49 Kaolin, Ball Clay, Other Clays and Shale

1. Kaolin (China Clay)

Kaolin, also known as china clay, is a natural clay formed by weathering of felspars. It is relatively pure clay predominantly consisting of kaolinite (Al_2O_3. $2SiO_2$. $2H_2O$), 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 in the country is in Cement Industry and of processed china clay is in Ceramic Industry. India has extensive deposits of china clay distributed almost in every state and is in a reasonable position to cater to the needs of both domestic and export markets. The clay formed in situ in India is often soft and easily extracted with no blasting required.

RESOURCES

China clay resources in the country as per UNFC system as on 1.4.2005 have been placed at 2,595.66 million tonnes, of which the reserves are only about 8% of the resources at 222 million tonnes. Out of the total reserves, 46% (about 102 million tonnes) reserves are under proved category whereas 54% (about 120 million tonnes) reserves fall under probable category.

The resources are spread over in a number of states of which Kerala holds about 24%, followed by West Bengal (16%), Rajasthan (14%), Odisha (11%) and Karnataka (10%).

Out of total resources, about 22% or 579 million tonnes fall under ceramic/pottery grade, 4% are classified under chemical, paper filler and cement grades and about 74% or 1,922 million tonnes resources fall under mixed grade, others, unclassified & not-known categories. The details of reserves/ resources are given in Table - 1.

EXPLORATION & DEVELOPMENT

Details of exploration carried out by different exploration agencies during 2009-10 are given in Table-2.

PRODUCTION, STOCKS & PRICES

The production of kaolin at 2,578 thousand tonnes in 2009-10 increased by 24% as compared to that of the previous year because of increased market demand.

There were 88 reporting mines during 2009-10 as against 93 mines in the previous year. Besides, the production of kaolin was also reported as an associated mineral from two mines. Fifteen principal producers accounted for about 84% of the total output of kaolin in 2009-10. There were 82 private sector mines which contributed 97% of the total production. Remaining 3% was contributed by 6 public sector mines.

During 2009-10 thirty-three mines and one associated mine each producing more than 10,000 tonnes annually accounted for 95% production of kaolin (natural) while 9 mines in the production range of 5,000 to 10,000 tonnes annually accounted for 3% production. Remaining 2% production of kaolin (natural) was shared by 28 small mines, each producing up to 5,000 tonnes annually.

Contribution of eight mines including one associated mine producing more than 5,000 tonnes of kaolin (processed) annually was about 77% in 2009-10. Remaining 23% production of kaolin (processed) was shared by 13 small mines.

The contribution of natural and processed kaolin in 2009-10 was 97% and 3%, respectively, as against 95% and 5% in the preceding year.

Gujarat was the leading producing state of kaolin accounting for 49% of the total production in 2009-10 followed by Kerala (28%), Rajasthan (13%), and Jharkhand & West bengal (4% each). The remaining 2% was shared by Andhra Pradesh & Odisha (Tables -3 to 7).

Mine-head stocks of kaolin at the end of 2009-10 were 416 thousand tonnes as against 354 thousand tonnes at the beginning of the year (Table - 8).

The average daily employment of labour strength during 2009-10 was 1,922 as against 2,718 in the preceding year. Prices of kaolin are furnished in the General Review on Prices.

Table – 1 : Reserves/Resources of China Clay as on 1.4.2005 (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	**101520**	**13142**	**107459**	**222121**	**3214**	**29460**	**34819**	**287435**	**408009**	**1588599**	**22005**	**2373540**	**2595661**
By Grades													
Chemical	-	-	-	-	-	600	-	-	-	33945	-	34545	34545
Ceramic/Pottery	25472	4618	37752	67842	1256	19688	13696	101906	20487	334479	19812	511324	579166
Mixed grade	22661	566	41248	64476	-	1393	1924	211	600	159031	-	163159	227635
Filler	9263	3500	8732	21495	-	50	333	11	303	33786	-	34484	55979
Cement	1077	-	397	1475	-	364	843	-	-	552	-	1759	3234
Others	9419	1777	6726	17923	606	6465	11257	180069	776	44226	429	243828	261751
Unclassified	30283	1237	2819	34339	1352	286	1769	3240	986	27592	1259	36483	70822
Not-known	3343	1443	9785	14572	-	613	4996	1998	384857	954988	505	1347957	1362529
By States													
Andhra Pradesh	4490	2578	4841	11908	-	-	-	5	179	61582	-	61767	73675
Assam	-	131	-	131	-	3360	-	392	-	160	-	3912	4043
Bihar	-	-	-	-	-	-	-	104	39	1296	-	1438	1438
Chhattisgarh	914	179	1585	2678	-	600	110	-	-	11378	-	12088	14766
Delhi	19	-	60	79	-	-	-	857	630	3723	-	5210	5289
Goa	-	-	-	-	-	-	16	-	-	-	-	16	16
Gujarat	38581	924	27685	67190	-	148	867	3088	936	38917	3	43958	111148
Haryana	-	7	29	36	2367	782	3348	13	34	5485	-	12029	12065
Jammu & Kashmir	-	-	-	-	-	-	-	-	-	28122	-	28122	28122
Jharkhand	22162	711	7774	30647	-	1383	28	2007	7280	148753	42	159493	190140
Karnataka	1805	3714	2168	7687	241	311	1997	220360	443	26017	-	249369	257056
Kerala	7826	1055	670	9551	-	303	2077	43930	20439	534582	19770	621101	630652
Madhya Pradesh	943	-	443	1386	-	-	17	-	17	11741	-	11774	13161
Maharashtra	418	-	354	772	-	256	502	11	184	5523	-	6477	7248
Manipur	-	-	-	-	-	-	-	2520	-	-	-	2520	2520
Meghalaya	-	-	-	-	-	-	-	1890	5786	81199	-	88875	88875
Odisha	557	1523	37293	39373	-	-	23	76	35316	201907	1259	238789	278162
Puducherry	-	-	-	-	-	-	-	-	-	2940	-	2940	2940
Rajasthan	23050	1858	17384	42292	606	22317	25328	545	1017	279266	340	329418	371710
Tamil Nadu	-	-	-	-	-	-	-	-	327	56570	-	56897	56897
Uttar Pradesh	-	-	-	-	-	-	-	11600	3447	10018	-	25065	25065
West Bengal	757	461	7173	8390	-	-	300	36	331935	79418	591	412281	420671

Figures rounded off.

