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KAOLIN, BALL CLAY, OTHER CLAYS AND SHALE

(ADVANCE RELEASE)

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29 Kaolin, Ball Clay, Other Clays and Shale

1. Kaolin (China Clay)

Kaolin, also known as china clay, is a natural clay formed by chemical weathering of aluminium silicate minerals like felspars through a complex sequence of events. It is relatively pure clay predominantly consisting of kaolinite ($Al_2Si_2O_5(OH)_4$), associated with other clay minerals like dickite, halloysite, nacrite and anauxite. Kaolin is commercially valued for its whiteness and fine particle size which distinguish it from other clays, such as, ball clay and fireclay. Other physical characteristics that influence commercial utility include brightness, glossiness, abrasiveness and viscosity. It often contains small amounts of impurities in the form of rock fragments, hydrous oxides and colloidal materials. Kaolin is produced and consumed in the country in crude & processed forms. The major use of crude china clay is in Cement Industry and of processed china clay is Ceramic Industry. The insitu clay deposits in India are often soft and easily extracted with no blasting required.

RESOURCES

China clay resources in the country as per UNFC system as on 1.4.2010 have been placed at 2,705.21 million tonnes. The reserves constitute only about 7% of the resources at 177.16 million tonnes. Out of the total reserves, 70% (about 124 million tonnes) reserves are under proved category whereas 30% (about 53 million tonnes) reserves fall under probable category.

The resources are spread over in a number of states of which Kerala holds about 25%, followed by West Bengal and Rajasthan (16% each) and Odisha and Karnataka (10% each).

Out of total resources, about 22% or 607.78 million tonnes fall under ceramic/pottery grade, 4% are classified under chemical, paper filler and cement grades and about 73% or 1,980 million tonnes resources fall under mixed grade, others, unclassified & not-known categories. The details of reserves/resources are given in Table- 1.

EXPLORATION & DEVELOPMENT

DMG, Kerala carried out exploration for kaolin in the districts of Kannur and Kollam,Kerala state. The details of exploration carried out during 2014-15 are furnished in Table-2.

PRODUCTION, STOCKS & PRICES

The production of kaolin at 3861 thousand tonnes in 2014-15 (up to January 2015) decreased by 20% as compared to previous full year.

There were 135 reporting mines during 2014-15 as against 160 mines in the previous year. Besides, the production of kaolin was also reported as an associated mineral by five mines in the year 2014-15 and ten mines in the previous year. Nine principal producers accounted for about 69% of the total output of kaolin in 2014-15. The private sector mines reported almost the entire production of Kaolin. Nominal production was reported by 5 public sector mines. The proportion of natural and processed kaolin in 2014-15 was 98% and 2% respectively.

During 2014-15, 52 mines including 2 associated mines each producing more than 10,000 tonnes annually accounted for 96% of the total production of kaolin (natural) while 15 mines each in the annual production range of 5,001 to10,000 tonnes accounted for about 3 % and the remaining production of kaolin (natural) was shared by 58 mines including 3 associated mines producing up to 5,000 tonnes annually.

Contribution of 5 kaolin mines producing more than 5000 tonnes of kaolin (processed) was about 75% and remaining 25% production of kaolin (processed) was shared by 10 kaolin mines.

Gujarat was the leading producing state of kaolin accounting for 64% of the total production in 2014-15 followed by Rajasthan (16%), Kerala (15%) and West Bengal (2%). The remaining 3% was shared by Andhra Pradesh, Jharkhand, Karnataka and Madhya Prades (Tables - 3 to 7)

Mine-head closing stocks of kaolin for the year 2014-15 (up to January 2015) were 1,267 thousand tonnes as against 1,210 thousand tonnes for the previous year (Table - 8)

The average daily employment of labour during 2014-15 was 2787 as against 2939 in the preceding year.

Domestic prices of kaolin are furnished in the General Review on 'Prices".

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

(In '000 tonnes)

Grade / State	Reserves				Remaining resources								Total resources (A+B)
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
		STD121	STD122			STD221	STD222						
All India : Total	**124118**	**11034**	**42006**	**177158**	**24543**	**22980**	**71270**	**284781**	**412852**	**1651286**	**60338**	**2528050**	**2705208**
By Grades													
Chemical	-	-	-	-	-	600	-	-	-	33945	-	34545	34545
Ceramic/Pottery	48028	2948	19564	70540	5957	10837	34695	100846	21283	337834	25788	537240	607780
Mixed Grade	7926	525	1330	9781	256	1784	2725	884	607	199355	18373	223984	233765
Filler	5793	181	2892	8866	2699	992	3671	11	665	30035	2804	40877	49743
Cement	14275	4324	2981	21580	1211	321	4637	730	1286	2565	409	11159	32739
Others	17796	1563	10234	29593	9464	6606	13651	180195	2758	41709	676	255059	284652
Unclassified	22924	506	1801	25231	3888	1161	3820	850	68338	30644	1289	109990	135221
Not-known	7376	987	3205	11568	1068	677	8071	1264	317915	975199	11000	1315194	1326762
By States													
Andhra Pradesh	2524	339	2205	4828	286	790	996	126	669	51378	3088	57333	62161
Assam	-	-	-	-	-	131	-	392	-	3520	-	4043	4043
Bihar	-	-	-	-	-	-	-	104	39	1296	-	1439	1439
Chhattisgarh	834	-	344	1178	480	765	1076	-	-	11512	-	13833	15011
Delhi	-	-	-	-	-	-	-	857	630	3802	-	5289	5289
Goa	-	-	-	-	-	-	16	-	-	-	-	16	16
Gujarat	34290	240	6232	40762	4654	856	24135	-	878	40904	-	71427	112189
Haryana	-	-	-	-	2367	789	3377	13	34	5485	-	12065	12065
Jammu & Kashmir	-	-	-	-	-	-	-	-	-	28122	-	28122	28122
Jharkhand	8554	325	8731	17610	209	2031	1565	1936	7363	149957	18019	181080	198690
Karnataka	943	835	280	2058	819	738	3390	220360	443	24685	6030	256465	258523
Kerala	3352	792	-	4144	2447	463	2985	43930	20439	569226	20200	659690	663834
Madhya Pradesh	-	-	-	-	942	-	61	-	415	11741	-	13159	13159
Maharashtra	-	-	-	-	418	256	856	11	184	5523	-	7248	7248
Manipur	-	-	-	-	-	-	-	2520	-	-	-	2520	2520
Meghalaya	-	-	-	-	-	-	-	1410	6266	76032	5167	88875	88875
Odisha	2376	715	811	3902	-	1252	2476	223	35393	236421	1259	277024	280926
Puducherry	-	-	-	-	-	-	-	-	-	2940	-	2940	2940
Rajasthan	70012	7603	22497	100112	11524	14008	29483	1260	4067	271314	749	332405	432517
Tamil Nadu	-	-	-	-	-	-	-	-	327	56570	-	56897	56897
Telangana	240	-	-	240	397	700	152	-	22	10505	-	11775	12015
Uttar Pradesh	-	-	-	-	-	-	-	11600	3447	10018	-	25065	25065
West Bengal	1232	185	906	2323	-	202	703	38	332236	80335	5826	419340	421663

Figures rounded off.

