

FLUORITE



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FLUORITE

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

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Fluorite or fluorspar is the common name of the mineral having chemical composition calcium fluoride (CaF_2). In Mohs' scale, fluorite hardness is 4 and its specific gravity is normally 3.175-3.184 g/cm^3 but can be higher if rich in rare earth elements. It is a mineral with veritable bouquet of brilliant colours from hallmark colour purple to blue, green, yellow, colourless, brown, pink, black and reddish orange. The rich purple colour is by far the most famous and popular colour. It is an important commercial source of fluorine. Fluorite plays a vital role in the manufacturing industry and major consuming industries are chemical, cement, iron & steel, electrode, etc. It is also used to produce synthetic cryolite without which aluminium extraction is not possible.

Fluorite is commonly deposited by hydrothermal solution sourced from igneous intrusions. The mineralisation occurs as veins or replacement deposits either by the filling of cavities and fissures or by the replacement of the host rock, typically carbonates.

Mainly two grades of fluorite are involved in consumption and trade, namely, the acid grade (acidspar) containing more than 97% CaF_2 and the sub-acid grade analysing 97% or less CaF_2 . The sub-acid grade includes metallurgical (60 to 85% CaF_2) and ceramic (85 to 95% CaF_2) grades and is commonly known as metallurgical grade (metspar). Fluorite production in the country is meagre when compared with the world production. Production of fluorite in the country is reported from the state of Maharashtra in 2014-15 and 2015-16.

In addition to the natural fluorite production, synthetic fluorite is recovered as by-product during uranium processing, petroleum alkylation and stainless pickling. The by-product, fluorosilicic acid, obtained from phosphoric acid plants while processing phosphate rock also supplements fluorite as a source of fluorine.

RESERVES/RESOURCES

As per NMI data base, based on the UNFC

system, the total reserves/resources of fluorite in the country as on 1.4.2015 have been estimated at 18.18 million tonnes. Out of these, 0.29 million tonnes are placed under reserves category (further classified into 0.22 million tonnes under proved category and 0.06 million tonnes under probable category). Remaining resources comprise 17.89 million tonnes.

By States, Gujarat accounts for 66% of the total reserves/resources having 12 million tonnes, followed by Rajasthan with 5.24 million tonnes (29%), Chhattisgarh 0.55 million tonnes (3%) and Maharashtra 0.39 million tonnes (2%). Gradewise, the resources are classified into marketable grade which accounted for 81% of the total resources, low grade (17%) and unclassified grade (2%) (Table-1).

EXPLORATION & DEVELOPMENT

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

PRODUCTION & STOCKS

The production of fluorite (graded) at 1,175 tonnes in 2016-17 decreased by 50% as compared to that in the previous year. The single captive mine of GMDC is not in operation since October 2010.

There were two reporting mines in 2016-17 as well as in 2015-16. The entire output was reported from a public sector mine located in Chandrapur district of Maharashtra owned by Maharashtra State Mining Corporation Ltd (Tables - 2 to 4).

The mine-head closing stocks of fluorite (graded) was 97,793 tonnes in 2016-17 as against 96,619 tonnes in 2015-16 (table-5).

The average daily labour employed in fluorite mines in 2016-17 was 45 as against 58 in the previous year. The domestic price of fluorite are furnished in the General Review on 'Prices'.

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

(In tonnes)

Grade / State	Reserves			Remaining resources						Total resources (A+B)		
	Proved STD111	Probable STD121 STD122	Total (A)	Feasibility STD211	Pre-feasibility STD221 STD222	Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334		Total (B)	
All India : Total	224824	63860	288684	4976749	745390	571311	1713833	6218421	3522537	145183	17893423	18182107
By Grades												
Marketable	224824	63860	288684	4976749	586080	406111	-	5757010	2497534	145183	14368666	14657350
Low	-	-	-	-	3790	9680	1710348	445660	1000003	-	3169481	3169481
Unclassified	-	-	-	-	155520	155520	3485	15751	25000	-	355276	355276
By States												
Chhattisgarh	-	-	-	65889	153132	9288	185485	5573	126088	-	545455	545455
Gujarat	-	-	-	4279230	-	-	-	5723360	2001920	-	12004510	12004510
Maharashtra	224824	63860	288684	-	-	-	-	-	100000	-	100000	388684
Rajasthan	-	-	-	631630	592258	562023	1528348	489488	1294529	145183	5243458	5243458

Figures rounded off.