Table – 2 : Details of Exploration Activities for Kaolin and Other Clays during 2009-10

Agency/ State/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage (m)		
DMG							
Rajasthan							
Jaisalmer	N/V Modha, Jasuwala Noda (Gaj Singh ki Dhani)	1:50,000 1:10,000 1:2,000	150 10 1.0	–	–	14	Occurrence of off-white coloured siliceous white clay was noticed in about 0.50 sq km & 0.35 sq km area, N/V Modha and Jasuwala Nada (Gaj Singh ki Dhani), respectively.
MML							
Clay							
Karnataka							
Shimoga	Thirthahalli	1:2,000	6.48	–	–	8	Strike length of the deposit observed was 1000 m with a width of 100 m. About 0.26 million tonnes of resources were estimated.

Table – 3 : Principal Producers of Kaolin, 2009-10

Name & address of producer	Location of mine	
	State	District
Shri Ram Mine Chem International, Near Kutch Diary, G.I.D.C. Area, Madhapur-370 020, Dist. Kachchh, Gujarat.	Gujarat	Kachchh
English Indian Clays Ltd, KP 111/428, Veli. P. O. Thiruvananthapuram, Dist. Thiruvananthapuram, Pin-695 021, Kerala.	Kerala	Thiruvanantha-puram
H.D. Enterprises Pvt. Ltd, Silver Point H.D. House, Pooja 'A', Above ICICI Bank Ltd., P.O. Bhuj-370 001, Dist. Kachchh, Gujarat.	Gujarat	Kachchh
Shankarlal Gangaram Thakkar P. O. Santhalpur–385 850, Dist. Banaskantha, Gujarat.	Gujarat	Patan Kachchh
Mohd. Sherkhan Pathan P. O. Sawa-312 613, Dist. Chittorgarh, Rajasthan.	Rajasthan	Chittorgarh
Manoj P. Solanki, At-Madhapar, P.O. Bhuj, Dist. Kachchh Gujarat.	Gujarat	Kachchh
Patel Nagar Minerals & Industries Pvt. Ltd, P. O. Md. Bazar-731 132, Dist. Birbhum, West Bengal.	West Bengal	Birbhum

(Contd.)

Table-3 (Concld.)

Name & address of producer	Location of mine	
	State	District
The Kerala Ceramics Ltd, P. Box No. 2, P. O. Kundra-691 501, Dist. Kollam, Kerala.	Kerala	Kollam
Smt. Suhura Beevi Thiruvananthapuram, New Bungalow, Karamodu, Thonnakal, Kerala.	Kerala	Thiruvanantha-puram
Shri Modi Levigated Kaolin(P)Ltd, Opp. Railway Station, Neem-ka-Thana-332 713,. Dist-Sikar, Rajasthan.	Rajasthan	Jaipur
D.B.H. International (P) Ltd. N-75, Connaught Circus, New Delhi-110 001.	Kerala	Thiruvanantha-puram
J.K. White cement Works 70, Sector – 7 Extn. Indra Vihar Street, New power House Road, Jodhpur, Rajasthan.	Rajsthan	Chittorgarh
E.A.Rasheed, 38/970, Power House Road, P.O. Thiruvanathapuram- 695 023, Dist-Thiruvanathapuram, Kerala.	Kerala	Thiruvanantha-puram
Bharat Mineral Dr.Rajendra Prasad Shrani, Mezzanine Floor, Room No.8, Kolkata-700 001.	Jharkhand	West Singhbhum
Regency Ceramics Ltd, 5-8-358, N.N. House, Chirag Ali Lane, Hyderabad-500 001, Andhra Pradesh.	Andhra Pradesh	Visakhapatnam

Table – 5 : Production of Kaolin, 2008-09 and 2009-10
(By Sectors/States/Districts/Grades)

(Qty. in tonnes; value in Rs. '000)

State/District	2008-09							2009-10(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	**93(1)**	**1987387**	**410952**	**96344**	**230795**	**2083731**	**641747**	**88(2)**	**2496352**	**530399**	**81885**	**168475**	**2578237**	**698874**
Public sector	6	73908	9978	26904	124215	100812	134193	6	63950	9027	19006	70048	82956	79075
Private sector	87(1)	1913479	400974	69440	106580	1982919	507554	82(2)	2432402	521372	62879	98427	2495281	619799
Andhra Pradesh	**10**	**47678**	**4730**	**-**	**-**	**47678**	**4730**	**7**	**42049**	**3207**	**-**	**-**	**42049**	**3207**
Adilabad	2	13678	1430	-	-	13678	1430	1	4840	484	-	-	4840	484
Cuddapah	1	4450	668	-	-	4450	668	1	2600	390	-	-	2600	390
East Godavari	4	7300	1460	-	-	7300	1460	3	4421	884	-	-	4421	884
Visakhapatnam	2	21700	1062	-	-	21700	1062	2	30188	1449	-	-	30188	1449
West Godavari	1	550	110	-	-	550	110	-	-	-	-	-	-	-
Gujarat	**27**	**937559**	**157900**	**31369**	**43217**	**968928**	**201117**	**29**	**1245645**	**209970**	**27539**	**34635**	**1273184**	**244605**
Kachchh	16	752993	138870	-	-	752993	138870	19	1054251	190556	-	-	1054251	190556
Mahesana	2	-	-	8190	8600	8190	8600	2	-	-	9280	9744	9280	9744
Patan	3	173090	17309	-	-	173090	17309	3	187044	18704	-	-	187044	18704
Sabarkantha	6	11476	1721	23179	34617	34655	36338	5	4350	710	18259	24891	22609	25601
Jharkhand	**13(1)**	**138230**	**36385**	**30692**	**55665**	**168922**	**92050**	**11(1)**	**64404**	**27330**	**28656**	**56849**	**93060**	**84179**
Ranchi	1	3062	230	-	-	3062	230	-	-	-	-	-	-	-
Sahebganj	3(1)	77778	3717	15153	31937	92931	35654	3(1)	16433	1277	15102	36054	31535	37331
Singhbhum (West)	9	57390	32438	15539	23728	72929	56166	8	47971	26053	13554	20795	61525	46848

