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MINOR MINERALS

30.9 FIRECLAY

(FINAL RELEASE)

GOVERNMENT OF INDIA
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30-9 Fireclay

The name fireclay is given to a group of refractory clays which can withstand temperatures above pyrometric cone equivalent (PCE) - 19. Refractoriness and plasticity are the two main properties needed in fireclay for its suitability in the manufacture of refractory bricks. A good fireclay should have a high fusion point (>1580° C) and good plasticity. Fireclay containing high alumina and low iron oxide, lime, magnesia & alkalies is preferred by refractory manufacturers. The aluminous (kaolinitic) variety of fireclay is more refractory because of its hardness and density and absence of iron, giving it a white-burning colour. The absence of alkalies gives it a very high fusion temperature.

RESERVES/RESOURCES

India possesses substantial reserves of fireclay. The best deposits occur in association with the coal seams in the Lower Gondwana Coalfields of Andhra Pradesh, Jharkhand, West Bengal, Madhya Pradesh and Neyveli lignite fields in Tamil Nadu. Notable occurrences of fireclay, not associated with coal measures, are reported in Gujarat, Jabalpur region of Madhya Pradesh and Belpahar-Sundergarh areas of Odisha. The reserves of fireclay are substantial but reserves of high-grade (non-plastic) fireclay containing more than 37% alumina are limited.

Reserves/Resources of fireclay as per NMI data, based on UNFC system as on 1.4.2015 has been estimated at 722.83 million tonnes. Out of these, 27 million tonnes are grouped under Reserves category while the bulk i.e. 695.79 million tonnes are classified under Resources category. Out of 27 million tonnes reserves, 13.29 million tonnes are proved reserves and 13.74 million tonnes are probable reserves. Out of the total reserves/resources, Odisha accounts for 24% followed by Madhya Pradesh (18%), Tamil Nadu (16%), Jharkhand (9%), Gujarat & Rajasthan (8% each). Gradewise, refractory-plastic grade accounts for 37% followed by refractory-non-plastic/semi-plastic (16%) and refractory-unspecified (15%). The remaining 32% are of others, unclassified and not-known grades (Table-1).

EXPLORATION & DEVELOPMENT

The exploration & development details if any are given in the review on Exploration & Development in "General Reviews".

PRODUCTION & STOCKS

As per Govt. of India Notification S.O.423 (E), dated 10th February 2015, 'fireclay' has been declared as 'Minor Mineral' hence the production data is not available with IBM.

MINING AND MARKETING

Fireclay mines are worked by manual method. Most of the mines are small and worked by opencast method by forming benches in overburden and fireclay. Most of the refractory manufacturing units have their own captive mines.

The important marketing centres of fireclay are Bikaner in Rajasthan, Mahuamilan and Balumath in Jharkhand, Than in Gujarat, Katni in Madhya Pradesh and Belpahar in Odisha. Water seepage beyond the depth of 6 m is the main problem commonly faced by most of the mine owners and as a result of which most of the mines are kept closed during rainy season.

USES AND SPECIFICATIONS

Fireclays are used in the manufacture of cement, bricks, blocks, retorts, crucibles, mortars, masses, pottery, floor tiles, etc. Low-grade material is used for manufacturing heavy sanitaryware, such as, pipes and bath tubs. Firebricks are used where heat generation is involved. Firebricks are used extensively in furnaces, kilns and ovens. Firebricks are required chiefly by metallurgical industries.

The fireclays are graded into: i) low duty ii) intermediate duty iii) high duty and iv) super duty, depending upon their capacity to withstand high temperature before melting. The low duty fireclay can withstand temperatures between 1,515 and 1,615 °C (PCE 19-28); intermediate duty fireclay up to 1,650 °C (PCE 30), high duty fireclay up to 1,700 °C (PCE 32) and super duty beyond 1,775 °C (PCE 35).

Crude fireclay and other clays including kaolin (china clay) are also used in a few cement manufacturing plants to increase the alumina content in the raw meal and its plasticity.

