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CHROMITE

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GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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6 Chromite

Chromite is the single commercially viable ore of chromium (Cr) which is chemically known as iron chromium oxide ($FeCr_2O_4$). 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 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 has been estimated at 344 million tonnes with 102 million tonnes as "Reserves" (30%) and 242 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%), Ferrochrome 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 covered in the Review on Exploration & Development under "General Reviews".

PRODUCTION AND STOCKS

The production of chromite was 3,971 thousand tonnes during 2018-19 which increased by 14% as compared to that in the previous year.

The number of reporting mines were 26 in 2018-19 as compared to 25 in the preceding year. The share of Public Sector in total production was 31% in 2018-19 as compared to 28% in the previous year. About 21% of the total production was reported from captive mines in the current year as compared to 26% in the previous year.

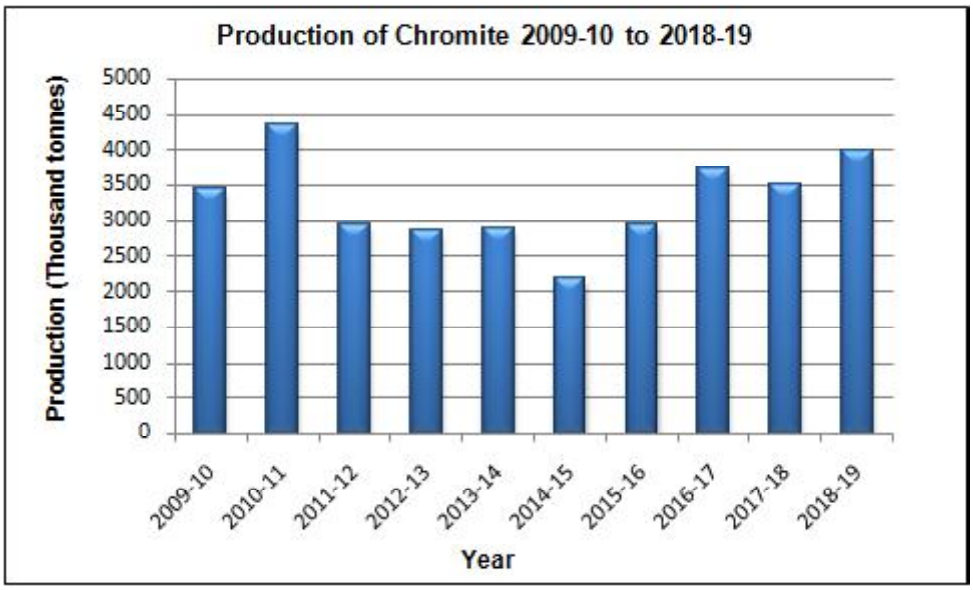

Table – 1 : Reserves/Resources of Chromite as on 1.4.2015
(By Grades/States)

(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
Ferrochrome	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

Odisha continued to be the major producing State for chromite, accounting for the entire production during 2018-19. Other States such as, Karnataka and Maharashtra reported nil production during 2018-19.

Gradewise analysis of production during 2018-19 reveals that about 43% of the total production of chromite was accounted for by 52% & above Cr_2O_3 fines grade followed by 31% of 40%-52% Cr_2O_3(lumps 3% & fines 28%) grade.

Mine-head closing stocks of chromite in 2018-19 were 2,253 thousand tonnes as compared to 2,270 thousand tonnes in 2017-18.

The average daily employment of labour in chromite mines during 2018-19 was 7,218 as against 7,234 in the previous year (Tables- 2 to 8).

