

QUARTZ & OTHER SILICA MINERALS



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QUARTZ & OTHER SILICA MINERALS

(FINAL RELEASE)

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MINISTRY OF MINES
INDIAN BUREAU OF MINES**

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The term 'quartz' is often referred to as a synonym for silica. Silica (SiO_2) is one of the ubiquitous materials in the earth's crust. Quartz, quartz crystals, quartzite, silica sand, sand (others) and moulding sand are all coined together in one generic name 'silica minerals'. This is because all these commodities are essentially crystalline silicon dioxide (SiO_2) with variations mostly related to their crystalline structure and presence of minor or trace impurities. Silica occurs in several forms giving rise to different varieties.

Crystalline Varieties

The important varieties of crystalline quartz are vein quartz (massive crystalline quartz); milky quartz (white, translucent to opaque); ferruginous quartz (containing brown limonite and red haematite and almost opaque); aventurine quartz (containing glistening flakes of mica or haematite); cat's eye (opalescent greenish quartz with fibrous structure); rock crystal (clear, colourless, well-crystallised transparent quartz); amethyst (clear-purple or violet-blue), transparent quartz; rose quartz; smoky quartz; etc. Occurrences of massive crystalline quartz in veins or pegmatites have been recorded in almost all the states.

Clastic or Granular Varieties

These varieties include sand consisting largely of unconsolidated quartzose grains (0.06 mm to 2 mm diameter), gravel consisting largely of unconsolidated coarse quartzose grains or pebbles (2 mm to 8 mm in diameter), sandstone and quartzite. Quartzite is a granulose metamorphic rock consisting essentially of quartz and sandstone cemented by silica which has grown in optical continuity around each grain. Occurrences are reported from Andhra Pradesh, Bihar, Delhi, Haryana, Karnataka, Kerala, Madhya Pradesh, Rajasthan, Tamil Nadu, Uttar Pradesh, etc. The silica sand from Naini area in Allahabad district, Uttar Pradesh is of a very high quality.

Cryptocrystalline Varieties

This group includes chalcedony, agate, jasper, onyx, flint and chert. These varieties appear non-crystalline (amorphous) in hand specimens, but under microscope show double refraction which reveals their concealed crystalline nature. These varieties are reported from Gujarat, Uttar Pradesh, Tamil Nadu, Andhra Pradesh, Maharashtra, Madhya Pradesh, Karnataka and Punjab. The most important occurrences of agate are in

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Ratnapur, Rajpipla area and further west between Tapi and Narmada rivers in Bharuch district, Gujarat, where it is found as pebbles in varying sizes associated with clay washed down by the river flow. Other occurrences of economic importance are reported from Amravati, Aurangabad, Buldhana, Chandrapur, Nashik and Pune districts in Maharashtra; beds of Krishna and Godavari rivers in Andhra Pradesh; Dumka district in Jharkhand; Dhar, Mandsaur, Sihore and Shahdol districts in Madhya Pradesh; and Kachchh district in Gujarat.

RESOURCES

As per the UNFC system as on 1.4.2010, the total resources of quartz and silica sand in the country are estimated at 3,499 million tonnes out of which 429.22 million tonnes (12%) are placed under reserves category and 3,070 million tonnes (88%) are placed under remaining resources category. Resources by grades reflect foundry & moulding grade at 659.32 million tonnes (19%), glass at 473.08 million tonnes (14%), ceramic & pottery grade at 395.77 million tonnes (11%) and ferro-silicon grade at 179.32 million tonnes (5%). The unclassified, others, sodium silicate and not-known grades at 1,783.48 million tonnes (51%) of the total resources. State-wise Haryana alone accounts for 1811.23 million tonnes (52%) resources, followed by Rajasthan at 332.47 million tonnes (9.5%). Tamil Nadu 228.60 million tonnes (6.53%), Maharashtra 176.99 million tonnes (5.05%), Jharkhand 156.52 million tonnes (4.4%), Andhra Pradesh 142.15 million tonnes (4%),

Kerala 128.13 million tonnes (3.36%), Uttar Pradesh 105.89 million tonnes (3.02%), Karnataka 90.89 million tonnes (2.87%) and Gujarat 100.77 million tonnes (2.88%) (Table-1).

Similarly the total resources of quartzite in the country as per UNFC system as on 1.4.2010 are estimated at 1251.25 million tonnes (86.60%), out of which reserves are placed at 86.60 million tonnes (6.92%) and the remaining resources at 1,165 million tonnes (93.08%). Statewise bulk resources of about 621.98 million tonnes are located in Haryana (49.71%) followed by Bihar 276.33 million tonnes (22.08%), Maharashtra 90.72 million tonnes (7.25%), Punjab 81.91 million tonnes (6.55%), Odisha 60.40 million tonnes (4.82%) and Jharkhand at 40.59 million tonnes (3.24%). Gradewise resources of refractory grade are estimated at 460.39 million tonnes (37%), ceramic & pottery grade at 220.67 million tonnes (18%), BF grades at 66.50 million tonnes (5%) and the remaining resources at 503.68 million tonnes (40%) are of low, unclassified, others & not-known grades (Table-2).

EXPLORATION & DEVELOPMENT

Exploration for quartz and silica minerals was conducted by Geological Survey of India, Directorate of Mineral Resources, Meghalaya, Directorate of Mines & Geology, Rajasthan, Directorate of Mines & Minerals, West Bengal. Details of exploration carried out for quartz and other silica minerals during 2014-15 are given in Table - 3.

QUARTZ & OTHER SILICA MINERALS

**Table – 1 : Reserves/Resources of Quartz & Silica Sand as on 1.4.2010
(By Grades/States)**

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	272972	35079	121173	429223	185399	322454	321760	58683	259116	1907994	14402	3069808	3499031
By Grades													
Glass	103129	15139	40524	158792	46785	23815	51528	2176	8707	175356	5922	314289	473082
Ferro-silicon	4889	96	6479	11464	9022	16023	20409	98	65126	57175	-	167853	179317
Sodium silicate	1622	38	1594	3254	533	1490	5143	-	146	31245	11	38568	41822
Ceramic and Pottery	96746	1554	32111	130411	12935	23781	59764	7328	12826	148729	-	265362	395773
Foundry and Moulding	46285	15999	20891	83175	58339	36249	116140	16984	38301	302462	7672	576148	659323
Abrasive	2405	7	13	2425	-	249	1861	-	10	3508	-	5628	8053
Others	10844	116	11398	22358	38280	62210	14649	116	25	862023	220	977523	999881
Unclassified	4600	353	2828	7781	11869	154593	33209	31982	39669	190442	17	461781	469562
Not-known	2453	1778	5333	9564	7634	4045	19058	-	94307	137053	560	262657	272220
By States													
Andhra Pradesh	28196	2975	29607	60778	9493	1778	15299	5245	8314	35515	5732	81376	142154
Assam	-	-	-	-	-	-	-	-	-	1790	-	1790	1790
Bihar	-	-	2121	2121	-	-	-	-	-	24652	-	24652	26773
Chhattisgarh	141	-	46	187	385	-	620	56	-	191	7672	8924	9111
Goa	-	-	-	-	-	20	1736	-	-	18248	-	20004	20004
Gujarat	16042	684	19256	35982	17133	5110	11774	2144	2999	25629	-	64789	100771
Haryana	-	46	8317	8363	35553	252759	182478	27837	39767	1264473	-	1,802868	1811231
Himachal Pradesh	1	-	7	8	99	-	-	-	-	2928	-	3027	3035
Jammu & Kashmir	-	-	-	-	-	-	-	-	-	3110	-	3110	3110
Jharkhand	563	4	8671	9238	2	989	3299	518	1026	141342	107	147283	156521
Karnataka	8677	3809	2375	14861	12402	4970	8276	205	100	49508	525	75987	90848
Kerala	-	38	-	38	404	1959	3354	14611	30241	77528	-	128096	128135
Madhya Pradesh	144	11	14	169	51	-	86	47	316	2191	-	2692	2861
Maharashtra	12356	2085	10884	25326	29372	15172	48391	-	355	58374	-	151663	176989
Meghalaya	-	-	-	-	-	-	-	-	177	6906	-	7083	7083
Odisha	438	69	860	1367	1161	1503	2599	90	63385	3836	-	72573	73940
Punjab	-	-	-	-	-	-	-	-	-	3927	-	3927	3927
Rajasthan	132135	10472	27757	170364	40583	13344	23433	3202	7658	73883	-	162104	332468
Tamil Nadu	60063	9	93	60166	29644	4892	7523	3387	95837	27150	-	168432	228598
Telangana	5394	387	6124	11904	7170	4464	9810	159	2651	30352	367	54973	66877
Tripura	-	-	-	-	-	-	-	225	-	264	-	490	490
Uttar Pradesh	8042	14530	3977	26549	1946	15482	3071	957	6290	51590	-	79337	105886
West Bengal	779	-	1022	1801	-	11	11	-	-	4607	-	4629	6430

Figures rounded off.

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**Table – 2 : Reserves/Resources of Quartzite as on 1.4.2010
(By Grades/States)**

(In '000 tonnes)

Grades/States	Reserves				Remaining resources				Total resources (A+B)				
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Total (B)					
		STD121	STD122			STD221	STD222						
All India : Total	59004	1647	25948	86599	33217	105018	147686	93116	113611	669453	2548	1164648	1251248
By Grades													
Refractory Grade-I	52958	268	21894	75120	4549	626	11470	829	1067	239474	1730	259745	334865
Refractory Grade-II	1520	406	485	2411	146	461	-	3183	21490	97836	-	123115	125526
Ceramic / Pottery	558	9	1015	1581	16195	35826	72771	-	3599	90702	-	219093	220673
Low	985	-	1000	1985	468	3863	18	37	-	8460	-	12846	14830
Ferro-silicon	-	-	-	-	169	692	3034	-	376	-	523	4794	4794
B.F.	242	-	1258	1500	-	606	809	197	275	62822	295	65003	66504
Others	1079	907	210	2195	9488	757	2025	588	-	3012	-	15870	18066
Unclassified	163	-	86	249	2203	55769	55479	67347	55674	133095	-	369566	369816
Not-known	1500	58	-	1558	-	6418	2080	20935	31130	34053	-	94616	96174
By States													
Andhra Pradesh	2114	406	2131	4651	548	1009	7481	-	4390	5209	295	18931	23583
Arunachal Pradesh	-	-	-	-	-	-	-	-	-	5270	-	5270	5270
Bihar	-	32	-	32	146	461	20054	5287	22822	227531	-	276302	276334
Chhattisgarh	1404	-	1267	2672	3086	3926	2195	-	-	14706	-	23913	26584
Haryana	-	-	-	-	15702	89742	112365	86951	85333	231887	-	621980	621980
Himachal Pradesh	25	-	16	41	16	-	-	-	-	-	-	16	57
Jammu & Kashmir	1500	58	-	1558	-	-	-	-	-	-	-	-	1558
Jharkhand	1079	-	174	1253	-	-	-	197	275	38869	-	39340	40592
Karnataka	390	-	1011	1401	-	-	190	-	-	-	1730	1920	3321
Madhya Pradesh	-	-	-	-	-	-	-	-	-	832	-	832	832
Maharashtra	48700	-	19480	68180	9516	28	1639	-	-	11353	-	22536	90716
Odisha	3629	1151	1783	6563	4204	9834	3744	681	-	34851	523	53837	60400
Punjab	-	-	-	-	-	-	-	-	116	81796	-	81912	81912
Rajasthan	163	-	86	249	-	18	18	-	-	706	-	742	991
Sikkim	-	-	-	-	-	-	-	-	675	16444	-	17119	17119

Figures rounded off.