Table – 2 : Details of Exploration Activities for Kaolin and other Clays, 2014-15

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DMG China Clay Kerala							
Kannur	Kannadipoyil area Taluka: Taliparamba	-	-	04	97	-	Objective of exploration was investigation for china clay by core drilling. The average thickness of overburden was found out to be about 4 m followed by lateritic clay, greyish yellowish, yellowish white variegated clay. The average thickness was found out to be about 7 m. Resources will be estimated after completionof investigation.
	Vaipiriyam, Kankol Taluka: Taliparamba	-	-	07	250	-	China clay occurs as sedimentary as well as residual deposits. The average thickness of overburden was 5 m followed by lateritic clay, greyish yellowish, yellowish white variegated clay. The average thickness of clay was found out to be 15 m. About 10 million tonnes resources were estmated.
	Koram area Taluka: Taliparamba	-	-	09	354	-	The average alumnious laterite thickness was found out to be 3.5 m and that of low grade clay is 14 m. About 16 million tonnes ressources were estimated.
	Karinthadaom area Taluka: Taliparamba	-	-	05	140.5	-	The thickness of lateritic overburden was found out to be 5 m and that of low grade china clay was 17 m. Estimation of ressources will be computed aftr receipt of chemical analysis report.
Kollam	Kalapoika-Punnathadaom area Taluka: Kollam	-	-	12	447	-	It was observed that alternate beds of pale white to greyish clay, pale pinkish clayey sand & black carbonaceous clay exists. The average thickness of overburden was found out to be about 7 m and that of dull white to greyish sandy clay is 20m. About 9.6 million tonnes tentative resources of dull white to greyish sandy clay were estimated.
Kasargod	Nileswaram area	-	-	05	113.5	-	The average of 6.5 m lateritc soil overburden was present and the clay thickness varies from 10-16 m. The average thickness of clay deposit was found out to be about 13 m. About 52,000 tones resources were estimated.
Directorate of Mines & Minerals West Bengal							
Bankura	Beliatore area, Bajora block	1:12500	35	-	-	36	Alluvial/lateritic soil which acts as a capping of the underlying clay beds. The overburden have variable thickness of 1-4 m and the thickness of clay beds ranges from 2-3 m upto maximum depth of 7 m from the surface. Resources were not estimated.
	Dhunara, Ainagobindapur Mukundapur, Bhalaibagan	1:12500	37.0	-	447	38	Alluvial/lateritic soil which acts as a capping of the underlying clay beds. The overburden have variable thickness of 1.2 - 10.66 m and the thickness of clay deposits varies from 3.35 - 6.40 m from the surface.The china clay was found to occur with an intermittent layer of latrite in between. Resources were not estimated.

Table – 3 : Principal Producers of Kaolin, 2014-15

Name & address of producer	Location of mine	
	State	District
Shree Ram Minechem International, G.I.D.C Area, Madhapar, Bhuj-370 020, Distt. Kachchh Gujarat	Gujarat	Kachchh
EICL Ltd, TC- 79/04, Veli, Thiruvananthapuram-695 021, Kerala.	Kerala	Thiruvanantha-puram
Manoj P. Solanki, Near Thakar Mandir, Junavas, Madhapar, Bhuj- 370 020, Distt. Kachchh Gujarat.	Gujarat	Kachchh
Satish Valji Chhanga & Harilal Hira Jatiya, Vill. Mamuara, Taluka. Bhuj, Distt. Kachchh Gujarat.	Gujarat	Kachchh
Gopal Savabhai Dangar, Near Ramdevpir Temple, Nadapa, Distt. Kachchh -370 020, Gujarat.	Gujarat	Kachchh
HD Enterprises Pvt. Ltd, 101, HD House, Pooja Complex 'A', Station Road, P.O. Bhuj, Distt. Kachchh -370 001, Gujarat.	Gujarat	Kachchh
Mohd. Sher Khan, Khawaja Bagh, P.O. Sawa, Distt. Chittorgarh-312 613, Rajasthan.	Rajasthan	Chittorgarh
Rajmahal Quartz Sand & Kaolin Co. Mangalhat Hills, Rajmahal, Distt. Sahebganj-816 108, Jharkhand.	Jharkhand	Sahebganj
R.B. Mining & Company, 25/531, Neelkanth Colony, Vill. Gudda, P.O. Mandal, Distt. Bhilwara-311 403, Rajasthan.	Rajasthan	Bhilwara

(Contd.)

(Table - 3 Concld.)

Table – 4 : Production of Kaolin (Total) 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	**4258697**	**1157392**	**4853420**	**1240484**	**3861380**	**1100154**
Andhra Pradesh #	53057	8945	58516	11183	45857	8487
Gujarat	2656099	496079	3074737	613017	2456977	490988
Jharkhand	66235	31363	600	119	70623	17655
Karnataka	2836	7657	2540	7112	1984	6271
Kerala	708257	187628	743138	166817	561565	131480
Madhya Pradesh	11790	1114	13000	1044	10200	1377
Rajasthan	662362	355559	870307	372005	633175	385663
West Bengal	98061	69047	90582	69187	80999	58233

** Data up to January, 2015*

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

Table – 5 : Production of Kaolin, 2013-14 and 2014-15
(By Sectors/States/Districts/Grades)

(Qty. in tonnes; Value in ₹ '000)

State/District	2013-14							2014-15* (P)						
	No. of mines	Natural		Processed		Total		No. of mines	Natural		Processed		Total	
		Qty	Value	Qty	Value	Qty	Value		Qty	Value	Qty	Value	Qty	Value
India	**160(10)**	**4781519**	**1035516**	**71901**	**204968**	**4853420**	**1240484**	**135(5)**	**3787173**	**840514**	**74207**	**259640**	**3861380**	**1100154**
Public Sector	6	499	75	7333	33552	7832	33627	5	-	-	4913	25694	4913	25694
Private Sector	154(10)	4781020	1035441	64568	171416	4845588	1206857	130(5)	3787173	840514	69294	233946	3856467	1074460
Andhra Pradesh #	**8**	**58516**	**11183**	-	-	**58516**	**11183**	**6**	**45857**	**8487**	-	-	**45857**	**8487**
Cuddapah	2	43430	7616	-	-	43430	7616	2	37357	6469	-	-	37357	6469
East Godavari	5	15086	3567	-	-	15086	3567	4	8500	2018	-	-	8500	2018
West Godavari **	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Gujarat	**57(3)**	**3041355**	**562341**	**33382**	**50676**	**3074737**	**613017**	**44(1)**	**2427140**	**448406**	**29837**	**42582**	**2456977**	**490988**
Kachchh	42(3)	2931375	536755	-	-	2931375	536755	31(1)	2313730	422940	-	-	2313730	422940
Mahesana	4	12446	3111	15033	22440	27479	25551	4	3668	968	15477	23653	19145	24621
Patan	5	79290	18007	-	-	79290	18007	5	99012	21809	-	-	99012	21809
Sabarkantha	6	18244	4468	18349	28236	36593	32704	4	10730	2689	14360	18929	25090	21618
Jharkhand	**2**	**600**	**119**	**-**	**-**	**600**	**119**	**1**	**70623**	**17655**	-	-	**70623**	**17655**
Sahebganj	1	600	119	-	-	600	119	1	70623	17655	-	-	70623	17655
Singhbhum(West)**	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Karnataka	**2**	**-**	**-**	**2540**	**7112**	**2540**	**7112**	**1**	**-**	**-**	**1984**	**6271**	**1984**	**6271**
Hassan	1	-	-	2540	7112	2540	7112	1	-	-	1984	6271	1984	6271
Shivamogga **	1	-	-	-	-	-	-	-	-	-	-	-	-	-

(Contd.)

Table - 5 : (Concld.)

