

FLUORITE



# Indian Minerals Yearbook 2014

(Part- III : MINERAL REVIEWS)

53<sup>rd</sup> Edition

**FLUORITE**

(FINAL RELEASE)

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

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# 21 Fluorite

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**F**luorite or fluorspar is the common name of the mineral having chemical composition calcium fluoride ( $\text{CaF}_2$ ). 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 manufacture of aluminium, gasoline, insulating foams, refrigerants, steel and uranium fuel.

Mainly two grades of fluorite are involved in consumption and trade, namely, the acid grade containing more than 97%  $\text{CaF}_2$  and the sub-acid grade analysing 97% or less  $\text{CaF}_2$ . The sub-acid grade includes metallurgical and ceramic grades and is commonly known as metallurgical grade. 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 2012-13 and 2013-14.

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.

## RESOURCES

As per the UNFC system, the total resources of fluorite in the country as on 1.4.2010 are estimated at 18.2 million tonnes. Out of these, 4.7 million tonnes are placed under reserves category (further classified into 4.6 million tonnes under proved category and 0.15 million tonnes under probable category). Remaining resources comprise 13.5 million tonnes.

By States, Gujarat accounts for 66% of the total resources having 12 million tonnes, followed by Rajasthan with 5.24 million tonnes (29%), Chhattisgarh 0.55 million tonnes (3%) and Maharashtra 0.42 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

Geological Survey of India took up reconnaissance stage investigation for RM/REE minerals during the year showing presence of fluorite along with allanite, columbite, pollucite, spodumene, barytes, etc. in granite and pegmatite in Dublabetoli-Sundil area, District Ranchi in Jharkhand.

## PRODUCTION, STOCKS & PRICES

The production of fluorite (graded) at 2,486 tonnes in 2013-14 decreased by 20% as compared to that in the previous year.

There were two reporting mines in both the years. The entire output was reported from a public sector mine located in District Chandrapur of Maharashtra owned by Maharashtra State Mining Corporation Ltd (Tables 2 to 4).

The mine-head closing stock of fluorite (graded) for the year 2013-14 was 91,569 tonnes as against 91,367 tonnes in the previous year (Table-5).

The average daily labour employed in fluorite mines in 2013-14 was 60 as against 86 in the previous year.

The domestic price of fluorite are furnished in the General Review on 'Prices'.

**Table – 1 : Reserves/Resources of Fluorite as on 1.4.2010  
(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
<b>All India : Total</b>	<b>4566234</b>	<b>- 146082</b>	<b>4712316</b>	<b>673889</b>	<b>745390 529966</b>	<b>1713833</b>	<b>6218421</b>	<b>3474906</b>	<b>145183</b>	<b>13501588 18213904</b>
<b>By Grades</b>										
Marketable	4566234	- 146082	4712316	673889	586080 364766	-	5757010	2449903	145183	9976831 14689147
Low	-	-	-	-	3790 9680 1710348	445660	1000003	-	-	3169481
Unclassified	-	-	-	-	155520 155520 3485	15751	25000	-	-	355276
<b>By States</b>										
Chhattisgarh	-	-	-	65889	153132 9288 185485	5573	126088	-	-	545455
Gujarat	4280000	-	4280000	-	-	5723360	2001920	-	-	7725280 12005280
Maharashtra	261843	- 104737	366580	-	-	-	-	52369	-	52369 418949
Rajasthan	24391	- 41345	65736	608000	592258 520678	1528348	489488	1294529	145183	5178484 5244220

*Figures rounded off.*

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**Table – 2 : Producer of Fluorite, 2013-14**

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), 2011-12 to 2013-14 (P)  
(By States)**

(Qty in tonnes; value in ₹'000)

State	2011-12		2012-13		2013-14(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
<b>India</b>	<b>5010</b>	<b>12270</b>	<b>3092</b>	<b>13818</b>	<b>2486</b>	<b>11646</b>
Gujarat	1920	576	-	-	-	-
Maharashtra	2894	11133	3092	13818	2486	11646
Rajasthan	196	561	-	-	-	-

**Table – 4 : Production of Fluorite (Graded), 2012-13 & 2013-14 (P)  
(By Sector/States/Districts)**

(Qty in tonnes; value in ₹'000)