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Table – 3 : Details of Exploration Activities for Quartz & Silica sand, 2014-15

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
QUARTZ							
DMR							
Shillong	South-West- Khasi Hills	1:50000 1:4000	10 3.59	- -	- -	86 -	- -
	Nongtynger South-west Khasi Hills						
DMG, Rajasthan Bundi	N/v Jajawar, Ranipura, Kali dungri, etc.	1:50000 1:10000 1:2000	155 16 2.5	- -	- -	42	Estimated 106.325 thousand tonnes of resources.
SILICA SAND							
D M Minerals							
West Bengal							
Bankura	Brindabanpur and Chanetar PS Beliatore	1:12500	35	-	-	-	Pitting - 10 nos. of dimension 1.2 diameter x 7.0 m depth and Trenching - 3 nos. of dimension 9 x 1.5 x 3.5 m were carried out.
	In and around Dhunara, Ainag Obindapur, Mukundapur, Balaibagan, Khemua, Sitpukur, etc.	1:12500	37	-	-	-	Pitting - 10 nos. of average dimension 1.08 m diameter x 6.65 m depth was carried out.
DMG, Rajasthan Barmer	Jasse Ka Gaon	1:50000 1:10000 1:2000	100 5 3	-	-		
Alwar	Jat Ka Har Teh: Thanagaji	1:10000 1:4000	15 1.5	-	-	20	
Nagaur	N/v Phalki, Lunias, Bargaon, Hiran Khure, etc. Tehj- Merta	1:50000	400	-	-	10	
QUARTZITE							
GSI							
Jammu & Kashmir Udhampur	Sudh Mahadev Area	-	-	-	-	150	The basal quartzite member of Gamir formation consists of 3 types of quartzite i.e. milky white, light grey & bluish grey. The analytical results show that the quartzite exposed in the area is suitable for glass industry after suitable beneficiation.

PRODUCTION, STOCKS & PRICES QUARTZ

As per the GOI Notification S.O. 423(E) dated 10th February 2015, 'Quartz' has been declared as 'Minor Mineral', hence the production beyond January 2015 is not available with IBM. The production of quartz was at 1,381 thousand tonnes in 2014-15 (up to January 2015) as against 1,489 thousand tonnes for the preceding full year.

There were 257 reporting mines in 2014-15 (up to January 2015) as against 288 in preceding year. Besides, the production of quartz was also reported from 119 mines as an associated mineral during the year as against 167 mines in preceding year. The share of public sector mines in the total output was about only 1% during the year. The share of 9 principal producers was about 45% of the total output.

Andhra Pradesh continued to be the major producing state of quartz in the year 2014-15 accounting for 37% of the total production followed by

**Table – 4 : Principal Producers of Quartz
2014-15**

Name & address of producer	Location of mine	
	State	District
Veejee Mines & Minerals, 1-154, Hanaval (Post), Adoni- 518 344, Andhra Pradesh.	Andhra Pradesh	Kurnool
Adibonia Subbarayadu, 20/1/2, Kondapeta, Rajivnagar, Dhone, Kurnool- 518 222, Andhra Pradesh.	Andhra Pradesh	Anantapur
Sibelco India Minerals Pvt. Ltd, (Formerly Vijaya Gimpex, Mining (P)Ltd), No.8-2-293/k/311-312, Sriman Chambers, Kamalapuri Colony, Phase-3, Hyderabad- 500 073, Andhra Pradesh.	Andhra Pradesh Telangana	Anantapur, Mahabubnagar Nalgonda Rangareddy
Sharana Basaveshwara Mining Co. 124/B, Ward No. 2, Koppal – 583 234, Karnataka.	Karnataka	Koppal

(Contd.)

Telangana (27%), Rajasthan (16%), Gujarat (7%), Karnataka (6%), West Bengal (3%), Tamil Nadu (2%), Jharkhand (1%) and the remaining one percent production was contributed by Chhattisgarh, Maharashtra, Odisha and Uttar Pradesh. About 69% of the production during the year 2014-15 (up to January 2015) was reported by 33 mines including 6 associated mines having production above ten thousand tonnes. 24 mines including 5 associated mines having annual production between five thousand & ten thousand tonnes contributed about 12% of the total production. The remaining 19% contribution was from 319 mines including 108 associated mines having annual production below five thousand tonnes (Tables 4 to 7).

The mine-head closing stocks of quartz in 2014-15 (up to January 2015) were 703 thousand tonnes as against 736 thousand tonnes in the year 2013-14 (Table-8).

The average daily labour employed in quartz mines for the ten months period in 2014-15 was 2,450 as against 2,784 in the previous year.

Table - 4 (Concl.)

Name & address of producer	Location of mine	
	State	District
Bijendra Kumar Goyal, 35-36, Shiv Nagar, Murlipura, Jaipur- 302 013, Rajasthan.	Rajasthan	Tonk
Asha Lata Bairwa, R-3, Raghu Vihar, Lal Kothi, Gandhi Nagar, Jaipur- 302 015, Rajasthan.	Rajasthan	Tonk
K. Maheswara Reddy, 5/57, Village & PO. Hussainapuram, Peapully- 518 222, Andhra Pradesh.	Andhra Pradesh	Kurnool
Vidhatri Mines & Minerals, D. No. 40-439-S, Ravi Prakash Complex, R.S. Road, Kurnool – 518 001, Andhra Pradesh.	Andhra Pradesh	Kurnool
Allum Prashant, 11 th Ward, Gadigi Palace Car Street, Ballari - 583 101, Karnataka.	Karnataka	Ballari

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**Table – 5 : Production of Quartz, 2012-13 to 2014-15
(By States)**

(Qty in tonnes; Value in ₹'000)

State	2012-13		2013-14		2014-15* (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	1384155	341129	1488743	392258	1381406	351054
Andhra Pradesh #	515353	104788	522446	127727	508179	110151
Bihar	8997	3914	-	-	-	-
Chhattisgarh	17009	6804	14784	5845	4705	2113
Gujarat	164462	24330	156379	28370	102885	19565
Jharkhand	42474	8566	32633	8418	14730	2940
Karnataka	6931	2225	63624	22443	88673	30344
Madhya Pradesh	340	31	-	-	3450	985
Maharashtra	17475	14899	14985	6791	7256	6030
Odisha	7720	3529	7142	7870	-	-
Rajasthan	173448	40937	229814	57248	225528	53705
Tamil Nadu	21367	28368	15783	18393	21268	15725
Telangana*	378317	93368	394733	96494	367467	96146
Uttar Pradesh	-	-	900	90	50	5
West Bengal	30262	9370	35520	12569	37215	13345

* Data up to January, 2015

Figures mentioned against 2012-13 and 2013-14 are of districts which are part of present Andhra Pradesh & Telangana states.

**Table – 6 : Production of Quartz, 2013-14 & 2014-15
(By Sectors/States/Districts)**

(Qty in tonnes; Value in ₹ '000)

State/District	2013-14			2014-15* (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	288(167)	1488743	392258	257(119)	1381406	351054
Public Sector	2	11676	10874	2	11262	3978
Private Sector	286(167)	1477067	381384	255(119)	1370144	347076
Andhra Pradesh#	52(19)	522446	127727	49(18)	508179	110151
Anantapur	9	181952	38256	6	115298	14468
Chittoor	4	1790	937	4	3873	1505
Cuddapah	1**	-	-	1	710	213
Godavari West	1	6033	3813	2	22170	16381
Guntur	1	3062	1225	2	3984	2156
Krishna	2	264	53	-	-	-
Kurnool	11	269851	56079	11	310512	52547
Nellore	9(19)	33104	14850	7(18)	34929	16284
Prakasam	7	10460	4945	7	11158	3974
Srikakulam	1	100	37	1	60	29
Visakhapatnam	2	9528	4838	3	4985	2419
Vizianagaram	4	6302	2694	5	500	175

(Contd.)

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Table-6 (Contd.)

(Qty in tonnes; Value in ₹ '000)

State/District	2013-14			2014-15 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
Bihar	1**	-	-	1*	-	-
Nawada	1**	-	-	1*	-	-
Chhattisgarh	6	14784	5845	5	4705	2113
Mahasamund	4	11960	4751	3	3888	1788
Rajnandgaon	2	2824	1094	2	817	325
Gujarat	20	156379	28370	17	102885	19565
Dahod	4	14240	2549	4	18122	3353
Kaira	1	10255	1590	-	-	-
Panchmahals	15	131884	24231	13	84763	16212
Jharkhand	7(2)	32633	8418	3(1)	14730	2940
Deogarh	1	72	18	1	2360	590
Giridih	3	16487	5135	1	3440	688
Jamtara	(1)	12288	2212	(1)	8830	1647
Koderma	1(1)	3336	985	-	-	-
Ranchi	1	450	68	1	100	15
Saraikela-kharaswan	1**	-	-	-	-	-
Karnataka	7	63624	22443	5	88673	30344
Ballari	2	29000	9425	2	25480	9406
Chitradurga	1	12100	3134	1**	-	-
Koppal	1	15500	6975	1	62000	20327
Raichur	1	4000	1600	-	-	-
Tumakuru	2	3024	1309	1	1193	611
Madhya Pradesh	1**	-	-	1(1)	3450	985
Balaghat	-	-	-	(1)	250	25
Chhatarpur	1*	-	-	-	-	-
Tikamgarh	-	-	-	1	3200	960
Maharashtra	6	14985	6791	6	7256	6030
Bhandara	3	2426	2184	3	2490	2241
Chandarpur	1**	-	-	1**	-	-
Gadchiroli	1	12549	4605	1	4756	3786
Nagpur	1	10	2	1	10	3
Odisha	2	7142	7870	1	-	-
Jharsuguda	1	7142	7870	-	-	-
Mayurbhanj	1**	-	-	1**	-	-

(Contd.)

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Table - 6 (Concl.)