State/District	2013-14							2014-15*(P)						
	No. of mines	Natural		Processed		Total		No. of mines	Natural		Processed		Total	
		Qty	Value	Qty	Value	Qty	Value		Qty	Value	Qty	Value	Qty	Value
Kerala	**20(1)**	**737695**	**140104**	**5443**	**26713**	**743138**	**166817**	**22**	**558636**	**112056**	**2929**	**19424**	**561565**	**131480**
Kannur	2	-	-	3500	20522	3500	20522	2	-	-	1927	13265	1927	13265
Kasaragod	1	-	-	1293	5918	1293	5918	1	-	-	1002	6159	1002	6159
Kollam	1	499	75	-	-	499	75	1	-	-	-	-	-	-
Thiruvananthapuram	16(1)	737196	140029	650	273	737846	140302	18	558636	112056	-	-	558636	112056
Madhya Pradesh	**2(1)**	**13000**	**1044**	**-**	**-**	**13000**	**1044**	**2**	**10200**	**1377**	**-**	**-**	**10200**	**1377**
Katni	1(1)	13000	1044	-	-	13000	1044	2	10200	1377	-	-	10200	1377
Satna**	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Rajasthan	**60(4)**	**844920**	**263005**	**25387**	**109000**	**870307**	**372005**	**51(3)**	**598999**	**205733**	**34176**	**179930**	**633175**	**385663**
Bhilwara	9(1)	223780	67713	-	-	223780	67713	11(2)	193297	57216	-	-	193297	57216
Bikaner	(1)	19375	9862	-	-	19375	9862	(1)	22448	7303	-	-	22448	7303
Bundi	2	11410	3278	-	-	11410	3278	2	4940	1332	-	-	4940	1332
Chittorgarh	8	222710	79288	-	-	222710	79288	10	203011	87615	-	-	203011	87615
Jaipur	2	-	-	23650	104604	23650	104604	1	-	-	28874	167397	28874	167397
Karauli**	1	-	-	-	-	-	-	1	-	-	-	-	-	-
Nagaur	30(2)	310290	87264	1737	4396	312027	91660	18	118682	34955	5302	12533	123984	47488
Pali	6	55945	15314	-	-	55945	15314	6	53891	16774	-	-	53891	16774
Udaipur	2	1410	286	-	-	1410	286	2	2730	538	-	-	2730	538
Telangana #	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Adilabad**	1	-	-	-	-	-	-	-	-	-	-	-	-	-
West Bengal	**8(1)**	**85433**	**57720**	**5149**	**11467**	**90582**	**69187**	**8(1)**	**75718**	**46800**	**5281**	**11433**	**80999**	**58233**
Bankura	2(1)	3100	481	-	-	3100	481	(1)	1170	136	-	-	1170	136
Birbhum	6	82333	57239	5149	11467	87482	68706	8	74548	46664	5281	11433	79829	58097

**Data up to January 2015.*

( ): Figures in parenthesis indicates no. of associated mines.

***: Mine reporting production of associated minerals or labours only.*

 # : Figures mentioned against 2013-14 are of districts which are part of present Andhra Pradesh and Telangana states.

Table – 6: Production of Kaolin (Natural), 2013-14 and 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	**142(10)**	**120(5)**	**4781519**	**3787173**	**100.00**	**100.00**	**-**	**-**
Up to 500	30(1)	30(1)	2260	1330	0.05	0.04	0.05	0.04
501-1000	7(1)	4	6105	2738	0.13	0.07	0.18	0.11
1001-2000	6(1)	11(1)	11836	19027	0.25	0.50	0.43	0.61
2001-3000	13(1)	4(1)	34967	12565	0.73	0.33	1.16	0.94
3001-4000	6(1)	2	24437	6990	0.51	0.18	1.67	1.12
4001-5000	4(1)	4	22501	18334	0.47	0.48	2.14	1.60
5001-10000	15	15	104396	107860	2.18	2.85	4.32	4.45
10001 & 15000	12	8(1)	147018	108499	3.07	2.87	7.39	7.32
15001 & Above	49(4)	42(1)	4427999	3509830	92.61	92.68	100.00	100.00

** Data up to January 2015*

Figures in parentheses indicate the number of associated mines.

Table – 7 : Production of Kaolin (Processed), 2013-14 and 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‘	**18**	**15**	**71901**	**74207**	**100.00**	**100.00**	**-**	**-**
Up to 500	1	1	236	165	0.33	0.22	0.33	0.22
501-1000	2	3	1450	2839	2.02	3.83	2.35	4.05
1001-2000	6	3	8698	4219	12.10	5.68	14.45	9.73
2001-3000	3	-	7689	-	10.69	-	25.14	9.73
3001-4000	1	2	3146	7130	4.37	9.61	29.51	19.34
4001-5000	1	1	4099	4369	5.70	5.89	35.21	25.23
5001-10000	3	4	22933	26611	31.90	35.86	67.11	61.09
10001 & Above	1	1	23650	28874	32.89	38.91	100.00	100.00

** Data up to January 2015*

( ) : Figures in parentheses indicates no. of associated mines.

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

(In tonnes)

State	2013-14	2014-15*(P)
India	**1209570**	**1267276**
Andhra Pradesh #	18967	19050
Gujarat	287805	334575
Jharkhand	23702	13528
Karnataka	13270	15631
Kerala	30379	61494
Madhya Pradesh	8640	9570
Odisha	23304	17208
Rajasthan	780414	782860
Telangana #	1330	1330
West Bengal	21759	12030

**Data up to January 2015.*
 # Figures mentioned against 2013-14 are of district which are part of present Andhra Pradesh and Telangana States.

MINING, PROCESSING & MARKETING

China clay deposits worked in India are mostly of pocket-type. Opencast manual mining is followed in most kaolin mines. The most common practice is to dig trial pits for locating clay pockets or beds which are gradually enlarged into pits of various dimensions. China clay is often soft and easily extracted with no blasting required. Clay and overburden are quarried in benches. In few mines, bulldozers and excavators are used to remove the overburden which is then transported through trucks/tractors/trailers.

Crude china clay is normally processed. Almost, all the china clay user industries except cement, insecticide and refractory units consume processed china clay. The natural china clay is processed in the country mostly by conventional method of levigation/washing. In addition, hi-tech processes, such as, Mozeley hydrocyclone separator, high-intensity magnetic separator, bleaching (chemical decolourisation), spray drying and calcination are in practice. There is a need to use more sophisticated processing techniques like ultra froth-flotation, cryo-filter, etc.

The recovery percentage of processed china clay from raw china clay ranges from as low as 14% to as high as 56%, depending upon the quality of china clay available in different states. Large number of levigation plants are installed in the country mostly in Kerala, Gujarat, Jharkhand, West Bengal and Rajasthan. Kerala has become a hub for India's processed kaolin production. The important plants in the country are English Indian Clays Ltd (EICL) (240,000 tpy capacity), Veli, Thiruvananthapuram, Kerala; Kerala Clays and Ceramic Products Ltd, (10,000 tpy capacity) Payangadi, Kannur district, Kerala; 20 Microns Ltd, Mamuara, Bhuj district Kachchh, Gujarat (80,500 tpy capacity; a new plant of 33,600 tpy is also installed); Amrapali China Clay Washing Plant, Nadapa, Bhuj, district Kachchh, Gujarat; Mokdumnagar China Clay Processing Plant of West Bengal Projects Ltd, Mohammad Bazar, Birbhum district, West Bengal and Hindalco's Beneficiation Plant at Bagru Plateau in Lohardaga district, Jharkhand. EICL has capacity to produce 240,000 tpy paper coating and filler grades of processed china clay (hydrous), besides 60,000 tpy of calcined clays. Popular Minerals are reported to be developing its mine and plant in Chittorgarh, Rajasthan. Ashapura is also establishing new production unit in Thiruvananthapuram, Kerala with a 180,000 tpa kaolin capacity of various grades - air floated, lumps, hydrous and hydrous calcined kaolin reserves with 96% kaolinite content. It also has china clay processing plant at Bhujodi taluka, district Bhuj, Gujarat.The new facility is the company's second facility after the one operational in Kerala, and make Ashapura one of the largest producer of kaolin in Asia. Ashapura has already acquired new mines having reserves of about 2.5 to 3.0 million tonnes in Kerala to meet high demand for kaolin. Satish Minerals is also leading manufacturer and processor of china clay with 18,000 tpy capacity plant at Kachchh, Gujarat. Uma group of kaolin located in district, Gujarat is engaged in mining, processing & trading of china clay. It possess mining area in Dagara & Mamuara. Koat manufacturing company is engaged in processing of hydrous kaolin, calcined kaolin & metakaolin, having plant of capacity 1000 mtpm at Kachchh, Gujarat. Hydrous Kaolin, Vadodara manufacturers Levigated/Water Washed/Deaminated/spray dried kaolin products available from 75% to 84%(ISO) brightness. Particle size 2 Micron-49% to 93% (packing options available - 25 kg/50 kg/500 kg jumbo bags). China clay powder manufacturers: Shree Umia Sales Corpn. in GIDC Ahmedabad are exporters, suppliers Indian china clay powder, ball clay.

