

GARNET



# Indian Minerals Yearbook 2012

(Part- III : Mineral Reviews)

**51<sup>st</sup> Edition**

**GARNET**

**(FINAL RELEASE)**

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

Indira Bhavan, Civil Lines,  
NAGPUR – 440 001

PHONE/FAX NO. (0712) 2565471  
PBX : (0712) 2562649, 2560544, 2560648  
E-MAIL : [cme@ibm.gov.in](mailto:cme@ibm.gov.in)  
Website: [www.ibm.gov.in](http://www.ibm.gov.in)

**February, 2014**

# 23 Garnet

Garnet is the collective name for a group of minerals which crystallise in cubic system with different chemical composition. Garnet is hard with sharp angular chisel-edged fracture, containing small amounts of free silica and exhibits high resistance to physical and chemical attacks. It is used both as semi-precious stone and as abrasive. The hardness of garnets varies from 6.5 to 7.5 on Mohs' scale.

## RESOURCES

In India, garnet deposits suitable for use in abrasive industry, occur in Andhra Pradesh, Chhattisgarh, Jharkhand, Kerala, Odisha, Rajasthan and Tamil Nadu. Gem variety of garnet occurs in Ajmer, Jaipur, Kishangarh, Tonk and Udaipur districts, Rajasthan; Krishna, Nellore and Warangal districts, Andhra Pradesh; and Coimbatore, Nilgiri and Salem districts, Tamil Nadu. Garnet is found to occur in beach sands along with ilmenite, rutile, sillimanite, etc. in the states of Kerala, Odisha and Tamil Nadu.

The total resources of garnet in India, as on 1.4.2010, as per UNFC system are placed at 56.96 million tonnes of which reserves in proved and probable categories together are 19.32 million tonnes. Of the total resources, about 21.56 million tonnes are of abrasive grade, whereas resources of semi-precious grade are 5,352 tonnes only. Tamil Nadu alone accounts for more than 59% of the total resources followed by Andhra Pradesh 33% and Odisha 6%. The remaining states together shared less than 2% (Table - 1).

## EXPLORATION & DEVELOPMENT

During 2011-12, Directorate of Geology, Odisha carried out following exploration activities for heavy minerals (rutile, monazite, ilmenite, sillimanite, garnet, zircon, etc.): (1) 0.92 sq. km area was delineated and 2000 samples were collected in Balrampur area, district Puri. (2) Four potential heavy mineral bearing areas around Gelinasi, Hunda-Sumantarapur, Mulpari and Mundabar in District Puri had been identified. Sea bed sediment samples were collected from territorial waters off north of Bhimunipatnam, Andhra Pradesh by GSI. The analysis of the samples indicate that the weight percentage of total heavy minerals (ilmenite, sillimanite, garnet, monazite, zircon, rutile, etc) varies from 1.4021 to 8.7745 weight percentage.

## PRODUCTION, STOCKS AND PRICES

### Garnet (Abrasive)

Production of garnet (abrasive) at 1,825 thousand tonnes during 2011-12 decreased by 14% as compared to that in the preceding year due to less market demand. There were 67 reporting mines during 2011-12 as against 64 in the previous year. Besides production of garnet (abrasive) was reported as an associated mineral by one sillimanite mine in Odisha. Three principal producers accounted for about 89% of the total output during the period. The share of public sector in the total output was 2% in both the years 2010-11 and 2011-12.

About 96% of the total production was reported from Tamil Nadu, 3% from Andhra Pradesh and the remaining 1% production was reported from Odisha (Tables - 2 to 4).

Mine-head stocks at the end of the year was 393 thousand tonnes as against 383 thousand tonnes at the beginning of the year (Table 5).

The average daily employment of labour during 2011-12 was 3,118 as against 3,484 in the previous year.

Prices of garnet are given in the General Review on 'Prices'.

**Table - 2 : Principal Producers of Garnet (Abrasive), 2011-12**

Name & address of producer	Location of mine	
	State	District
V. V. Mineral Keeraikeeranhattu, Tisaiyanvilai - 627 657, Thirunelveli, Tamil Nadu.	Tamil Nadu	Thirunelveli
Transworld Garnet India (P) Ltd, New No. 34, M. G. T. Road, Kalashetra Colony, Besant Nagar, Chennai - 600 090, Tamil Nadu.	Tamil Nadu	Thirunelveli
Beach Minerals (sand) Company Pvt. Ltd, 132, Tiruchendur Road, Kuttam - 627 651, Thirunelveli, Tamil Nadu.	Tamil Nadu	Thirunelveli