(Qty in tonnes; value in ₹ '000)

State/District	2013-14			2014-15 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
Rajasthan	62(125)	229814	57248	65(83)	225528	53705
Ajmer	34(52)	61405	17159	42(48)	53452	13717
Bhilwara	8(59)	43838	12483	7(24)	30826	8556
Bundi	(2)	2060	218	(1)	18	5
Chittorgarh	-	-	-	2	2628	679
Jaipur	4	635	254	3	180	41
Rajasamand	(9)	6937	2965	(8)	3105	1707
Sikar	7(2)	13247	3050	5(2)	47234	10069
Tonk	7(1)	89857	19344	5	88085	18931
Udaipur	2	11835	1775	1**	-	-
Tamil Nadu	64	15783	18393	58	21268	15725
Coimbatore	3	553	488	2	232	186
Dharmapuri	1	981	245	-	-	-
Dindigul	6	921	474	6	8046	4727
Erode	13	2323	1892	9	2367	1737
Karur	19	2517	1620	19	5302	3815
Madurai	1	248	198	1	203	162
Namakkal	8	5376	11210	8	3672	3887
Salem	11	511	123	11**	-	-
Tiruchirapalli	1	2088	1639	1	1418	1158
Tiruppur	1	265	504	1	28	53
Telangana #	57(20)	394733	96494	43(15)	367467	96146
Mahabubnagar	29(18)	253455	57268	22(13)	234339	59806
Medak	12	41575	13941	12	40907	13261
Nalgonda	4	17620	3535	3	31821	6853
Nizamabad	2	1984	431	-	-	-
Rangareddy	10(2)	80099	21319	6(2)	60400	16226
Uttar Pradesh	(1)	900	90	(1)	50	5
Hamirpur	(1)	900	90	(1)	50	5
West Bengal	3	35520	12569	3	37215	13345
Bankura	1	11925	5367	1	8995	4047
Birbhum	1	13667	4373	1	17320	6191
Purulia	1	9928	2829	1	10900	3107

Figures in parentheses indicate no. of associated mines of quartz with asbestos, felspar, mica, laterite, pyrophyllite and quartzite.

* Data up to January, 2015

** Reported labour and/or production of felspar

Figures mentioned against 2012-13 and 2013-14 are of districts which are part of present Andhra Pradesh & Telangana states.

QUARTZ & OTHER SILICA MINERALS

Table – 7 : Production of Quartz, 2013-14 & 2014-15 *
(By Frequency Groups)

(Qty in tonnes)

Production group	No. of mines		Production for the group		Percentage in total production		Cumulative percentage	
	2013-14	2014-15 (P)	2013-14	2014-15 (P)	2013-14	2014-15 (P)	2013-14	2014-15 (P)
All Groups	288(167)	257(119)	1488743	1381406	100.00	100.00	-	-
Up to 500	139(89)	130(61)	25566	25430	1.72	1.84	1.72	1.84
501-1000	30(26)	32(17)	41370	35053	2.78	2.54	4.50	4.38
1001-5000	62(39)	49(30)	225858	192437	15.17	13.93	19.67	18.31
5001-10000	26(7)	19(5)	229974	170612	15.45	12.35	35.12	30.66
10001 & above	31(6)	27(6)	965975	957874	64.88	69.34	100.00	100.00

Figures in parentheses indicate number of associated mines of quartz with asbestos, feldspar, laterite, mica, pyrophyllite & quartzite.

* Data up to January, 2015

Table – 8 : Mine-head Stocks of Quartz
2013-14 & 2014-15
(By States)

(In tonnes)

State	2013-14	2014-15 (P)
India	735690	702887
Andhra Pradesh #	155109	206767
Chhattisgarh	8111	7110
Gujarat	5503	5495
Jharkhand	3468	3036
Karnataka	57682	39577
Madhya Pradesh	14537	2802
Maharashtra	2778	3518
Odisha	8092	4447
Rajasthan	139961	130423
Tamil Nadu	9299	12117
Telangana #	330782	286524
Uttar Pradesh	67	37
West Bengal	301	1034

Figures mentioned against 2012-13 and 2013-14 are of districts which are part of present Andhra Pradesh & Telangana states.

SILICA SAND

As per the GOI Notification S.O. 423(E) dated 10th February 2015, 'Silica Sand' has been declared as 'Minor Mineral', hence the production beyond January 2015 is not available with IBM. The production of silica sand at 3,047 thousand tonnes in 2014-15 (up to January 2015) decreased by about 18% over the previous full year due to decrease in market demand and non-availability of labour.

During the year under review, there were 125 reporting mines as against 146 in the preceding year. Besides, the production of silica sand was also reported as an associated mineral by six mines during the year. Ten principal producers accounted for about 53% of the total production. The share of public sector in the total production was 4% in current year as well as in preceding year.

Andhra Pradesh, the leading producing state accounted for 40% of the total production during the year followed by Gujarat (29%), Rajasthan (17%), Maharashtra (4%), West Bengal & Karnataka (3% each). The remaining four percent of production was contributed by Kerala and Tamil Nadu (Tables 9 to 12).

About 56% of the total production of silica sand was contributed by 13 silica sand mines and two associated mines, each producing more than 50 thousand tonnes annually and about 40% by 59 silica sand mines and three associated mines, each producing five thousand to fifty thousand tonnes. The remaining 4% of the output was contributed by 53 silica sand mines and one associated mine, each producing less than 5,000 tonnes annually.

Mine-head closing stocks of silica sand for the year 2014-15 (up to January 2015) were 5,210 thousand tonnes as against 5,427 thousand tonnes for the previous year (Table 13).

The average daily employment of labour in 2014-15 was 1,716 as against 2,240 in the previous year.

QUARTZ & OTHER SILICA MINERALS

Table – 9 : Principal Producers of Silica Sand 2014-15

Name & address of producer	Location of mine	
	State	District
Bhavani Minerals, P.O.Bhilod-393 135, Distt. Bharuch, Gujarat.	Gujarat	Bharuch
Mohd. Sher Khan Khwaja Bagh, P.O. Sawa- 312 613, Distt. Chittorgarh, Rajasthan.	Rajasthan	Chittorgarh
Sanghi Industries Ltd, 10 th Floor, Kataria Arcade, Opp. S. G. Highway, P.O. Makaraba, Distt. Ahmedabad- 380 051, Gujarat.	Gujarat	Kachchh
Alimiya Imam Ali Saiyed, 22/FF-16, Smruddhi Complex, Nyay Mandir, P.O. Himmatnagar- 383 001, Distt. Sabarkantha, Gujarat.	Gujarat	Bharuch
Nishita Mines & Minerals, 6/160, East Street, Gudur, Distt. Nellore, Andhra Pradesh.	Andhra Pradesh	Nellore

Table- 9 (Concl'd.)

Name & address of producer	Location of mine	
	State	District
D. Sundara Rami Reddy, P.O. Chillakur, Mandal-524 412, Distt. Nellore, Andhra Pradesh	Andhra Pradesh	Nellore
Bhajan Dutta, Vill. & P.O. Panchmura, P.S. Taldangra, Distt. Bankura-722 156, West Bengal.	West Bengal	Bankura
Bundi Silica Sand Supply Co., B-72, Ballabh Nagar, Kota- 324 007, Rajasthan.	Rajasthan	Bundi
Shanmuga Minerals, 38/3, Siddavaram Village, Vill. & Post. Siddavaram, Kota Mandal, Gudur, Nellore- 524 411, Andhra Pradesh.	Andhra Pradesh	Nellore
Neyveli Lignite Corporation Ltd., No.135, Periyar E.V.R High Road, Kilpauk, Distt. Chennai-600 010, Tamil Nadu.	Tamil Nadu.	Cuddalore

(Contd.)

Table – 10 : Production of Silica Sand, 2012-13 to 2014-15 (By States)

State	Qty in tonnes; Value in ₹'000)					
	2012-13		2013-14		2014-15*(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	4303883	1002046	3724241	966210	3047485	877497
Andhra Pradesh	2128989	325572	1693844	294559	1242041	223500
Gujarat	869926	72208	844988	73943	873200	89601
Jharkhand	81088	20971	-	-	-	-
Karnataka	102854	37845	133005	56455	88773	39998
Kerala	91833	160183	50793	107973	38628	81245
Maharashtra	278138	82656	274966	97212	129947	59139
Rajasthan	626336	250040	611361	276557	510703	296991
Tamil Nadu	10916	13337	44533	31058	74268	46933
Uttar Pradesh	42051	8326	8336	1667	-	-
West Bengal	71752	30908	62415	26786	89925	40090

* Data up to January, 2015

QUARTZ & OTHER SILICA MINERALS

Table – 11 : Production of Silica Sand, 2013-14 and 2014-15*
(By Sectors/States/Districts)

(Qty in tonnes; Value in ₹' 000)

State/District	2013-14			2014-15*(P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	146(9)	3724241	966210	125(6)	3047485	877497
Public Sector	6(1)	149501	63092	6(1)	111821	69285
Private Sector	140(8)	3574740	903118	119(5)	2935664	808212
Andhra Pradesh	60	1693844	294559	54	1242041	223500
Kurnool	8	59425	15894	5	30685	7658
Nellore	43	1539724	268582	41	1161067	209947
Prakasam	9	94695	10083	8	50289	5895
Gujarat	18(1)	844988	73943	12	873200	89601
Bharuch	13(1)	473193	55841	9	602138	76088
Kachchh	1	326626	12640	1	250513	9703
Sabarkantha	1	5078	1650	1	3337	1335
Surat	1	9010	360	-	-	-
Surendranagar	2	31081	3452	1	17212	2475
Karnataka	13	133005	56455	13	88773	39998
Udupi	11	125675	53523	12	84673	38358
Uttara Kannada	2	7330	2932	1	4100	1640
Kerala	19	50793	107973	17	38628	81245
Alappuzha	19	50793	107973	17	38628	81245
Maharashtra	15	274966	97212	13	129947	59139
Kolhapur	1	8865	1551	1	2100	373
Ratnagiri	5	11533	4486	3	4892	1331
Sindhudurg	9	254568	91175	9	122955	57435
Rajasthan	13(6)	611361	276557	10(4)	510703	296991
Alwar	1	4477	1074	1	5443	1498
Barmer	1	480	120	1	1003	243
Bharatpur	1	15194	3799	-	-	-
Bikaner	(3)	30004	7639	(1)	14990	2838
Bundi	1	93412	56047	1	76416	38208
Chittorgarh	(1)	296000	120175	(1)	260800	169396
Jaisalmer	1	4940	3211	1	3005	1953
Karauli	1	18678	4670	1	12700	3175
Sawai Madhopur	5	139893	77560	5	128074	78349
Sikar	2(1)	4493	1693	(1)	1812	362
Udaipur	(1)	3790	569	(1)	6460	969
Tamil Nadu	6(1)	44533	31058	5(1)	74268	46933
Cuddalore	(1)	33012	18157	(1)	65783	36181
Kanchipuram	2	4489	5086	2	3153	4515
Nagapattinam	3	4460	5351	2	4637	5564
Villupuram	1	2572	2464	1	695	673
Uttar Pradesh	1	8336	1667	-	-	-
Allahabad	1	8336	1667	-	-	-
West Bengal	1(1)	62415	26786	1(1)	89925	40090
Bankura	1(1)	62415	26786	1(1)	89925	40090

Figures in parentheses indicate number of associated mines with agate, ball clay, clay(others), felspar, fireclay, kaolin & quartz.