Processed kaolin is presently marketed under various trade names mostly in levigated

and spray dried forms. A small quantity of crude kaolin is also marketed. The various trade names under which the levigated kaolin is marketed are Highest brightness calcined clays for coated paper, excellent partial replacement for TiO_2. Zeta- balanced kaolin, highest brigntness calcined clays for architectural decorative and industrial coatings/inks. High brightness finer hydrous clays for all kinds of acqueous paints, excellent functional clays for all paints formulations. Calcined lumps for refractory grade materials non-calcined lumps for refractories. Highly reactive pozzolan, Meta kaolin for RMC and cement application; kaolin for Agrochemicals, Rubber & Plastics, soaps & detergents, Fibre glass & ceramics. Improved processing techniques could increase further the prospects of Indian kaolin in the international markets.

USES AND SPECIFICATIONS

China clay (kaolin) is used in a number of industries in both crude and processed forms. The major use for crude china clay in India is in the Cement Industry, whereas Ceramic Industry accounts for consumption of a major share of processed form of china clay. Besides ceramics, processed china clay finds use in other industries in the country, such as sealants, paper coatings, as extender in fibre glass, paint and as a filler for paper, rubber, plastic, cosmetics, pharmaceuticals and textiles. Crude china clay also finds use in Insecticide and Refractory Industries. Other uses of china clay are in ink, ultramarine, synthetic zeolite, catalyst, water filter candles, soaps & detergents and explosives & pyrotechnic industries. Some of the areas where use of china clay is gaining importance are in the manufacture of plastic film, video and audio tapes where clays are used as anti-blocking agents, and in the field of biotechnology, where ceramics are widely in use for its light weight & high strength properties. EICL has been producing Metakaolin for the concrete industry for over a decade and now exporting regularly to the UAE, Kuwait and Germany for the durability of concrete by lime fixation and arresting of deterioration of concrete by weathering. Himacem has high chemical resistance which makes the product suitable for construction of high span bridges, under-water structures and chemical plants.

The Bureau of Indian Standards (BIS) has prescribed specifications for china clay to be used in different industries. They are IS:505-1995 (Third Revision, Reaffirmed 2011) for paper coating and filler for paper, rubber, textile industries, IS:1463-1983 (Third Revision, Reaffirmed 2000) for cosmetics and IS:7589-1974 (Reaffirmed 2011) for Explosive & Pyrotechnic Industry. BIS has revised the specifications for china clay for Ceramic Industry to IS:2840-2002 (Second Revision, Reaffirmed 2008) and for paint industry to IS:68-2006. The whiteness, particle size, plasticity, contents of alumina, iron and titanium are some important factors which control the specifications of china clay for different end-uses. China clay for ceramic and refractory applications is analysed for grit, brightness, green and dry strength, fixed colour, iron and alumina contents. For filler and extender applications, it must meet very rigid specifications, such as, particle size, colour, brightness and viscosity (Table-9). The replacement of kaolin as a filler with precipitated calcium carbonate (PCC) and ground calcium carbonate (GCC), results in lowering consumption of kaolin in paper industry.Now they are using GCC due to a switch over by paper makers from an acid-based processing route to an alkali-based route for production. (Table - 9)

CONSUMPTION

The main consuming industry for raw china clay is the china clay processing/refining plants. The china clay processed by these plants in turn is consumed by various industries except cement, refractory and pesticide industries. The data on raw china clay consumption by various china clay processing plants are not readily available. However, the consumption of china clay by various industries is given in Table-10.

Consumption of china clay decreased slightly to 1,423 thousand tonnes in 2014-15, from 1,429 thousand tonnes in 2013-14. Cement Industry accounted for 47% consumption followed by ceramic (39%), the major consumer of raw china clay. Pesticide, paint, refractory, paper, cosmetic, rubber, abrasive, asbestos products, chemical, dry cell batteries, textile, electrical, electrode and glass industries together accounted for the remaining 14%.

Table – 9 : Specifications of China Clay Required in Different Industries

Sl. No.	Characteristics	Paper coating Grade I	Filler in paper, rubber, textile Grade II	Cosmetics	Explosives
1.	Bureau of Indian Standard Specification No.	505 (1995)	505 (1995)	1463 (1983)	7589 (1974)
2.	Fineness (by weight % material retained on:)				
	45 microns sieve	–	–	2.0	–
	53 microns sieve	0.8	1.0	–	–
	63 microns sieve	–	–	–	1.0
	90 microns sieve	–	–	0.1	–
3.	Larger than 10 microns in diameter (% by mass, max)	5.0	15.0	–	–
4.	Smaller than 10 microns in diameter (% by mass, min)	75.0	60.0	–	–
5.	Grit (% by mass, max)	–	–	–	0.001
6.	Loss on Drying (% max)	2.0	2.0	1.5	1.5
7.	Loss on Ignition (% max)	14-15.5	14-15.5	15	14.0
8.	Water Plasticity (%)	14.0	–	–	–
9.	Shrinkage linear				
	a) Dry shrinking	–	–	–	–
	b) Fired shrinking	–	–	–	–
10.	Relative/Bulk density	2.5-2.9	2.5-2.9	*	0.65-0.90(BD)
11.	Colour reflectance to blue light (%)	80-85	*	–	–
12.	Chemical (% by mass, max)	–	–	@	–
	Fe_2O_3	0.6	0.75	0.5	–
	Matter soluble in HCl	0.5-1	1.5-2.5	2.0	1.5
	CuO	–	0.007	–	–
	MnO	–	0.013	–	–
	Heavy metals (as Pb)	–	–	5 ppm	–
	As_2O_3	–	10 ppm	2 ppm	–
	pH value of aqueous extract	4.5-7.5	4.5-7.5	7.5	6.0-7.5
13.	Oil absorption (ml/100 g)	–	50 (min)	–	35-45
14.	Water soluble matter (%, max)	–	0.5	–	0.5

** As agreed.*
@ To pass test for iron and carbonate as well.

Table - 10 : Consumption of Kaolin (China clay)*, 2012-13 to 2014-15 (By Industries)

(In tonnes)

Industry	2012-13	2013-14(R)	2014-15(P)
All Industries	**1430100**	**1429400**	**1423100**
Cement	664500(8)	662900(8)	662000(8)
Ceramic	561500(237)	561500(237)	561700(237)
Cosmetic	2300(6)	2300(6)	2300(6)
Glass	700(3)	700(3)	700(3)
Paint	111100(26)	111100(26)	111100(26)
Paper	27700(23)	27700(23)	27700(23)
Pesticide	24800(21)	24800(21)	24800(21)
Refractory	32800(31)	33800(32)	28200(32)
Rubber	2400(31)	2400(31)	2400(31)
Others (abrasives, asbestos-products, chemical, dry cell battery, electrical, electrode and textile).	2300(42)	2200(43)	2300(43)

Figures rounded off.
Figures in parentheses denote the number of units in organised sector reporting consumption.
***: Paucity of data hence coverage may not be complete.*

TRADE POLICY

As per the Foreign Trade Policy (FTP) 2009-2014, there are no restrictions on exports and imports of china clay (kaolin).