Table – 2 : Principal Producers of Chromite, 2018-19

Name & address of producer	Location of mine	
	State	District
Tata Steel Ltd, Bombay House, 24, Homi Mody Street, Fort, Mumbai – 400 001, Maharashtra.	Odisha	Jajpur
The Odisha Mining Corporation Ltd, 'OMC House', Unit 5, Post Box No. 34, Bhubaneswar – 751 001, Odisha.	Odisha	Jajpur Keonjhar
Indian Metals & Ferro Alloys Ltd, IMFA Building, Bomikhal, Rasulgarh, Bhubaneswar – 751 010, Odisha.	Odisha	Jajpur, Keonjhar
Balasore Alloys Ltd, Balgopalpur, P.O. Rasalpur, Balasore - 756 020, Odisha.	Odisha	Jajpur
Misrilal Mines (P) Ltd, Mineral House, 27-A, CAMAC Street, Kolkata – 700 016, West Bengal.	Odisha	Jajpur

Table – 3 : Production of Chromite, 2016-17 to 2018-19
(By States)

(Qty in tonnes; Value in `'000)

State	2016-17		2017-18		2018-19 (P)	
	Qty	Value	Qty	Value	Qty	Value
India	**3727780**	**31937475**	**3480941**	**32037005**	**3970688**	**35836111**
Karnataka	785	3768	-	-	-	-
Maharashtra	1	5	17	82	-	-
Odisha	3726994	31933702	3480924	32036923	3970688	35836111

Table – 4 : Gradewise Production of Chromite, 2018-19 (P)
(By Sectors/States/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	**26**	**88156**	**709228**	**102754**	**1130556**	**-**	**1689042**	**250952**	**3970688**	**35836111**
Public sector	11	6460	177944	2919	408597	-	629977	11636	1237533	12866610
Private sector	15	81696	531284	99835	721959	-	1059065	239316	2733155	22969501
Karnataka	**3***	-	-	-	-	-	-	-	-	-
Hassan	3*	-	-	-	-	-	-	-	-	-
Maharashtra	**1***	-	-	-	-	-	-	-	-	-
Bhandara	1*	-	-	-	-	-	-	-	-	-
Odisha	**22**	**88156**	**709228**	**102754**	**1130556**	**-**	**1689042**	**250952**	**3970688**	**35836111**
Dhenkanal	4	-	3358	671	-	-	-	-	4029	14799
Jajpur	15	81696	703950	99164	1130556	-	1689042	250952	3955360	35739039
Kendujhar	3	6460	1920	2919	-	-	-	-	11299	82273

** Only labour reported.*

Table – 5 : Gradewise Production of Chromite, 2017-18
(By Sectors/States/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**	**86433**	**601127**	**145028**	**1185916**	**-**	**1046446**	**415991**	**3480941**	**32037005**
Public sector	10	4780	160064	2657	434381	-	359638	12895	974415	9502588
Private sector	15	81653	441063	142371	751535	-	686808	403096	2506526	22534417
Karnataka	**3***	-	-	-	-	-	-	-	-	-
Hassan	3	-	-	-	-	-	-	-	-	-
Maharashtra	**1**	**10**	-	**7**	-	-	-	-	**17**	**82**
Bhandara	1	10	-	7	-	-	-	-	17	82
Odisha	**21**	**86423**	**601127**	**145021**	**1185916**	**-**	**1046446**	**415991**	**3480924**	**32036923**
Dhenkanal	3	-	1128	1203	-	-	-	-	2331	14639
Jajpur	15	81643	599805	141161	1185916	-	1046446	415991	3470962	31973956
Kendujhar	3	4780	194	2657	-	-	-	-	7631	48328

** Only labour reported*

Table – 6 : Production of Chromite, 2017-18 and 2018-19 (By Frequency Groups)

(Qty in tonnes)

Production group	No. of mines		Production for the group		Percentage to total production		Cumulative percentage	
	2017-18	2018-19 (P)	2017-18	2018-19 (P)	2017-18	2018-19 (P)	2017-18	2018-19 (P)
Total	**25**	**26**	**3480940**	**3970688**	**100.00**	**100.00**	-	-
Up to 10000	13	14	9980	4029	0.29	0.10	0.29	0.10
10001- 100000	3	3	174174	109745	5.00	2.76	5.29	2.86
100001 - 200000	4	4	533503	596048	15.33	15.01	20.62	17.87
200001 - 300000	2	2	476319	457802	13.68	11.53	34.3	29.4
300001 and above	3	3	2286964	2803064	65.70	70.60	100.00	100.00