* Data up to January, 2015

QUARTZ & OTHER SILICA MINERALS

**Table – 12 : Production of Silica Sand, 2013-14 & 2014-15
(By Frequency Groups)**

(Qty in tonnes)

Production group	No. of mines		Production for the group		Percentage in total production		Cumulative percentage	
	2013-14	2014-15*(P)	2013-14	2014-15*(P)	2013-14	2014-15*(P)	2013-14	2014-15*(P)
All Groups	146(9)	125(6)	3724241	3047485	100.00	100.00	-	-
Up to 500	20	14	4687	2097	0.13	0.07	0.13	0.07
501 to 1000	1	4	630	3105	0.02	0.10	0.15	0.17
1001 to 3000	24(2)	16(1)	51866	31021	1.39	1.02	1.54	1.19
3001 to 5000	13(2)	19	63483	73727	1.70	2.42	3.24	3.61
5001 to 10000	20	14(2)	145714	114642	3.91	3.76	7.15	7.37
10001 to 15000	11(1)	13(1)	138375	175923	3.72	5.77	10.87	13.14
15001 to 25000	14(1)	11	281950	219927	7.57	7.22	18.44	20.36
25001 to 50000	25(1)	21	949442	717644	25.49	23.55	43.93	43.91
50001 and Above	18(2)	13(2)	2088094	1709399	56.07	56.09	100.00	100.00

* Data up to January, 2015

**Table – 13 : Mine-head closing Stocks of Silica Sand, 2013-14 & 2014-15*
(By States)**

(In tonnes)

State	2013-14	2014-15*(P)
India	5427043	5209834
Andhra Pradesh	2371868	2307411
Gujarat	2058866	1951900
Jharkhand	-	7696
Karnataka	65754	73609
Kerala	32312	15428
Maharashtra	198279	133686
Odisha	656	-
Rajasthan	599452	715266
Tamil Nadu	18269	4411
Uttar Pradesh	81587	427

* Data up to January, 2015

QUARTZITE

As per the GOI Notification S.O. 423(E) dated 10th February 2015, 'Quartzite' has been declared as 'minor mineral', hence the production beyond January 2015 is not available with IBM. Production of quartzite at 583 thousand tonnes in 2014-15 (up to January 2015) remained almost same as compared to that in the previous full year.

There were 30 reporting mines during the year as against 31 in the previous year. Besides, production of quartzite was reported by 13 associated mines in the current year and 11 associated mines in the previous year. During the year under review, seven principal producers accounted for about 65% of the total production. Entire output of quartzite was reported only from the private sector mines.

Andhra Pradesh was the leading producing state during the year under review contributing about 78% of total production which was followed by Maharashtra (10%), Odisha (4%), Chhattisgarh (3%) and Karnataka (2%). The remaining about 3% was contributed by Rajasthan, Bihar and West Bengal (Tables - 14 to 16).

Mine-head closing stocks of quartzite for the year 2014-15 (up to January 2015) were 322 thousand tonnes as against 235 thousand tonnes for the previous year (Table -17).

The average daily employment of labour during the year under review was 471 as against 628 in 2013-14.

QUARTZ & OTHER SILICA MINERALS

Table – 14 : Principal Producers of Quartzite, 2014-15

Name & address of producer	Location of mine	
	State	District
Dinesh Das & Son's Mines & Steel Pvt. Ltd, Post- Bahalda, Bahalda Road, Distt.- Mayurbhanj - 757 054, Odisha.	Andhra Pradesh	Vizianagaram
B. Ramesh, Flat No. 201, Supriya Niwas, Sagar Society, Road No. 2, Banjara Hills, Hyderabad-500 034.	Andhra Pradesh	Vizianagaram
*Abdul Gaffar Rangoonwala, Gahra Mineral Habib Nagar,Teka Naka, Nagpur-440 017, Maharashtra.	Maharashtra	Bhandara Chandrapur
R. Suneetha, P.O.: Gadasam, Mandal : Dattirajeru, Vizianagaram-535 580, Andhra Pradesh.	Andhra Pradesh	Vizianagaram
BVRM Vishakha, 6-2-79, Gembali Vari Street, Vill. Parvathipuram, Vizianagaram-535 501, Andhra Pradesh.	Andhra Pradesh	Vizianagaram
S. Tirumala Rao, D. No. 4-117, Main Road, P.O. Cheepurupalli, Vizianagaram-535 128, Andhra Pradesh.	Andhra Pradesh	Vizianagaram
Venkateswara Mines and Minerals, Post.Balagudaba,Parvathipuram- 535 501, Distt. Vizianagaram, Andhra Pradesh.	Andhra Pradesh	Vizianagaram

* Producing as an associated mineral with quartz and pyrophyllite.

**Table – 15 : Production of Quartzite, 2012-13 to 2014-15
(By States)**

(Qty in tonnes; Value in ₹'000)

State	2012-13		2013-14		2014-15*(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	501399	276777	584235	342453	583095	325692
Andhra Pradesh	221885	96019	389984	194956	456494	220509
Bihar	109495	54829	35346	16350	5706	2616
Chhattisgarh	42524	43514	31119	33732	19696	20813
Jharkhand	30771	7307	1981	436	-	-
Karnataka	10000	4900	13000	5200	8500	4505
Maharashtra	55117	43160	58073	52063	59991	52234
Odisha	26818	26289	43455	36298	21863	21613
Rajasthan	4489	669	4187	1256	8285	2485
West Bengal	300	90	7090	2162	2560	917

* Data up to January, 2015

QUARTZ & OTHER SILICA MINERALS

**Table – 16 : Production of Quartzite, 2013-14 & 2014-15
(By Sectors/States/Districts)**

(Qty in tonnes; value in ₹ '000)

State/District	2013-14			2014-15* (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	31(11)	584235	342453	30(13)	583095	325692
Private Sector	31(11)	584235	342453	30(13)	583095	325692
Andhra Pradesh	16(4)	389984	194956	17(5)	456494	220509
Cuddapah	1	1038	500	1	25	12
Kurnool	(2)	1137	110	(1)	1487	145
Srikakulam	2	78985	50515	3	61167	36882
Vizianagaram	13(2)	308824	143831	13(4)	393815	183470
Bihar	1(1)	35346	16350	(1)	5706	2616
Munger	1	10670	4802	-	-	-
Nawada	(1)	24676	11548	(1)	5706	2616
Chhattisgarh	6	31119	33732	7	19696	20813
Durg	3	3200	1567	3	3510	2299
Raigarh	2	27869	32125	2	16136	18473
Rajnandgaon	1	50	40	2	50	41
Jharkhand	1	1981	436	1**	-	-
Singhbhum (East)	1	1981	436	1**	-	-
Karnataka	1	13000	5200	1	8500	4505
Belagavi	13000	5200	1	8500	4505	
Maharashtra	(4)	58073	52063	(5)	59991	52234
Bhandara	(3)	35907	30562	(3)	31989	28257
Chandrapur	(1)	22166	21501	(1)	15401	15387
Gadchiroli	-	-	-	(1)	12601	8590
Odisha	4(2)	43455	36298	2(2)	21863	21613
Jharsuguda	2	30248	29580	2	13855	16857
Keonjhar	(1)	1533	736	(1)	2461	1238
Mayurbhanj	2(1)	11674	5982	(1)	5547	3518
Rajasthan	1	4187	1256	1	8285	2485
Sawai Madhopur	1	4187	1256	1	8285	2485
West Bengal	1	7090	2162	1	2560	917
Bankura	1	7090	2162	1	2560	917

Figures in parentheses indicate number of associated mines of quartzite with kyanite, pyrophyllite and quartz.

* Data up to January, 2015

** Only labour reported.

**Table – 17 : Mine-head Stocks of Quartzite
2013-14 & 2014-15
(By States)**

State	(In tonnes)	
	2013-14	2014-15*(P)
India	234839	322193
Andhra Pradesh	124856	232416
Bihar	48006	37524
Chhattisgarh	23119	10626
Jharkhand	1197	966
Karnataka	3014	3759
Maharashtra	12738	18319
Odisha	15901	14706
Rajasthan	4627	2378
Tamil Nadu ⁴	1243	1145
West Bengal	138	354

* Data up to January, 2015

MOULDING SAND

The production of moulding sand was at 6,383 tonnes in 2014-15 decreased by 79% during the year as compared to that in the previous year due to water logging in a mine for which no mining activity could be carried out.

There were three reporting mines in 2014-15 as against five mines in the previous year. The production of moulding sand was reported only from Chhattisgarh during the year. Three principal producers of moulding sand accounted for the entire production in 2014-15 (Tables-18 to 20).

Mine-head closing stocks of moulding sand in the year 2014-15 were 411 tonnes as against 2,741 tonnes in 2013-14 (Table- 21).

The average daily employment of labour in 2014-15 was 40 as against 33 in the preceding year.

QUARTZ & OTHER SILICA MINERALS

Table - 18 : Producers of Moulding Sand, 2014-15

Name and address of producer	Location of mine	
	State	District
Mahendra Kumar Seksaria, 271, Ramdev Mandir, Ward-35, Ganjpara, Durg-491 001, Chhattisgarh.	Chhattisgarh	Durg
Deepak Kumar Gupta, 97-A, Plot 10-11, Nehru Nagar(East), Bhilai, Durg-490 020, Chhattisgarh .	Chhattisgarh	Durg
Archana Das, 44, Vardhaman Nagar, Jain School Road, Rajnandgaon-491 441, Chhattisgarh.	Chhattisgarh	Rajnandgaon

**Table –19: Production of Moulding Sand , 2012-13 to 2014-15
(By States)**

(Qty in tonnes; Value in ₹'000)

State	2012-13		2013-14		2014-15 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	3118	564	29963	4877	6383	1672
Chhattisgarh	2613	392	29323	4675	6383	1672
Gujarat	200	90	150	68	-	-
West Bengal	305	82	490	134	-	-

**Table – 20 : Production of Moulding Sand, 2013-14 & 2014-15
(By Sector/States/Districts)**

(Qty in tonnes; Value in ₹'000)

State/District	2013-14			2014-15 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	5	29963	4877	3	6383	1672
Private sector	5	29963	4877	3	6383	1672
Chhattisgarh	3	29323	4675	3	6383	1672
Durg	2	29228	4580	2	5953	1460
Rajnandgaon	1	95	95	1	430	212
Gujarat	1	150	68	-	-	-
Bhavnagar	1	150	68	-	-	-
West Bengal	1	490	134	-	-	-
Burdwan	1	490	134	-	-	-

QUARTZ & OTHER SILICA MINERALS

**Table – 21: Mine-head closing Stocks of Moulding Sand, 2013-14 & 2014-15
(By States)**

(In tonnes)

State	2013-14	2014-15 (P)
India	2741	411
Chhattisgarh	2427	190
Gujarat	293	200
West Bengal	21	21

SAND (OTHERS)

As per Govt. of India Notification S.O 423 (E) dated 10th February 2015, Sand (others) has been declared as 'Minor Mineral', hence the production beyond January, 2015 is not available with IBM. The production of sand (others) at 2,101 thousand tonnes in 2014-15 decreased by 18% as compared to that of previous year.

