

10.1 BALL CLAY

Introduction

Ball Clay is a highly plastic variety of kaolin having high binding power, tensile strength and shrinkage ability. It is generally utilised after mixing with non-plastic clay to impart the desired plasticity in pottery, porcelain and refractory materials. It also helps in preparation of glaze enamels and for imparting a dense vitrified body.

Ball Clay has been declared as a "Minor Mineral" under section 3 (e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015 and therefore inventory of Ball Clay has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

The grade classification adopted in the mineral inventory as on 1.4.2015 was based on the data identified and reported by the exploration and exploitation agencies, mostly without considering the chemical constituents qualifying the grades. However, some leading consumers of ball clay for refractory and ceramic/pottery industries indicated specific requirements which have now been included. The specifications for end-use resources classification is given below:

- | | | |
|---|-----------------|--|
| 1 | Ceramic/Pottery | Grain 300 mesh 3% (max)
SiO ₂ : 60 % (min)
Al ₂ O ₃ : 25% (min)
Fe ₂ O ₃ : 1.5% (max)
TiO ₂ : 2.5% (max) |
| 2 | Refractory | Al ₂ O ₃ : 28-30 % (26% min)
Fe ₂ O ₃ : 1.5-2.0% (2% max)
TiO ₂ : 1-1.5% (1.5% max)
Others 66-70% (70% max)
LOI : 6-10%
PCE : 26 to 28 (26 min)
Lump size (+/-) 30 mm |
| 3 | Others | Estimations placed under other than the above grades. |
| 4 | Unclassified | The maximum and minimum values of chemical constituents are such that it could not be classified under above classifications. |

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to norms of this system, reserves of ball clay have been placed under proved (111) and probable (112) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332) and inferred (333) categories.

Salient Features of the Inventory

The total resources of ball clay in the country as on 1.4.2015 are estimated at 134.7 million tonnes, of these 49.5 million tonnes (37%) fall under reserve category and the balance 85.2 million tonnes (63%) are remaining resource category.

All India scenario of ball clay reserves, remaining resources and total resources as on 1.4.2015 vis-à-vis 1.4.2010 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade and states. In Table- 3 district-wise reserves/ resources as on 1.4.2015 have been given.

Of the total resources, about 10.11 million tonnes (7.5%) are in freehold and 122.04 million tonnes (90.6%) in leasehold (private) and 2.6 million tonnes (1.9%) in lease hold (public) areas.

By grade, 58% of the total estimated resources of ball clay are in ceramic/pottery grade, 4% are in refractory grade and the rest 38% are of others and unclassified grades.(Table - 1). An overall increase of about 51.34 million tonnes resources is recorded in comparison to the earlier inventory as on 1.4.2010.

A comparison of present grade wise resources with that of 1.4.2010, reveals an increase in ceramic/pottery grade resources by 4.3 million tonnes (94%), others grade 0.1 million tonnes and unclassified grade 0.1 million tonnes (3% each).

Of the three states, where resources of ball clay have been estimated, Rajasthan is credited with 77 million tonnes (57%), followed by Andhra Pradesh 57 million tonnes (42%) and Gujarat 0.82 million tonnes (1%).

Table - 1 : Reserves/Resources of Ball Clay as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
	(In tonne)								
All India : Total	49493621	16777842	(+)32715779	85249716	66615662	(+)18634054	134743337	83393504	(+)51349833
Ceramic/ Pottery	17792361	16662602	(+)1129759	60900094	57739683	(+)3160411	78692455	74402285	(+)4290170
Refractory	1614108	-	(+)1614108	4639248	-	(+)4639248	62533356	-	(+)62533356
Others	27281909	115240	(+)27166669	10067249	221254	(+)9845995	37349158	336494	(+)37012664
Unclassified	2805243	-	(+)2805243	9643125	8654725	(+)988400	12448368	8654725	(+)3793643
Freehold	-	-	-	10113647	9653206	(+)460441	10113647	9653206	(+)460441
Ceramic/									
Pottery	-	-	-	6053647	5593206	(+)460441	6053647	5593206	(+)460441
Unclassified	-	-	-	4060000	4060000	No Change	4060000	4060000	No Change
Leasehold (Private)	46910725	14351938	(+)32558787	75136069	56962456	(+)18173613	122046794	71314394	(+)50732400
Ceramic/Pottery	15209465	14236698	(+)972767	54846447	52146477	(+)2699970	7005912	66383175	(+)3672737
Refractory	1614108	-	(+)1614108	4639248	-	(+)4639248	62533356	-	(+)62533356
Others	27281909	115240	(+)27166669	10067249	221254	(+)9845995	37349158	336494	(+)37012664
Unclassified	2805243	-	(+)2805243	5583125	4594725	(+)988400	8388368	4594725	(+)3793643
Leasehold (Public)	2582896	2425904	(+) 156992	-	-	-	2582896	2425904	(+)156992
Ceramic/Pottery	2582896	2425904	(+)156992	-	-	-	2582896	2425904	(+)156992

figures rounded off.

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In Andhra Pradesh, a net increase of resources by 5.7 million tonnes is attributed to the addition of 6 new deposit (1.4 million tonnes) and revision in the 14 existing leasehold (private) deposits in Godavari (West) district.

In Rajasthan, a net increase of 45 million tonnes is recorded due to the upward revision in resources of existing leasehold (private) deposits and 24 new deposits in Bikaner and Pali districts.

About 42 million tonnes (50%) of the total estimated resources of ball clay, are under inferred

category. These resources are estimated, based on a limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position of ball clay in the country may improve.

A total 103 deposits have been covered in the inventory as on 1.4.2015. Out of this, 11 deposits are in freehold areas and 92 deposits are in leasehold (private) and one deposit in lease hold (public) areas.

A total of 33 new deposits of ball clay were reported in 2014 -15 in the country.

Table – 2 : Total Resources of Ball Clay as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

(In tonne)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	134743337	83393504	(+)51349833
Andhra Pradesh	57017115	51281299	(+)5735816
Gujarat	816540	299480	(+)517060
Rajasthan	76909682	31812725	(+)45096957

figures rounded off

Table - 3 : District wise Reserves/Resources of Ball Clay as on 1.4.2015

(In tonne)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	49493621	85249716	134743337
Andhra Pradesh	7952392	49064723	57017115
Godavari (West)	7952392	49064723	57017115
Gujarat	20900	795640	816540
Kutch	20900	641649	662549
Patan	-	153991	153991
Rajasthan	41520329	35389353	76909682
Bikaner	41392794	25856557	67249351
Nagaur	-	7891	7891
Pali	127535	9524905	9652440

figures rounded off

10.2 BARYTES

Introduction

The unique properties of barytes and its resultant uses in many diverse spheres of life make it an indispensable mineral. Owing high specific gravity of 4.5, insolubility in water and inertness it is chiefly used as weighing agent in preparation of drilling mud for oil & gas drilling. It is also used as a feedstock for barium chemicals production. India is one of the largest producers & exporters of barytes in the world market.

Barytes has been declared as a "Minor Mineral" under section 3 (e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015.