Table – 7 : Mine-head Closing Stocks of Chromite, 2018-19 (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	**42492**	**1551940**	**9805**	**249245**	**285**	**359765**	**39300**	**2252832**
Karnataka	20691	-	-	303	-	-	-	20994
Maharashtra	10	-	7	-	-	-	-	17
Odisha	21791	1551940	9798	248942	285	359765	39300	2231821

Table – 8 : Mine-head Closing Stocks of Chromite, 2017-18 (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	**56497**	**1498055**	**12456**	**336918**	**285**	**249233**	**116085**	**2269529**
Karnataka	20796	-	-	-	-	-	-	20796
Maharashtra	10	-	7	-	-	-	-	17
Odisha	35691	1498055	12449	336918	285	249233	116085	2248716

MINING & TRANSPORT

At present, mining operations for chromite are restricted in the Sukinda ultramafic belt, in the Baula Nausahi chromite belt in Odisha, 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, done with jack hammer, and blasting (with appropriate quantity of explosives) 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.

ENVIRONMENT

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 pumping 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 ferrochrome industries, from spray paintings, chrome baths, refractory industries and mining of chromite & 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%.

Protection of environment has become a major issue at present time. Mining Industry has a very poor pubic image as far as environmental damage is concerned. The major environmental impacts of mining are (i) deforestation (ii) land damage (iii) water pollution and hydrological damage (iv) air pollution (v) noise pollution (vi) ground vibration and fly rock problem (vii) visual impacts, etc.

Deforestation takes place at actual site of an opencast mines and also where mineral and over-burden dumps are created or where service buildings and roads are built. Land damage takes place in opencast mining while exposing the mineral and in underground mining due to surface subsidence. In addition, land damage also takes place due to siting of surface dump of mineral, overburden refuse tips and formation of tailing dams.

After enforcement of MCDR,1988 there was afforestation in mettalliferous mines in order to stabilise and reduce the impact of mining. IBM did play a major role in the restoration of mine environment. Plantation trees and other afforestation efforts to improve the environment were carried out regularly since 1989-90 and are still in practice.

CONSUMPTION

The consumption of chromite decreased substantially by about 25% to 19,19,600 tonnes in 2018-19 from 25,75,200 tonnes in 2017-18 . The most consuming industry was Ferroalloys/ Charge chrome Industry (93%). 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 from 2016-17 to 2018-19 and ferrochrome from 2015-16 to 2017-18 are furnished in Tables- 9 & 10.

Table – 9 : Estimated Consumption* of Chromite 2016-17 to 2018-19 (By Industries)

(In tonnes)

Industry	2016-17	2017-18 (R)	2018-19 (P)
All Industries	**2289500**	**2575200**	**1919600**
Chemical	5400	5000	5100
Concentrates (Chrome ore/ chromite)	66500	60700	112100
Ferroalloys (including Charge chrome)	2212700	2499200	1791100
Refractory (including iron & steel)	4100	9300	10200
Others (foundry, ceramic, calcination & glass)	800	1000	1100

Figures rounded off

** Includes actual reported consumption and/or estimates made wherever required. Coverage may not be complete Paucity of data.*

Table – 10 : Estimated* Consumption of Ferrochrome, 2015-16 to 2017-18 (By Industries)

(In tonnes)

Industry	2015-16	2016-17 (R)	2017-18 (P)
All Industries	**290200**	**15900**	**14600**
Alloy Steel	30400	13600	13600
Iron & Steel	259200	2200	900
Others (Electrode Foundry)	600	100	100

Figures rounded off

** Includes actual reported consumption and/or estimates made wherever required. Coverage may not be complete due to paucity of data.*

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.