There were sixteen reporting mines in 2014-15 as against eighteen reporting mines in the previous year.

The Singareni Collieries Co. Ltd., having seven mines in Telangana contributed 85 % of the total production of sand (others). 14% from three mines of Western Coal Fields Ltd. 1% from 2 mines of MOIL Ltd in Balaghat district of Madhya Pradesh and the remaining quantity was from Rajasthan and Andhra Pradesh (Tables - 22 to 24).

All mines were captive in nature and contract labours were employed by the producers.

Mine-head closing stocks of sand (others) for the 2014-15 were 773 thousand tonnes as against 557 thousand tonnes in the previous year (Table - 25).

Table – 22 : Producers of Sand (Others), 2014-15

Name & address of producer	Location of mine	
	State	District
Singareni Collieries Co.Ltd, P.O. Kothagudam, Distt.- Khammam- 507 101, Telangana.	Telangana	Adilabad Karimnagar
Western Coal fields Ltd, Coal Estate, Civil Lines, Nagpur- 440 001, Maharashtra.	Maharashtra	Chandrapur
MOIL Limited, MOIL Bhavan, I-A Katol Road, Nagpur- 440 013, Maharashtra.	Madhya Pradesh	Balaghat

**Table –23: Production of Sand (Others), 2012-13 to 2014-15
(By States)**

(Qty in tonnes; Value in ₹ '000)

State	2012-13		2013-14		2014-15 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	2638424	201821	2577869	244899	2100563	243975
Andhra Pradesh	9349	1356	7788	1246	7197	1089
Madhya Pradesh	-	-	109843	9666	16037	1540
Maharashtra	750877	49759	577986	38080	291979	27301
Meghalaya	12923	1065	-	-	-	-
Rajasthan	-	-	5831	919	7232	1484
Telangana	1865275	149641	1876421	194988	1778118	212561

QUARTZ & OTHER SILICA MINERALS

**Table – 24 : Production of Sand (Others), 2013-14 & 2014-15
(By Sectors/States/Districts)**

(Qty in tonnes; Value in ₹'000)

State/District	2013-14			2014-15 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	18	2577869	244899	16	2100563	243975
Public Sector	14	2572038	243980	13	2093331	242491
Private Sector	4	5831	919	3	7232	1484
Andhra Pradesh	1	7788	1246	1	7197	1089
Vijaynagaram	1	7788	1246	1	7197	1089
Madhya Pradesh	2	109843	9666	2	16037	1540
Balaghat	2	109843	9666	2	16037	1540
Maharashtra	4	577986	38080	3	291979	27301
Chandrapur	3	523181	34737	3	291979	27301
Nagpur	1	54805	3343	-	-	-
Rajasthan	4	5831	919	3	7232	1484
Barmer	1	551	116	1	825	173
Jaisalmer	3	5280	803	2	6407	1311
Telangana	7	1876421	194988	7	1778118	212561
Adilabad	3	844555	114620	3	925078	142282
Karimnagar	4	1031866	80368	4	853040	70279

**Table – 25: Mine-head Stocks of Sand (Others), 2013-14 & 2014-15
(By States)**

(In tonnes)

State	2013-14	2014-15 (P)
India	556818	772881
Maharashtra	43671	46557
Rajasthan	4767	6551
Telangana	508380	719773

AGATE

As per Govt. of India Notification S.O 423 (E) dated 10th February 2015, Agate has been declared as 'Minor Mineral' hence the production beyond January, 2015 is not available with IBM. No production of agate was reported in 2014-15 as compared to 100 tonnes during the preceding year. There was only a single

private sector mine of agate in Bharuch district of Gujarat in 2013-14 (Tables 26 to 27). Mine-head closing stocks of agate were 21 tonnes for both the year 2013-14 & 2014-15 (Table- 28).

The average daily employment of labour was 'nil' in 2014-15 as against 3 in the previous year.

**Table – 26 : Production of Agate, 2012-13 to 2014-15
(By State)**

(Qty in tonnes; Value in ₹ '000)

State	2012-13		2013-14		2014-15 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India/Gujarat	493	247	100	50	-	-

QUARTZ & OTHER SILICA MINERALS

**Table – 27 : Production of Agate, 2013-14 & 2014-15
(By Sector/State/District)**

(Qty in tonnes; Value in ₹'000)

State/District	2013-14			2014-15 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India/Private Sector/ Gujarat/ Bharuch	1	100	50	-	-	-

**Table – 28 : Mine-head closing Stocks
of Agate
2013-14 & 2014-15
(By State)**

(In tonnes)

State	2013-14	2014-15 (P)
	India/Gujarat	21

FLINT STONE

The production of flint stone at 294 tonnes in 2014-15 decreased by 36% during the year as compared to that in the previous year due to lack of demand.

There were two reporting mines in both the years. The entire production of flintstone was reported from Jharkhand (Tables -29 to 31).

There were no mine-head closing stocks of flint stone in both the years 2013-14 as well as in 2014-15.

The average daily employment of labour was 7 in both the years.

**Table – 29: Producers of Flint stone
2014-15**

Name and address of producer	Location of mine	
	State	District
Sisir Kumar Sarkar, Vill.Taljhari, Taluk-Rajmahal, Distt. Sahibganj-816 129, Jharkhand.	Jharkhand	Sahibganj
Sanjay Stone Industries, 411, 412 , 413/P, Vill.Taljhari, Kharbani, Distt. Sahibganj-816 129, Jharkhand.	Jharkhand	Sahibganj

**Table – 30 : Production of Flint Stone, 2012-13 to 2014-15
(By State)**

(Qty in tonnes; Value in ₹'000)

State	2012-13		2013-14		2014-15 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India/Jharkhand	633	192	459	136	294	59

**Table – 31 : Production of Flint Stone, 2013-14 & 2014-15
(By Sector/State/District)**

(Qty in tonnes; Value in ₹'000)

State/District	2013-14			2014-15 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India/Private Sector	2	459	136	2	294	59
Jharkhand/ Sahibganj	2	459	136	2	294	59

JASPER

No production of jasper was reported since 2009-10. The only mine which reported production in 2008-09 wound up its operation due to lack of demand.

MINING

Mining for silica minerals is carried out by manual opencast method. Quartz produced in the form of lump along with other associated minerals is invariably hammered to pieces and manually sorted before it is despatched to the consuming industries. It is sometimes crushed and marketed. Glass sand is generally screened and washed to remove all the deleterious constituents for its use in glass industry.

APMDC owns two crushing plants located at Mahabubnagar district in Andhra Pradesh with crushing capacity of 45 tonnes and 1000 tonnes a month, respectively. Besides, Maharashtra Minerals Corp. Ltd having a 50,000 tonnes per year beneficiation plant at Phondaghat in Sindhudurg district. The plant has advanced technology in washing both by water and chemicals and further grading it in required fractions.

HEALTH HAZARDS

Respirable silica is still a cause of major concern to miners and consumers since many minerals, especially industrial sand and gravel contain crystalline silica. There is a potential threat of workers getting subjected to "silicosis" in quartz, silica sand and gravel mines. Occupational safety measures & regulations to monitor the levels of crystalline silica in these mines are mandatory. In the USA, the Occupational Safety and Health Administration (OSHA) listed "crystalline silica" as one of their top five priorities for formulation of necessary

rules. The OSHA, on the basis of significant information put out by International Agency for Research on Evaluation of Cancer has declared that any material containing more than 0.1% crystalline silica should indicate its carcinogenic hazard.

USES

Quartz, quartzite and silica sand are used in various industries like glass, refractory, foundry, ceramic, cosmetic, electrical, abrasives, paints, etc. The primary use of silica is in the manufacture of virtually all types of glasswares, ceramics and ceramic glazes. Other major uses are in metallurgy, (where silica is used as a refractory, foundry mould, fluxes and as a source of silicon for the production of silicon metal and ferro-silicon and other ferro-alloys), silicon carbide manufacture, chemical & construction sectors and as a natural abrasive. Known for its piezoelectric properties, high quality quartz crystal is used in electronic devices, multiple telephone lines, depth-sounding devices, range finders, chronometers, etc.

Sand is also used as a fireproofing material, for sandstowing in mines, soundproofing material and as a filler. Silica sand is also used to maintain or increase the permeability of oil and gas-bearing formations; its application as a filler in acid proof cements, putty, paints, epoxy & polyester resins is inevitable. Besides, it is widely used in horticulture as a filtration medium, and for ornamental purposes as well. Silica flour is used as a filler in plastic and rubber products.

Flint and chert are used in abrasives and tube-mill lining. Besides, chert is used in crushed form as aggregate for concrete and road surfacing. Rounded pebbles of chalcedony are used as balls in ball mill for finer crushing and grinding

felspar, calcite and barytes. The different cryptocrystalline varieties of transparent and translucent chalcedony are valued as semiprecious stones and are carved out into a variety of ornaments and used for making different ornamental wares or articles of decoration. Agate pieces after cutting and polishing are sold as semiprecious stones. Big pieces are used in making mortars and pestles for laboratory use. Agate cut into requisite shapes is also used as fulcra of scientific balances and in making edges, planes and bearings of precision instruments.

INDUSTRY & SPECIFICATIONS

In India, quartz, quartzite and silica sand are used mainly in glass, foundry, ferro-alloys and refractory industries and also as building materials. According to its suitability for different purposes, it may be named as building sand, paving sand, moulding or foundry sand, refractory sand or furnace sand, filter sand, glass sand and grinding & polishing sand.

Glass

Main use of silica minerals is in the manufacture of different types of glasses, i.e. glass containers, bottles, amber glass containers, clear flint glass, vacuum bottles and other glasswares. Most of the glass demand in India currently comes from container glass, which accounts for 50% of the country's glass consumption by value. It is reported that a large fraction of the requirement of flat glass, container glass, glass fibre and glass tablewares is being produced by about 100 large-scale producers. Most of them are located in Gujarat, Mumbai, Kolkata, Bengaluru and Hyderabad. There are more than 600 medium and small

cottage-scale industries. The production of glass sheet, toughened glass, fibre glass and glass bottles during 2014-15 was 92,820.32 thousand sq m, 3,437.69 thousand sq m, 40.69 thousand tonnes and 953.92 thousand tonnes, respectively and during 2015-16 (April 2015 to Dec.2015) have been 65,725.25 thousand sq m, 2,435.41 thousand sq m, 37.31 thousand tonnes and 668.53 thousand tonnes, respectively.

The natural silica sand is the preferred material in glass industry, but in some cases where the glass plants are located far away from silica deposits, crushed quartz is also used. For use in glass industry, the silica sand must be uniform in chemical composition, size and shape of grains. Uniform grain size promotes even melting in the glass tank. The sand should not be coarser than 20 or 30 mesh and finer than 100 to 120 mesh. As a general rule, the grains should be angular rather than rounded, because angular grains melt more readily than the rounded ones.