State/District	2012-13			2013-14(P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
<b>India</b>	<b>2</b>	<b>3092</b>	<b>13818</b>	<b>2</b>	<b>2486</b>	<b>11646</b>
Public Sector	2	3092	13818	2	2486	11646
<b>Gujarat</b>	<b>1*</b>	<b>-</b>	<b>-</b>	<b>1*</b>	<b>-</b>	<b>-</b>
Vadodara	1*	-	-	1*	-	-
<b>Maharashtra</b>	<b>1</b>	<b>3092</b>	<b>13818</b>	<b>1</b>	<b>2486</b>	<b>11646</b>
Chandrapur	1	3092	13818	1	2486	11646

\*: Only labour reported.

**Table – 5 : Mine-head Stocks of Fluorite, 2012-13 & 2013-14 (P)  
(By State)**

(In tonnes)

State	2012-13	2013-14
<b>India</b>	<b>91367</b>	<b>91569</b>
Gujarat	85739	84602
Maharashtra	5628	6967

## FLUORITE

### 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.

### 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% CaF<sub>2</sub>) and metallurgical grade (90% CaF<sub>2</sub>) fluorite upgrading the low grade fluorspar ore from 23-25% CaF<sub>2</sub> by flotation method. Besides, it has facility to produce MFC & MET grade powder analysing 75 to 85% CaF<sub>2</sub> & 85 to 92.5% CaF<sub>2</sub> respectively, starch briquettes (81% CaF<sub>2</sub> min) and silicate briquettes (79% CaF<sub>2</sub> min). The Government of Gujarat has accorded approval for setting up beneficiation plant at Kadipani, district Vadodara in joint venture with M/s Gujarat Fluoro Chemicals Ltd, Noida and M/s Navin Fluorine International, Mumbai. They are developing process of beneficiation with new reagents, modification in the plant.

The hand-picked high grade ore from Dongargaon mine of MSMC is beneficiated in a beneficiation plant by M/s SANBRO Corporation Ltd, situated at Waregaon, Koradi, Nagpur district, to produce fluorite concentrate.

### CONSUMPTION

Fluorite consumption was 62,600 tonnes in 2013-14. The major consuming industry is the chemical industry which accounted for more than 85% of the total consumption reported. Industrywise consumption of fluorite is given in Table-6.

**Table- 6: Consumption of Fluorite  
2011-12 to 2013-14 (P)  
(By Industries)**

Industry	2011-12	2012-13(R)	2013-14(P)
<b>All Industries</b>	<b>61700</b>	<b>62900</b>	<b>62600</b>
Alloy steel	1300(7)	1300(7)	1400(7)
Cement	4100(2)	4100(2)	4100(2)
Chemical	51400(5)	53300(6)	53300(6)
Electrode	2100(12)	1500(13)	1600(13)
Ferro-alloys	200(3)	200(3)	200(3)
Iron & steel	2300(8)	2200(9)	1700(8)
Others (aluminium, foundry glass, Refractories)	300(9)	300(9)	300(9)

*Figures rounded off.*

*Figures in parentheses denote the number of units in organised sector.*

*\*: Includes actual reported consumption and/or estimates made wherever required.*

### 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 (AlF<sub>3</sub>). 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.

$\text{AlF}_3$  manufactured from acid grade fluorite is used 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%  $\text{CaF}_2$  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. Company has strategically reduced the production of hydrofluoric acid and stiff competition from China in aluminium fluorides segment have led to lower sales volume & higher interest outgo.

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.

Sterlite Industries (India) Ltd, a Vedanta Group Company, was planning to set up a high bulk density and low bulk density aluminium fluoride plant of 13,000 tpy capacity at or near Thoothukudi, Tamil Nadu as a joint venture with Maya Rasayan Ltd. The plant will produce aluminium fluoride through hydro-fluorosilicic acid route.

Apatite and rock phosphate containing 3 to 4%  $\text{CaF}_2$  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 report 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. "Defluoridisation 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 defluoridisation.