(Contd.)

Table - 5 : (Contd.)

State/District	2008-09							2009-10(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
Karnataka	**3**	**2450**	**662**	**3714**	**5448**	**6164**	**6110**	**3**	**2400**	**648**	**3593**	**5307**	**5993**	**5955**
Hassan	1	-	-	3614	5338	3614	5338	1	-	-	3593	5307	3593	5307
Kolar	1	2450	662	-	-	2450	662	1	2400	648	-	-	2400	648
Shimoga	1	-	-	100	110	100	110	1*	-	-	-	-	-	-
Kerala	**16**	**564032**	**139889**	**23190**	**118767**	**587222**	**258656**	**14**	**704003**	**180546**	**15413**	**64741**	**719416**	**45287**
Kannur	2	-	-	7653	18283	7653	18283	2	-	-	7609	18094	7609	18094
Kasaragode	1	-	-	769	1538	769	1538	1	-	-	1200	2400	1200	2400
Kollam	1	73908	9978	14768	98946	88676	108924	2	71785	10594	6604	44247	78389	54841
Thiruvananthapuram	12	490124	129911	-	-	490124	129911	9	632218	169952	-	-	632218	69952
Madhya Pradesh	**2**	**8400**	**762**	**-**	**-**	**8400**	**762**	**3**	**17025**	**1615**	**-**	**-**	**17025**	**1615**
Katni	1	8300	747	-	-	8300	747	2	15700	1416	-	-	15700	1416
Satna	1	100	15	-	-	100	15	1	1325	199	-	-	1325	199
Odisha	**3**	**2031**	**626**	**1422**	**1145**	**3453**	**1771**	**3**	**770**	**151**	**1388**	**1117**	**2158**	**1268**
Bargarh	1	500	90	-	-	500	90	1	700	126	-	-	700	126
Mayurbhanj	2	1531	536	1422	1145	2953	1681	2	70	25	1388	1117	1458	1142
Rajasthan	**16**	**202189**	**36027**	**-**	**-**	**202189**	**36027**	**15(1)**	**325912**	**69764**	**-**	**-**	**325912**	**69764**
Bhilwara	5	48378	7838	-	-	48378	7838	6	63132	10185	-	-	63132	10185
Bundi	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Chittorgarh	6	121395	22441	-	-	121395	22441	6(1)	211330	50440	-	-	211330	50440
Jaipur	2	29396	5144	-	-	29396	5144	1	48450	8479	-	-	48450	8479
Pali	1	3020	604	-	-	3020	604	1	3000	660	-	-	3000	660
Sikar	1#	-	-	-	-	-	-	1#	-	-	-	-	-	-
West Bengal	**3**	**84818**	**33971**	**5957**	**6553**	**90775**	**40524**	**3**	**94144**	**37168**	**5296**	**5826**	**99440**	**42994**
Birbhum	3	84818	33971	5957	6553	90775	40524	3	94144	37168	5296	5826	99440	42994

Figures in parentheses indicate the number of associated mines.
** Mines reporting bauxite & ochre.*
 # Mines reporting dolomite.

Table – 4 : Production of Kaolin (Total), 2007-08 to 2009-10
(By States)

(Qty. in tonnes; value in Rs. '000)

State	2007-08		2008-09		2009-10 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**1466442**	**573568**	**2083731**	**641747**	**2578237**	**698874**
Andhra Pradesh	19446	1769	47678	4730	42049	3207
Chhattisgarh	1706	233	–	–	–	–
Gujarat	491435	112424	968928	201117	1273184	244605
Jharkhand	152948	95256	168922	92050	93060	84179
Karnataka	5900	5783	6164	6110	5993	5955
Kerala	466469	269554	587222	258656	719416	245287
Madhya Pradesh	10670	975	8400	762	17025	1615
Odisha	3606	1555	3453	1771	2158	1268
Rajasthan	238196	49050	202189	36027	325912	69764
West Bengal	76066	36969	90775	40524	99440	42994

Table – 6: Production of Kaolin (Natural), 2008-09 and 2009-10(P)
(By Frequency Groups)

(Qty. in tonnes)

Production Group	No. of mines		Production for the Group		Percentage in total production		Cumulative percentage	
	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10
All Groups	**73**	**70(1)**	**1987387**	**2496352**	**100.0**	**100.0**	–	–
Up to 500	6	7	1440	730	0.1	0.1	0.1	0.1
501-1000	5	3	3624	2146	0.2	0.1	0.3	0.2
1001-2000	3	4	5041	5629	0.2	0.2	0.5	0.4
2001-3000	6	6	15075	15342	0.8	0.6	1.3	1.0
3001-4000	7	4	22935	13692	1.2	0.5	2.5	1.5
4001-5000	4	4	16744	17355	0.8	0.7	3.3	2.2
5001-10000	9	9	60189	64188	3.0	2.6	6.3	4.8
10001-15000	2	5(1)	25990	61137	1.3	2.4	7.6	7.2
15001 & above	31	28	1836349	2316133	92.4	92.8	100.0	100.0

Figures in parentheses indicate number of associated mines.