Basis of Grade Classification

Based on the recommendations of Expert Committee to review the classification of minerals with regards to their optimum industrial uses (September, 2004), the resources of barytes as on 1.4.2015 have been classified into the following grades:

- | | |
|----------------------|---|
| 1. Chemical 'A' | BaSO ₄ (+) 97%,
Specific Gravity 4.25 (Min.) |
| 2. Chemical 'B' | BaSO ₄ (+) 90%,
Specific Gravity 4.15 (min.) |
| 3. Oil Well Drilling | BaSO ₄ (+) 90% generally off colour, Specific Gravity 4.10 (min.) |
| 4. Paint | BaSO ₄ (+) 95%, Snow white to white in colour |
| 5. Low Grade | BaSO ₄ less than 90% |
| 6. Beneficiable | BaSO ₄ 50% (min.), Specific Gravity 3.5 (min.) |
| 7. Other | Estimation for such grade though useable/marketable but cannot be classified into the above grades. |
| 8. Unclassified | The range of maximum and minimum values of the constituents are such that its classification under any of the above grades is not possible. |
| 9. Not known | The information on chemical analysis is not available or potential/actual use is not known. |

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, reserves of barytes have been placed under proved (111) and probable (121 & 122) categories and the remaining resources under feasibility (211), pre-feasibility (221 & 222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of barytes in the country as on 1.4.2015 are estimated at 86.67 million tonnes of which 51.34 million tonnes (59%) are under reserve category and 35.32 million tonnes (41%) under remaining resource category. Of the total resources, 63% are in leasehold (Public 55% and Private 8%) and the remaining 37% resources are in freehold areas.

All India reserves, remaining resources and total resources of barytes as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables-1 and 2. These tables give an idea about changes in terms of increase or decrease of resources as per lease status, grades and state. In Table-3 district wise reserves/resources as on 1.4.2015 have been given.

All India resources of barytes as on 1.4.2015 show an increase of 13.94 million tonnes as compared to resources as on 1.4.2010. Resources of freehold deposits remain unchanged while those of leasehold private and leasehold public deposits record an increase of 0.62 and 13.31 million tonnes respectively.

Out of the total resources of barytes, oil well drilling grade constitutes 55.18 million tonnes (64%), low grade 23.72 million tonnes (27%), chemical "B" grade 4.09 million tonnes (5%), Chemical "A" grade 1.02 million tonnes (1%), paint grade 0.48 million tonnes (0.6%), others, unclassified and not known grade together 2.17 million tonnes (2.5%). Oil well drilling grade recorded a significant increase of 26 million tonnes of resources, whereas others grade recorded decline of 12 million tonnes. Resources of other grades do not show much change worth special mentioning.

Of the total resources of barytes estimated in the country, Andhra Pradesh is endowed with a major chunk of 79.45 million tonnes (92%) followed by Rajasthan 2.99 million tonnes & Telangana 2.74 million

Table - 1 : Reserves/Resources of Barytes as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources			(In tonne)
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	
All India : Total	51346825	31584128	(+19762697)	35333825	41149746	(-5825921)	86670650	72733874	(+13936776)	
Chemical 'A'	212973	267198	(-54225)	806266	730836	(+75430)	1019239	998034	(+21205)	
Chemical 'B'	2053917	2090283	(-36366)	2040801	1598777	(+442024)	4094718	3689060	(+405658)	
Oil Well Drilling	48798783	21743075	(+27055708)	6377538	7338230	(-960692)	55176321	29081305	(+26095016)	
Paint	5986	222066	(-216080)	474859	261705	(+213154)	480845	483771	(-2926)	
Low	-	10285	(-10285)	23724795	23888995	(-1164200)	23724795	23899280	(-1174485)	
Others	209102	7222921	(-7013819)	172671	5562141	(-5389470)	381773	12785062	(-12403289)	
Unclassified	66064	28300	(+37764)	1669741	1711908	(-42168)	1735805	1740208	(-4404)	
Not Known	-	-	-	57154	57154	No Change	57154	57154	No Change	
Freehold	-	-	-	31825221	31825221	No Change	31825221	31825221	No Change	
Chemical 'A'	-	-	-	332056	332056	No Change	332056	332056	No Change	
Chemical 'B'	-	-	-	1105894	1105894	No Change	1105894	1105894	No Change	
Oil Well Drilling	-	-	-	5203985	5203985	No Change	5203985	5203985	No Change	
Low	-	-	-	23563236	23563236	No Change	23563236	23563236	No Change	
Others	-	-	-	2035	2035	No Change	2035	2035	No Change	
Unclassified	-	-	-	1560861	1560861	No Change	1560861	1560861	No Change	
Not Known	-	-	-	57154	57154	No Change	57154	57154	No Change	
Leasehold (Private)	3493990	3037500	(+456490)	3498604	3322555	(+169049)	6992594	6367055	(+625539)	
Chemical 'A'	212973	267198	(-54225)	474210	398780	(+75430)	687183	665978	(+21205)	
Chemical 'B'	2053917	2090283	(-36366)	934907	492883	(+442024)	2988824	2583166	(+405658)	
Oil Well Drilling	945948	210229	(+735719)	1173553	1692945	(-519392)	2119501	1903174	(+216327)	
Paint	5986	222066	(-216080)	474859	261705	(+213154)	480845	483771	(-2926)	
Low	-	10285	(-10285)	161559	161559	No Change	161559	171844	(-10285)	
Others	209102	209139	(-37)	170636	170636	No Change	379738	379775	(-37)	
Unclassified	66064	28300	(+37764)	108880	151047	(-42167)	174944	179347	(-4403)	
Lease Hold (Public)	47852835	28546628	(+19306207)	-	5994970	(-5994970)	47852835	34541598	(+13311237)	
Oil Well Drilling	47852835	21532846	(+26319989)	-	441300	(-441300)	47852835	21974146	(+25878689)	
Low	-	-	-	-	164200	(-164200)	-	164200	(-164200)	
Others	-	7013782	(-7013782)	-	5389470	(-5389470)	-	12403252	(-12403252)	

figures rounded off

tonnes (3% each), West Bengal 0.43 million tonnes (0.5%) and Madhya Pradesh 0.29 million tonnes & Tamil Nadu 0.22 million tonnes (0.3% each). The remaining 0.54 million tonnes resources have been reported from Haryana, Himachal Pradesh, Jharkhand, Maharashtra, Karnataka and Uttarakhand. The Mangampet Baryte deposit in Cuddapah district, Andhra Pradesh is one of the single largest deposits in the world.

As stated, the resources of barytes have been increased by 13.94 million tonnes to 86.67 million tonnes as on 1.4.2015 as compared to 72.73 million tonnes in the earlier inventory as on 1.4.2010. Out of the 12 states reporting occurrence of barytes; only Rajasthan has shown a decline of a small quantity. Increase of 10.97 million tonnes of resources reported from Andhra Pradesh is mainly due to re-estimation of resources of Mangampet mine of APMD. Total 2 new deposits (one

each in Karnataka and Telangana) with resources of 0.34 million tonnes have been reported in the inventory as on 1.4.2015. Increase in resources of Telangana is also due to the fact that it was a new state carved out of Andhra Pradesh in 2014. In the rest of the states, resources have not been changed in current inventory as compared to the inventory as on 1.4.2010.

A review of inventory as on 1.4.2015 indicates that 31.84 million tonnes (37%) of total resources of barytes estimated in the country is placed under inferred and reconnaissance categories. A detailed exploration of these areas may improve the confidence level of resources.

Out of the total 249 deposits covered in inventory as on 1.4.2015, 139 deposits fall under freehold category, 109 deposits under leasehold private and one deposit under leasehold public category.

Table – 2 : Total Resources of Barytes as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

(In tonne)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India: Total	86670650	72733874	(+) 13936776
Andhra Pradesh	79446513	68478435	(+) 10968078
Haryana	440	440	No Change
Himachal Pradesh	117053	117053	No Change
Jharkhand	35900	35900	No Change
Karnataka	243943	15175	(+) 228768
Madhya Pradesh	291912	291912	No Change
Maharashtra	122860	122860	No Change
Rajasthan	2991648	2991680	(-) 32
Tamil Nadu	222419	222419	No Change
Telangana	2739962	-	(+) 2739962
Uttarakhand	25000	25000	No Change
West Bengal	433000	433000	No Change

figures rounded off

Table - 3 : District wise Reserves/Resources of Barytes as on 1.4.2015

(In tonne)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	51346825	35323825	86670650
Andhra Pradesh	49411656	30034857	79446513
Anantapur	-	156966	156966
Cuddapah	48464716	26814817	75279533
Krishna	-	5000	5000
Kurnool	37931	188644	226575
Nellore	805986	2415693	3221679
Prakasam (Ongole H.Q.)	103023	453737	556760

(Contd.)