Ferrochrome 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 BIS has specified IS:10818-1984 specifications of chromite for Metallurgical Industries. IS: 10819-1999 (First Revision Oct. 2011) for specifications of chromite for Refractory Industry, IS: 4737-1982 (First Revision, Reaffirmed 2011) for specification of chromite for Chemical Industry and IS : 6788: 1973 (Re-affirmed Feb.2014) for specification of chromite sand for Foundry Industry.

INDUSTRY

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

Production of ferrochrome/charge chrome 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 ferrochrome 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.

India is ranked fourth in global ferrochrome production. The production has been at 1.0 to 1.1 million tonnes over the past 4-5 years. India consumes 15-30% of its production and exports the rest to countries like China, South Korea and Japan. The domestic consumption of ferrochrome has not grown for two main reasons - a) except for the top three ferrochrome players - IMFA, Tata Steel and Balasore Alloys-others are in financial difficulties; b) Domestic Stainless Steel production which is

largely accounted for by the Jindal Stainless Group of late is under severe duress. The Indian Ferrochrome Industry is likely to get consolidated as capacities owned by Rohit Ferro Alloys and FACOR Alloys are to be auctioned through the National Company Law Tribunal (NCLT) shortly. Recently, NCLT released the results of bidding for FACOR's assets.

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 per cent. 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 & Industries 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 Industries 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.

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 charge chrome in the country are 100% export-oriented, having a total capacity of 1,82,500 tpy. Tata Steel with its charge chrome plant at Bamnipal, Odisha has a capacity of 55,000 tpy, while FACOR has a capacity of 65,000 tpy charge chrome at its Randia Plant, Bhadrak district, Odisha. Indian Metals & Ferro Alloys Ltd (IMFA), Cuttack district, Odisha has an installed capacity of 62,500 tpy.

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-11.

Table – 11 : 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,	Cr_2O_3 : 42-52%

(Contd)

Table-11 (Contd)

Industry/Name and location of plant	Specifications of ore consumed
Jajpur Road, Distt Cuttack	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 to 52% Fines: Cr_2O_3 : 40 to >52% Concentrates: N.A.
Rohit Ferro Tech. Ltd, (Unit 2) Duburi, Distt Jajpur	Lumps, fines & concentrates
Tata Steel Ltd, (Formerly OMC Alloys Ltd) Bamnipal, Distt Keonjhar	Cr_2O_3 : 47% min. Size : 0 to 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 to 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 to 54% Fe_2O_3 : 15 to 18% max. SiO_2 : 3 to 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 to 50% min.
Shree Chem Industries (Pvt) Ltd, Mandiyakudar, Distt Sundargarh	Cr_2O_3 : 54% SiO_2 : 5 to 9% min.
Kalinga Ferro Ispat Pvt Ltd, Mandia, Distt Jajpur	Fines Cr_2O_3 : 40-52% & above,

(Contd)

Table - 11 (Concld)

Industry/Name and location of plant	Specifications of ore consumed
Khemka Refractories Pvt. Ltd, Kamakhyanagar - 759 018, Distt Dhenkanal	Fines Cr_2O_3 : 52% min.
T. S. Alloys Ltd, Anantpur, Distt Cuttack	N.A.
Tamil Nadu	
Burn Standard Co. Ltd, Salem	Cr_2O_3 : 52 to 54% min., SiO_2 : 3 to 5% max. Fe_2O_3 : 15 to 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 to 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:

HS Code	Item	Export Policy
261000	Chromium ores and concentrates	Free
26100010	Chromium ore lumps, containing 47% Cr_2O_3 and above	Free
26100030	Chrome ore lumps with Cr_2O_3 not below 40%	Free
26100040	Chrome ore friable & concentrates fixes conatining 47% Cr_2O_3 and above	Free
26100090	Others	Free

WORLD REVIEW

World reserves of Shipping-grade chromite are about 570 million tonnes in terms of chromite ore. Countries that possess sizeable quantities of reserves are Kazakhstan (40%) and South Africa (35%). These two countries together hold about 75% of world's chromite reserves. India possesses 18% while USA accounts for 5% of the world reserves of chromite. The available data on world reserves of chromite (Shipping-grade) is shown in Table-12.