Table – 7 : Production of Kaolin (Processed), 2008-09 and 2009-10 (P)
(By Frequency Groups)

(In tonnes)

Production Group	No. of mines		Production for the Group		Percentage in total production		Cumulative percentage	
	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10
All Groups	**22(1)**	**21(1)**	**96344**	**81885**	**100.0**	**100.0**	–	–
Up to 500	3	3	492	996	0.5	1.2	0.5	1.2
501-1000	3	2	2447	1342	2.5	1.6	3.0	2.8
1001-2000	4	5	5751	6937	6.0	8.5	9.0	11.3
2001-3000	1	-	2800	-	2.9	-	11.9	11.3
3001-4000	1	3	3614	9848	3.8	12.0	15.7	23.3
4001-5000	2	1	9311	4956	9.7	6.1	25.4	29.4
5001-10000	6(1)	6(1)	45903	45353	47.6	55.4	73.0	84.8
10001 & above	2	1	26026	12453	27.0	15.2	100.0	100.0

Figures in parentheses indicate the number of associated mines.

Table – 8 : Mine-head Stocks of Kaolin (Total), 2009-10 (P)
(By States)

(In tonnes)

State	At the beginning of the year	At the end of the year
India	**353770**	**415613**
Andhra Pradesh	53239	57370
Gujarat	59394	104080
Jharkhand	22900	20775
Karnataka	3759	4772
Kerala	23518	20800
Madhya Pradesh	32891	22342
Odisha	2935	4189
Rajasthan	142758	166836
West Bengal	12376	14449

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 outside the leasehold area. 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%, depends 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 Kaolin production. The important plants amongst them are English India Clays Ltd (EICL) (220,000 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, Gujarat (80,000 tpy capacity, a new plant of 40,000 tpy is under construction); Amrapalli China Clay Washing Plant, Nadapa, Bhuj district, 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. Wolkem India Ltd which reportedly acquired a kaolin deposit with an initial 15,000 tpy clay processing facility, had sold this facility to EICL in 2007. EICL has capacity to produce 180,000 tpy paper coating and filler grades of processed china clay (hydrous), besides 30,000 tpy of calcined clays. It is in the process of increasing capacity of calcined clay to 60,000 tpy. Ashapura is on the verge of establishing new production unit in Kerala with a 200,000 tpy kaolin capacity of various grades - air floated, lumps, hydrous and hydrous calcined.

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 Hibrite, Cerefel - K.C.G. Spray dried, K.C.G. Lumps, B.C.K. Spray dried, etc. Grading is based primarily on

white colouration and grit content. Improved processing techniques could 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.

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 1999) for paper coating and filler for paper, rubber, textile industries, IS:68-1979 (First Revision, Reaffirmed 2002) for paint, IS:1463-1983 (Third Revision, Reaffirmed 2000) for cosmetics and IS:7589-1974 (Reaffirmed 1998) for Explosive & Pyrotechnic Industry. BIS has revised the specifications for china clay for Ceramic Industry to IS:2840 - 2002 (Second Revision). 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).

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, refractories and pesticides 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 increased to 1,138,300 tonnes in 2009-10, from 1,088,100 tonnes in 2008-09. Ceramic Industry accounted for 45% consumption followed by cement (32%), 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 23%.

TRADE POLICY

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

WORLD REVIEW

Occurrences of kaolin are widespread in the world. Kaolin is mined, processed and traded by most of the countries. The world reserves of kaolin are very large. Alternatively, improved processing technologies are facilitating usage of hitherto unuseable china clay deposits which are today abundantly exploited and are made suitable for various consuming industries. No foreseeable crunch in meeting the world demand is envisaged.

The world production of kaolin at 25.4 million tonnes in 2009 showed slight decrease over that of the previous year. Six countries, namely, USA, Germany, China, Brazil, UK and Iran accounted for about 69% world production. The share of USA in total world production was about 20%, followed by Germany (18%), China (12%), Brazil (10%), Iran (5%) and UK (4%) (Table-11).

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

Sl. No.	Characteristics	Paper coating Grade I	Filler in paper, rubber, textile Grade II	Paint Grades I & II	Cosmetics	Explosives
1.	Bureau of Indian Standard Specification No.	505 (1995)	505 (1995)	68 (1979)	1463 (1983)	7589 (1974)
2.	Fineness (by weight % material retained on:)					
	45 micron sieve	–	–	0.5 (Gr. II)	2.0	–
	53 micron sieve	0.8	1.0	–	–	–
	63 micron sieve	–	–	0.5 (Gr.I)	–	1.0
	90 micron 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	2.0	1.5	1.5
7.	Loss on ignition (% max.)	14-15.5	14-15.5	10-14	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	6-8.5	7.5	6.0-7.5
13.	Oil absorption (ml/100 g)	–	50 (min)	25-40±10	–	35-45
14.	Water soluble matter (%, max.)	–	0.5	1.0	–	0.5

** As agreed.*

@ To pass test for iron and carbonate as well.