## GARNET

**Table – 1 : Reserves/Resources of Garnet as on 1.4.2010**  
(By Grades/States)

(In 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	Total (B)
		STD121	STD122			STD221	STD222					
<b>All India : Total</b>	<b>3252107</b>	<b>4712202</b>	<b>11360484</b>	<b>193224793</b>	<b>9270</b>	<b>81901</b>	<b>207041</b>	<b>117887</b>	<b>10226689</b>	<b>26995243</b>	<b>37638032</b>	<b>56962825</b>
<b>By Grades</b>												
Abrasive	3048526	4710071	11091469	18850066	214	39774	114044	102848	15645	2438410	2710935	21561001
Semi-precious	283	481	227	991	5	94	553	39	1293	2378	4361	5352
Others	-	-	5534	5534	9051	6033	-	-	-	215573	230657	236191
Unclassified	203298	1650	263254	468202	-	36000	394	15000	10208995	23951287	34211676	34679878
Not-known	-	-	-	-	-	-	92051	-	756	387596	480403	480403
<b>By States</b>												
Andhra Pradesh	2911387	4500	710000	3625887	9051	42033	-	-	8800000	6587776	15438860	19064747
Chhattisgarh	-	-	-	-	-	-	-	-	-	28800	28800	28800
Jharkhand	-	-	-	-	-	-	88303	-	-	21768	110071	110071
Kerala	-	-	45797	45797	-	-	-	100874	-	52190	153064	198861
Odisha	-	3185605	-	3185605	5	-	-	-	-	348000	348005	3533610
Rajasthan	6251	10700	9299	26250	214	39868	26687	2013	17694	85690	172167	198416
Tamil Nadu	334469	1511397	10595388	12441254	-	-	92051	15000	1408995	19871019	21387065	33828319

Figures rounded off.

## GARNET

**Table – 3 : Production of Garnet (Abrasive) 2009-10 to 2011-12  
(By States)**

(Qty in tonnes; value in ₹'000)

State	2009-10		2010-11		2011-12(p)	
	Quantity	Value	Quantity	Value	Quantity	Value
<b>India</b>	<b>1580617</b>	<b>763377</b>	<b>2126337</b>	<b>1274864</b>	<b>1824648</b>	<b>1354920</b>
Andhra Pradesh	124756	48255	153574	183821	62325	263256
Odisha	11080	36209	18474	65620	19889	84813
Tamil Nadu	1444781	678913	1954289	1025423	1742434	1006851

**Table – 4 : Production of Garnet (Abrasive), 2010-11 & 2011-12  
(By Sectors/States/Districts)**

(Qty in tonnes; value in ₹'000)

State	2010-11			2011-12 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
<b>India</b>	<b>64(1)</b>	<b>2126337</b>	<b>1274864</b>	<b>67(1)</b>	<b>1824648</b>	<b>1354920</b>
Public sector	1(1)	33383	148350	1(1)	31688	147815
Private sector	63	2092954	1126514	66	1792960	1207105
<b>Andhra Pradesh</b>	<b>2</b>	<b>153574</b>	<b>183821</b>	<b>2</b>	<b>62325</b>	<b>263256</b>
Srikakulam	2	153574	183821	2	62325	263256
<b>Odisha</b>	<b>(1)</b>	<b>18474</b>	<b>65620</b>	<b>(1)</b>	<b>19889</b>	<b>84813</b>
Ganjam	(1)	18474	65620	(1)	19889	84813
<b>Tamil Nadu</b>	<b>62</b>	<b>1954289</b>	<b>1025423</b>	<b>65</b>	<b>1742434</b>	<b>1006851</b>
Kanyakumari	4	168134	174665	4	185674	167327
Madurai	-	-	-	1	10	6
Thiruchirapalli	5	121550	15802	6	43075	29381
Thirunelveli	51	1516695	748460	51	1333210	703211
Thoothukudi	2	147910	86496	3	180465	106926

*Figures in parentheses indicate associated mine of sillimanite.***Table – 5 : Mine-head stocks of Garnet (Abrasive), 2011-12 (P)  
(By States)**

(In tonnes)

State	At the beginning of the year	At the end of the year
<b>India</b>	<b>383012</b>	<b>392575</b>
Andhra Pradesh	19232	7067
Odisha	9156	8786
Tamil Nadu	354624	376722

## Garnet (Gem)

No production of garnet (gem) had been recorded during 2011-12.