Table – 12 : World Reserves of Chromite (Shipping Grade) (By Principal Countries)

(In '000 tonnes of chromite ore)

Country	Reserves
World: Total (rounded off)	**570000**
Finland	13000
India*	100000
Kazakhstan	230000
South Africa	200000
Turkey	26000
USA	620
Other countries	NA

Source: *Mineral Commodity Summaries,USGS, 2020 Shipping grade - Deposit quantity and grade normalised to 45% Cr_2O_3except for United States where grade is normalised to 7% Cr_2O_3 and finland where grade is normalised to 26% Cr_2O_3 . NA-Not available. *: Reserves/ resources of chromite in the country as on 1.4.2015 as per NMI database on UNFC system have been placed at 344 million tonnes.*

South Africa is by far the largest producer of chromite ore and concentrates followed by Kazakhstan, Turkey and India. Albania, Finland, Russia and Brazil are also major producing countries. The world production of chromite ores increased by 7% to 40.8 million tonnes in 2018 from 38 million tonnes recorded in the previous year. South Africa was the leading producer contributing about 44% to the total world production followed by Kazakhstan (17%), Turkey (16%), India (9%) and Albania & Finland (3% each)(Table-13).

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

(In '000 tonnes)

Country	2016	2017	2018
World: Total (rounded off)	**34700**	**38000**	**40800**
South Africa	14705	16587	17829
Kazakhstan	5543	6313	6889
Turkey	6600	6600	6600
India*	3728	3481	3780
Albania	727	808	1143
Finland	1070	972	1099
Zimbabwe	112	689	895
Oman	451	632	688
Russia	485	488	507
Brazil	500	543	500
Pakistan	230	350	325
Iran	342	301	300
Other countries	174	244	236

Source: *BGS World Mineral Production, 2014-18*
**: India's production of chromite during 2016-17, 2017-18 and 2018-19 were 3.73 millions tonnes, 3.48 millions tonnes and 3.97 million tonnes respectively.*

For the generalised view of the development in various countries, the countrywise description sourced from the latest available publication of USGS 'Mineral Yearbook 2017 chromium (Advance Release)' is furnished below:

Brazil

The European Commission approved the merger of RHI AG (Austria) and Magesita Refratarios S.A.(Brazil). Magnesita Refratarios would continue to operate in Brazil as a susidiary of RHI Magnesita N.V.

China

Mintal Group Co. Ltd. (Inner Mongolia Autonomous Region), a major producer of ferrochromium in Baotou, China, commissioned the first of two new 75-megavoltampere furnaces in August. The new furnaces increased Mintal's high-grade ferrochromium production capacity to 600,000 metric tons per year. Ningbo Haoyang New Materials Technolgy Co. Ltd obtained Government approval in December to increse its stainless-steel production capacity. The approval included the installation of a 70-t electric are furnace that would add 400,000 tons

per year to its stailess-steel capacity. The Government of China also announced in December that it would lower the traiff on stainless-steel plate exports to 5% from 10% beginning January 1, 2018. The net exports of stainless-steel plates from China in 2017 were $3.8 billion, an increase of 11% from $3.4 billion in 2016, using import and export data from Global Trade Atlas.

Finland

Outokumpu Oyj owned and operated the Kemi chromite mine, the only chromite mine in Finland. Outokumpu also produced ferrochromium at its Tornio ferrochromium production facility using chrome extracted from its Kemi chrome mine. The Tornio facility was the only ferrochromium plant in Finland. Outokumpu obtained European patents for high-chromium-grade stainless-steel products in March. The products were developed in Outokumpu's Research and Development Center in Tornio, Finland. In addition, Outokumpu announced that it was expanding the Kemi Mine to a depth of 1 kilometer to ensure that mining operations would continue well into the future, with expected completion in 2020.