Table – 10 : Reported Consumption of Kaolin1/ (China clay), 2007-08 to 2009-10 (By Industries)

(In tonnes)

Industry	2007-08	2008-09(R)	2009-10(P)
All Industries	**983500**	**1088100**	**1138300**
Cement2/	270000 (8)	339300 (8)	363100 (8)
Ceramic1/	479700 (236)(e)	480700 (236)(e)	517000 237)(e)
Cosmetic	2200 (5)	2200 (5)	2200 (5)
Glass	2300 (3)	2300 (3)	2300 (3)
Paint	88900 (25)	110900 (25)	111000 (25)
Paper	21300 (22)	21100 (23)	21700 (23)
Pesticide	25600 (21)	24800 (21)	24400 (19)
Refractory	27600 (27)	27900 (28)	27400 (28)
Rubber	2300 (30)	2400 (31)	2400 (31)
Others (abrasives, asbestos-products, chemicals, dry cell battery, electrical, electrode and textile).	63600 (41)	76500 (41)	66800 (41)

Figures rounded off. Data collected on non-statutory basis. Figures in parentheses denote the number of units in organised sector reporting consumption.*
*(**includes actual reported consumption and/or estimates made wherever required).*
1/ Includes 2 units which processed crude china clay to the tune of about 62,007 tonnes,74,922 tonnes & 65,285 tonnes during 2007-08, 2008-09 & 2009-10, respectively.
2/ Relates to raw/unprocessed china clay.

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

(In '000 tonnes)

Country	2007	2008	2009
World : Total	**28700**	**27700**	**21000**
Brazil	2480	2670	2500
China	2781	3000(e)	3000(e)
Czech Republic	682	672	525
France	351	336	227
Germany	3842	3622	4514
Iran	948	1274	1274
Korea, Rep. of	1054	1182	890
Malaysia	587	506	464
Mexico	971	690	406
Spain	489	356	338
Turkey	456	233	235
UK	1671	1355	1060
USA	7110	6280(e)	5200
Vietnam	650(e)	650(e)	650(e) –
Other countries	4628	4874	4117

Source: *World Mineral Production, 2005-2009.*

Venenzuela

Ruskaolin (a joint venture between the Venezuelan government and Russian Agapov - owned Kaolin Venezuela) planned to mine kaolin in the state of Bolivar. The deposit contained more than 38 million tonnes of reserves. Production was planned to be around 300,000 tpy.

FOREIGN TRADE

Exports

Exports of kaolin increased to 160,935 tonnes in 2009-10 from 120,418 tonnes in 2008-09. UAE (68%) and Bangladesh (16%) were the major importing countries in 2009-10 (Table - 12).

Imports

Imports of kaolin decreased to 46,708 tonnes in 2009-10 from 62,083 tonnes in 2008-09. Major suppliers were USA (53%), China (21%) and Ukraine (12%) (Table - 13).

Table – 12 : Exports of Kaolin (By Countries)

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**120418**	**477819**	**160935**	**490785**
Belgium	5976	18134	++	++
UAE	72325	177678	108934	136641
Bangladesh	22662	68784	25047	82080
Germany	2771	35451	4627	49808
Malaysia	806	10597	2768	29443
Egypt	1033	13601	1896	28063
Angola	3282	26759	3643	25290
Indonesia	498	7452	1121	11392
Sri Lanka	2981	21582	1207	10957
Philippines	558	10521	527	8073
Other countries	7256	87260	11165	109038

Table – 13 : Imports of Kaolin
(By Countries)

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**62083**	**632016**	**46708**	**563887**
USA	14947	198363	24842	327863
China	10188	111360	9577	98991
UK	3979	58828	2518	44968
Ukraine	–	–	5376	28208
New Zealand	336	8606	588	15858
Spain	603	7067	900	12974
France	823	12135	572	11512
Czech Republic	921	6238	398	3335
Indonesia	18574	97365	211	919
Brazil	5698	54545	9762	106357
Other countries	1950	25697	1723	19217

FUTURE OUTLOOK

India has abundant resources of kaolin which can easily meet both the internal and the external demands. The future requirement of processed kaolin in the domestic market is expected to grow substantially. The processing of kaolin in the country is done mostly by conventional methods like levigation and washing. Hi-tech processing techniques may have to be adopted for generation of processed kaolin in future.

New capacities for processing have to be established and existing capacities have to be augmented in the country to meet the demand of processed kaolin in the future. Efforts to foray into the potential markets like Egypt, Zimbabwe, Iran, Malaysia, Jordan and Pakistan need to be prioritised, besides expansion in exports to the traditional and neighbouring markets like Bangladesh, Sri Lanka and Nepal as also other prospective markets such as, Kenya, UAE, Saudi Arabia and Bahrain must be high in the line of focus.

In the Indian kaolin market, good growth is expected both for hydrous and calcined clay particularly in paint, cables, plastics, rubber and ceramics.

2. Ball Clay

Ball clay and china clay are used for similar purposes in ceramic and pottery. 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

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 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.

Table – 14 : Reserves/Resources as on 1.4.2010 : Ball Clay(P)
(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.

PRODUCTION, STOCKS & PRICES

The production of ball clay at 898 thousand tonnes in 2009-10 decreased by 10 % as compared to that in the previous year.

During the year under review, there were 34 reporting mines as against 46 in 2008-09. Besides, production of ball clay was also reported as an associated mineral by two mines during 2009-10. Six principal producers accounted for about 63% production. The share of public sector mines in the total production was 11 % as in the preceding year.

Rajasthan continued to be the major producing state accounting for 68% of the total production followed by Andhra Pradesh with 23%. The remaining 9% production was from Gujarat and Tamil Nadu (Tables - 15 to 17).

Mine-head stocks of ball clay at the end of 2009-10 were 328 thousand tonnes as against 299 thousand tonnes at the beginning of the year (Table - 18).

The average daily employment of labour strength in 2009-10 was 315 as against 397 in the previous year. Domestic prices of ball clay are furnished in the General Review on Prices.