WORLD REVIEW

The world production of kaolin remained steady at 26.9 million tonnes in 2014 as compared to 26.7 million tonne in the previous year. Seven countries, namely, USA, Germany, China, Brazil, Ukraine, Iran and Turkey accounted for about 68% world production. The share of USA in total world production was about 22%, followed by Germany (16%), China (12%), Brazil (6%), Ukraine (5%), Iran (4%) and Turkey (3%) (Table-11).

Table – 11 : World Production of Kaolin (By Principal Countries)

(In '000 tonnes)

Country	2012	2013	2014
World: Total	**27600**	**26700**	**26900**
Belgium[(e)]	300	300	300
Brazil	2388	2139	1706
China[(e)]	3200	3200	3200
Czech Republic	624	609	617
Egypt[(e)]	300	300[(e)]	300
France	308	300	311
Germany	4399	4349	4275
Iran	1503	1000[(e)]	1000[(e)]
Korea, Rep. of	797	847	683
Malaysia	439	293	208
Mexico	515	670	600[(e)]
Portugal	322	248	265
Spain	402	411	350
Turkey	988	1027	734
Ukraine	1218	1179	1426
USA	5980	5950	5830
Vietnam[(e)]	650	650	650
Other countries	3267	3228	4445

Source: *World Mineral Production, 2010-2014.*

USA

KaMin LLC is to buy Imerys US based global ultraline paperhydrous kaolin (UPHK) business to bolster its expertise in kaolin & boost its product offering. The UPHK business is par of Imery's recent acquisition of BASF's paper hadrous kaolin business (PHK). Under the term of agrement, Imerys will retain all of the non-UPHK business from the BASF transaction.

The Germany-headquarter and Chemical Company BASF has completed the divestment of its global PHK business to Imerys under the term of agreement, BASF wll continue to produce and supply PHK products to Imerys for a perod of time determined by the French Company to ensure a smooth transtion of customers BASF continues to be a leading global supplier to the paper industry and offers a wide range of products for paper manufacturing & coating.

Australia

Tellu Holdings Ltd is developing the Sandy Ridge facility 140km NW of Kalgoordie, Western Australia primarily for waste disposal in voids created by the mining and for processing of the removed kaolin.

In Western Australia, the kaolinised ganite deposits were evaluated in great detail by CRA/Rio Tinto in Wickepin area, 180 km SE of Perth. These were acquired some years ago by WA kaolin Holdngs Pvt.Ltd. (WAK).

FOREIGN TRADE

Exports

Exports of kaolin decreased marginally to 258,330 tonnes in 2014-15 from 276,165 tonnes in 2013-14. UAE (77%) and Bangladesh (10%) were the major importing countries in 2014-15 (Table-12).

Imports

Imports of kaolin increased to 93,322 tonnes in 2014-15 from 80,204 tonnes in 2013-14. Major suppliers were USA (61%) Ukraine (12%),China (7%) and UK (4%) (Table- 13).

Table – 12 : Exports of Kaolin (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**276165**	**1053487**	**258330**	**941752**
UAE	205898	313147	198089	262280
Bangladesh	29010	134187	25392	135305
Iran	6349	68271	5799	89052
Germany	4753	78775	3174	55302
Sri Lanka	1896	31877	2448	38613
Indonesia	1244	27220	1518	35763
UK	1446	23426	1711	28745
Malaysia	1356	26409	1013	20958
South Africa	1430	22077	2043	20055
Turkey	791	16120	873	17036
Other countries	21992	311978	16270	238643

Table – 13 : Imports of Kaolin (By Countries)

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**80204**	**1420872**	**93322**	**1662634**
USA	44271	878669	56759	1135291
Ukraine	8863	91287	10818	117987
China	10955	158652	6136	92907
France	4740	91538	3332	62199
UK	2093	38112	3409	52895
Spain	96	1648	1474	42099
Germany	1058	18785	2154	36618
Czech Republic	203	3641	2215	27946
New Zealand	399	15289	504	19526
Iran	1918	12142	2330	18303
Other countries	5608	111109	4191	56863

FUTURE OUTLOOK

India has abundant resources of kaolin which can easily meet both the internal and the external demands. The processing of kaolin in the country is done mostly by conventional methods like levigation and washing. New capacities for High-tech processing have to be established and existing capacities in the country have to be augmented to meet the demand of processed kaolin in the future.

In the Indian kaolin market, good growth is expected both for hydrous and calcined clay particularly in paint, cables, plastics, rubber and ceramics. The apparent demand of china clay is estimated at 4.61 million tonnes by 2016-17 and that of ball clay at 1.82 million tonnes by 2016-17 at 9% growth rate by the Planning Commission of India.

2. Ball Clay

Ball clay commonly consists of 20-80% kaolinite, 10-25% mica & 6-65% quartz. Ball clay and china clay differ only in the degree of plasticity. China clay is less plastic than ball clay. Ball clay is a highly plastic variety of kaolin having high binding power, tensile strength and shrinkage. It is utilised generally after mixing with non-plastic clay to impart the desired plasticity in pottery, porcelain and refractory materials. It also helps in the preparation of glaze, enamels and for imparting a dense vitrified body.

RESOURCES

Deposits of ball clays are relatively scarce due to the combination of geological factors needed for their formation.The total resources of ball clay as on 1.4.2010 in the country are placed at 83.39 million tonnes. Out of these resources, the reserves are about 16.78 million tonnes and the remaining resources are 66.61 million tonnes. More than 62% resources are in Andhra Pradesh, followed by Rajasthan with 38%. Resources in Gujarat are nominal. Out of the total resources, ceramic/pottery grade constitutes 89%. All India reserves/resources of ball clay are given in Table-14.

PRODUCTION, STOCKS & PRICES

The production of ball clay at 1,910 thousand tonnes in 2014-15 (upto January 2015) increased by 10% as compared to that in the previous year.

During the year under review, there were 54 reporting mines as against 48 in 2013-14. Besides, production of ball clay was reported as an associated mineral by twelve mines during 2014-15 as against 13 in 2013-14. Ten principal producers accounted for about 64% of total production. The share of public sector mines in the total production was nominal as compared to about 1% in the preceding year.

Rajasthan continued to be the leading state in ball clay production accounting for 92% of the total production followed by Andhra Pradesh with 8%. Nominal production was reported from Tamil Nadu. (Tables -15 to 17)

Mine-head closing stock of ball clay for the year 2014-15 (upto January 2015) was 1,147 thousand tonnes as against 1,147 thousand tonnes in the previous year. (Table-18)

The average daily employment of labour in 2014-15 was 625 as against 750 in the previous year.

Domestic prices of ballclay are furnished in the General Review on 'Prices'.