## MINING & MARKETING

Garnet is obtained generally by digging small shallow pits barring a couple of places in Tamil Nadu where it is recovered from seashore. Mining is done manually with the help of pickaxes and spades. Drilling and blasting are not required as garnet is found in soft rocks. Fine abrasive garnet is recovered from processing of beach sands. The mining of beach sand is done by dry and wet dredging. In Heavy Upgradation Plant and Mineral Separation Plant, individual minerals including garnet are separated. The production from mines is graded into two varieties - abrasive and gem, depending upon the clarity of crystals. After cutting and polishing, clear flawless and rich-colour crystals of garnet are sold as semi-precious stones.

## USES & CONSUMPTION

The most important industrial use of garnet is as an abrasive. About 90% production of abrasive garnet is used for manufacturing of garnet-coated papers, cloths and discs. The remaining 10% output is used in the form of loose grains for surfacing and polishing soft stones (marble, slate, soapstone, etc.). Clear flawless and rich-coloured crystals of garnet are used as semi-precious stones. The principal variety among them are ruby, pyrope, deep-crimson almandine, orange-yellow grossularite, etc. Garnet-coated abrasives are used in the form of belts, covers for drums, discs or as small sheets. It is used for cleaning spark plugs, paints, polishing and grinding of plate-glass, ceramic and wood. Other uses are in electronic and television industry for polishing glass and TV tubes. Garnet also finds its use in sand blasting where generally garnet of mesh size 16-24 is used.

Water jet cutting machines generally use finely ground 80-120 mesh size garnet as cutting medium with high pressure water. Owing to its inertness to a wide range of chemicals, it is used as filter medium for water and other liquids.

The apparent consumption of garnet (abrasive) during 2009-10, 2010-11 and 2011-12 was about 1,409 thousand tonnes, 1,849 thousand tonnes and 1,386 thousand tonnes, respectively.

## WORLD REVIEW

World reserves of garnet are large and occur in a wide variety of rocks like gneisses, schists in crystalline limestone, pegmatites, serpentinites, vein deposits, etc. In addition, alluvial garnet also occurs in heavy minerals sand deposits throughout the world. Major garnet deposits are found in USA, Australia, China and India. Deposits of garnets are also located in Canada, Chile, Czech Republic, Pakistan, South Africa, Spain, Thailand and Ukraine.

In 2011, India produced about 48% of total global production, followed by China 30% and Australia 16% and remaining 6% was contributed by USA and other countries.

World end uses of garnet and market shares are: abrasive blasting media 50%, abrasive grains for waterjet cutting 30%, water filtration 15%, and other end uses 5 per cent.

The world reserves and production of industrial garnet are furnished in Tables - 6 and 7.

**Table – 6 : World Reserves of Garnet (Industrial)  
(By Principal Countries)**

(In tonnes)	
Country	Reserve
<b>World: Total (rounded)</b>	<b>Moderate to Large</b>
Australia	Moderate to large
China	Moderate to large
India*	6700000
USA	5000000
Other countries	6500000

*Source: Mineral Commodity Summaries, 2013.*

\* India's total UNFC resources of garnet as on 1.4.2010 are estimated at 56.96 million tonnes.

**Table – 7 : World Production of Garnet (Industrial)  
(By Principal Countries)**

(In tonnes)			
Country	2009	2010	2011
<b>World: Total (rounded)</b>	<b>1400000</b>	<b>1400000</b>	<b>1660000</b>
Australia	160000	150000	263000
China	450000	470000	506000
India	700000	700000	800000
USA	56500	52600	56400
Other countries	24500	27400	34600

*Source: Mineral Commodity Summaries, 2012 and 2013.*

\* India's production of garnet during 2009-10, 2010-11 and 2011-12 was 1.58 million tonnes, 2.13 million tonnes and 1.82 million tonnes, respectively.

## FOREIGN TRADE

### Exports

Exports of abrasive garnet increased 87% to 428,716 tonnes in 2011-12 from 228,663 tonnes in 2010-11. Exports were mainly to UAE (22%), USA (11%), Germany (8%) and Saudi Arabia (7%). Exports value of garnet (cut & uncut) increased in 2011-12 to 4.2 crore from 1.8 crore in the previous year. Out of total from cut and uncut garnet, more than 81% exports earnings were from cut garnet. Exports of cut variety were mainly to Thailand, Czech Republic, UK and USA (Tables - 8 to 11).

### Imports

In 2011-12, imports of abrasive garnet decreased slightly to 314 tonnes from 357 tonnes in the previous year. Import value of cut and uncut garnet increased in 2011-12 to `535 lakh from `161 lakh in 2010-11. Imports were mainly from Thailand (55%), Tanzania (21%) and Switzerland (8%) in terms of value. Out of the total imports in 2011-12, uncut garnet accounted for 99.96% value and the remaining 0.05% was accounted for by cut garnet (Tables - 12 to 15).