Table – 15 : Principal Producers of Ball clay 2009-10

Name & address of producer	Location of mine	
	State	District
Jaichandlal Daga Bagree Mohalla Bikaner-334 001, Rajasthan.	Rajasthan	Bikaner
Tahlaram & Sons, Ramnath Sadan, Rathkhana Colony, Bikaner-334 001, Rajasthan.	Rajasthan	Bikaner
Harish Clays, P.B.No. 57, Harasar House, Near M. N. Hospital, Bikaner, Rajasthan.	Rajasthan	Bikaner
Sunder Lal Daga, Bagree Mohalla, Post : Bikaner - 334 001, Dist. : Bikaner, Rajasthan.	Rajasthan	Bikaner
Padmavati Minerals C/o K. Sriramamurthy, Dwarka Tirumala (Vill & Mand), P.O. Dwarka Tirumala-534 426 Dist. : West Godavari, Andhra Pradesh.	Andhra-Pradesh	West Godavari
Andhra Pradesh Mineral Dev. Corpn. Ltd, House No. 8-3-945, Pancom Business Center, Ameerpet, Hyderabad –500016.	Andhra-Pradesh	West Godavari

Table – 16 : Production of Ball Clay, 2007-08 to 2009-10

(By States)

(Qty in tonnes; value in Rs. '000)

State	2007-08		2008-09		2009-10 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**796134**	**140368**	**997676**	**200778**	**898125**	**188775**
Andhra Pradesh	241506	34639	262342	35221	205634	21736
Gujarat	10392	662	11539	579	55166	1878
Rajasthan	535791	103158	698795	159328	614740	160102
Tamil Nadu	8445	1909	25000	5650	22585	5059

Table – 17 : Production of Ball clay, 2008-09 and 2009-10 (By Sectors/States/Districts)

(Qty. in tonnes; value in Rs.'000)

State/District	2008-09			2009-10 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	**46(2)**	**997676**	**200778**	**34(2)**	**898125**	**188775**
Public sector	2	110882	9178	2	99327	7312
Private sector	44(2)	886794	191600	32(2)	798798	181463
Andhra Pradesh	**15**	**262342**	**35221**	**12**	**205634**	**21736**
West Godavari	15	262342	35221	12	205634	21736
Gujarat	**2(1)**	**11539**	**579**	**2(1)**	**55166**	**1878**
Bharuch	(1)	7189	144	(1)	45486	910
Kachchh	1	20	2	1	30	3
Patan	1	4330	433	1	9650	965
Rajasthan	**28(1)**	**698795**	**159328**	**19(1)**	**614740**	**160102**
Bikaner	28(1)	698795	159328	19(1)	614740	160102
Tamil Nadu	**1**	**25000**	**5650**	**1**	**22585**	**5059**
Cuddalore	1	25000	5650	1	22585	5059

Figures in parentheses indicate associated mines of ball clay with silica sand & fire clay.

Table – 18 : Mine-head Stocks of Ball Clay 2009-10(P) (By States)

(In tonnes)

State	At the beginning of the year	At the end of the year
India	**299229**	**328417**
Andhra Pradesh	114174	118984
Gujarat	393	467
Rajasthan	171261	194229
Tamil Nadu	13401	14737

SPECIFICATIONS

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

CONSUMPTION

Consumption of ball clay increased from 544,700 tonnes in 2008-09 to 564,500 tonnes in 2009-10. About 98% 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 to 32,132 tonnes in 2009-10 from 23,228 tonnes in 2008-09. Exports were mainly to Bangladesh (96%) (Table - 20).

Imports

Imports of ball clay were 123,073 tonnes in 2009-10 as compared to 122,026 tonnes in the previous year. Imports were mainly from Ukraine (56%), Indonesia (22%) and UK (17%) (Table -21).

Table – 19 : Reported Consumption of Ball clay 2007-08 to 2009-10 (By Industries)

(In tonnes)

Industry	2007-08	2008-09(R)	2009-10 (P)
All Industries	**524400**	**544700**	**564500**
Abrasive	100(2)	100(2)	100(2)
Ceramic[e]	513000(224)	534300(224)	551400(225)
Refractory	11300(26)	10300(26)	13000(27)

Figures rounded off. Data collected on non-statutory basis.
Figures in parentheses denote the number of units in the organised sector reporting consumption.*
(Includes actual reported consumption and/or estimates made wherever required).*

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

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**23228**	**77787**	**32132**	**104567**
Bangladesh	17039	58459	30783	101090
UAE	5042	15382	717	2026
Oman	279	1255	330	542
Kenya	104	363	190	425
Nepal	600	1977	51	194
UK	1	3	18	111
Nigeria	–	–	16	93
Thailand	106	118	2	3
Australia	10	72	–	–
USA	14	115	–	–
Other countries	33	43	25	83

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

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**122026**	**755642**	**123073**	**667661**
Ukraine	91719	480390	68961	372948
UK	20111	194307	21247	184931
Indonesia	5325	16838	27594	62964
China	646	4286	3095	20784
USA	1074	17014	694	11469
Portugal	52	162	456	3936
France	104	1511	156	2417
Germany	1293	25138	139	2329
Japan	260	5441	100	2263
Thailand	1343	9917	43	130
Other countries	99	638	588	3490

3. Clay (Others)

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

PRODUCTION, STOCKS & PRICES

The production of clay (others) at 1,006 thousand tonnes in 2009-10 decreased by about 18% as compared to that in the previous year due to fall in demand.

There were 17 mines reporting production in 2009-10 as against 20 mines in the previous year. Besides production of clay (others) was reported by 9 mines as associated mineral to the tune of 31% of the total production. Entire production of clay (others) was by private sector.

Gujarat, the major producing state, accounted for about 39% of the total production during followed by Madhya Pradesh (23%), Andhra Pradesh (20%), and Rajasthan (18%).