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 10 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

World total reserves of fluorite were 240 million tonnes. World reserves are concentrated mainly in South Africa (17%), Mexico (13%) followed by China (10%) and Mongolia (9%) (Table- 7).

World production of fluorite in 2013 decreased slightly to 9.2 million tonnes from 9.4 million tonnes during the year 2012. China (71%), Mexico (13%) and Mongolia (4%) were the principal producing countries (Table - 8).

### Canada

Canada fluorspar Inc. reported new mineral resources for its Director Vein and & AGS Vein (formerly the Grebes Nest Vein) deposits. The indicated resources were 2.1 million tonnes at an average grade of 51% CaF<sub>2</sub> and the inferred resources were at 8.5 million tonnes at an average grade of 42.2% CaF<sub>2</sub>. Canada Fluorspar's Newspaper fluorspar project (jointly owned with Arkema S.A.) in the same St. Lawrence area remained under review at year end.

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### Afghanistan

Amania Mining Company (Kabul) started production at its Bakhud fluorspar mine. The deposit estimated resources totalling to 8.8 million tonnes with an average grade of 47% CaF<sub>2</sub>. Initial operations involved surface mining of the deposit and production of metallurgical and ceramic grade fluorspar.

### Mongolia

ARViN monspar, explored fluorspar resources in the Choir area of central Mongolia, to produce acid-grade fluorspar. The company conducted a major exploration programme, which involved analyzing previous geologic and drill hole data, performing new drilling and conducting beneficiation tests on process samples. Project plans called for open pit mining followed by dense media separation to upgrade the ore followed by flotation. The project was expected to be commissioned in 2015 to 2016 timeframe.

### Russia

United Company RUSAL announced that it was mothballing its wholly owned fluorspar mining operation at JSC Yaroslavskaya Mining Co. It was in order to modernise it because of low ore quality. After modernisation, the mining company expects to be able to produce higher grade fluorspar products.

### South Africa

Sephaku Fluoride Ltd. (SepFluor) issued contracts to install a fluorspar beneficiation plant (crushing and screening) and a flotation mill at SepFluor's Nokeng Mine project in Gauteng Province. Both plants were expected to be in operation by the year end 2017. SepFluor's plans call for production of up to 185,000 tpy of acid-grade fluorspar and a maximum of 30,000 tpy of metallurgical-grade fluorspar. An HF plant and an AlF<sub>3</sub> plant that would consumed 130,000 tpy of acidspar with the balance of the acidspar available for export were also planned.

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

(In '000 tonnes)

Country	Reserves
<b>World: Total (rounded)</b>	<b>240000</b>
China	24000
Kenya	5000
Mexico	32000
Mongolia	22000
Morocco	NA
Namibia	NA
Russia	NA
South Africa	41000
Spain	6000
USA	4000
Other countries	110000

*Source: Mineral Commodity Summaries, 2015.*

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

(In '000 tonnes)

Country	2011	2012	2013
<b>World: Total</b>	<b>9200</b>	<b>9400</b>	<b>9235</b>
Argentina	25	36	35*
Brazil@	25	24	25 <sup>(e)</sup>
Bulgaria	32	70	82
China	6550	6600 <sup>(e)</sup>	6600 <sup>(e)</sup>
Germany	66	54	49
Iran	56	60 <sup>(e)</sup>	60 <sup>(e)</sup>
Kazakhstan <sup>(e)</sup>	66	66	66
Kenya	95	91 <sup>(e)</sup>	78
Mexico	1207	1237	1210
Morocco	79	78 <sup>(e)</sup>	75 <sup>(e)</sup>
Mongolia	404	429	338
Namibia	94	91	90 <sup>(e)</sup>
Russia <sup>(e)</sup>	120	130	130
South Africa <sup>(e)</sup>	240	225	180
Spain	117	114	129
Other countries	24	95	88

*Source: World Mineral Production, 2009-2013.*

@ : Including beneficiated and directly shipped material.