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(Table - 3 conclud.)

State/District	Reserves	Remaining Resources	Total Resources
Haryana	-	440	440
Mahendragarh	-	440	440
Himachal Pradesh	-	117053	117053
Sirmur	-	117053	117053
Jharkhand	-	35900	35900
Palamau	-	33000	33000
Singhbhum (East)	-	2900	2900
Karnataka	-	243943	243943
Bagalkot	-	228768	228768
Chitradurga	-	15175	15175
Madhya Pradesh	-	291912	291912
Dewas	-	4472	4472
Dhar	-	35000	35000
Shivpuri	-	39600	39600
Sidhi	-	118000	118000
Tikamgarh	-	94840	94840
Maharashtra	-	122860	122860
Chandrapur	-	122410	122410
Gadchiroli	-	450	450
Rajasthan	207167	2784481	2991648
Alwar	-	954053	954053
Bharatpur	-	1575	1575
Bhilwara	-	1601618	1601618
Bundi	-	26038	26038
Chittorgarh	-	4500	4500
Jalore	-	3808	3808
Pali	-	2680	2680
Rajsamand	-	62390	62390
Sikar	-	4313	4313
Udaipur	207167	123506	330673
Tamil Nadu	-	222419	222419
Erode	-	35560	35560
Madurai	-	100000	100000
Perambalur	-	2000	2000
Tirunelveli	-	500	500
Vellore	-	84359	84359
Telangana	1728002	1011960	2739962
Khammam	1728002	1011960	2739962
Uttarakhand	-	25000	25000
Dehradun	-	25000	25000
West Bengal	-	433000	433000
Purulia	-	433000	433000

figures rounded off

10.3 BENTONITE

Introduction

Bentonite is essentially highly plastic clay containing not less than 85% clay mineral, montmorillonite. Bentonite is of great commercial importance in possessing inherent bleaching properties like fuller's earth, hence it is known as 'bleaching clay'. There are two types of bentonites namely, swelling-type or sodium bentonite and non-swelling-type or calcium bentonite. Sodium bentonite is usually referred to simply as bentonite whereas calcium bentonite is called 'fuller's earth'. The commercial importance of bentonite depends more on its physico-chemical properties rather than its chemical composition. Excellent plasticity and lubricity, high dry-bonding strength, high shear and compressive strength, low permeability and low compressibility make bentonite important. Bentonite is valued in drilling mud, iron & steel, foundry sand binding, iron ore pelletisation as water proofing and sealing agent in civil engineering.

As bentonite is "Minor Mineral", therefore inventory of bentonite has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

The resources in the inventory as on 1.4.2015 have been classified into following grades based on present trend of use by different industries.

- | | | |
|-------------------|---|---|
| 1. Drilling mud | } | As identified and reported |
| 2. Foundry | } | by the exploration and |
| 3. Low/ Blendable | } | exploitation agencies. |
| 4. Unclassified | | Where estimation could not be classified into a specific grade based on the available data. |
| 5. Not known | | Where data is not available to classify the resources as per their end use. |

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC) resources are broadly classified into 'reserves' and 'remaining resources'.

According to norms of this system, reserves of bentonite have been placed under proved (111), probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222) measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of bentonite in the country as on 1.4.2015 are estimated at 582.9 million tonnes, of these 14.6 million tonnes (about 2.5%) fall under reserve category and the balance 568 million tonnes (97.5%) are remaining resources.

All India scenario of bentonite 'reserves', 'remaining resources' and 'total resources' as on 1.4.2015 vis-a-vis 1.4.2010, have been given in Tables - 1 and 2. These tables reflect the changes in terms of increase or decrease of resources as per lease status, grades and states. In Table -3 district wise reserves/resources as on 1.4.2015 have been given.

About 88% of the total resources at 513 million tonnes is in freehold and the remaining about 70 million tonnes (12%) is in leasehold (private) areas.

Out of the total resources, drilling fluid grade constitutes 3 million tonnes (0.5%), foundry grade 60 million tonnes (10.3%), poor/blendable grade 19 million tonnes (3.3%), unclassified 90 million tonnes (15.4%) and the balance 411 million tonnes resources (70.5%) have been placed under not known grade.

Of the total resources of 582.9 million tonnes, Rajasthan alone accounts for 73% (428 million tonnes), followed by Gujarat about 25% (144 million tonnes) and the balance 2% (11 million tonnes) is held together by three states namely Tamil Nadu, Jharkhand and Jammu & Kashmir .

About 96% of the total resources estimated in the country is concentrated in four districts only. Of these, 72% is held by Barmer in Rajasthan followed by Kachchh, 14% , Bhavnagar and Sabarkantha 5% each in Gujarat.

An increase of about 14.5 million tonnes of

National Mineral Inventory - An Overview

Table - 1 : Reserves/Resources of Bentonite as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
All India : Total	14586	25061	(-10475)	568303	543306	(+)24997	582888	568367	(+)14521
Drilling Fluid	69	-	(+169)	3009	9303	(-)6294	3079	9303	(-)6224
Foundry	4755	4158	(+)597	55046	50889	(+)4157	59801	55046	(+)4755
Poor/Blendable	-	-	-	18531	18531	No Change	18531	18531	No Change
Unclassified	9762	2736	(+)7026	80437	71472	(+)8965	90199	74208	(+)15991
Not known	-	18167	(-)18167	411279	393111	(+)18168	411279	411279	No Change
Freehold	-	-	-	512995	462126	(+)50869	512995	462126	(+)50869
Drilling Fluid	-	-	-	338	6632	(-)6294	338	6632	(-)6294
Foundry	-	-	-	46341	45173	(+)1168	46341	45173	(+)1168
Poor/Blendable	-	-	-	4	4	No Change	4	4	No Change
Unclassified	-	-	-	71871	71472	(+)399	71871	71472	(+)399
Not known	-	-	-	394442	338844	(+)55598	394442	338844	(+)55598
Leasehold (Public)	-	9865	(-)9865	-	46900	(-)46900	-	56765	(-)56765
Foundry	-	1168	(-)1168	-	-	-	-	1168	(-)1168
Not Known	-	8697	(-)8697	-	46900	(-)46900	-	55597	(-)55597
Leasehold (Private)	14586	15196	(-)610	55308	34281	(+)21027	69893	49477	(+)20416
Drilling Fluid	69	-	(+)69	2671	2671	No Change	2741	2671	(+70)
Foundry	4755	2990	(+)1765	8706	5716	(+)2990	13461	8706	(+4755)
Poor/Blendable	-	-	-	18527	18527	No Change	18527	18527	No Change
Unclassified	9762	2736	(+)7026	8566	-	(+)8566	18328	2736	(+)15592
Not known	-	9470	(-)9470	16837	7367	(+)9470	16837	16837	No Change

figures rounded off

resources has been recorded in the inventory as on 1.4.2015 in comparison to the earlier inventory as on 1.4.2010. Out of the total increase, about 20.8 million tonnes have been accounted with addition of 86 new leasehold private deposits i.e.52 in Kachchh districts in Gujarat and 27 deposit in Barmer , 1 desposit in Bikaner and 6 deposit in Jhalawar district in Rajasthan. Besides, about 6.3 million tonnes decrease has been reported in Bhavnagar district, Gujarat.

Of the total resources of bentonite, about 238

million tonnes (41%) resources are under inferred and reconnaissance categories. These resources are based on a very limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position in the country may improve.

In the inventory as on 1.4.2015 total 143 deposits have been covered out of which 43 deposits are in freehold areas and 100 deposits in leasehold private areas .

