**++**	**13**	**++**	**243**
UAE	-	-	++	86
Germany	-	-	++	78
Philippines	-	-	++	66
Singapore	-	-	++	11
Sri Lanka	++	13	++	2

Table – 24 : Exports of Chromium & Scrap (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**++**	**9**	**++**	**1**
UAE	-	-	++	1
Vietnam	++	9	-	-

Table – 25 : Exports of Chromium Unwrought : Powder (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**58**	**50844**	**80**	**63035**
USA	-	-	38	22282
Italy	20	19860	24	22219
Peru	5	4659	9	8012
Brazil	5	5749	4	4589
Netherlands	-	-	++	2787
Indonesia	4	2757	2	1171
Egypt	1	372	1	668
Pakistan	1	411	1	619
Kenya	1	510	++	208
Chile	++	78	++	182
Other countries	21	16448	1	298

Imports

Imports of chromite decreased sharply to 154 thousand tonnes in 2016-17 from 188 thousand tonnes in the previous year. Out of total quantity of chromite imported in 2016-17, lumpy chromite accounted for 67%, while concentrate and other forms accounted for the remaining 33%. Imports were mainly from South Africa (53%) and Oman (31%). Imports of chrome ore conc. were mainly from South Africa (50%) and Zimbawe (32%). Imports of chromium and alloys in 2016-17 were 982 tonnes as compared to 840 tonnes in the previous year. Imports were mainly from Russia (76%), UK (12%) and France (8%). Imports of chromium and scrap sharply decreased to negligible in 2016-17 from 7 tonnes in 2015-16 (Tables-26 to 33).

The import details of ferrochrome are furnished in the Review entitled 'Ferro-alloys'.

Table – 26 : Imports of Chromite : Total (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**187663**	**2266406**	**154226**	**2105121**
South Africa	140116	1787926	82167	1405005
Oman	31946	260243	48489	380830
Pakistan	7859	105131	6605	100102
Madagascar	3185	42451	7503	89185
Zimbabwe	-	-	4492	62208
Turkey	934	10166	2354	25283
Netherlands	786	24030	817	23968
Iran	519	5389	1721	16901
UK	-	-	72	1498
China	-	-	5	92
Other countries	2318	31070	1	49

Table – 27 : Imports of Chrome Lump (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**153487**	**1714028**	**103098**	**1416556**
South Africa	110278	1312822	65549	1098112
Oman	31946	260243	30071	213118
Pakistan	7659	97749	5537	85580
Madagascar	-	-	973	11101
Iran	519	5389	963	8553
China	-	-	5	92
Albania	2151	27659	-	-
Turkey	934	10166	-	-

Table – 28 : Imports of Chrome Ore Concentrate (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**11195**	**206037**	**11066**	**167943**
South Africa	11087	203841	5488	94114
Zimbabwe	-	-	3496	49802
Madagascar	-	-	1001	9825
Turkey	-	-	515	6982
Pakistan	-	-	494	5722
UK	-	-	72	1498
USA	108	2196	-	-

Table – 29 : Imports of Chrome Ore Others (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**22981**	**346341**	**40062**	**520622**
South Africa	18751	271263	11130	212779
Oman	-	-	18418	167712
Madagascar	3185	42451	5529	68259
Netherlands	786	24030	817	23968
Turkey	-	-	1839	18301
Zimbabwe	-	-	996	12406
Pakistan	200	7382	574	8800
Iran	-	-	758	8348
Germany	-	-	1	49
Ecuador	54	1108	-	-
Other countries	5	107	-	-

Table – 30 : Imports of Chromium & Alloys (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**840**	**540333**	**982**	**534573**
Russia	509	269784	744	358769
UK	139	91784	116	72090
France	35	20390	75	38911
USA	10	29224	7	27844
Germany	18	37610	1	10090
China	113	56904	20	9645
Japan	6	10164	3	5222
Netherlands	5	2731	10	4956
Korea, Rep. of	++	1482	5	3818
Singapore	5	19847	1	3181
Other countries	++	413	++	47