**Table – 8 : Exports of Garnet (Abrasive)  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>228663</b>	<b>1726150</b>	<b>428716</b>	<b>3500974</b>
UAE	44464	337756	95168	797590
USA	25683	163414	47906	448183
Germany	12562	87435	34298	278514
Saudi Arabia	16187	113363	31498	257435
Malaysia	7114	58364	28767	160074
Australia	9891	79922	15286	136569
Kuwait	11307	93615	13015	119817
UK	8605	69434	12036	106814
Italy	7132	58400	11566	104599
Qatar	13124	91705	9607	84056
Other countries	72594	572742	129569	1007323

**Table – 9 : Exports Value of Garnet  
(Cut and Uncut)  
(By Countries)**

Country	2010-11	2011-12
	Value (₹'000)	Value (₹'000)
<b>All Countries</b>	<b>18450</b>	<b>42540</b>
Thailand	5300	18479
Singapore	--	7198
Czech Republic	3749	5404
Hong Kong	--	4347
USA	3464	3053
Japan	804	1416
UAE	1903	1356
Canada	--	486
UK	1570	253
Germany	1111	133
Other countries	549	415

*Note: Quantity not given due to partial coverage; value figures, however, have full coverage.*

**Table – 10 : Exports of Garnet (Cut)  
(By Countries)**

Country	2010-11		2011-12	
	Qty ( '000 carats)	Value (₹'000)	Qty ( '000 carats)	Value (₹'000)
<b>All Countries</b>	<b>260</b>	<b>17257</b>	<b>761</b>	<b>34416</b>
Thailand	114	5139	298	18479
Czech Republic	60	3749	103	5404
Hong Kong	--	--	125	3539
USA	30	3372	130	3053
UAE	4	1789	1	1356
Japan	6	804	25	1325
Canada	--	--	71	486
France	--	--	3	315
UK	35	1570	2	253
Germany	11	762	3	133
Other countries	++	72	++	73

**Table – 11 : Exports of Garnet (Uncut)  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1</b>	<b>1193</b>	<b>1</b>	<b>8124</b>
Singapore	-	-	1	7198
Hong Kong	-	-	++	808
Japan	-	-	++	91
France	-	-	++	26
Other countries	1	1193	++	1

**Table – 12 : Imports of Garnet (Abrasive)  
(By Countries)**

Country	2010-11		2011-12	
	Qty (‘000 crt)	Value (₹'000)	Qty (‘000 crt)	Value (₹'000)
<b>All Countries</b>	<b>357</b>	<b>7490</b>	<b>314</b>	<b>5519</b>
China	292	6360	260	4954
Australia	4	68	26	404
UAE	52	895	28	160
Other countries	9	167	++	1

**Table – 13 : Imports Value of Garnet  
(Cut & Uncut)  
(By Countries)**

Country	2010-11	2011-12
	Value (₹'000)	Value (₹'000)
<b>All Countries</b>	<b>16114</b>	<b>53509</b>
Thailand	471	29647
Tanzania Rep.	737	10976
Switzerland	-	4498
Mozambique	-	2451
Kenya	516	1737
Hong Kong	8524	1360
South Africa	-	1121
Sri Lanka	1215	23
Brazil	1670	-
USA	2161	-
Other countries	820	1696

**Table – 14 : Imports of Garnet (Cut)  
(By Countries)**

Country	2010-11		2011-12	
	Qty (‘000 crt)	Value (₹'000)	Qty (‘000 crt)	Value (₹'000)
<b>All Countries</b>	<b>21</b>	<b>5443</b>	<b>++</b>	<b>23</b>
Sri Lanka	1	1215	++	23
Other countries	20	4228	++	++

**Table – 15 : Imports of Garnet (Uncut)  
(By Countries)**

Country	2010-11		2011-12	
	Qty (‘000 crt)	Value (₹'000)	Qty (‘000 crt)	Value (₹'000)
<b>All Countries</b>	<b>3</b>	<b>10671</b>	<b>41</b>	<b>53486</b>
Thailand	++	127	++	29647
Tanzania Rep.	++	737	16	10976
Switzerland	-	-	++	4498
Mozambique	-	-	25	2451
Kenya	++	516	++	1737
Hong Kong	++	6772	++	1360
South Africa	-	-	++	1121
Nigeria	++	191	++	862
Madagascar	-	-	++	823
Zambia	++	10	++	10
Other countries	3	2318	++	1

## FUTURE OUTLOOK

Garnet has wide range of applications, such as in production of abrasives, sand blasting, water filtration materials and water-jet cutting. Domestic production of garnet is very high while the current domestic demand is limited and the major chunk is exported.