Table – 2 : Total Resources of Bentonite as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	582888	568367	(+)14521
Gujarat	143945	134179	(+)9766
Jammu & Kashmir	147	147	No Change
Jharkhand	980	980	No Change
Rajasthan	428272	423517	(+)4755
Tamil Nadu	9544	9544	No Change

figures rounded off

Table - 3 : District wise Reserves/Resources of Bentonite as on 1.4.2015

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	14586	568303	582888
Gujarat	9221	134724	143945
Amreli	-	616	616
Bhavnagar	-	30632	30632
Jamnagar	-	420	420
Kachchh	9221	74039	83260
Sabarkantha	-	28972	28972
Surendranagar	-	46	46
Jammu & Kashmir	-	147	147
Jammu	-	147	147
Jharkhand	609	371	980
Pakur	609	234	843
Sahebganj	-	137	137
Rajasthan	4755	423517	428272
Barmer	4285	412087	416372
Bikaner	50	-	50
Jaisalmer	-	3270	3270
Jhalawar	420	8160	8580
Tamil Nadu	-	9544	9544
Chengai-Anna	-	9544	9544

figures rounded off

10.4 CALCITE

Introduction

Calcite is a carbonate of calcium (CaCO_3) containing 56% CaO and 44% CO_2 . It is one of the important industrial minerals also known as 'calc spar'. Pure crystallised transparent variety of calcite is known as 'iceland spar' which is used as Nicol prism in optical instruments for demonstrating the polarization of light and also used in the manufacture of glass, ceramic products, chemicals, paint, rubber, textile, etc. Calcite of high purity is used for making glazes in pottery and as a flux in metallurgical operations. It is a widely used mineral as construction material, abrasive, agricultural soil treatment, construction aggregate and pigment etc.

Calcite mineralisation occurs in a number of states but major and commercial deposits are located in Rajasthan, Andhra Pradesh, Madhya Pradesh, Haryana, Tamil Nadu, Karnataka, Gujarat and Uttar Pradesh.

Calcite has been declared as a "Minor Mineral" under section 3 (e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015.

Basis of Grade Classification

The following grade classification has been adopted in the mineral inventory as on 1.4.2015:

- | | |
|--------------------|---|
| 1. Chemical | } As reported by the |
| 2. Glass & Ceramic | } Exploration and |
| 3. Poor/Low | } Exploitation agencies. |
| 4. Other | } |
| 5. Un-classified | Estimation for which supporting data is not available to classify under any above specific grade. |
| 6. Not known | No supporting data to classify under any grade. |

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources have broadly been classified into 'reserves' and 'remaining resources'.

According to norms of this system reserves of calcite have been placed under proved (111) and probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of calcite in the country as on 1.4.2015 are estimated at 23 million tonnes. Of these 3.44 million tonnes (15 %) fall under reserve category and the balance 19.55 million tonnes (85%) are under remaining resources.

All India scenarios of calcite 'reserves', 'remaining resources' and 'total resources' as on 1.4.2015 vis-a-vis 1.4.2010, have been given in Tables-1 and 2. These tables reflect the changes in resources in terms of increase or decrease as per lease status, grades and states. In Table - 3 district wise reserves/resources as on 1.4.2015 have been given.

Of the the total resources about 12% are in freehold, 51% in leasehold (private) and 37% in leasehold (public) areas. Gradewise, chemical grade constitutes 5.02 million tonnes (22%), glass and ceramic grade 0.78 million tonnes (3%), poor/low grade 0.20 million tonnes (1%), others 2.1 million tonnes (9%), unclassified 12.18 million tonnes (53%), and not known grade 2.65 million tonnes (12%).

Of the three major states, Rajasthan is credited with 12.21 million tonnes (about 53%), Andhra Pradesh 9.10 million tonnes (about 40%) and Madhya Pradesh 1.07 million tonnes (about 5%) and the rest 2% are accounted for by other states namely, Haryana, Karnataka, Tamil Nadu, Gujarat and Uttar Pradesh.

A net increase of 2 million tonnes resources of calcite recorded in the inventory as on 1.4.2015. These changes have been realised due to re-assessment of resources in Madhya Pradesh and Rajasthan. The total resources of 662 million tonnes added due to addition of 8 new deposits.

Of the total resources of calcite, about 4.30 million tonnes (about 19%) are under inferred and reconnaissance categories. These resources are based on a limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position of calcite in the country may improve.

National Mineral Inventory - An Overview

Table - 1 : Reserves/Resources of Calcite as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
All India : Total	3449	2664	(+784)	19555	18281	(+1274)	23004	20945	(+2059)
Chemical	469	728	(-259)	4556	3946	(+610)	5024	4674	(+350)
Glass & Ceramic	13	0.8	(+) 12	771	838	(-)68	784	839	(-)55
Poor/Low	-	-	No Change	205	205	No Change	205	205	No Change
Others	1276	1509	(-)233	878	877	(+1)	2154	2386	(-)232
Unclassified	1691	403	(+)1288	10494	9763	(+731)	12184	10166	(+)2018
Not Known	-	24	(-)24	2653	2652	No Change	2652	2676	(-) 24
Freehold	-	-	No Change	2833	2833	No Change	2833	2833	No Change
Chemical	-	-	No Change	131	131	No Change	131	131	No Change
Glass & Ceramic	-	-	No Change	347	347	No Change	347	347	No Change
Poor/Low	-	-	No Change	188	188	No Change	188	188	No Change
Others	-	-	No Change	23	23	No Change	23	23	No Change
Unclassified	-	-	No Change	57	57	No Change	57	57	No Change
Not Known	-	-	No Change	2087	2087	No change	2087	2087	No change
Leasehold (Private)	3449	2664	(-)785	8164	6891	(+)1273	11613	9555	(+) 2058
Chemical	469	728	(-)259	4425	3815	(+610)	4893	4543	(+) 350
Glass & Ceramic	13	0.8	(+)12	424	491	(-)67	437	492	(-) 55
Poor/Low	-	-	No Change	16	16	No Change	16	16	No Change
Others	1276	1509	(-)233	855	854	(+1)	2131	2363	(-) 232
Unclassified	1690	403	(-)1287	1879	1149	(+730)	3569	1552	(+) 2017
Not Known	-	24	(-)24	565	565	No Change	565	589	(-)24
Leasehold (Public)	-	-	No Change	8557	8557	No Change	8557	8557	No Change
Unclassified	-	-	No Change	8557	8557	No Change	8557	8557	No Change

figures rounded off

National Mineral Inventory - An Overview

A total of 152 deposits of calcite have been covered in the mineral inventory as on 1.4.2015, of which 81 deposits are in freehold areas and 70 deposits in leasehold private and one deposit in lease hold public.

**Table – 2 : Total Resources of Calcite as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

(In '000 tonnes)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India: Total	23004	20945	(+)2059
Andhra Pradesh	9108	8799	(+)309
Gujarat	12	12	No Change
Haryana	351	351	No Change
Karnataka	114	66	(+)47
Madhya Pradesh	1073	1191	(-) 118
Rajasthan	12219	10398	(+) 1821
Tamil Nadu	117	117	No Change
Uttar Pradesh	11	11	No Change

figures rounded off

Table - 3 : District wise Reserves/Resources of Calcite as on 1.4.2015

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	3449	19555	23004
Andhra Pradesh	144	8964	9108
Anantapur	22	25	47
Cuddapah	-	12	12
Kurnool	3	6	9
Visakhapatnam	119	8921	9040
Gujarat	-	12	12
Amreli	-	11	11
Bharuch	-	1	1
Haryana	-	351	351
Mahendragarh	-	351	351
Karnataka	-	114	114
Belgaum	-	48	48
Bijapur	-	16	16
Mysore	-	50	50
Madhya Pradesh	5	1067	1073
Badwani	5	617	622
Jhabua	-	277	277
Khandwa (East Nimar)	-	16	16
Khargaon (West Nimar)	-	158	158

(Contd.)