Table – 1 : Reserves/Resources of Fireclay as on 1.4.2015
(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	**13295**	**5035**	**8707**	**27037**	**13878**	**30155**	**18260**	**49290**	**54093**	**524011**	**6104**	**695791**	**722829**
By Grades													
Refractory-non-plastic/semi-plastic	2069	782	813	3663	4099	15234	3231	2607	1397	86980	-	113548	117211
Refractory-plastic	2271	1113	2076	5460	2492	4835	3074	4076	4674	238564	5146	262861	268321
Refractory-unspecified	7493	2088	4666	14248	5552	5983	6625	945	2010	69444	-	90558	104806
Others	641	302	772	1715	1384	2394	3420	7251	4137	44935	125	63647	65362
Unclassified	821	749	381	1951	194	1382	823	205	30	10020	-	12653	14604
Not-known	-	-	-	-	157	327	1087	34206	41845	74070	833	152525	152525
By States													
Andhra Pradesh	1252	40	642	1934	771	1400	1574	56	417	10211	132	14562	16496
Assam	-	-	-	-	-	-	-	-	-	3161	-	3161	3161
Bihar	-	-	-	-	-	-	-	-	-	44	-	44	44
Chhattisgarh	315	23	94	433	68	27	17	7180	3400	10435	-	21126	21558
Delhi	-	-	-	-	-	-	-	6	13	45	-	64	64
Gujarat	231	-	56	287	1193	664	966	2120	1053	53526	-	59522	59809
Jammu & Kashmir	-	-	-	-	-	-	-	-	-	-	4914	4914	4914
Jharkhand	-	-	3	3	-	1125	309	139	122	64755	-	66450	66454
Karnataka	146	-	-	146	247	340	2003	-	226	8832	-	11648	11794
Kerala	-	-	-	-	-	-	-	8200	51	9929	-	18181	18181
Madhya Pradesh	390	4192	3020	7603	2139	7164	4975	1551	2129	100977	100	119036	126639
Maharashtra	-	322	388	709	17	44	32	-	-	6652	-	6746	7455
Meghalaya	-	-	-	-	-	-	-	-	-	10999	-	10999	10999
Odisha	133	-	40	173	3074	12376	4495	26219	42925	83662	-	172751	172924
Rajasthan	6561	-	3932	10493	1548	1718	697	2256	2580	35363	-	44163	54656
Tamil Nadu	2523	458	155	3136	3952	3971	1842	1561	-	102202	-	113528	116663
Telangana	762	-	-	762	667	746	-	-	758	8514	-	10684	11446
Tripura	-	-	-	-	-	-	-	1	-	369	-	370	370
Uttar Pradesh	-	-	-	-	-	-	-	-	-	3221	-	3221	3221
West Bengal	981	-	377	1359	201	580	1349	-	419	11114	958	14622	15981

Figures rounded off

CONSUMPTION

Cement Industry was the major consumer of crude fireclay , followed by refractory , ceramic and iron & steel industries and other industries, i.e. pesticide, alloy steel, graphite products, foundry, sugar, etc.

FUTURE OUTLOOK

Fireclay is one of the most important minerals used in the Refractory Industry. Cement Industries were the major consumer of crude fireclay accounting for about 64% consumption in the year 2015-16. India has huge reserves of fireclay and there does not seem to be any problem in respect of supplies to the Refractory Industry in the near future. However, a serious dearth is being felt in the availability of high-grade fireclay analysing 37% and above Al_2O_3 with Fe_2O_3 and fluxing impurities less than 2% for supply to the refractories. To fulfil the increasing demand of the Refractory Industry, it is imperative that deposits of high-grade fireclay be explored and delineated.

The export prospect of fireclay is relatively less as it is considered as low-value high bulk mineral. However, fireclay bricks as a commodity could have high export potential and therefore must be encouraged.

As per the Sub-Group-II Report for 12^{th} five year plan, the apparent domestic demand of fireclay was estimated at 739 thousand tonnes by 2016-17 at 9% growth rate.