For glass manufacturing, the silica sand should be fairly free from contaminations of clay materials, pebbles, etc. Silica sand usually contains iron oxide, calcium oxide, potassium oxide and sodium oxide in small amounts. Iron is the most objectionable impurity because it imparts colouration to the glass. The common permissible limits of iron oxide in silica sand for use in the manufacture of different types of glass are as follows:

Glass type	Fe ₂ O ₃ %
Optical glass	0.005-0.008
Flint or soda-lime glass	0.02-0.05
Plate glass	0.1-0.2
White bottles or window glass	0.2-0.5
Dark bottle glass	0.5-0.7

BIS has laid down specifications for glass making sands vide IS:488-1980 (Second Revision, Reaffirmed 2008).

Chromium compounds, alumina, lime and magnesia are the other deleterious impurities. Chromium compounds are undesirable because these compounds impart more colouration to the glass than iron. Alumina tends to decrease transparency and makes the batch more difficult to melt. The maximum quantity of alumina permissible in sand is 1.5 percent. The maximum permissible limit for lime and magnesia is about 0.05% and for alkalies, it is 0.01% or less.

Ceramic

The Indian ceramic tiles industry, despite an overall slow down of the economy continues to grow at a healthy rate of about 15% per annum. India ranks in top 3 countries in terms of tiles production in the world. The ceramic tiles industry have been characterised by excess capacities and falling margins. The per capita consumption in India is as low as 0.5 m² per person compared to China (2.6 m² per person), Europe (5 to 6 m² per person) or Brazil (3.4 m² per person). Considering the shortage of 40 million units of housing and rising income of growing middle class the industry has a great potential.

Ceramic industry comprises ceramic tiles, sanitaryware and crockeryware items. These products are manufactured both in large and small-scale sectors. In organised sector, there were 16 units for ceramic tiles with an installed capacity of 2.1 million tonnes per year, 16 units for potteryware with 43,000 tpy installed capacity and 7 units for sanitaryware with 143,000 tpy capacity in the country.

In the small - scale sector, there were over 210 units of sanitaryware with capacity of 53,000 tpy

and over 1400 plants of potteryware with a capacity of 3 lakh tpy.

Ceramic whiteware contains about 40% silica, besides other constituents except for bone china in which it is not used at all. The silica serves to provide whiteness renders the ceramic body to dry easily and provides compatibility between the body and the glass to prevent crazing or peeling. Main source of silica for this application is silica sand. In addition, silica flour is used in formulation of ceramic body for enamels and frits. Silica flour produced by fine grinding of quartzite, sandstone or lump quartz is used in enamels. The silica flour normally contains more than 97.5% SiO₂, less than 0.55% Al₂O₃ and less than 0.2% Fe₂O₃. Purity and small particle size (BS mesh-200) are fundamentally important for silica in manufacture of ceramics. BIS has prescribed the specifications of quartz for ceramic industry vide IS: 11464-2011 (First Revision).

Foundry

The Indian foundry industry is the largest in the world. This industry is well established in the country and is spread across a wide spectrum consisting of large, medium, small and tiny sector. A special feature of domestic foundry industry is its geographical clustering, i.e., Coimbatore cluster is famous for pump sets castings, Kolhapur and Belgaum cluster for automotive castings, Rajkot cluster for diesel engine castings and Batala and Jalandhar cluster for machinery parts and agriculture implements.

A large number of foundries in both ferrous and non-ferrous sectors are functioning in the organised sector in the country. Most of the foundry units use moulding sand having 40 to 65 A.F.S. (American Foundrymen's Society) numbers.

QUARTZ & OTHER SILICA MINERALS

Silica sand is used in both foundry cores and moulds because of its resistance to thermal shock. Silica content of 85% is used in iron casting. In steel foundries, silica content should be at least 95%. BIS has laid down specifications of high silica sand for use in foundries vide IS: 1987-2002 (Second Revision, Reaffirmed 2007).

Natural moulding sand contains variable amount of clay which acts as a bond between the sand grains. These sands, therefore, possess strength, plasticity and refractoriness to varying extent depending upon the clay minerals present. When it contains more clay, it is blended with river sand, which is relatively clay-free so as to get the optimum properties desired in the sand mixture.

Washed grains shall be mostly sub-angular to rounded shape. As far as possible, the sand shall be free from gravel. As per IS:3343-1965 (Reaffirmed 2008), natural moulding sand for use in foundries shall be of three main grades, namely, A, B and C with respect to clay content.

Grade	Clay (%)
A	5 to 10
B	10 to 15
C	15 to 20

Refractoriness of the natural moulding sand based on sintering temperature range should be as follows:

Grade A - 1350 to 1450 °C

Grade B - 1200 to 1350 °C

Grade C - 1100 to 1200 °C

Washed sand grains are required to be sub-angular to rounded shape.

Silica flour is particularly used in the steel foundry in dressing for moulds & cores and also as essential ingredient in the moulding sand mixtures. It is also used to obtain elevated temperature strength, high density and resistance to metal penetration in cores. Silica flour is produced by crushing, washing and grading high-grade quartz/quartzite rocks or white silica sand or other deposits sufficiently pure to get the desired material. BIS has laid down

specifications of silica flour for use in foundries vide IS: 3339-1975 (Reaffirmed 2008).

Refractory

Quartz and quartzite are used in the manufacture of refractory silica bricks. However, recently these bricks are being replaced by basic linings of magnesite, dolomite or natural types such as bauxite, etc. in LD basic oxygen and electric furnaces. Silica reacts readily with basic slag and is, therefore, unsuitable in the basic steel making process. Nevertheless, silica bricks continue to be used in coke ovens, ceramic kilns, glass tank crowns and as blast furnace chequers in some steel mills. Silica bricks have excellent load resistance capacity at high temperature. For the manufacture of refractory bricks, silica mineral should be free from aluminosilicates (felspar, mica, etc.) as they adversely affect refractoriness of the bricks. Silica rock (raw material) should be hard, having high bulk density and low porosity.

Fluxes

Massive quartz, quartzite, sandstone and unconsolidated sands are the main sources of silica that get used as flux in smelting base metal ores where iron and basic oxides are slagged as silicates. Silica is also used to balance the lime and silica ratio of the blast furnace mix. The silica content for this purpose must be as high as 90% with minor amounts of impurities like iron and alumina up to 1.5% maximum. BIS has laid down IS: 13676-1993 (Reaffirmed 2008) for quartzite for iron making in blast furnace.

Ferro-silicon and Other Alloys

Ferro-silicon contains about 75-90% silicon and minor amounts of iron, carbon, etc. It is estimated that for the manufacture of one tonne ferro-silicon of 70-75% grade, about 1.78 tonnes quartz is required besides other raw materials like coke, iron scrap, etc. Quartz is the major source of silica in the manufacture of ferro-silicon. Occasionally, quartzite is also used. However, use of quartzite is restricted as it contains higher alumina and iron and more likely that it would break down in the furnace. Lump silica in the size range from 3/4 to 5 inches are generally preferred. Ferro-silicon is produced by smelting a mixture of quartz, metallic iron (steel scrap and turnings) and a reducing agent like coke, charcoal or wood chips.

QUARTZ & OTHER SILICA MINERALS

Quartz, suitable for ferro-silicon production should have more than 98% SiO₂, less than 0.4% Al₂O₃ and not more than 0.2% each of Fe₂O₃, CaO and MgO. Phosphorus or arsenic should not be present in quartz. If Al₂O₃ is more than the prescribed limit, it affects reduction in the electric furnace. Alkali has a tendency to promote a sticky slag which contaminates the products. If higher iron (more than 0.3%) is present in quartz, the fusion in the furnace takes place at lower temperature and affects

reduction process. Another important factor is that quartz should have good thermal stability at 1200°C or more. BIS has laid down IS: 13054-1991 (Reaffirmed 2008) for use of quartz/ quartzite for production of ferro-alloys.

The production of ferro-silicon was estimated at around 90 thousand tonnes each in 2013-14 and 2014-2015. List of principal producers of ferro-silicon is furnished in Table - 34.

Table – 32 : Principal Producers of Ferro-silicon

Name of the plant	Installed capacity (tpy)
Ferro Alloys Corp. Ltd, (Ferro Alloys Division), Vizianagaram, Andhra Pradesh.	72500 (Total)
Navbharat Ferro Alloys Ltd, Paloncha, Distt.- Khammam, Andhra Pradesh.	9300
VBC Ferro Alloys Ltd, Medak, Andhra Pradesh.	19000
GMR Technologies & Ind. Ltd, Ravivalasa, Distt.- Srikakulam, Andhra Pradesh.	25000 (Total)
Akshay Ispat & Ferro Alloys Ltd, Namchi Distt.- South Sikkim, Sikkim.	6000
Hindustan Malleables & Forgings Ltd, Dhanbad, Jharkhand.	1800
Anjaney Ferro Alloys Ltd, Mihijam, Distt.- Dumka, Jharkhand.	NA

(Contd.)

(Table -32 Concltd.)

Name of the plant	Installed capacity (tpy)
Sandur Manganese & Iron Ore Ltd, Vyasankere, Ballari, Karnataka (closed).	24000
Sri Laxmi Electro Smelters (Pvt.) Ltd, Erumathala, Aluva, Kerala.	NA
Indsil Electrosmelts Ltd, Pallabhari, Distt.- Palakkad, Kerala.	NA
Indian Metals & Ferro Alloys Ltd, Therubali, Distt.- Cuttack, Odisha.	53000
The Silical Metallurgic Ltd, Puducherry.	10560
Snam Alloys Ltd, Village Kariamanickam, Puducherry.	12000
V.S.K. Ferro Alloys Ltd, Thuthipet, Puducherry.	3000
Hindustan Ferro Alloys & Industries Ltd, Hamirpur, Uttar Pradesh.	3200

QUARTZ & OTHER SILICA MINERALS

Silico-manganese, a combination of 60-70% manganese, 10-20% silicon and 20% carbon, substitutes low carbon ferro-manganese in steel industry. The production of silico-manganese (including medium carbon & low carbon silico-manganese) which was about 225 thousand tonnes in 2013-14 increased to 250 thousand tonnes in 2014-15. The details of silicon ferro-alloys are also discussed in the review on 'Ferro-Alloys'.

Silicon Metal

A high purity quartz containing about 99.80% SiO₂, without any other contaminant, is used in the production of silicon metal. The production of silicon metal is similar to that for ferro-silicon except that no iron is added. The alumina and iron contents are specified to be below 0.1% each with calcium and phosphorus contents each restricted to 0.005 percent. For production of one tonne of silicon metal, about 2.6 tonnes silica is consumed. Specifications of silica minerals to be used in different industries are given in Table- 33.