National Mineral Inventory - An Overview

(Table - 3 conclud.)

State/District	Reserves	Remaining Resources	Total Resources
Rajasthan	3300	8919	12219
Ajmer	-	1	1
Alwar	-	138	138
Bhilwara	1215	1947	3162
Jaipur	-	89	89
Jhunjhunu	-	85	85
Pali	3	71	74
Sikar	-	343	343
Sirohi	353	1844	2198
Udaipur	1728	4400	6128
Tamil Nadu	-	117	117
Salem	-	117	117
Uttar Pradesh	-	11	11
Mirzapur	-	11	11

figures rounded off

10.5 CHALK

Introduction

Chalk is a white, extremely fine grained, usually soft and friable variety of limestone, composed wholly or largely of microscopic small remains of foraminifera and broken shelly fragments. Its use in the mineral consuming industry is as calcareous material. Its occurrence and mining of chalk is reported from the state of Gujarat.

Chalk has been declared as a "Minor Mineral" under section 3 (e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015.

Basis of Grade Classification

The physical and chemical specifications of chalk for end use consumption have not suitably been reported by the exploration and exploitation agencies. Hence the entire resources in national mineral inventory as on 1.4.2015 have been placed under unclassified grade.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources have broadly been classified into 'reserves' and 'remaining resources'.

According to norms of this system reserves of chalk as on 1.4.2015 have been placed under proved (111) and probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331) and inferred (333) categories.

Salient Features of the Inventory

The total resources of chalk in the country as on 1.4.2015 are estimated at about 6,751 thousand tonnes

of which 5,064 thousand tonnes (75%) are under reserve category and the balance 1,687 thousand tonnes (25%) are under remaining resources.

All India resources of chalk with break up into reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in tables 1 and 2. In table -3 district wise reserves / resources as on 1.4.2015 have been given. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade and state.

Out of the the total resources only about 3.4% are in freehold and 96.6% in leasehold (private). The entire resources are in 'unclassified' grade and have been reported from the state of Gujarat. District wise Porbandar leads with about 89.2% of resources, followed by Jamnagar (6.7%), Rajkot (3.4%) and Kachchh (0.7%).

A net increase of 1,834 thousand tonnes resources have been recorded in the inventory as on 1.4.2015 in comparison to the earlier inventory as on 1.4.2010. These changes are mainly due to the upward revision of resources in the existing deposits and 1,391 thousand tonnes due to addition of 27 new deposits of leasehold private areas of Porbandar, Jamnagar & Rajkot districts in Gujarat.

About 269 thousand tonnes (4%) of resources are under inferred category which are based on a limited and preliminary exploration. If these are examined for further detailed exploration, the confidence level of resource position of chalk in the country may improve.

A total of 143 deposits of chalk have been covered in the mineral inventory as on 1.4.2015, of which 15 deposits are in freehold areas and 128 deposits in leasehold (private) areas.

**Table - 1 : Reserves/Resources of Chalk as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)**

Lease status/Grade	Reserves				Remaining resources				Total resources						
	1.4.2015		1.4.2010		1.4.2015		1.4.2010		1.4.2015		1.4.2010		Net change		
All India : Total	5064	4332	(+) 732	1687	585	(+)1102	6751	4917	(+)1834						
Unclassified	5064	4332	(+) 732	1687	585	(+)1102	6751	4917	(+)1834						
Freehold	-	65	(-)65	232	167	(+)65	232	232	No change						
Unclassified	-	65	(-)65	232	167	(+)65	232	232	No change						
Leasehold (Private)	5064	4266	(+) 798	1456	419	(+)1036	6519	4685	(+) 1834						
Unclassified	5064	4266	(+) 798	1456	419	(+)1036	6519	4685	(+)1834						

figures rounded off

Table - 2 : Total Resources of Chalk as on 1.4.2015 vis-a-vis 1.4.2010

(In '000 tonnes)

State	Total Resources		Net change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	6751	4917	(+) 1834
Gujarat	6751	4917	(+) 1834

figures rounded off.

Table - 3 : District wise Reserves/Resources of Chalk as on 1.4.2015

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	5064	1687	6751
Gujarat	5064	1687	6751
Jamnagar	307	145	452
Kachchh	-	49	49
Porbandar	4622	1400	6022
Rajkot	135	94	229

figures rounded off.

10.6 CHINACLAY

Introduction

Kaolin, is also known as China Clay. It falls under the kaolinite group of minerals and hence is known as kaolin. China Clay is a natural clay formed by weathering of felspar. It is relatively a pure clay consisting of predominantly the mineral, kaolinite ($\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$) and associated with other clay minerals like diekite, 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 fire clay. Other physical characteristics that influence commercial utility include brightness, glossiness, abrasiveness and viscosity. It often contains small amount of impurities in the form of rock fragments, hydrous oxides and colloidal materials. The major use of crude china clay in the country is in cement industry and a processed china clay in ceramic industry and as filler in textile, paper, rubber and insecticide. India has extensive deposits of china clay distributed almost in every state and it can cater to the need of both domestic and export markets.

China clay has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E) dated 10.2.2015 and therefore inventory of china clay has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

China clay is consumed as a filler in rubber, textile, paper and insecticide industries. The exploration agencies used to carry out the necessary test to classify the reserves as per the user's specification. The resources of china clay in the inventory as on 1.4.2015 have broadly been classified in the following end uses as indicated by the exploration and exploitation agencies.

1. Ceramic
2. Filler (textile, paper, rubber, insecticide)
3. Chemical
4. Cement grade
5. Mixed grade
6. Unclassified
7. Others
8. Not Known

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves'

and 'remaining resources'.

According to the norms of this system, reserves of china clay have been placed under proved (111) and probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of china clay in the country as on 1.4.2015 are estimated at 2,941 million tonnes, of these 229 million tonnes (7.8%) falls under 'reserve' category and the balance 2,712 million tonnes (92.2%) under 'remaining resource' category.

All India scenario of china clay reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables - 1 and 2. The tables give an idea of the significant changes in terms of increase and decrease of resources as per lease status, grades and states. In Table-3 district wise reserves/resources as on 1.4.2015 have been given.

Of the total resources, 2,329 million tonnes (79.20%) are in freehold, 19 million tonnes (0.65%) in leasehold Public Sector and 593 million tonnes (20.15%) in leasehold Private areas.

About 45% of the total resources of china clay as on 1.4.2015 have been placed under not known grade due to paucity of data. Ceramic/pottery grade constitutes 26% of the total resources followed by others 12%, mixed grade 8% and remaining 9% resources are classified under chemical, filler, cement, and unclassified grades.

About 88% of the total resources are concentrated in seven states. Kerala is credited with 673 million tonnes (22.89%), followed by Rajasthan 550 million tonnes (18.71%), West Bengal 426 million tonnes (14.47%), Odisha 286 million tonnes (9.73%), Karnataka 258 million tonnes (8.76%), Jharkhand 202 million tonnes (6.88%) and Gujarat 195 million tonnes (6.64%). The balance 11.92% resources are accounted for by other 16 states namely Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Haryana, Jammu & Kashmir, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Puducherry, Tamil Nadu, Telangana and Uttar Pradesh.

An increase of about 236 million tonnes of resources has been recorded in the inventory as on 1.4.2015 as compared to the earlier inventory as on 1.4.2010. About 196 million tonnes of resources has been increased due to addition of 298 new deposits.