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Table – 2 : Producer of Fluorite, 2016-17

Name and address of producer	Location of mine	
	State	District
Maharashtra State Mining Corporation Ltd, Plot No. 7, Ajni square, Wardha Road, Nagpur-440 015, Maharashtra.	Maharashtra	Chandrapur

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

(Qty in tonnes; Value in `'000)

State	2014-15		2015-16		2016-17(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India/	2946	13761	2333	12965	1175	6166
Maharashtra	2946	13761	2333	12965	1175	6166

**Table – 4 : Production of Fluorite (Graded), 2015-16 & 2016-17
(By Sector/States/Districts)**

(Qty in tonnes; Value in `'000)

State/District	2015-16			2016-17 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	2	2333	12965	2	1175	6166
Public Sector	2	2333	12965	2	1175	6166
Gujarat	1*	-	-	1*	-	-
Vadodara	1	-	-	1	-	-
Maharashtra	1	2333	12965	1	1175	6166
Chandrapur	1	2333	12965	1	1175	6166

(p): Provisional

*: Only labour reported.

**Table – 5 : Mine-head closing Stocks of Fluorite, 2015-16 & 2016-17
(By States)**

(In tonnes)

State	2015-16	2016-17(P)
India	96619	97793
Gujarat	84372	84371
Maharashtra	12247	13422

MINING

Maharashtra State Mining Corporation (MSMC) operates Dongargaon fluorite mines in District Chandrapur, Maharashtra. Mining is carried out by semi-mechanised opencast method. The run-of-mine is hand sorted for marketing of fluorite (graded).

BENEFICIATION

Fluorspar is beneficiated by hand sorting followed by gravity concentration methods such as heavy media, jigs and tables in order to separate calcite and silicate mineral impurities. Low grade fluorite produced is used after beneficiation in the industries. GMDC has a beneficiation plant of 500 tpd capacity located at Kadipani to produce acid grade (96% CaF₂) and metallurgical grade (90% CaF₂) fluorite upgrading the low grade fluorspar ore from 23-25% CaF₂ by flotation method. Besides, it has facility to produce MFC & MET grade powder analysing 75 to 85% CaF₂ & 85 to 92.5% CaF₂, respectively, starch briquettes (81% CaF₂ min) and silicate briquettes (79% CaF₂ min). As per annual report of GMDC 2016-17, the Government of Gujarat has accorded approval for setting up beneficiation plant of 40,000 MTPA capacity at Kadipani, district Vadodara in joint venture with Gujarat Fluoro Chemicals Ltd, Noida and Navin Fluorine International, Mumbai. Selection of suitable technology is completed and further necessary action will be taken. GMDC conducted a pilot study for Fluorspar Beneficiation Plant of ore through BGRIMM China and the ore has been found suitable for producing Acid Fluorspar. EPC contract will be finalised soon.

Dongargaon mine of MSMC is semi-mechanised open-cast mine, the ore is beneficiated in a beneficiation plant of SANBRO Corporation Ltd, situated at Waregaon, Koradi, Nagpur district, to produce fluorite concentrate.

CONSUMPTION

Fluorite consumption was 4,000 tonnes in 2016-17. The major consuming industry is the Iron & Steel industry which accounted for more than 50% of the total consumption. Industry-wise consumption of fluorite is given in Table-6.

Table- 6: Estimated Consumption* of Fluorite 2014-15 to 2016-17 (By Industries)

(In tonnes)			
Industry	2014-15	2015-16 (R)	2016-17 (P)
All Industries	63100	63500	4000
Alloy steel	1400	1500	400
Cement	4100	4100	-
Chemical	53300	53400	-
Electrode	2100	2000	1500
Ferro alloys	200	200	-
Iron & steel	1700	2000	2000
Others (aluminium, foundry glass, Refractories)	300	300	100

Figures rounded off.

**Includes actual reported consumption and/or estimates made, wherever required and due to paucity of data, hence coverage may not be complete. Apparent consumption of fluorite is around 1,84,870 tonnes during 2016-17.*

SPECIFICATIONS

BIS has prescribed IS: 8587-1993 (First Revision, reaffirmed 2011) for acid grade fluorite for use in chemical industries, and IS: 4574-1989 (Second Revision, reaffirmed 2008) for fluorite in metallurgical industries.