Table – 33 : BIS Specifications of Silica Minerals for various Industries

Industry	Mineral consumed	BIS No.	Physical specifications	Grade	Chemical Specifications							Remarks
					SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	CaO (%)	MgO (%)	TiO ₂ (%)	P (%)	
Glass	Silica sand	IS: 488 1980 (Second Revision; Reaffirmed 2008 & 2013)	-	Special Gr.	99	0.020 (min)	-	-	-	0.10	-	For manufacturing high-grade colourless glass, viz, crystal glass, tableware and decoratedware.
				Gr. I	98.0 (min)	0.04 (max)	-	-	-	0.10 (max)	-	For manufacturing decolourised glassware, viz, containerware, lampware, etc.
				Gr. II	97.5 (min)	0.07 (max)	-	-	-	0.10 (max)	-	For manufacturing glassware where slight tint is permissible.
				Gr. III	97 (max)	0.2 (max)	-	-	-	-	-	For manufacturing of decolourised and some coloured glasses.
Foundry	Silica flour	IS:3339 1975 (First Revision; Reaffirmed 2008 & 2014)	-	-	98.0 (min)	-	-	-	-	-	100% silica flour should pass through 150-micron I.S. sieve and atleast 95% through 75-micron sieve. The fusion temperature should be >1700 °C.	
Iron (BF)	Quartzite	IS:13676 -1993 (Reaffirmed 2008 & 2014)	Lumpy, Hard, Non-friable of size -150 to +10 mm	-	96-98	2.4	-	-	-	-	-	After prescribed thermal stability test on -25+19 mm material, +19 mm fraction should be more than 55% and -5 mm fraction should be less than 5%.
	Banded Hematite Quartzite	-do-	-do-	-	48-50	1.0 (max)	50-52 (Fe)	-	-	-	-	After prescribed tumbling test on +5 mm material, +5 mm fraction should be more than 90%.

Note: In addition, BIS has prescribed following specifications: - silica for paint industry (IS : 67 - 1998; Second Revision; Reaffirmed 2002), High-silica sand for use in foundaries (IS : 1987-2002; Second Revision), Quartz, quartzite for production of ferro-alloys (IS : 13054-1991; Reaffirmed 2003).

CONSUMPTION

The consumption of quartz and silica sand was estimated at 2.08 million tonnes in 2014-15. Major consuming industries were glass (45%), cement (18%), ferro-alloys (13%), foundry (7%), fertilizer (5%) and ceramic (4%). Other industries such as iron & steel, alloy steel, insecticide, refractory, abrasive, etc. consumed the remaining 8%.

The consumption of quartzite was estimated around 414 thousand tonnes out of which iron and steel industry consumed about 68%, followed by refractory (12%), sponge iron (11%) and ferro-alloys (10%).

The total ferro-silicon consumed by various industries in 2014-15 was estimated at 42,500 tonnes. Major consuming industries were iron & steel (86%), alloy steel (8%) and foundry (5%). Besides, reported consumption of ferro-silico-magnesium was 13 tonnes in foundry industry in 2014-15 (Tables 34 to 37).

POLICY

Foreign Trade Policy (FTP) for 2009-2014 and the amended Export and Import Policy incorporated in the FTP, the imports of natural sands will subject to Plant quarantine (Regulation of imports into India) Order, 2003. However, the exports of river sand to Maldives under bilateral agreements between Government of India and Government of the Republic of Maldives is permitted, subject to 'No Objection Certificate' by CAPEXIL within the annual ceiling of 2, 2.5 & 3 lakh metric tonnes for the year 2014-15, 2015-16 and 2016-17, respectively.

SUBSTITUTION

In order to reduce the potential threat of "silicosis", a variety of materials are used as substitutes for silica. Basic and neutral refractories (including magnesite, mag-chrome, dolomite and high alumina bricks) have replaced silica in a large number of applications. Chromite, olivine and zircon are alternatives to foundry sands. Garnet and to a lesser extent, olivine are used in sand blasting to avoid the risk of silicosis. Wollastonite is more favoured than free silicon for use in the ceramic industry, again due to the risk of silicosis. In electronic industry, replacement of natural quartz crystal by cultured quartz crystal is increasing steadily. It has been estimated that about 10 billion quartz crystals and oscillators per year are manufactured and installed world wide in all types of electronic devices.

Table – 34 : Consumption* of Quartz/Silica Sand, 2012-13 to 2014-15 (By Industries)

(In tonnes)			
Industry	2012-13	2013-14(R)	2014-15(P)
All Industries	1713500	2123400	2076400
Alloy steel	2900(9)	2900(9)	2900(9)
Cement	381900(17)	334200(19)	384100(19)
Ceramic	88200(38)	88200(38)	88200(38)
Ferro-alloys	276100(45)	272700(45)	272100(45)
Fertilizer	105800(4)	105800(4)	105800(4)
Foundry	141400(32)	141400(32)	146600(32)
Glass	628100(54)	1036100(55)	940800(55)
Iron & Steel	30200(5)	83700(7)	84800(7)
Others (Abrasive, asbestos, chemical, dry cell battery, electrical, paint, pesticide, refractory and rubber)	58900(89)	58400(90)	57100(90)

Figures rounded off.

Figures in parentheses denote the number of units in organised sector reporting consumption.

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

Table – 35 : Consumption* of Quartzite, 2012-13 to 2014-15 (By Industries)

(In tonnes)			
Industry	2012-13	2013-14(R)	2014-15(P)
All Industries	293300	418000	413700
Cement	++(2)	++(2)	-
Ferro-alloys	39900(13)	43100(13)	39900(13)
Foundry	100(5)	100(5)	100(5)
Iron & steel	158500(29)	279400(30)	280600(30)
Pelletisation (Iron & steel)	++(1)	++(1)	-
Refractory	49900(12)	50500(12)	48200(12)
Sponge iron	44900(2)	54900(2)	44900(2)

Figures rounded off.

Figures in parentheses denote the number of units in organised sector reporting consumption.

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

QUARTZ & OTHER SILICA MINERALS

**Table – 36: Consumption* of Ferro-Silicon
2012-13 to 2014-15
(By Industries)**

(In tonnes)			
Industry	2012-13	2013-14(R)	2014-15(P)
All Industries	41700	42000	42500
Alloy steel	3300 (7)	3300 (7)	3300 (7)
Foundry	2200 (21)	2200 (23)	2200 (23)
Iron & steel	35900 (23)	36200 (23)	36700 (23)
Others (Electrode & Ferro-alloys)	300 (7)	300 (7)	300 (7)

Figures rounded off.

Figures in parentheses denote no. of units in organised sector.

* Paucity of data, hence consumption may not be complete.

**Table – 37: Consumption* of Ferro-Silicon-
Magnesium, 2012-13 to 2014-15
(By Industries)**

(In tonnes)			
Industry	2012-13	2013-14(R)	2014-15(P)
All Industries	13	13	13
Foundry	13 (2)	13 (2)	13 (2)

Figures in parenthesis denote the number of units in organised sector.

* Paucity of data, hence consumption may not be complete.

WORLD REVIEW

Basically, silica is abundant in the earth's crust. Sand and gravel reserves of the world are large. Quartz-rich sand and sandstone are the main sources of industrial silica sand which occurs throughout the world. Reserves of natural quartz crystal suitable for electronics or optical use in the world are limited. The world's dependence on these reserves will continue to decline because of the increased usage of cultured quartz crystal as an alternate material. Electronic applications accounted for the most industrial uses of quartz crystal, followed by optical application.

All quartz crystals used for electronics were cultured. The world production of industrial silica sand and gravel by principal countries is given in Table - 38.

**Table – 38: World Production of
Sand and Gravel (Industrial), 2012 to 2014
(By Principal Countries)**

(In '000 tonnes)			
Country	2012	2013	2014
World: Total	139000	152000	165000
Australia	5300	5500	5500
Belgium	1800	-	-
Canada	1590	1690	1800
Chile	1270	1360	1400
Czech Republic	1340	1340	1340
Egypt	1800	-	-
Finland	2400	2400	2400
France	6290	6290	6300
French Guyana	1500	-	-
Gambia	1200	-	-
Germany	7500	7500	7500
India*	1900	1210	1200
Iran	1500	-	-
Italy	16400	16400	16400
Japan	3200	3000	3000
Latvia	1360	-	-
Malaysia	1200	1000	1000
Mexico	3590	3590	3590
Moldova	2970	3000	3000
Norway	1000	1000	1000
Poland	2570	2300	2300
Saudi Arabia	-	1400	1400
South Africa	2600	2110	2100
Spain	5000	3400	3400
Turkey	7000	15000	15000
UK	3760	3760	3800
USA	50700	62100	75000
Other countries	2260	6690	7000

Source: World Mineral Production, 2010 - 2014.

* India's production of silica minerals during 2012-13, 2013-14 and 2014-15, Tables-5, 10, 15 and 19 of this Review may be referred. Besides, sand is also produced as a minor mineral for use in building construction applications.

FOREIGN TRADE

Exports

Exports of quartz and quartzite (natural) increased to 410,483 tonnes in 2014-15 from 308,409 tonnes in the previous year. Out of total exports, quartz comprised 337,231 tonnes (82%) and quartzite 73,252 tonnes (18%). Exports were mainly to Bhutan & Vietnam (12% each), Bangladesh (11%), Japan & Korea, Rep. of (8% each), Oman, Malaysia & UAE (7% each). Exports of silica sand decreased considerably to 1,126 tonnes in 2014-15 from 4,497 tonnes in the previous year. Exports were mainly to UAE (23%), Oman (21%), Nigeria (18%), Ghana (9%) and China (8%). Exports of sand (excluding metal bearing) increased considerably to 10,751 tonnes in 2014-15 from 5,444 tonnes in the previous year. Exports were mainly to Saudi Arabia (28%), Maldives (26%), Japan (12%), Iran (8%), Bangladesh & Turkey (3% each). Exports of agate (uncut) decreased to 557 tonnes in 2014-15 from 767 tonnes in the previous year. China (90%) was the main buyer followed by USA (3%) and UK (1%). Exports of agate (cut) registered a sharp increase of 3,34,484 thousand carat in 2014-15 from 1,533 thousand carat in the previous year. China (98%) and USA (1%), were the main buyers of agate (cut) in 2014-15. Exports of silicon also increased considerably to 260 tonnes in 2014-15 from 84 tonnes in the previous year. USA (74%), Nepal (15%), Sri Lanka (7%) and Cameroon (2%) were the main buyers of silicon in 2014-15. Exports of flint decreased drastically to 484 tonnes in 2014-15 from 2,524 tonnes in the previous year. Ethiopia (46%), Japan (45) and Djibouti (8%) were the main buyers in 2014-15. (Tables- 39 to 47).