National Mineral Inventory - An Overview

Table - 1 : Reserves/Resources of Chinaclay as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
	(In '000 tonnes)								
All India : Total	229469	177158	(+)52311	2711777	2528049	(+)183728	2941247	2705207	(+)236040
Textile/Paper Coating	-	-	No Change	65	-	(+)65	65	-	(+)65
Insecticide	-	-	No Change	113	-	(+)113	113	-	(+)113
Chemical	-	-	No Change	34545	34545	No Change	34545	34545	No Change
Ceramic/Pottery	123683	70539	(+)53144	647736	537241	(+)110495	771419	607780	(+)163639
Rubber	136	-	(+)136	345	-	(+)345	481	-	(+)481
Mixed Grade	636	9781	(-)9145	232778	223986	(+)8792	233414	233767	(-)353
Filler	13752	8865	(+)4887	55990	40877	(+)15113	69742	49743	(+)19999
Cement	8584	21580	(-)12996	17330	11158	(+)6172	25914	32739	(-)6825
Others	58525	29594	(+)28931	281925	255059	(+)26866	340450	284652	(+)55798
Unclassified	14192	25230	(-)11038	126694	109990	(+)16704	140886	135220	(+)5666
Not Known	9961	11568	(-)1607	1314257	1315194	(-)937	1324218	1326762	(-)2544
Freehold	-	-	No Change	2329602	2327433	(+)2169	2329602	2327433	(+)2169
Insecticide	-	-	No Change	113	-	(+)113	113	-	(+)113
Chemical	-	-	No change	34545	34545	No Change	34545	34545	No Change
Ceramic/Pottery	-	-	No change	492027	491988	(+)39	492027	491988	(+)39
Mixed Grade	-	-	No change	175447	175447	No change	175447	175447	No change
Filler	-	-	No change	27101	25511	(+)1590	27101	25511	(+)1590
Cement	-	-	No Change	679	679	No change	679	679	No change
Others	-	-	No change	212316	212316	No change	212316	212316	No change
Unclassified	-	-	No Change	95747	95343	(+)404	95747	95343	(+)404
Not Known	-	-	No change	1291627	1291604	(+)23	1291627	1291604	(+)23
Leasehold (Public)	2265	3252	(-)987	16703	15792	(+)911	18967	19044	(-)77
Ceramic/Pottery	1145	1145	No change	-	-	No Change	1145	1145	No change
Mixed Grade	290	290	No change	13809	13809	No change	14099	14099	No change
Filler	28	324	(-)296	1655	1372	(+)283	1683	1696	(-)13
Unclassified	-	618	(-)618	533	-	(+)533	533	618	(-)85
Not Known	802	875	(-)73	706	612	(+)94	1507	1486	(+)21

(contd.)

Table - 1 (Contd.) (In '000 tonnes)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
Leasehold (Private)	227205	173907	(+)53298	365473	184824	(+)180649	592678	358731	(+)233947
Textile / Paper Coating	-	-	No change	65	-	(+)65	65	-	(+)65
Ceramic/Pottery	122538	69394	(+)53144	155710	45252	(+)110458	278247	114647	(+)163600
Rubber	136	-	(+)136	345	-	(+)345	481	-	(+)481
Mixed Grade	346	9491	(-)9145	43522	34730	(+)8792	43869	44221	(-)352
Filler	13724	8542	(+)5182	27234	13994	(+)13240	40958	22536	(+)18422
Cement	8584	21580	(-)12996	16651	10479	(+)6172	25235	32060	(-)6825
Others	58525	29594	(+)28931	69609	42743	(+)26866	128135	72336	(+)55799
Unclassified	14192	24612	(-)10420	30414	14647	(+)15767	44606	39260	(+)5346
Not Known	9159	10693	(-)1534	21924	22979	(-)1055	31083	33672	(-)2589

figures rounded off

Out of the total increase, about 118 million tonnes (50%) resources have been accounted alone by Rajasthan, mostly in the districts of Nagaur, Pali, Bhilwara, Chhittorgarh, Bundi, Karauli, Jaisalmer and Udaipur. About 104 million tonnes total resources has been increased mainly due to addition of 159 new deposits and partly due to revision of resources in the existing deposits.

About 83 million tonnes (35%) resources increased in Gujarat. The entire increase of resources in Gujarat is reported in leasehold private areas due to addition of 69 new deposits (64 million tonnes) in Kutch district, 17 million tonnes increased due to upward revision in the resources of existing deposits and about 2 million tonnes increased in Jamnagar, Mehsana and Patan districts due to addition of 7 new deposits.

In Telangana, which was earlier part of Andhra Pradesh, an increase of about 4 million tonnes of resources has been recorded due to addition of 8 new deposits in Adilabad and Rangareddy districts.

About 10 million tonnes of resources increased in Kerala. About 6 million tonnes of resources has increased due to addition of 6 new deposits and upward revision in leasehold private areas of existing deposits.

In Madhya Pradesh about 9 million tonnes

resources has been increased. The entire increase of resources in leasehold private areas are due to addition of 25 new deposits containing 9 million tonnes of resources reported from Jabalpur, Satna, Shahdol, Sagar, Katni & Chhatrapur districts.

In case of Odisha, an increase of about 5 million tonnes of resources has been recorded due to upward revision in resources of existing deposits and addition of two new deposits in Koraput district. In West Bengal, resources has been increased by about 4 million tonnes mainly due to upward revision of resources in existing deposits and addition of one new deposit in Bankura district.

However, about 11 million tonnes resources seems to be decreased in Andhra Pradesh due to carving out of Telangana state. In other states, the changes are negligible.

Of the total resources, about 1758 million tonnes (60 %) resources are under inferred & reconnaissance categories. A detailed exploration may improve the confidence level of resources.

A total 1355 deposits have been covered in the inventory as on 1.4.2015, of which 653 deposits are in freehold and 702 deposits in leasehold (public - 12 and Private - 690).

**Table – 2 : Total Resources of Chinaclay as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

(In '000 tonnes)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	2941247	2705207	(+)236040
Andhra Pradesh	62893	74176	(-)11283
Assam	4043	4043	No Change
Bihar	1438	1438	No Change
Chhattisgarh	15001	15009	(-)8
Delhi	5289	5289	No Change
Goa	16	16	No Change
Gujarat	195289	112188	(+)83101
Haryana	12065	12065	No Change
Jammu & Kashmir	28124	28122	(+)2
Jharkhand	202244	198691	(+)3553
Karnataka	257636	258524	(-)888
Kerala	673383	663834	(+)9549
Madhya Pradesh	21848	13160	(+)8688
Maharashtra	7248	7248	No Change
Manipur	2520	2520	No Change
Meghalaya	88875	88875	No Change
Odisha	286157	280926	(+)5231
Puducherry	2940	2940	No Change
Rajasthan	550311	432517	(+)117794
Tamil Nadu	56897	56897	No Change
Telangana	16295	-	(+)16295
Uttar Pradesh	25065	25065	No Change
West Bengal	425669	421663	(+)4006

Table - 3 : District wise Reserves/Resources of Chinaclay as on 1.4.2015

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	229469	2711777	2941247
Andhra Pradesh	5337	57556	62893
Anantapur	-	146	146
Chittoor	-	2497	2497
Cuddapah	3501	7292	10793
Godavari East	938	21132	22070
Godavari West	-	4160	4160
Guntur	-	73	73
Kurnool	897	19736	20633
Nellore	-	523	523
Visakhapatnam	-	1997	1997
Assam	-	4043	4043
Karbi Anglong	-	3983	3983
North Lakhimpur	-	60	60
Bihar	-	1438	1438
Bhagalpur	-	1426	1426
Monghyr	-	12	12
Chhattisgarh	130	14871	15001
Durg	-	263	263
Rajnandgaon	130	14608	14738
Delhi	-	5289	5289
Delhi	-	5289	5289
Goa	-	16	16
South Goa	-	16	16
Gujarat	77268	118021	195289
Amreli	10369	36473	46842
Bhavnagar	316	536	851
Jamnagar	767	658	1425
Junagarh	-	573	573
Kutch	60963	69877	130839
Mehesana	257	2074	2332
Patan	892	4689	5581
Sabarkantha	3705	3141	6846
Haryana	-	12065	12065
Faridabad	-	4215	4215
Gurgaon	-	7843	7843
Rewari	-	8	8
Jammu & Kashmir	-	28124	28124
Doda	-	2	2
Udhampur	-	28122	28122
Jharkhand	6838	195405	202244
Dumka	-	4359	4359
Hazaribagh	-	192	192
Lohardaga	-	1215	1215
Ranchi	-	307	307
Sahebganj	6668	114425	121092
Singhbhum (East)	171	8387	8558
Singhbhum (West)	-	66521	66521
Karnataka	802	256834	257636
Bangalore	-	4410	4410
Belgaum	-	3141	3141