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## FOREIGN TRADE

### Exports

Exports of fluorite decreased substantially to 876 tonnes in 2013-14 from 1,195 tonnes in the previous year. Exports were mainly to Bangladesh (69%) and Indonesia (24%). Exports of aluminium fluoride also decreased slightly to 3,658 tonnes in 2013-14 as compared to 3,756 tonnes in the previous year. Exports were mainly to UAE (85%), Japan (8%) and Brazil (4%). Exports of hydrofluoric acid in 2013-14 were 1,415 tonnes against 1,191 tonnes in the previous year. No exports of sodium fluoride were reported during last two years 2012-13 & 2013-14 (Tables- 9 to 11).

### Imports

Imports of fluorite increased considerably to 1.17 lakh tonnes in 2013-14 as compared to 98 thousand tonnes in the previous year. Imports were mainly from China (62%), Kenya (13%), South Africa (11%) & Thailand (8%). Imports of aluminium fluoride slightly decreased to 24,542 tonnes in 2013-14 from 26,244 tonnes in the previous year. Imports were mainly from China (95%) and Indonesia (4%). On the other hand, imports of hydrofluoric acid increased marginally to 1,372 tonnes in 2013-14 from 1,283 tonnes in the previous year. Imports were mainly from China (80%) and Chinese Taipei/Taiwan (19%) (Tables- 12 to 14).

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

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1195</b>	<b>22216</b>	<b>876</b>	<b>16549</b>
Indonesia	272	10742	211	10386
Bangladesh	626	4498	601	3326
Brazil	74	1805	31	1783
Iran	-	-	10	441
UAE	30	263	4	172
Kenya	-	-	5	170
Angola	-	-	4	164
Nepal	-	-	10	77
Belgium	-	-	++	15
Thailand	-	-	++	12
Other countries	193	4908	++	3

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

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>3756</b>	<b>240993</b>	<b>3658</b>	<b>257125</b>
UAE	3279	194909	3120	209718
Japan	375	39018	275	29425
USA	2	8	120	8809
Brazil	100	7054	140	8605
Kuwait	-	-	3	332
Oman	-	-	++	229
Malaysia	-	-	++	7
Other countries	++	4	-	-

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

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1191</b>	<b>77725</b>	<b>1415</b>	<b>101553</b>
Thailand	261	15399	375	28677
Indonesia	56	3788	332	21890
Korea, Rep. of	473	27157	258	14373
Japan	17	1818	68	6350
UAE	40	3395	55	5089
Singapore	57	6898	36	4950
Philippines	22	1963	44	3836
Bangladesh	46	2763	48	3266
Pakistan	22	1173	66	3135
Saudi Arabia	2	157	29	2687
Other countries	195	13214	104	7300

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

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>98041</b>	<b>2241949</b>	<b>117254</b>	<b>2412179</b>
China	66854	1571021	72108	1527059
Kenya	10337	249175	15821	314050
South Africa	11425	262819	13054	287885
Thailand	5115	67336	9883	151248
Norway	393	10123	1632	37954
Turkey	-	-	1214	28431
Mongolia	1600	29840	1385	23251
Pakistan	654	9510	1157	16621
Germany	140	4894	200	8491
UAE	464	10434	302	6627
Other countries	1059	26797	498	10562

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

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1283</b>	<b>107424</b>	<b>1372</b>	<b>105724</b>
China	1255	102252	1103	85972
Chinese Taipei/Taiwan	-	-	264	18010
Germany	2	240	1	946
Belgium	++	42	1	331
UK	6	1799	++	273
Canada	-	-	3	107
USA	1	127	++	41
Switzerland	-	-	++	35
Pakistan	-	-	++	7
Japan	++	258	++	2
Other countries	19	2706	-	-

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

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>26244</b>	<b>1908647</b>	<b>24542</b>	<b>1738311</b>
China	20674	1534276	23422	1663604
Indonesia	1320	70603	1100	73310
Canada	-	-	20	1397
Other countries	4250	303768	-	-

## FUTURE OUTLOOK

The resources of fluorite in India are limited and grades of fluorite produced do not meet the specifications of the chemical industry which is the bulk consumer of fluorite. 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.

As per the Report of the Working Group for 12<sup>th</sup> plan period (2012-17) of the Planning Commission, the average total consumption of fluorite by all industries has been around 72,000 tonne per annum. The Working Group has estimated the apparent domestic demand of fluorspar at 185 thousand tonnes by 2011-12 and 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.