USES

Acid grade fluorite is used as a feedstock in the manufacture of hydrofluoric acid (HF) and to produce aluminium fluoride (AlF₃). The major use of HF is for the production of a wide range of fluorocarbon chemicals, including hydrofluorocarbons (HFCs), hydrochlorofluorocarbons (HCFCs), and fluoropolymers. But, owing to environmental concerns, part of chlorofluorocarbons (CFCs) are replaced by HCFCs. HF is used in the manufacture of uranium tetrafluoride required to make nuclear fuel and fission explosives. It is also used in stainless pickling, petroleum alkylation, glass etching, oil & gas well treatment and as etcher/cleaner in Electronic Industry.

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HF is used in the manufacture of a host of fluorine chemicals used in dielectrics, metallurgy, wood preservatives, herbicides, mouthwashes, decay-preventing dentifrices, plastics and water fluoridation.

AlF_3 manufactured from acid grade fluorite is used as a flux in electrolytic recovery of aluminium. On an average, worldwide consumption of fluorides is about 21 kg for every tonne of aluminium produced. This ranged from 10 to 12 kg per tonne in a modern pre-baked aluminium smelter and about 40 kg in an old Soderberg smelter without scrubber.

Ceramic grade fluorite containing 85 to 95% CaF_2 is used in ceramic industry as a flux and as an opacifier in the production of flat glass, white or opal glass and enamels. The addition of 10-30% ceramic grade fluorspar to glass makes it opaque, white and opalescent. It is also used in the manufacture of magnesium, some manganese chemicals and welding rod coating.

Metallurgical grade fluorite is used primarily as fluxing agent by steel industry. It is added to slag to make it more reactive through increased fluidity. Fluorite of different grades is used in the manufacture of aluminium, cement and glass fibres. It is also used in the melt shop by Foundry Industry.

INDUSTRY

Many fluorine-based chemicals like hydrofluoric acid, aluminium fluoride, cryolite, sodium silicofluoride and hydrofluorosilicic acid were produced by chemical and fertilizer industries in the country.

In addition to material produced indigenously, substantial quantity of high grade fluorite was also imported to meet the demand of the fluorine-based Chemical Industries.

The Tanfac Industries Ltd is a joint sector company of TIDCO and Aditya Birla Group at Cuddalore, Tamil Nadu. It is engaged in the

manufacture of fluorine chemicals, such as, aluminium fluoride, anhydrous hydrofluoric acid, sodium silico fluoride, ammonium bifluoride, potassium fluoride, and various other fluorine-based chemicals. The company has an annual installed capacity of 16,500 tonnes each of aluminium fluoride and anhydrous hydrogen fluoride, 67,200 tonnes of sulphuric acid, 14,000 tonnes of hydrofluoric acid and 3,400 tonnes of speciality fluorides. The Company's topline had gone up by 9% in year 2015-16 due to increased sales volume of Aluminium Fluoride and Sulphuric Acid. Revival of IBAP plant by successfully reducing the cost of production through process optimisations and successfully developing and marketing value added products out of By-products generated from the IBAP process.

Navin Fluorine Industries Ltd, Surat, Gujarat, has an installed capacity of about 22,000 tpy of hydrofluoric acid. The Company produces a number of fluorine chemicals, namely, hydrofluoric acid, cryolite, aluminium fluoride and various other organic and inorganic fluorine-based chemicals.

Apatite and rock phosphate containing 3 to 4% CaF_2 was another useful source for recovery of fluorine. Coimbatore Pioneer Fertilizer Ltd has reported production of sodium silicofluoride in the past. Hydrofluorosilicic acid producing units were Rashtriya Chemicals & Fertilizer Ltd, Mumbai, whereas Dharamsi Morarji Chemical Co. Ltd, Ambernath, Maharashtra no longer reported production of fluorine chemicals. Aluminium fluoride was being produced by Southern Petrochemical Industries Corporation Ltd, Thoothukudi, Tamil Nadu with an installed capacity of 2,560 tpy.

SUBSTITUTES

Olivine or dolomitic limestone was used as substitute for fluorite in Iron & Steel industry. The by-product fluorosilicic acid from phosphoric acid production was used as a substitute in aluminium fluoride production.