Imports

Imports of quartz and quartzite (natural) were 215 tonnes in 2014-15 as compared to 377 tonnes in 2013-14. Out of the total imports in 2014-15, those of quartz (natural) were 31 tonnes and mainly from Belgium (29%) and Germany (6%) while quartzite imports were 184 tonnes mainly from Brazil (57%), Italy (28%), Germany (13%) and China (2%). Imports of silica sand decreased slightly to 76,529 tonnes in 2014-15 from 97,526 tonnes in the previous year. Egypt (67%), Saudi Arabia (21%), China (5%), Italy and Belgium (1% each) were the main suppliers. Imports of sand (excluding metal bearing) was increased considerably to 58,237 tonnes in 2014-15 from 15,688 tonnes in the previous year and imports

were mainly from Cambodia (98%). Imports of agate (uncut) increased drastically to 98 tonnes in 2014-15 from 50 tonnes in the previous year. Imports were mainly from Turkey (39%), China (37%), Madagascar (10%) and USA (8%). Imports of agate (cut) also increased manifold to 767 thousand carat in 2014-15 from 12 thousand carat in 2013-14. China (67%), Australia (18%) and Hong Kong (14%) were the main suppliers of agate (cut). Imports of silicon increased marginally to 42,296 tonnes in 2014-15 from 37,411 tonnes in previous year. Imports were mainly from China (92%), Bhutan (4%), Australia (3%) and UK (1%). Imports of flint recorded at 141 tonnes in 2014-15 and were mainly from Egypt (99%) and Denmark (1%) (Tables - 48 to 56).

Table – 39 : Exports of Quartz And Quartzite (Natural) : Total (By Countries)

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	308409	2233315	410483	2938718
Japan	29118	398659	33730	449364
Vietnam, Soc. Rep.	26135	233773	47888	432739
Bhutan	46968	144507	49610	193342
Bangladesh	45635	160851	46356	184790
Korea, Rep. of	27439	155122	31915	175840
Malaysia	27674	210487	28011	175086
Israel	7898	98170	12124	159045
UAE	23688	109276	28885	135860
Oman	10095	59390	29909	130977
Italy	7072	80777	7726	93739
Other countries	56687	582303	94329	807936

Table – 40 : Exports of Quartzite (Natural) (By Countries)

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	69479	838777	73252	848514
Japan	10381	203415	13011	221323
Israel	6316	75246	8375	104793
Italy	5833	67521	5294	67038
Bangladesh	10382	31839	11160	53545
Bhutan	-	-	7466	50800
Singapore	711	14842	2475	49116
Vietnam, Soc. Rep.	10473	98863	5094	48585
Malaysia	5070	84163	3609	22316
U S A	169	4904	557	20970
Germany	1171	21401	935	17780
Other Countries	18973	236583	15276	192248

QUARTZ & OTHER SILICA MINERALS

**Table – 41: Exports of Quartz (Natural)
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	238930	1394538	337231	2090204
Vietnam, Soc. Rep.	15662	134910	42794	384154
Japan	18737	195244	20719	228041
Korea, Rep. of	26261	146394	31342	171006
Malaysia	22604	126325	24402	152771
Bhutan	46968	144507	42144	142543
Bangladesh	35253	129012	35196	131245
UAE	23293	106554	27327	126696
Oman	8003	45566	28527	125634
Nepal	1412	7128	24292	78557
China	2290	23986	8461	73351
Other countries	38447	334912	52027	476206

**Table – 43 : Exports of Sand
(Excl. Metal Bearing)
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	5444	369627	10751	342836
Saudi Arabia	1000	102467	2999	205129
Iran	2141	227246	898	81775
Japan	-	-	1253	22400
Bangladesh	537	11898	366	4814
Turkey	-	-	336	4361
Maldives	-	-	2800	3419
Singapore	++	2	135	2705
Vietnam, Soc. Rep.	-	-	240	2521
UAE	320	3593	93	2435
Angola	-	-	326	1877
Other countries	1446	24421	1305	11400

**Table –42 : Exports of Silica Sand
(By Countries)**

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	4497	33142	1216	9802
Kenya	658	6173	91	1701
UAE	1245	6364	284	1499
Nigeria	656	6001	216	1379
Ghana	1	3	104	1163
China	0	1	96	982
Oman	27	120	257	955
Nepal	17	91	49	840
Tanzania Rep	78	580	54	556
Bangladesh	124	197	16	353
Malaysia	235	1242	25	133
Other countries	1456	12370	24	241

**Table – 44 : Exports of Agate (Uncut)
(By Countries)**

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	767	84003	557	110088
USA	8	23620	19	48615
China	726	31768	504	17338
UK	1	1080	5	7984
Australia	1	3050	3	5178
France	++	1364	1	2957
Saudi Arabia	5	10080	4	2609
Hong Kong	15	825	1	2585
Canada	1	1514	++	2428
Germany	7	2095	2	2403
Japan	++	489	1	2370
Other countries	3	8118	17	15621

QUARTZ & OTHER SILICA MINERALS

**Table – 45: Exports of Agate: (Cut)
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (‘000 carats)	Value (₹‘000)	Qty (‘000 carats)	Value (₹‘000)
All Countries	1533	76910	334484	44484
USA	571	25131	3548	19722
China	208	13995	328069	6541
UK	416	11189	1126	5402
Australia	5	2861	824	4580
Korea, Rep. of	1	512	60	1342
Greece	7	454	17	1231
Hong Kong	246	6974	22	1210
Korea, Dem. Rep. of	3	3100	50	1085
Japan	47	4546	111	1009
Chinese Taipei/Taiwan	2	112	192	466
Other countries	27	8036	465	1896

**Table – 46 Exports of Flint
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹‘000)	Qty (t)	Value (₹‘000)
All Countries	2524	18156	484	3991
Japan	40	478	220	2409
Ethiopia	97	515	222	1305
Djibouti	337	1765	38	215
Egypt	1200	9826	4	61
Italy	-	-	++	1
Other countries	850	5572	-	-

**Table – 47: Exports of Silicon
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹‘000)	Qty (t)	Value (₹‘000)
All Countries	84	17642	260	34175
USA	++	76	192	26744
Sri Lanka	37	5937	17	3076
Nepal	3	442	40	2589
Cameroon	-	-	5	934
Angola	-	-	2	234
Vietnam, Soc. Rep.	-	-	1	175
UAE	4	514	++	112
Italy	2	436	1	101
Kenya	2	391	1	98
Saudi Arabia	-	-	1	59
Other countries	36	9846	++	53

**Table – 48: Imports of Quartz and Quartzite
(Natural) : Total
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹‘000)	Qty (t)	Value (₹‘000)
All Countries	377	10924	215	10404
Brazil	-	-	105	3480
Italy	34	1545	51	2475
Germany	50	3521	25	1813
Belgium	224	4678	10	1481
Israel	1	220	++	906
China	54	544	4	160
France	-	-	++	22
UAE	-	-	++	19
Thailand	12	388	++	17
Czech Republic	-	-	++	11
Other countries	2	28	20	20

QUARTZ & OTHER SILICA MINERALS

**Table – 49 : Imports of Quartzite(Natural)
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	40	2627	184	8393
Brazil	-	-	105	3440
Italy	34	1545	51	2475
Germany	4	733	23	1675
Belgium	++	57	1	342
Israel	1	220	++	253
China	1	62	4	160
Thailand	-	-	++	17
Czech Republic	-	-	++	11
Japan	-	-	++	9
USA	++	10	++	7
Other countries	-	-	++	4

**Table – 50 : Imports of Quartz (Natural)
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	337	8297	31	2011
Belgium	224	4621	9	1139
Israel	-	-	++	653
Germany	46	2788	2	138
Brazil	-	-	++	39
UAE	-	-	++	19
France	-	-	++	17
Bhutan	-	-	++	1
Other countries	67	888	20	5

**Table –51: Imports of Silica Sand
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	97526	938842	76529	556336
Egypt	2934	43764	51098	151829
China	2899	80457	3978	127493
Saudi Arabia	9932	68089	15700	112706
Chinese Taipei/ Taiwan	431	41867	424	36382
USA	786	48244	873	25563
Italy	1423	24779	1140	21288
Belgium	1146	24355	656	12809
UK	175	11105	152	9246
Norway	647	15736	128	8843
Germany	315	10174	635	7289
Other countries	76838	570272	1745	42888

**Table – 52 : Imports of Sand
(Excl. Metal Bearing)
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	15688	61432	58237	98399
Cambodia	11640	16379	57150	79757
China	117	4911	147	5218
Chinese Taipei/Taiwan	79	7464	59	4736
Saudi Arabia	-	-	322	1943
UK	44	1943	27	1714
Germany	592	19747	56	1682
Switzerland	2	91	45	1071
Italy	36	1388	20	774
South Africa	21	582	21	468
Hungary	36	984	12	349
Other countries	3121	7943	378	687

**Table – 53 : Imports of Flint
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	-	-	141	2257
Egypt	-	-	139	2201
Denmark	-	-	2	56
Other countries	-	-	-	-

**Table – 54: Imports of Agate: Uncut
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	50	9551	98	24688
China	13	4119	36	13382
Turkey	10	1618	38	7247
USA	15	1247	8	1435
Indonesia	-	-	4	850
Brazil	-	-	++	746
Madagascar	-	-	10	357
Hong Kong	1	1028	++	232
South Africa	1	621	1	113
Uruguay	-	-	++	105
France	-	-	++	65
Other countries	10	918	1	156

QUARTZ & OTHER SILICA MINERALS

**Table – 55 : Imports of Agate: Cut
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (‘000 Carats)	Value (₹‘000)	Qty (‘000 Carats)	Value (₹‘000)
All Countries	12	22179	767	8977
China	3	1984	512	4671
Hong Kong	8	17963	109	1915
Italy	-	-	1	1134
Australia	-	-	140	662
Thailand	++	454	1	392
USA	1	1531	4	203
Other countries	++	247	-	-

**Table – 56 : Imports of Silicon
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹‘000)	Qty (t)	Value (₹‘000)
All Countries	37411	4682391	42296	5689328
China	35717	4373190	38964	5190246
Australia	946	139857	1152	180569
Bhutan	1	1542	1503	149760
UK	190	29794	307	49714
Norway	34	13170	92	26494
Chinese Taipei/Taiwan	8	20519	8	25264
Korea, Rep. of	20	2446	93	13288
Singapore	24	12636	39	13115
USA	7	21187	5	11783
Belgium	20	2972	60	7651
Other countries	444	65078	73	21444

FUTURE OUTLOOK

According to its suitability for different purposes, quartz & silica minerals are named as building sand, paving sand, moulding or foundry sand, refractory sand or furnace sand and glass sand, etc. However, the main use of silica minerals is in manufacture of different types of glasses, natural silica sand being the preferred material in the glass industry. In India, quartz, quartzite and silica sand are used mainly in glass, foundry, ferro-alloys, refractory industries and also as building materials.

The demand for quartz, silica sand, moulding sand and quartzite is increasing over the years to cater to the requirement of ferro-silicon, silico-manganese, silico-chrome, silica refractories, glass and for moulding and casting purposes. The

requirements of these products are linked up directly with iron and steel industry including alloy steel production. Further, setting up foundries and enhancing their capacities are also linked with metallurgical industry.

As per the report of the Sub-Group on 12th Plan, Planning Commission of India, the domestic demand of quartz and silica minerals was estimated at 3.15 million tonnes by 2011-12 and at 4.85 million tonnes by 2016-17 at 9% growth rate.

The total resources of quartz and other silica minerals are 3,499 million tonnes as on 1.4.2010. There are very good prospects of increasing the production and also the export of quartz and silica minerals to the neighbouring countries.