About 84 % of the total production was contributed by six principal producers. Twelve minesincluding 4 associated mines having annual production more than 10,000 tonnes contributed about 95% of the total production (Tables - 22 to 25).

Mine-head stocks of clay (others) were 147 thousand tonnes at the end of 2009-10 as against 51 thousand tonnes at the beginning of the year (Table-26).

The average daily employment of labour strength was 164 during 2009-10 as against 194 in the previous year. Domestic prices of clay (others) are furnished in the General Review on Prices.

Table – 22 : Principal Producers of Clay (Others) 2009-10

Name & address of producer	Location of mine	
	State	District
Sanghi Industries Ltd, P.O. Bermoti, Tal: Abdasa, Dist. Kachchh - 370 655, Gujarat.	Gujarat	Kachchh
**The Associated Cement Co. Ltd, 'Cement House', 121, Maharshi Karve Road, Mumbai – 400 020, Maharashtra	Madhya Pradesh	Katni
Sundar Lal Daga., Bagree Mohalla, P.O. Bikaner, Dist. Bikaner, Rajasthan.	Rajasthan	Bikaner
**India Cement Ltd, Dhum Building, 827, Anna Salai, Chennai, Dist. Chennai, Tamil Nadu.	Andhra Pradesh	Rangareddi
Shiv Rattan Jwala Prasad Inside Himolonki Bari, Post : Bikaner, Dist: Bikaner, Rajasthan.	Rajasthan	Bikaner
Munnaswamy & Sons, Shri Vekateswara Ceramic Ind, Post : Bhimadoli,-534 425, Dist. West Godavari, Andhra Pradesh.	Andhra Pradesh	West Godavari

** *Producing of clay (others) with lime stone.*

Table – 23 : Production of Clay (Others), 2007-08 to 2009-10 (By States)

(Qty in tonnes; value in Rs.'000)

State	2007-08		2008-09		2009-10 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**818993**	**73904**	**1220783**	**80499**	**1005923**	**71735**
Andhra Pradesh	157853	18856	150265	10863	196726	22538
Chhattisgarh	390	98	400	100	–	–
Gujarat	364389	18383	369232	11000	395881	5880
Karnataka	45000	4500	–	–	–	–
Madhya Pradesh	247126	31769	556030	42586	235027	23757
Rajasthan	4139	290	144669	15931	178289	19560
West Bengal	96	8	187	19	–	–

Table – 24 : Production of Clay (Others), 2008-09 and 2009-10(P) (By Sector/States/Districts)

(Qty. in tonnes; value in 000)

State/District	2008-09			2009-10 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	**20(13)**	**1220783**	**80499**	**17(9)**	**1005923**	**71735**
Private sector	20(13)	1220783	80499	17(9)	1005923	71735
Andhra Pradesh	**9(10)**	**150265**	**10863**	**10(6)**	**196726**	**22538**
Adilabad	1	6500	611	1	5109	482
Anantapur	(3)	10440	1158	(1)	6640	915
East Godavari	–	–	–	1	30875	6175
West Godavari	–	–	–	1	36900	3690
Krishna	(2)	1200	136	(1)	13900	1427
Kurnool	8(4)	94125	5083	7(2)	48490	3271
Rangareddi	(1)	38000	3875	(2)	54812	6578
Chhattisgarh	**1**	**400**	**100**	**–**	**–**	**–**
Rajnandgaon	1	400	100	–	–	–
Gujarat	**4**	**369232**	**11000**	**2**	**395881**	**5880**
Amreli	2	37442	1947	1	28240	1468
Kachchh	2	331790	9053	1	367641	4412
Madhya Pradesh	**(3)**	**556030**	**42586**	**(3)**	**235027**	**23757**
Katni	(2)	556000	42584	(2)	234907	23751
Jabalpur	(1)	30	2	(1)	120	6
Rajasthan	**5**	**144669**	**15931**	**5**	**178289**	**19560**
Bikaner	5	144669	15931	5	178289	19560
West Bangal	**1**	**187**	**19**	**–**	**–**	**–**
Bankura	1	187	19	–	–	–

Figures in parentheses indicate number of associated mines of clay (others) with limestone, steatite & ochre.

Table – 25 : Production of Clay (Others), 2008-09 and 2009-10
(By Frequency Groups)

(In tonnes)

Production Group	No. of mines		Production for the group		Percentage in total production		Cumulative percentage	
	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10
All Groups	**20(13)**	**17(9)**	**1220783**	**1005923**	**100.0**	**100.0**	–	–
Up to 500	3(3)	1(2)	862	830	0.1	0.1	0.1	0.1
501 to 2000	3 (3)	1(1)	6631	2313	0.5	0.2	0.6	0.3
2001 to 5000	3(4)	3(2)	24157	17743	2.0	1.8	2.6	2.1
5001 to 10000	3	4	20248	27298	1.7	2.7	4.3	4.8
10001 & above	8(3)	8(4)	1168885	957739	95.7	95.2	100.0	100.0

Figures in parentheses indicate the number of associated mines of clay (others) with limestone.

Table – 26 : Mine-head Stocks of Clay (Others), 2009-10 (P)
(By States)

(In tonnes)

State	At the beginning of the year	At the end of the year
India	**50932**	**147760**
Andhra Pradesh	21355	67456
Madhya Pradesh	3432	1679
West Bengal	1633	–
Rajasthan	24512	78625

FOREIGN TRADE

Exports

Exports of clay (others) decreased substantially to 93,381 tonnes in 2009-10 from 337,244 tonnes in 2008-09. Exports were mainly to Malaysia (79%), Saudi Arabia (6%) and Bangladesh & UAE (3% each) (Table- 27).