Table – 31 : Imports of Chromium Unwrought : Powders (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**760**	**440797**	**922**	**468960**
Russia	509	269784	744	358769
UK	106	61280	77	46212
France	5	2654	60	30110
USA	6	11481	6	11364
China	111	55119	16	6910
Japan	6	9825	3	5177
Netherlands	5	2731	10	4956
Singapore	++	745	1	2722
Korea, Rep. of	-	-	5	2714
Germany	12	27178	++	26

Table – 32 : Imports of Chromium Articles, Nes (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**73**	**77337**	**60**	**64528**
UK	33	29370	39	24955
USA	1	12156	1	16318
Germany	6	10432	1	10064
France	30	17736	15	8801
China	2	1785	4	2735
Korea, Rep. of	++	1482	++	1104
Singapore	1	3673	++	459
Japan	++	339	++	45
Switzerland	++	153	++	36
Czech Republic	-	-	++	11
Other countries	++	211	-	-

Table – 33: Imports of Chromium & Scrap (By Countries)

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**7**	**22199**	**++**	**1085**
UK	++	1134	++	923
USA	3	5587	++	162
Singapore	4	15429	-	-
Hong Kong	++	49	-	-

FUTURE OUTLOOK

The Report of the Working Group for 12th Plan Period, Planning Commission, (erstwhile) which is presently Niti Aayog, has estimated chromite production at about 7.37 million tonnes by 2016-17 at 8% growth rate. The apparent consumption is estimated at 4.35 million tonnes by 2016-17 at 8% growth rate. The Working Group had also made following recommendations: (i) Chromite resources are located to the extent of 90% in Odisha, predominantly in Sukinda Valley. The mines are going deeper and ore is becoming friable at lower levels. Exploration of deep-seated ore bodies needs to be carried out on an urgent basis. (ii) Exploration efforts also need to be intensified to identify more deposits of chromite in the country. Underground mining technology needs to be promoted. (iii) Suitable technology needs to be developed for beneficiation of low-grade, friable chromite ore (30% Cr_2O_3) fines which are available in sizeable quantity in India. (iv) Further restrictions on exports of chromite ore/ concentrates are desirable in view of the limited resources in India and the increasing demand of the Steel Industry (v) R & D is required for development of suitable technology for extraction of nickel from the chromite overburden from the Sukinda area of Odisha.

Besides, environmental concerns associated with Chromite Industry are too many which would attract considerable attention. Each and every anthropogenic activity that contributes hexavalent chromium to the environment should be regulated in such a manner so that the adverse impacts are contained within reasonable limits. For this, regular monitoring is highly essential by regulatory authorities to control the contamination caused by $Cr.^{+VI.}$

The current status of chromite production and consumption is on anticipated lines, but the consumption could increase alarmingly in the coming years and the country may have to depend on imports even for the domestic needs of chromite. Depletion of reserves is bound to create a serious problem for the future of the Chromite Industry in the country. An Expert Committee constituted by the Ministry of Steel, Government of India, in its recommendations put forth the need for detailed exploration of chromite in all the potential areas in Odisha, Karnataka and ophiolite belt of North-Eastern region with a view to prognosticate resources to a depth of 500 m in Sukinda belt and estimate resources in all other potential areas. Addressing concerns in ferrochrome production which is electrical energy intensive segment is also essential. Setting up of such plant must strike a cost balance between raw materials and electrical energy supply. There are other imminent issues that need redressal in respect of the continuous and unscrupulous exploitation of chromite.

In coming days, increase in royalty on domestically produced chromite from 10% to 15% by Government of India is also bound to have its impact on the Industry. It will see radical transformation in the efforts undertaken to meet the challenges. Adherence to stringent pollution control norms, innovations in the process technology and plant equipment design would become inevitable for the future of the industry.

As per the Annual Report 2016-17 of M/s Balasore Alloys Ltd, the demand for ferrochrome is driven primarily by the demand for stainless steel. Global stainless steel production growth is expected to average +2.6% per annum up to 2021, driven mainly by China (due to relative scarcity) and consequently the demand for virgin chrome units will continue to be robust.