ENVIRONMENT

Fluorine attracts environmental concern. Use of fluorine in drinking water has begun to wane. Fluorine is toxic in high concentration but beneficial in low concentration. Although fluorine has been under attack ever since its use in water in 1949, the only significant health problem with which it has been linked was 'Fluorosis', a disease that involves health defects and bone lesions. This problem is caused by concentration of fluoride that is much higher than the permissible levels in municipal water supplies. As per Indian Standards, the permissible limit of fluoride in the drinking water is 1.5 mg/l. "Defluoridation by adsorption" is a common economical and efficient method for removal of excess fluoride from drinking water. Electrolytic precipitation based on use of aluminium salts and by electrochemical route, etc. are the other few methods used for defluoridation.

Fluorine is at the centre of controversy over chlorofluorocarbons (CFCs), which causes depletion of atmospheric ozone layer that protects the earth from ultraviolet radiation, a major cause of skin cancer. The hydrofluorocarbon (HFC) and hydrochlorofluorocarbon (HCFC) compounds, which have been developed as an alternative to CFC, require more hydrofluoric acid than CFC and are expected to boost fluorite consumption. These greenhouse gases are being phased out in stages. It is reported that even if CFC emission is stopped, the present level of these gases may take up to ten years to reach the upper atmosphere where they could persist for a century or more.

According to United Nations Environment Programme (UNEP), an international agreement to curtail illegal trade in CFC and other ozone depleting chemicals came into effect on 10th November 1999. The agreement, which was authorised through an amendment to the Montreal Protocol in 1997, requires nations to create licensing system for international sales of ozone depleting chemicals. Further, as a part of the Montreal Protocol, 129 nations agreed on a three-year funding package to enable developing countries to continue their efforts to phase out CFC and other ozone depleting chemicals, and

accordingly, the Fund's Executive Committee approved major agreements with China and India to finance the shutdown of CFC production facilities in the two countries during the next ten years.

The United Nations Environment Programme (UNEP) has prepared a Montreal Protocol Handbook that provides additional detail and explanation of the provisions. CIESIN's Thematic Guide on Ozone Depletion and Global Environmental Change presents an in-depth look at causes, human and environmental effects, and policy responses to stratospheric ozone depletion.

WORLD REVIEW

The world total reserves of fluorite were 270 million tonnes. World reserves are concentrated mainly in South Africa & China (15% each) followed by Mexico (12%), Mongolia (8%) and Spain (2%) (Table- 7).

World production of fluorite in 2016 decreased slightly to 6.20 million tonnes as against 6.50 million tonnes during the previous year. (Table-8). As per industrial mineral report on fluorspar, end-use markets for fluorspar remained weak throughout the year due to the slowdown in global construction and a slump in fluorochemicals demand. Congestion in the fluorine supply chain pulled operating rates in China's aluminium fluoride (AlF₃) sector down as low as 45% in year 2016.

Prices for both acidspars and metspars began at low levels in year 2016, due to a combination of oversupply and weak end market demand as a result of the slowdown in global construction markets. China (60%), Mexico (17%) and Mongolia (5%) were the principal producing countries of fluorite in 2015-16 (Table-8).

China

As per USGS report on fluorite, 2015, China reported fluorspar reserves of 40 MT for 2014, significantly higher than the most recent USGS estimate of 24 MT. The trend of reported reserves suggests ongoing exploration and development of China's fluorspar resources.

Germany

To comply MAC directive, automobile manufacturer Daimler AG (Daimler) announced that it will introduce CO₂ based air-conditioning system in specific model of passenger car in 2017. Daimler objected to its use and said it was unable to implement the technology. If successfully deployed, the CO₂ based system would represent the first viable alternative to fluorinated MAC refrigerants.

Kenya

Kenya fluorspar company suspended operations at its processing plant in western Kenya for two months in June 2015 citing quality issues, reduced global demand and competition from new producers. The company intended to sell 30,000 t of accumulated fluorspar stock prior to resuming operations.

Canada

The Government of Newfoundland and Labrador, Department of Environment and Conservation, spared the St. Lawrence AGS vein fluorspar project from further environmental review. The project, proposed by Canada Fluorspar Inc., would include four open pit and underground mine operations, capable of storing 2.8 MT of flotation tailings, a mill facility capable of processing 200,000 metric tons per year of fluorspar flotation concentrate.