Imports

Imports of clay (others) also decreased substantially to 3,200 tonnes in 2009-10 from 57,061 tonnes in 2008-09. USA (43%), China (29%) and Ukraine (16%) were the main suppliers (Table - 28).

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

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**337244**	**392298**	**93381**	**273221**
Malaysia	95358	185721	73750	156441
Saudi Arabia	208584	64896	5302	25497
UAE	14235	41855	2541	15871
Bangladesh	6333	31868	2857	8431
Sri Lanka	935	6733	1350	8337
Nepal	3442	14834	1876	8237
Kenya	900	5354	821	7189
Chinese Taipei/Taiwan	48	346	461	5125
Qatar	645	3091	525	3056
Kuwait	3192	13147	332	1497
Other countries	3572	24453	3566	33540

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

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**57061**	**392891**	**3200**	**59861**
USA	891	24339	1361	37061
China	305	1756	924	8285
Ukraine	55477	354726	501	4953
Germany	96	2463	191	4092
Japan	65	5262	75	2066
France	24	827	66	1579
UK	6	469	6	349
Netherlands	67	871	40	284
Indonesia	41	562	–	–
New Zealand	1	620	–	–
Other countries	88	996	36	1192

4. Shale

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, which reportedly encumbered the stages at the captive mines of cement companies. Now, with advancements and better knowledge, it is utilised as a source of alumina in cement making.

PRODUCTION & STOCKS

Production of shale at 2,793 thousand tonnes in 2009-2010 decreased by 8% over that of the previous year. There were 2 reporting mines in 2009-10 as against 4 mines during the previous year. About 96% of the total production of shale was reported as an associated mineral by 16 limestone mines in 2009-10. About 97% production was reported by captive mines of cement plants. The share of public sector was 2% as against 3% in the previous year.

As regards statewise production, Karnataka contributed 34% production of shale followed by Himachal Pradesh (24%), Madhya Pradesh (23%), Maharashtra (14%) and Andhra Pradesh (5%) (Tables - 29 to 31).

Mine-head stock at the end of 2009-10 was 93 thousand tonnes as against 96 thousand tonnes at the beginning of the year (Table 32). The average daily employment of labour strength in 2009-10 was 6 as against 35 in the previous year.

Table – 29 : Principal Producers of Shale, 2009-10

Name and address of producer	Location of mine	
	State	District
*The ACC Ltd, Cement House, 121, Maharshi Karve Road, Churchgate, Mumbai–400 020.	Karnataka Himachal Pradesh Maharashtra	Gulbarga Bilaspur Yavatmal
*Gujarat Ambuja Cements Ltd, P.O. Darlaghat, Taluqa: Arki, Dist. Solan–171 102, Himachal Pradesh.	Himachal Pradesh	Solan
Vasavadatta Cements, Prop.Kesoram Industries Ltd., Post : Sedam - 585 222, Dist. Gulbarga, Karnataka.	Karnataka	Gulbarga
*Ultratech Cement Ltd, P.O. Awarpur Cement Works-442 917, Dist. Chandrapur, Maharashtra.	Maharashtra	Chandrapur
*Jaypee Rewa Cement Ltd, P.O. Jaypee Nagar, Dist. Rewa - 486 450, Madhya Pradesh.	Madhya Pradesh	Rewa

** Produced as an associated mineral with limestone.*

Table – 30 : Production of Shale, 2007-08 to 2009-10
(By States)

(Qty in tonnes; value in Rs. '000)

State	2007-08		2008-09		2009-10 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**2894922**	**90073**	**3047063**	**90260**	**2792897**	**60246**
Andhra Pradesh	392484	18072	195676	10062	142697	7048
Himachal Pradesh	511950	5262	674840	7573	672500	8238
Karnataka	850154	32068	1152357	43820	936182	27922
Madhya Pradesh	556864	5012	589620	5307	637088	5734
Maharashtra	553506	28382	434570	23498	404430	11304
Meghalaya	29964	1277	–	–	–	–

Table – 31 : Production of Shale, 2008-09 and 2009-10 (By Sectors/States/Districts)

(In tonnes, value in Rs.'000)

State/District	2008-09			2009-10 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	**4(18)**	**3047063**	**90260**	**2(16)**	**2792897**	**60246**
Public sector	1	98800	5434	1	62495	3237
Private sector	3(18)	2948263	84826	1(16)	2730402	57009
Andhra Pradesh	**3(7)**	**195676**	**10062**	**2(4)**	**142697**	**7048**
Anantapur	1(2)	6191	846	(1)	430	60
Kurnool	(4)	45107	2000	(2)	21136	1396
Nalgonda	1(1)	45578	1782	1(1)	58636	2354
Rangareddi	1	98800	5434	1	62495	3238
Himachal Pradesh	**(2)**	**674840**	**7573**	**(2)**	**672500**	**8238**
Bilaspur	(1)	217450	3914	(1)	285800	5144
Solan	(1)	457390	3659	(1)	386700	3094
Karnataka	**(2)**	**1152357**	**43820**	**(3)**	**936182**	**27922**
Gulbarga	(2)	1152357	43820	(3)	936182	27922
Madhya Pradesh	**(5)**	**589620**	**5307**	**(5)**	**637088**	**5734**
Rewa	(5)	589620	5307	(5)	637088	5734
Maharashtra	**1(2)**	**434570**	**23498**	**(2)**	**404430**	**11304**
Chandrapur	1	68	2	–	–	–
Yavatmal	(2)	434502	23496	(2)	404430	11304

Figures in parentheses indicate associated mines with limestone.

Table – 32 : Mine-head Stocks of Shale, 2009-10 (P) (By States)

(In tonnes)

State	At the beginning of the year	At the end of the year
India	**95596**	**92885**
Andhra Pradesh	38933	35410
Karnataka	56663	57475