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Bellary	-	167	167
Bidar	-	450	450
Chickballapura	-	439	439
Chikmagalur	-	12	12
Dharwar	-	383	383
Gadag	-	9526	9526
Hassan	802	533	1335
Haveri	-	2142	2142
Kolar	-	230236	230236
North Kanara	-	24	24
Shimoga	-	1624	1624
South Kanara	-	64	64
Tumkur	-	3682	3682
Kerala	8022	665360	673383
Alapuzha (Alleppy)	-	13350	13350
Ernakulam	-	6833	6833
Kannur	1081	29923	31003
Kasargod	92	395100	395192
Kollam	290	43983	44273
Kottayam	-	18	18
Palakkad	-	400	400
Thiruvananthapuram	6560	175745	182305
Trissur	-	9	9
Madhya Pradesh	1733	20115	21848
Betul	-	122	122
Chhatarpur	-	1119	1119
Chhindwara	-	93	93
Gwalior	-	693	693
Hoshangabad	-	4	4
Jabalpur	1372	10777	12149
Katni	-	1311	1311
Khargaon (West Nimar)	-	17	17
Narasinhapur	-	732	732
Raisen	-	326	326
Sagar	294	1445	1739
Satna	67	1560	1627
Shahdol	-	1916	1916
Sidhi	-	1	1
Maharashtra	-	7248	7248
Amravati	-	1666	1666
Bhandara	-	32	32
Chandrapur	-	2305	2305
Nagpur	-	1711	1711
Sindhudurg	-	1380	1380
Thana (Thane)	-	155	155

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Manipur	-	2520	2520
Churachandpur	-	2520	2520
Meghalaya	-	88875	88875
Garo Hills (East)	-	72730	72730
Garo Hills (West)	-	10057	10057
Jaintia Hills	-	4263	4263
Khasi Hills (East)	-	1825	1825
Odisha	-	286157	286157
Bargarh	-	9304	9304
Bolangir	-	1	1
Keonjhar	-	1414	1414
Koraput	-	4679	4679
Mayurbhanj	-	268179	268179
Sambalpur	-	2562	2562
Sundergarh	-	18	18
Puducherry	-	2940	2940
Karaikal	-	1300	1300
Puducherry	-	1640	1640
Rajasthan	125437	424874	550311
Ajmer	-	6	6
Barmer	-	102	102
Bharatpur	-	28	28
Bhilwara	40960	32555	73515
Bikaner	15222	194620	209842
Bundi	1425	7006	8431
Chhittorgarh	28360	76225	104585
Dausa	-	249	249
Jaipur	2805	18934	21739
Jaisalmer	988	684	1672
Jhunjhunu	-	400	400
Karauli	545	1870	2415
Kota	-	208	208
Nagaur	27355	69381	96735
Pali	6762	14527	21289
Sawai Madhopur	14	2697	2712
Udaipur	1001	5383	6384
Tamil Nadu	-	56897	56897
Cuddalore	-	13612	13612
Dharmapuri	-	18	18

(Concl.d.)

National Mineral Inventory - An Overview

Table-3 (Concl.)

State/District	Reserves	Remaining Resources	Total Resources
Kanchipuram	-	2040	2040
Nilgiris	-	35	35
Sivaganga	-	4000	4000
Thiruvallur	-	29006	29006
Thiruvannamalai	-	187	187
Tiruchirapalli	-	3220	3220
Villupuram	-	4780	4780
Telangana	945	15350	16295
Adilabad	849	11712	12560
Mahbubnagar	-	1800	1800
Nalgonda	-	250	250
Rangareddy	-	1334	1334
Warangal	96	254	350
Uttar Pradesh	-	25065	25065
Banda	-	18	18
Sonbhadra	-	25047	25047
West Bengal	2957	422712	425669
24 Parganas	-	17	17
Bankura	307	189108	189414
Birbhum	2651	163590	166241
Burdwan	-	38069	38069
Hoogly	-	63	63
Midnapur	-	7672	7672
Purulia	-	24193	24193

figures rounded off

10.7 CORUNDUM

Introduction

Corundum is a crystalline form of aluminium oxide (Al_2O_3) typically containing traces of iron, titanium, vanadium and chromium. It is a rock-forming mineral. It is a naturally transparent material, but can have different colors when impurities are present. Transparent specimens are used as gems, called ruby if red and padparadscha if pink-orange. All other colors are called sapphire, e.g., green sapphire for a green specimen. The name corundum" is derived from the Tamil word Kurundam, which originates from the Sanskrit word Kuruvinda meaning ruby.

In nature, it occurs as a constituent of igneous rock as well as metamorphosed aluminous clay. In India, workable deposits are found in Karnataka, Andhra Pradesh and Rajasthan.

Corundum has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E) dated 10.2.2015 and therefore inventory of corundum has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

The following grade classification has been adopted in National Mineral Inventory as on 1.4.2015.

- | | |
|------------------|---|
| i) Semi precious | |
| ii) Industrial | Al_2O_3 content should be minimum 70% with bright, glassy lustre, devoid of cleavage and inclusions. |
| iii) Others | Estimations placed under other than the above grades. |
| iv) Unclassified | The supporting data are such that the estimations could not be classified specifically under any one of the above grades. |
| v) Not Known | Estimations where grade has not been mentioned by the exploration/exploitation agencies. |

Basis of Categorisation of Resources

As per United Nations Framework Classification

(UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to norms of this system reserves of corundum have been placed under proved (111) category. The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of corundum in the country as on 1.4.2015 are estimated at 293,697 tonnes, of these 200 tonnes (0.06 %) fall under reserves category, and the balance 293,497 tonnes (99.93 %) are estimated under remaining resources.

All India scenario of corundum reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase and decrease of resources as per lease status, grade and states. In Table-3 district-wise reserves/ resources as on 1.4.2015 have been given.

Out of the total resources, about 82,874 tonnes (28%) are in freehold and the balance 210,822 tonnes (71.78%) are in leasehold (0.42% public and 99.58% private leasehold). Out of the total resources of corundum about 263,007 tonnes (90%) constitutes industrial grade, 930 tonnes (0.31%) semi-precious, about 2,762 tonnes (0.94%) are in unclassified and others, about 26,997 tonnes (9%) not-known and other grades.

Resources of corundum have been estimated in six states. Karnataka is credited with 199,566 tonnes (68%), followed by Telangana 77,113 tonnes (26%), Rajasthan 11,925 tonnes (4%) and Andhra Pradesh, Tamil Nadu & Chhattisgarh together account for 5092 tonnes (2%).

An analysis of district-wise resources in the states reveals that about 54% of the total resources in the country is concentrated in only Bangalore district of Karnataka followed by Khammam district, Telangana (26%), Mandya district, Karnataka (9%), Tonk district, Rajasthan and Tumkur district, Karnataka (4% each), and Dharmapuri district, Tamil Nadu (1%).

An overall decrease of 447,094 tonnes of corundum has been reported in NMI as on 1.04.2015 as compared to earlier inventory. The decrease was due to re-assessment of reserves mainly in Karnataka state.