United Arab Emirates

Gulf Fluor LLC opened a new fluorine industrial complex in Abu Dhabi. Production facilities include a 60,000 t/yr AlF₃ plant, a 54,000 t/yr anhydrous HF plant, and a 140,000 t/yr sulfuric acid plant.

United Kingdom

Mexichem closed its HF production plant in Runcorn and withdrew financial support of Fenix Fluor Ltd, due to price decline of HF in Europe resulting from oversupply in China and the shutdown of numerous operations.

Bulgaria

Solvay SA announced to cease operations in Chiprovtsi fluorspar mine. The company cited reduced demand and depletion of quality ore.

**Table – 7 : World Reserves of Fluorite
(By Principal Countries)**

(In '000 tonnes)

Country	Reserves
World: Total (rounded)	270000
Brazil	640
China	41000
Iran	3400
Kenya	5000
Mexico	32000
Mongolia	22000
Morocco	580
South Africa	41000
Spain	6000
USA	4000
UK	4000
Vietnam	5000
Other countries	110000

Source: Mineral Commodity Summaries, 2018, USGS.

**Table – 8 : World Production of Fluorite
(By Principal Countries)**

(In '000 tonnes)

Country	2014	2015	2016
World Total (rounded)	6800	6500	6200
Argentina ^e	30	30	30
Brazil ^b	24	25 ^e	25 ^e
Bulgaria	131	147	4
China	4300	4400 ^e	4200 ^e
Germany	58	50	53
Iran	54	57	60 ^e
Kazakhstan ^e	100	100	100
Kenya	97	70	43
Mexico	1110	625	655
Mongolia ^e	338	338	338
Morocco	80	81	81 ^e
South Africa ^e	180	135	180
Spain	135	157	133
Vietnam	91	193	218 ^e
Other countries	85	47	47

Source: World Mineral Production, 2012-16, BGS.

b: Including beneficiated and directly shipped material.

FOREIGN TRADE

Exports

Exports of fluorite increased to 608 tonnes in 2016-17 from 316 tonnes in the previous year. Exports were mainly to Egypt (38%), Indonesia (24%), Bangladesh (11%) and Brazil (8%). Exports of aluminium fluoride decreased substantially to 320 tonnes in 2016-17 as compared to 1,795 tonnes in the previous year. Exports were mainly to UAE and Japan (50% each). Exports of hydrofluoric acid decreased slightly in 2016-17 to 2,644 tonnes against 2,792 tonnes in the previous year (Tables- 9 to 11).

Imports

Imports of fluorite increased slightly to 1.90 lakh tonnes in 2016-17 as compared to 1.63 lakh tonnes in the previous year. Imports were mainly from China (45%), Thailand (16%), Kenya (15%), Vietnam (13%) and South Africa (9%). Imports of aluminium fluoride however, increased substantially to 46,564 tonnes in 2016-17 from 27,258 tonnes in the previous year. Imports were mainly from UAE (41%), Indonesia (16%), Italy (13%), China (11%), Qatar (10%) and Jordan (9%). On the other hand, imports of hydrofluoric acid decreased considerably to 314 tonnes in 2016-17 from 2,251 tonnes in the previous year. Imports were mainly from China (67%) and Chinese Taipei/Taiwan (24%) (Tables- 12 to 14).

**Table – 9 : Exports of Fluorite
(By Countries)**

Country	2015-16 (R)		2016-17(P)	
	Qty (t)	Value ('000)	Qty (t)	Value ('000)
All Countries	316	11578	608	21579
Egypt	14	465	231	7329
Indonesia	126	4983	144	5497
Brazil	35	1789	51	2606
Bangladesh	76	2284	65	1988
Nigeria	46	1381	44	1246
Iran	-	-	15	719
Malaysia	-	-	16	546
Pakistan	4	141	12	414
Ethiopia	-	-	10	355
Qatar	2	68	9	323
Other countries	13	467	11	556