Kazakhstan

Eurasian Resources Group S.a.r.l. (ERG), with headquarters in Luxembourg, began mining chromite ore at the Pervomayskoye deposit, a mine in the Khromtau District in the western part of Kazakhstan. The Donskoy Ore Mining and Processing Plant, owned by JSC TNC Kazchrome (a subsidiary of ERG), had already extracted the first 3,500 tonnes of ore. Production at the mine was estimated to be 300,000 tonnes per year of ore. JSC TNC Kazchrome planned to construct a new slag-processing plant at its Aksu Ferroalloys Plant. The new plant would produce about 130,000 tonnes per year of metal concentrate and would be able to process materials not treatable at Aksu's existing stag-processing plants.

Russia

Polymetcore Trading S.A., a subsidiary of Yildirim Group, signed a 7-year offtake agreement with MidUral Group's Kluchevsky Ferroalloy Plant, a chromium metal producer in the Sverdlovsk region. Under the agreement, Polymetcore Trading would market and sell Kluchevsky's low-and ultra-low-carbon ferrochrome and chrome metal outside of Russia; Kluchevsky would continue to market its products within Russia.

South Africa

Afarak Group Plc. through its South African subsidiary Afarak Mining Limited, agreed to acquire a 70% stake in the Zeerust Chrome Mine(ZCM) from Afrika Mineral Trading & Investment Trust. Afarak converted a furnace from processing silicomanganese to ferrochrome at its Mogale plant of South Africa. In March, Jubilee Metals Group Plc commissioned an integrated chromite and platinum-group-metals (PGM) recovery plant at its Hernic Ferrochrome (Pty) Ltd. facility. Richards Bay Alloys, a subsidiary of Traxys S.A. (Luxemborg), suspended ferrochrome operations in South Africa for 3 months owing the low international ferrochrome prices.

Zimbabwe

Zimbabwe Alloys (ZimAlloys), a ferrochrome producer based in Gweru and under judicial managment by Grant Thornton International, approved a $100 million investment deal with Balasore Alloys Group, an Indian Ferroalloys producer. The Zimbabwe Government began redistributing idle chromite mines previously owned by the Zimbabwe Iron and Smelting Company(Zimasco) in response to inquiries from the Parliament regarding possible illegal mining activity. After legal disputes in 2016, Portnex International (Pty) Ltd and Zimasco resolved their differences. As a result, the two companies worked to improve operations at Zimasco's ferrochromium facilities in Kwekwe. Apple Bridge Investment, a special purpose organisation established in 2016 by the Zimbabwe Government to buy and export chromite ore from small-scale miners.

FOREIGN TRADE

Exports

Exports of chromite (total) decreased sharply by 52% to 39 thousand tonnes in 2018-19 from 82 thousand tonnes in the previous year. The exports were mainly to Japan (54%), China (44%) & remaining 2% was Spain & other countries. Out of total chromite exported in 2018-19, the share of about 89% was of chromite ore concentrate, while chromite ore (others) accounted for 7%. The remaining 4% was contributed by chrome ore & lumps. Exports of chrome ore lumps

were wholly to China in 2018-19. In 2018-19, 47 tonnes of chromium & alloys were exported which was 13% less from that of the preceding year. Exports of chromium & alloys were mainly to USA (47%), Iran, Brazil & Peru (13% each) and Indonesia, Thailand, Taiwan, Pakistan, UK & Kenya (2% each). During 2018-19 & 2017-18, the exports of chromium & scrap was negligible. Exports of chromium unwrought (powder) decreased by 13 % to 47 tonnes in 2018-19 from 54 tonnes in the preceding year (Tables-14 to 21).

The details of exports of ferrochrome are furnished in the Review entitled, 'Ferroalloys'.