Table – 14 : Reserves/Resources of Ball Clay as on 1.4.2010
(By Grades/States)

(In tonnes)

Grade/State	Reserves				Remaining resources							Total resources (A+B)
	Proved STD111	Probable		Total (A)	Feasibilty STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Total (B)	
		STD121	STD122			STD221	STD222					
All India : Total	**12292820**	**350832**	**4134190**	**16777842**	**6122450**	**3906958**	**12387575**	**268486**	**2279330**	**41650863**	**66615662**	**83393504**
By Grades												
Ceramic/Pottery	12252380	350832	4059390	16662602	3225279	3818040	11158607	268486	2279330	36989941	57739683	74402285
Others	40440	-	74800	115240	-	46134	67320	-	-	107800	221254	336494
Unclassified	-	-	-	-	2897171	42784	1161648	-	-	4553122	8654725	8654725
By States												
Andhra Pradesh	6017412	-	1288720	7306132	1821233	2806267	9512513	-	2279330	27555824	43975167	51281299
Gujarat	-	-	-	-	-	-	-	249810	-	49670	299480	299480
Rajasthan	6275408	350832	2845470	9471710	4301217	1100691	2875062	18676	-	14045369	22341015	31812725

Figures rounded off.

Table – 15 : Principal Producers of Ball Clay 2014-15

Name & address of producer	Location of mine	
	State	District
* Shanta Sales Corporation, H/o Mohanlal Mathur, Behind Rajasthan Pan Bhandar, Rani Bazar, Bikaner-334 001, Rajasthan.	Rajasthan	Bikaner
Jaichand Lal Daga, 1st Floor, Labhuji Ka Katla, Kotegate, Bikaner - 334 001, Rajasthan.	Rajasthan	Bikaner
Anirudh Mines & Minerals, Near Ramdev Park, Outside Nathusar Gate, Bikaner – 334 004, Rajasthan.	Rajasthan	Bikaner
Sunder Lal Daga, Bagree Mohalla, Bikaner-334 001, Rajasthan.	Rajasthan	Bikaner
* Sampat Lal Daga, 1st Floor, Labhu Ji Ka Katla, Bikaner-334 001, Rajasthan.	Rajasthan	Bikaner

(Contd.)

(Table - 15 Concld.)

Name & address of producer	Location of mine	
	State	District
Sandeep Chandna, Ramnath Sadan, Near Arya Samaj Mandir, Rathkhana Colony, Bikaner-334 001, Rajasthan.	Rajasthan	Bikaner
* Narendra Kumar Devra, Ward No. 51, Near Ratan Sagar Well, Bikaner-334 001, Rajasthan.	Rajasthan	Bikaner
* Smt Rama Devi Sharma, 99-100, Industrial Area, Road No.-9, Rani Bazar, Bikaner-334 001, Rajasthan.	Rajasthan	Bikaner
Vijayabharti Corporation, Door No. 22 D-3-30/1, Ramalayam Street, Ramkrishnapuram, Eluru, West Godawari-534 002, Andhra Pradesh.	Andhra-Pradesh	West-Godawari
Surendra Singh Baid, 1-B-10, Pawanpuri, Bikaner-334 001, Rajasthan.	Rajasthan	Bikaner

** Associated mines of ball clay with clay (others) and fire clay.*

Table – 16 : Production of Ball clay, 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	**1750559**	**780732**	**2130995**	**1055362**	**1910060**	**920542**
Andhra Pradesh	184345	99828	143430	75352	148774	77414
Gujarat	10900	1853	8600	1462	-	-
Rajasthan	1541981	665585	1974501	975423	1760526	842596
Tamil Nadu	13333	13466	4464	3125	760	532

** Data up to January, 2015*

Table – 17 : Production of Ball clay, 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	**58(13)**	**2130995**	**1055362**	**54(12)**	**1910060**	**920542**
Public Sector	1	4464	3125	1	760	532
Private Sector	57(13)	2126531	1052237	53(12)	1909300	920010
Andhra Pradesh	**13(1)**	**143430**	**75352**	**9**	**148774**	**77414**
Chittor	1	360	199	-	-	-
West Godavari	12(1)	143070	75153	9	148774	77414
Gujarat	**2**	**8600**	**1462**	**-**	**-**	**-**
Kutch	1	200	34	-	-	-
Patan	1	8400	1428	-	-	-
Rajasthan	**42(12)**	**1974501**	**975423**	**44(12)**	**1760526**	**842596**
Bikaner	41(12)	1970176	973438	42(12)	1742536	833962
Pali	1	4325	1985	2	17990	8634
Tamil Nadu	**1**	**4464**	**3125**	**1**	**760**	**532**
Cuddalore	1	4464	3125	1	760	532

** Data up to January, 2015*
( ) Figures in parentheses indicate associated mines of ball clay (others), fireclay and kaolin.

Table – 18 : Mine-head Closing Stocks of Ball Clay
2013-14 & 2014-15
(By States)

(In tonnes)

State	2013-14	2014-15*(P) :
India	**1146657**	**1048205**
Andhra Pradesh	156849	156727
Gujarat	267711	147923
Rajasthan	714674	741530
Tamil Nadu	7423	2025

** Data up to January, 2015*

SPECIFICATIONS

The specifications for plastic clay and washed plastic clay for use in Ceramic Industry are prescribed vide IS:4589-2002 (Third Revision, reaffirmed 2008).

CONSUMPTION

Consumption of ball clay decreased slightly from 582,000 tonnes in 2013-14 to 583,800 tonnes in 2014-15. About 97% consumption was accounted for by the Ceramic Industry. The remaining consumption was reported by the Refractory and Abrasive Industries (Table- 19).

FOREIGN TRADE

Exports

Exports of ball clay increased substantially to 57,557 tonnes in 2014-15 from 35,694 tonnes in the previous year. Exports were mainly to Bangladesh (46%) and Oman (21%) (Table- 20).

Imports

Imports of ball clay decreased considerably to 125,384 tonnes in 2014-15 as compared to 130,804 tonnes in the previous year. Imports were mainly from Ukraine (49%), Malaysia (18%), UK (17%) and China (11%) (Table- 21).

Table – 19 : Consumption* of Ball clay
2012-13 to 2014-15
(By Industries)

(In tonnes)

Industry	2012-13	2013-14 (R)	2014-15(P)
All Industries	**585000**	**582500**	**583800**
Ceramic[e]	565200(222)	565200(222)	565200(222)
Refractory	19700(30)	17200(30)	18500(30)
Others (Abrasive)	100(3)	100(3)	100(3)

Figures rounded off.
Figures in parentheses denote the number of units in the organised sector.
** Paucity of data hence coverage may not be completed.*

Table – 20 : Exports of Ball Clay
(By Countries)

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**35694**	**158847**	**57557**	**194269**
Bangladesh	27248	125715	26620	110583
Oman	6902	23088	12150	29976
UAE	380	1183	7097	18138
Saudi Arabia	26	171	8875	17977
Iran	27	158	749	5461
Malaysia	420	3555	1000	5365
Kuwait	252	1452	714	4708
Kenya	240	1597	264	1408
Sri Lanka	26	222	57	465
China	-	-	1	54
Other countries	173	1705	30	134

Table – 21 : Imports of Ball Clay (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**130804**	**915231**	**125384**	**957636**
Ukraine	52554	400319	61021	453872
UK	18267	226682	21224	242144
China	9995	80512	14223	110337
Malaysia	45363	145379	22853	65585
USA	518	11548	983	22178
Thailand	1960	20440	2130	22125
Portugal	1508	16887	1300	13719
Spain	-	-	702	9235
France	236	3081	446	5412
Japan	100	2565	180	5325
Other countries	303	7818	322	7704

3. Clay (others)

Clay under this category includes aluminous, ferruginous and tile & brick making clays.