**Table – 10 : Exports of Aluminium Fluoride
(By Countries)**

Country	2015-16 (R)		2016-17(P)	
	Qty (t)	Value ('000)	Qty (t)	Value ('000)
All Countries	1795	123986	320	26455
Japan	200	19545	160	16088
UAE	1520	101786	160	10254
UK	-	-	++	51
Israel	-	-	++	36
USA	-	-	++	14
Singapore	-	-	++	11
Uganda	-	-	++	1
Nigeria	75	2437	-	-
Nepal	++	154	-	-
Iran	++	32	-	-
Other countries	++	32	-	-

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**Table – 11 : Exports of Hydrofluoric Acid
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	2792	161045	2644	162160
Thailand	431	33598	720	51663
Korea, Rep. of.	1867	90310	1179	49835
Saudi Arabia	72	4349	210	23914
UK	--	--	22	8042
USA	36	2168	106	5496
Bangladesh	36	2380	73	4506
Australia	--	--	108	4433
UAE	31	3216	32	2910
Indonesia	73	4237	37	2080
Spain	--	--	31	1858
Other countries	246	20787	126	7423

**Table – 12 : Imports of Fluorite
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	163113	2908707	190446	2992257
China	77895	1419129	85634	1376788
Thailand	33102	589237	29812	467483
Kenya	23099	412467	28792	435143
Vietnam	12628	192571	24599	359168
South Africa	12302	206149	17118	254891
Norway	2193	54737	1389	38478
Pakistan	654	9394	1213	18052
Spain	7	134	486	9314
Turkey	757	13537	561	6606
Canada	6	178	117	5066
Other countries	470	11174	725	21268

**Table – 13 : Imports of Hydrofluoric Acid
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	2251	151943	314	26497
China	1695	114582	209	14233
Chinese Taipei/Taiwan	550	34947	76	4860
Germany	++	311	22	4134
USA	++	52	4	2387
UK	3	1120	2	693
Sweden	++	172	1	130
Belgium	1	146	++	60
France	2	516	-	-
Spain	++	97	-	-
Japan	-	-	-	-
Other countries	-	-	-	-

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**Table – 14 : Imports of Aluminium Fluoride
(By Countries)**

Country	2015-16 (R)		2016-17(P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	27258	1810221	46564	2643714
UAE	9314	595564	19036	1207617
Indonesia	1000	66532	7540	430314
Italy	8046	531724	6156	403583
China	8798	612584	4978	332396
Jordan	-	-	4051	216682
Qatar	++	3	4689	49627
Netherlands	-	-	74	2031
Brazil	-	-	40	1464
USA	100	3813	-	-
UK	++	1	-	-

FUTURE OUTLOOK

The major driving factors for fluorite market are the growing chemical industry and increasing use of fluorite in Cement, Iron & Steel, Glass, etc. Industries. The Chemical Industry and Glass Industry accounts for the major share of the fluorite demand globally. As per TANFAC Annual Report 2016-17, global fluoro-chemical market is expected to reach USD 27.6 billion by 2022, growing at a CAGR of 5.6% from 2014 to 2022.

As per USGS report, improvements in steel making technology have also reduced the unit consumption of fluorite per unit tonnes of steel produced. In less developed countries, the quantity of fluorite used as a flux in steel making continues to be much higher, but further efficiency improvements are expected to moderate growth.

As on 01.04.2015, the resources of fluorite in India are 18.18 million tonnes which is considered to be limited resource. Ambadungar Fluorspar Mine of GMDC is the only domestic source of acid grade fluorite, slightly inferior in quality with high phosphorus content. Hence, to meet the

requirements, the domestic Chemical Industry will have to depend, both qualitatively and quantitatively on imported fluorite in the coming years, both for direct use and for blending with the domestic acid grade fluorite.

The import trend of fluorite showing 17% increase during 2016-17, while import of hydrofluoric acid decreased by 8%. On the other hand consumption of fluorite also drastically came down to 4000 tonnes in year 2016-17 as compared to 63,500 tonnes in year 2015-16. As per the Report of the Working Group for 12th plan period (2012-17), the average total consumption of fluorite by all industries has been around 72,000 tonnes per annum. The Working Group has estimated the apparent domestic demand of fluorite at 285 thousand tonnes by 2016-17 at 9% growth rate. The Working Group has recommended that cluster mining approach may be adopted in order to utilise the small deposits for further industrialisation of the mining area in the sector which will improve the workability of small mines. It has also suggested R&D for beneficiation and setting up of facilities to utilise fluorite from other parts of the country in the Chemical Industry.