Table – 14 : Exports of Chromite : Total (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**81835**	**1743015**	**39273**	**1337693**
Japan	18485	444407	21051	703583
China	63348	1298517	17492	602026
Spain	++	2	702	30674
Saudi Arabia	-	-	21	1287
UAE	2	82	6	90
UK	-	-	1	33
Bangladesh	++	7	-	-

Figures rounded off.

Table – 15 : Exports of Chrome Ore Lumps (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**2**	**82**	**1500**	**53223**
China	-	-	1500	**53223**
UAE	2	82	-	-

Figures rounded off.

Table – 16 : Exports of Chrome Ore Concentrates (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**33367**	**789176**	**34985**	**1167942**
Japan	18485	444407	21051	703583
China	14882	344769	13913	463072
Saudi Arabia	-	-	21	1287

Figures rounded off.

Table – 17 : Exports of Chrome Ore (Others) (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**48466**	**953758**	**2788**	**116528**
China	48466	953748	2079	85731
Spain	++	2	702	30674
UAE	-	-	6	90
UK	-	-	1	33
Bangladesh	++	7	-	-

Figures rounded off.

Table – 18 : Exports of Chromium & Alloys (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**54**	**36227**	**47**	**60386**
USA	38	22557	22	23087
Iran	++	19	6	15721
Brazil	4	3936	6	7009
Peru	-	-	6	6774
Indonesia	7	5107	1	1484
Thailand	3	2266	1	1314
Taiwan	-	-	1	1069
Pakistan	1	461	1	1053
UK	++	68	1	986
Kenya	1	372	1	505
Other countries	2	1442	1	1383

Figures rounded off.

Table – 19 : Exports of Chromium Articles, Nes (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	++	**8**	++	**58**
Mauritius	-	-	++	47
Nepal	-	-	++	4
Bhutan	-	-	++	3
Canada	-	-	++	3
Sri Lanka	++	3	++	1
Zimbabwe	++	5	-	-

Figures rounded off.

Table – 20 : Exports of Chromium & Scrap (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	++	**97**	++	**198**
USA	-	-	++	189
Azerbaijan	-	-	++	8
Mauritius	++	96	-	-
Iran	++	1	-	-

Figures rounded off.

Table – 21 : Exports of Chromium Unwrought : Powder (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**54**	**36220**	**47**	**60328**
USA	38	22557	22	23087
Iran	++	19	6	15721
Brazil	4	3936	6	7009
Peru	-	-	6	6774
Indonesia	7	5107	1	1484
Thailand	3	2266	1	1314
Taiwan	-	-	1	1069
Pakistan	1	461	1	1053
UK	++	68	1	986
Kenya	1	372	1	505
Other countries	2	1434	1	1326

Figures rounded off.

Imports

Imports of chromite (total) increased slightly by 1% to 163 thousand tonnes in 2018-19 from 161 thousand tonnes in the previous year. Out of total quantity of chromite imported in 2018-19, Chrome Ore Lump accounted for 79%, while concentrate and Other forms accounted for the remaining 21%. Imports were mainly from South Africa (67%), Oman (20%) and Madagascar (10%). Imports of Chrome Ore lump were mainly from South Africa (75%), Madagascar (13%) and Oman (11%). Imports of chrome ore concentrate were solely from South Africa. Imports of Chromium and Alloys in 2018-19 were at 1,268 tonnes as compared to 1,084 tonnes in the previous year. Imports were mainly from Russia (40%), China (29%) and UK (10%). Imports of Chromium and Scrap were negligible in 2018-19 as compared to 2 tonnes in 2017-18 (Tables-22 to 29).

The import details of ferrochrome are furnished in the Review entitled 'Ferroalloys'.