PRODUCTION, STOCKS & PRICES

The production of clay (others) at 2,248 thousand tonnes in 2014-15 (up to January 2015) decreased by about 10% as compared to 2,507 thousand tonnes in the previous year.

There were 43 reporting mines in 2014-15 as against 55 mines in the previous year. Besides production of clay (others) was reported by 28 mines as associated mineral in 2014-15 and 33 for the previous year. About, 37% of the total production of clay (others) was reported as an associated mineral. Entire production of clay (others) was contributed by private sector. About 69% of the total production was contributed by eight principal producers.

Gujarat, the major producing state, accounted for about 67% of the total production during the period under review, followed by Madhya Pradesh (16%), Kerala (6%), Rajasthan (5%) and the remaining 6% was reported from Andhra Pradesh & Telangana.

Nineteen mines and twelve associated mines having annual production more than 10,000 tonnes contributed about 97% of the total production (Tables- 22 to 25)

Mine-head closing stock of clay (others) for the year 2014-15 was 205 thousand tonnes as against 202 thousand tonnes in the previous year (Table - 26)

The average daily employment of labour was 405 during 2014-15 as against 603 in the previous year.

Domestic prices of clay are furnished in the General Review on 'Prices'.

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

Name and address of producer	Location of mine	
	State	District
Bhupendra Reva Sankar Gor, 66, Devkrupa, Limbda Street, Bhuj, Kachchh - 370 001, Gujarat.	Gujarat	Kachchh
* ACC Ltd., 'Cement House', 121, Maharshi Karve Road, Mumbai – 400 020, Maharashtra.	Madhya-Pradesh	Katni
English India Clays Ltd., TC-79/04, Veli, Thiruvananthapuram–695 021, Kerala.	Kerala	Thiruvanan-thapuram
Ishvarlal Nanjibhai Bhavani, 113-114, Pooja-B, Behind ICICI Bank, Station Road, Bhuj - 370 001, Distt. Kachchh, Gujarat.	Gujarat	Kachchh
Kissan Minerals, Shop No. 4, Mate Buiding, Salari Naka Road, Rapar-370 165, Distt. Kachchh, Gujarat.	Gujarat	Kachchh
Ratanbhai Dalabhai Gohil, Goyalvas, Bhimasar (Bhuj), Rapar-370 160, Distt. Kachchh, Gujarat.	Gujarat	Kachchh
*Shankarlal Gangaram Thakkar, DBZ South-157, Zanda Chowk, Gandhidham-370 201, Distt. Kachchh, Gujarat.	Gujarat	Patan
Satyam Minerals, Survey No.947, Paiki, Hamirpar Moti, Rapar–370 165, Distt. Kachchh, Gujarat.	Gujarat	Kachchh

** Producing clay (others) as an associated mineral.*

Table – 23 : Production of Clay (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	**2680726**	**353628**	**2506662**	**382002**	**2248184**	**384286**
Andhra Pradesh #	76574	9648	63622	7806	50920	7264
Gujarat	1928419	256099	1612566	253614	1515449	253461
Kerala	-	-	78703	10571	141843	17346
Madhya Pradesh	436329	44447	437150	56800	365273	50420
Rajasthan	152534	34361	241396	45627	122784	50447
Tamil Nadu	4770	692	-	-	-	-
Telangana #	82100	8381	73225	7584	51915	5348

**Data up to January 2015*
 # : Figures mentioned against 2013-14 are of districts which are part of present Andhra Pradesh and Telangana states.

Table – 24: Production of Clay (Others), 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	**55(33)**	**2506662**	**382002**	**43(28)**	**2248184**	**384286**
Private Sector	55(33)	2506662	382002	43(28)	2248184	384286
Andhra Pradesh #	**9(6)**	**63622**	**7806**	**5(5)**	**50920**	**7264**
Anantapur	(3)	9893	1131	(3)	9097	1098
Cuddapah	3	4892	732	2	3281	571
Godavari East	1	673	135	-	-	-
Krishna	(1)	14100	1692	(1)	10600	1535
Kurnool	5(2)	34064	4116	3(1)	27942	4060
Gujarat	**29(16)**	**1612566**	**253614**	**26(12)**	**1515449**	**253461**
Amreli	1	40143	5981	1	33659	5246
Bhavnagar	1*	-	-	1*	-	-
Kutch	27(13)	1447773	229002	24(9)	1388105	232743
Patan	(3)	124650	18631	(3)	93685	15472
Kerala	**2**	**78703**	**10571**	**2**	**141843**	**17346**
Thiruvananthapuram	2	78703	10571	2	141843	17346
Madhya Pradesh	**1(8)**	**437150**	**56800**	**(9)**	**365273**	**50420**
Jabalpur	(2)	13600	3164	(2)	8520	2073
Katni	(3)	412809	51592	(3)	343771	45910
Sagar	-	-	-	(2)	2160	270
Satna	1(3)	10741	2044	(2)	10822	2167
Rajasthan	**10(2)**	**241396**	**45627**	**6(2)**	**122784**	**50447**
Bikaner	7(1)	234009	42303	6(1)	109034	44340
Jaisalmer	1*	-	-	-	-	-
Karauli	(1)	7387	3324	(1)	13750	6107
Nagaur	2*	-	-	-	-	-
Tamil Nadu	**2***	**-**	**-**	**2***	**-**	**-**
Tiruchirapalli	2*	-	-	2*	-	-
Telangana #	**2(1)**	**73225**	**7584**	**2**	**51915**	**5348**
Adilabad	2(1)	73225	7584	2	51915	5348

Figures in parentheses indicate number of associated mines of Clay (others) with ball clay, dolomite, kaolin/chna clay, laterite, limestone, ochre & steatite.
Data up to January 2015
** only labour or production of associated mineral reported.*
 # : Figures mentioned against 2013-14 are of distiricts which are part of present Andhra Pradesh and Telangana States.

Table – 25 : Production of Clay (Others), 2013-14 and 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	**55(33)**	**43(28)**	**2506662**	**2248184**	**100.00**	**100.00**	**-**	**-**
Upto 5000	29(15)	22(13)	38874	28266	1.55	1.26	1.55	1.26
5001 to 10000	5(5)	2(3)	70217	35231	2.80	1.56	4.35	2.82
10001 to 20000	3(3)	(4)	85202	47420	3.40	2.11	7.75	4.93
20001 to 30000	4(3)	8	179950	186783	7.18	8.31	14.93	13.24
30001 & above	14(7)	11(8)	2132419	1950484	85.07	86.76	100.00	100.00

** Data up to January, 2015*
( ): Figures in parentheses indicate number of Associated mines of Clay (Others) with ball clay, dolomite, kaolin/ china clay, laterite, limestone, ochre & Talc/soapstone/steatite.

Table – 26 : Mine-head Closing Stocks of Clay (Others), 2013-14 & 2014-15
(By States)

(In tonnes)

State	2013-14	2014-15(P)
India	**201520**	**204871**
Andhra Pradesh #	21444	9643
Gujarat	80857	91801
Karnataka	6000	829
Madhya Pradesh	70682	73544
Rajasthan	19344	24441
Telangana #	1560	2980
West Bengal	1633	1633

** Data up to January 2015*
 # : Figures mentioned against 2013-14 are of districts which are part of present Andhra Pradesh and Telangana states.

FOREIGN TRADE

Exports

Exports of clay (others) increased to 25,515 tonnes in 2014-15 from 19,604 tonnes in 2013-14. Exports were mainly to Malaysia (26%), Bangladesh (22%) and Nepal (16%) (Table- 27).