Table – 22 : Imports of Chromite : Total (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**160505**	**2981861**	**162664**	**3154448**
South Africa	114132	2401432	109688	2522850
Oman	35969	367041	32852	310336
Madagascar	3780	56852	16090	226911
Pakistan	5420	130113	2421	38511
UAE	-	-	844	34932
Netherlands	643	16943	326	11593
Zimbabwe	++	2	368	5707
Malta	-	-	54	2315
China	-	-	13	731
Belgium	-	-	8	532
Other countries	561	9478	++	30

Figures rounded off.

Table – 23 : Imports of Chrome Ore Lump (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**116449**	**2200678**	**128403**	**2419356**
South Africa	92642	1916655	95670	2022122
Madagascar	905	10505	16090	226911
Oman	18847	179443	13828	125264
Pakistan	4055	94073	2421	38511
Zimbabwe	-	-	368	5702
UAE	-	-	26	846
Iran	-	2	-	-

Figures rounded off.

Table – 24 : Imports of Chrome Ore Concentrate (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**6803**	**173381**	**2970**	**104952**
South Africa	6803	173381	2970	104952

Figures rounded off.

Table – 25 : Imports of Chrome Ore Others (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**37252**	**607802**	**31291**	**630140**
South Africa	14686	311396	11048	395775
Oman	17122	187598	19024	185072
UAE	-	-	818	34087
Netherlands	643	16943	326	11593
Malta	-	-	54	2315
China	-	-	13	731
Belgium	-	-	8	532
UK	-	-	++	30
Zimbabwe	++	2	++	5
Madagascar	2875	46347	-	-
Other countries	1926	45516	-	-

Figures rounded off.

Table – 26 : Imports of Chromium & Alloys (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**1084**	**616380**	**1268**	**1031309**
Russia	782	400181	504	394775
China	46	22550	362	277513
UK	191	118090	128	115390
Netherlands	10	5138	70	51783
U S A	4	18762	32	38970
Hong Kong	-	-	40	35540
Germany	25	26749	5	23501
Singapore	++	2596	20	18669
UAE	-	-	18	16135
Belgium	-	-	25	14154
Other countries	26	22314	64	44879

Figures rounded off.

Table – 27 : Imports of Chromium Unwrought : Powders (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**956**	**502946**	**1121**	**867136**
Russia	762	389752	504	394775
China	44	19269	336	257919
Netherlands	10	5138	70	51680
Hong Kong	-	-	40	35522
UK	111	62407	38	28800
Singapore	++	370	20	17827
USA	4	7128	26	17563
UAE	-	-	18	16135
Switzerland	-	-	25	14028
Eswatini	-	-	24	13009
Other countries	25	18882	20	19878

Figures rounded off.

Table – 28 : Imports of Chromium Articles, Nes (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**128**	**113434**	**147**	**164173**
UK	80	55683	91	86589
Germany	25	26749	5	23501
USA	++	11634	6	21407
China	2	3281	25	19594
Belgium	-	-	20	10741
Japan	++	2217	++	1137
Singapore	++	2227	++	842
Austria	-	-	++	228
Netherlands	-	-	++	104
Hong Kong	-	-	++	18
Other countries	21	11643	++	12

Figures rounded off.

Table – 29: Imports of Chromium & Scrap (By Countries)

Country	2017-18 (R)		2018-19 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**2**	**5668**	**++**	**318**
Turkey	-	-	++	281
Germany	-	-	++	36
Korea, Rep. of	-	-	++	1
USA	2	4076	-	-
UK	++	966	-	-
Poland	++	626	-	-

Figures rounded off.

FUTURE OUTLOOK

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 in the 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 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 like consistent supply of chrome ore at the right cost, steady power supply and other input materials like low phosporous met coke and good market conditions that need redressal in respect of the continuous and unscrupulous exploitation of chromite.

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 latest available data, supply of chrome ore is expected to increase at a compound annual growth rate (CAGR) of 2.4 per cent over the 2018 to 2022 period. Demand is expected to increase at a CAGR of 2.9 per cent. This is in comparision with the previous five years, where supply grew at a CAGR of 2.8 per cent and demand at 3.0 per cent modest reflection.