Imports

Imports of clay (others) decreased to 14,347 tonnes in 2014-15 from 17,016 tonnes in 2013-14. Ukraine (67%), USA (18%) were the main suppliers (Table- 28).

Table – 27 : Exports of Clay (Others) (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**19604**	**172389**	**25515**	**217300**
Malaysia	3799	23341	6568	39188
Bangladesh	4355	25322	5731	36171
Nepal	2503	19054	4022	23306
Kenya	719	8581	1215	13825
Saudi Arabia	3990	28624	1414	12658
Nigeria	351	4839	732	9378
Sri Lanka	1125	8097	1102	8725
UAE	689	5139	989	8642
Mozambique	382	6715	436	8385
Chinese Taipei/Taiwan			567	7340
Other Countries	1691	42678	2739	49682

Table – 28 : Imports of Clay (Others) (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**17016**	**256640**	**14347**	**231877**
USA	2656	89382	2574	99384
Ukraine	9424	67704	9655	72009
Spain	1003	25481	739	21893
Netherlands	151	9110	184	13914
UK	486	6152	456	7373
China	1194	12878	374	7349
Germany	20	254	44	3095
Japan	306	32132	34	1893
France	67	1935	38	1686
Malaysia	1	41	104	1092
Other countries	1708	11571	145	2189

4. Shale

Shale is a fine grained, plastic sedimentary rock comprised of mud that is a mixture of flakes of clay minerals and tiny fragments of minerals like quartz and calcite. The ratio of clay to other minerals is variable.

Shale which occurs with limestones as parting is rich in alumina content. Hitherto, shale was considered as implacable substance that reduced the quality of limestone due to presence of clay minerals. Now, with advancements and better knowledge, it is utilised as a source of alumina in cement making.

RESOURCES

The resources of shale were placed at 15.9 million tonnes as on 1.4.2010, comprising 15.3 million tonnes reserves and 0.6 million tonnes remaining resources. All the estimated resources are located in Andhra Pradesh (Table- 29).

PRODUCTION & STOCKS

Production of shale, primarily used in manufacturing of cement, at 2,793 thousand tonnes in 2014-15 decreased by 7% over the previous year. There were 11 reporting mines in both the years. About 96% of total production of shale was reported as an associated mineral by 28 limestone mines in 2014-15. The share of public sector was only 2% in 2014-15 as compared to 1% in the previous year.

As regards State-wise production, Himachal Pradesh contributed 46% of the total production of shale followed by Karnataka 23%, Madhya Pradesh 14%, Maharashtra 11% and the remaining 6 percent contributed by Andhra Pradesh & Telangana (Tables- 30 to 32).

Mine-head closing stock of shale at the end of the year 2014-15 was 57 thousand tonnes as against 86 thousand tonnes in the previous year (Table- 33).The average daily employment of labour in shale mines in 2014-15 was 58 as against 70 in the previous year.(Table- 33)

Table – 29 : Reserves/Resources of Shale as on 1.4.2010
(By Grades/States)

(In '000 tonnes)

Grade / State	Reserves				Remaining resources								Total resources (A+B)
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
		STD121	STD122			STD221	STD222						
All India : Total	**14,992**	**76**	**263**	**15,331**	**-**	**-**	**245**	**-**	**-**	**252**	**83**	**580**	**15,911**
By Grade													
All grades	14,992	76	263	15,331	-	-	245	-	-	252	83	580	15,911
By State													
Andhra Pradesh	14,992	76	263	15,331	-	-	245	-	-	252	83	580	15,911

Figures rounded off.

Table – 30: Principal Producers of Shale, 2014-15

Name and address of producer	Location of mine	
	State	District
* ACC Ltd. Cement House, 121, Maharshi Karve Road, Churchgate, Mumbai – 400 020.	Karnataka Himachal Pradesh Maharashtra	Gulbarga Bilaspur Yavatmal
*Jaiprakash Associates Ltd., Sector-128, Noida-201 304, Uttar Pradesh.	Himachal Pradesh Madhya Pradesh	Solan Rewa
*Ambuja Cements Ltd. Elegant Business Park, MIDC Cross Road B Off Andheri Kurla Road, Andheri East, Mumbai- 400 059	Himachal Pradesh	Solan
Cement Corp. of India ltd. Core – 5, Scope Complex , 7, Lodhi Road, New Delhi -110 003.	Telangana	Rangareddy
*Ultratech Cement Ltd., 'B' Wing, 2nd Floor, Ahura Centre, Mahakali Caves Road, Andheri (E), Mumbai-400 093	Maharashtra	Chandrapur
Rain Cements Limited, No.34, Rain Centre, Srinagar Colony, Hyderabad, Andhra Pradesh -500 073	Telangana	Nalgonda
*T.Krishna Murthy, H-No:10-118-20, Gandhinagar, Kothepeta, Andhra Pradesh -518 222	Andhra Pradesh	Kurnool

** Producing as an associated mineral with limestone.*

Table – 31 : Production of Shale, 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	**3067718**	**165924**	**3006945**	**170761**	**2792904**	**224542**
Andhra Pradesh#	53617	6407	104309	12922	102331	13422
Himachal Pradesh	1512161	77717	1430549	85780	1279203	119514
Karnataka	546026	37730	670136	33507	646286	48559
Madhya Pradesh	519521	5514	453825	5319	384008	5301
Maharashtra	347393	32335	289026	29170	294076	31467
Telangana	89000	6221	59100	4063	87000	6279

** Data up to January, 2015*

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

Table – 32 : Production of Shale, 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	**11(31)**	**3006945**	**170761**	**11(28)**	**2792904**	**224542**
Public Sector	1	24100	2217	1	45500	4147
Private Sector	10(31)	2982845	168544	10(28)	2747404	220395
Andhra Pradesh#	**4(20)**	**104309**	**12922**	**4(18)**	**102331**	**13422**
Anantpur	1(10)	30320	4328	1(8)	36990	5374
Guntur	1	700	140	1	3941	785
Kurnool	2(10)	73289	8454	2(10)	61400	7263
Himachal Pradesh	**(3)**	**1430549**	**85780**	**(3)**	**1279203**	**119514**
Bilaspur	(1)	488050	28795	(1)	446100	41325
Solan	(2)	942499	56985	(2)	833103	78189
Karnataka	**(1)**	**670136**	**33507**	**(1)**	**646286**	**48559**
Gulbarga	(1)	670136	33507	(1)	646286	48559
Madhya Pradesh	**4(5)**	**453825**	**5319**	**4(4)**	**384008**	**5301**
Mandsaur	4	2625	1259	4	3880	1880
Rewa	(5)	451200	4060	(4)	380128	3421
Maharashtra	**(2)**	**289026**	**29170**	**(2)**	**294076**	**31467**
Chandrapur	(1)	33930	4152	(1)	37290	4762
Yavatmal	(1)	255096	25018	(1)	256786	26705
Telangana	**3**	**59100**	**4063**	**3**	**87000**	**6279**
Nalgonda	2	35000	1846	2	41500	2132
Rangareddy	1	24100	2217	1	45500	4147

** Data up to January, 2015*

 # Figures mentioned against 2013-14 are of districts which are part of present Andhra Pradesh and Telangana States.

Table – 33 : Mine-head Closing Stocks of Shale, 2013-14 & 2014-15(P) (By States)

(In tonnes)

State	2013-14	2014-15*(P)
India	**85666**	**57241**
Andhra Pradesh	29703	26926
Karnataka	25668	-
Madhya pradesh	100	120
Telangana	30195	30195

** Data up to January, 2015*