Table - 1 : Reserves/Resources of Corundum as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
All India : Total	200	597	(-) 397	293497	740194	(-) 446697	293697	740791	(-) 447094
Semi Precious	-	1	(-)1	930	908	(+)22	930	909	(+)21
Industrial	-	596	(-)596	263007	709726	(-) 446719	263007	710323	(-) 447316
Others	-	-	-	4	4	No Change	4	4	No Change
Unclassified	200	-	(+)200	2558	2558	No Change	2758	2558	(+) 200
Not Known	-	-	-	26997	26997	No Change	26997	26997	No Change
Freehold	-	-	-	82874	82874	No Change	82874	82874	No Change
Semi Precious	-	-	-	901	901	No Change	901	901	No Change
Industrial	-	-	-	78469	78469	No Change	78469	78469	No Change
Others	-	-	-	1	1	No Change	1	1	No Change
Unclassified	-	-	-	2558	2558	No Change	2558	2558	No Change
Not Known	-	-	-	946	946	No Change	946	946	No Change
Leasehold (Private)	200	-	(+) 200	209738	657032	(-) 447294	209938	657032	(-) 447094
Semi Precious	-	-	-	7	7	No Change	7	7	No Change
Industrial	-	-	-	183676	630970	(-) 447294	183676	630970	(-) 447294
Others	-	-	-	3	3	No Change	3	3	No Change
Unclassified	200	-	(+)200	-	-	-	200	-	(+) 200
Not Known	-	-	-	26051	26051	No Change	26051	26051	No Change
Leasehold (Public)	-	597	(-) 597	885	288	(+) 597	885	885	No Change
Semi Precious	-	1	(-)1	22	-	(+)22	22	1	(+)21
Industrial	-	596	(-)596	863	288	(+)575	863	884	(-)21

figures rounded off

National Mineral Inventory - An Overview

A substantial quantity of the total resources about 158,469 tonnes (54%), have been estimated under inferred and reconnaissance categories. These resources are based on a limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource

position of corundum in the country may improve.

A total 63 deposits of corundum have been covered in the inventory as on 1.4.2015, of which 51 deposits are in freehold, 9 deposits in leasehold private and 3 deposits are in leasehold public leasehold.

**Table – 2 : Total Resources of Corundum as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

(In tonne)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	293697	740791	(-) 447094
Andhra Pradesh	207	77121	(-) 76914
Chhattisgarh	885	885	No Change
Karnataka	199566	646860	(-) 447294
Rajasthan	11925	11925	No Change
Tamil Nadu	4000	4000	No Change
Telangana	77113	-	(+) 77113

figures rounded off.

Table - 3 : District wise Reserves/Resources of Corundum as on 1.4.2015

(In tonne)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	200	293497	293697
Andhra Pradesh	200	7	207
Anantapur	200	7	207
Chhattisgarh	-	885	885
Bijapur	-	22	22
Sukma	-	863	863
Karnataka	-	199566	199566
Bangalore	-	159364	159364
Bellary	-	632	632
Chitradurga	-	8	8
Coorg	-	Negligible	Negligible
Hassan	-	936	936
Mandya	-	25682	25682
Mysore	-	50	50
Tumkur	-	12894	12894
Rajasthan	-	11925	11925
Tonk	-	11925	11925
Tamil Nadu	-	4000	4000
Dharmapuri	-	4000	4000
Telangana	-	77113	77113
Khammam	-	77113	77113

figures rounded off.

10.8 DIASPORE

Introduction

Diaspore is a dimorphous form of boehmite with chemical composition $\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$ (beta-monohydrate of aluminium). It is chiefly used in making high alumina refractories. It is also used as filler in plastic and pesticide industries. Occurrences of commercial diaspore deposits in the country are limited.

Diaspore has been declared as a "Minor Mineral," under section 3 (e) of the MMDR Act, 1957 vide Gazette Notification 423 (E) dated 10.02.201 and therefore inventory of diaspore has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

The following end-use grade classification for resources of diaspore has been adopted in the inventory as on 1.4.2015.

1. Refractory Grade I	Al_2O_3 58-60% Fe_2O_3 1-1.5% TiO_2 1%(max.) CaO 0.2 - 0.3% PCE Orton Conc - 36 (min)
2. Refractory Grade II	Al_2O_3 52-55% Fe_2O_3 2.0 % (max.) TiO_2 2.0%(max.) CaO 1%(max.) PCE Orton Conc - 34 (min)
3. Ceramic	Al_2O_3 (+)58% SiO_2 22.30 to 28.30% Fe_2O_3 2% (max)
4. Others	Estimation for such grade though useable/ marketable but cannot be classified into the above grade.
5. Unclassified	Where analysis ranges widely and cannot be classified into the above grades.
6. Not Known	Where chemical analysis is not available or actual use has not been reported.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources are broadly categorised into 'reserves' and 'remaining resources'.

According to the norms of this system, the 'reserves' of diaspore have been placed under proved (111) and probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221 & 222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources 10,193 thousand tonnes of diaspore in the country as on 1.4.2015 have registered an increase of 4,208 thousand tonnes as compared to previous inventory as on 1.4.2010. Of the total resources, about 7,882 thousand tonnes (77.32%) fall under reserve category and the balance 2,311 thousand tonnes (22.67%) under remaining resources category. Out of the total estimated resources, about 98.62% are in private sector and 0.31% in public sector. A negligible quantity of 1.07% has been estimated in freehold areas. Refractory-I grade constitutes about 71.65% of the total resources of diaspore, and the remaining 28.35% resources are accounted together by rest of grades.

All India scenario of diaspore reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables-1 and 2. These tables give an idea about changes in terms of increase or decrease of resources as per lease status, grade and state. In Table - 3 district wise reserves/resources as on 01.04.2015 have been given.

The geographical distribution of diaspore resources are limited to three states namely Jammu & Kashmir, Madhya Pradesh and Uttar Pradesh. However, the deposits of economic importance have been reported from Madhya Pradesh and Uttar Pradesh, accounting 74.18% and 25.80% of the total resources, respectively. These deposits have been reported from Chhatarpur, Tikamgarh and Shivpuri districts in Madhya Pradesh and Mahoba, Lalitpur, Jhansi and Hamirpur districts in Uttar Pradesh. The resources in Madhya

Table - 1 : Reserves/Resources of Diapore as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
All India : Total	7882434	2859674	(+) 5022760	2310817	3125143	(-) 814327	10193251	5984818	(+) 4208433
Ceramic	15057	15057	No Change	307	252	(+)55	15364	15309	(+)55
Refractory-I	6520235	2300992	(+) 4219243	783701	780415	(+) 3286	7303936	3081408	(+)4222529
Refractory-II	1208488	367982	(+) 840506	339899	1124289	(-)784390	1548387	1492271	(+)56116
Unclassified	59835	57531	(+) 2304	157746	85250	(+)72496	217581	142781	(+)74800
Not Known	-	-	-	28728	28728	No Change	28728	28728	No Change
Others	78819	118112	(-) 39293	1000436	1106210	(-)105774	1079255	1224322	(-)145067
Freehold	-	-	-	108647	105895	(+) 2752	108647	105895	(+) 2752
Ceramic	-	-	-	252	-	(+) 252	252	-	(+) 252
Refractory - I	-	-	No Change	86699	86699	No Change	86699	86699	No Change
Refractory - II	-	-	No Change	2344	2344	No Change	2344	2344	No Change
Unclassified	-	-	No Change	9402	9402	No Change	9402	9402	No Change
Not Known	-	-	No Change	9950	7450	(+)2500	9950	7450	(+)2500
Leasehold (Private)	7869800	2741562	(+)5128238	2182907	2892254	(-)709347	10052707	5633816	(+)4418891
Ceramic	15057	15057	No Change	55	252	(-) 197	15112	15309	(-) 197
Refractory-I	6520235	2300992	(+) 4219243	697002	693716	(+)3286	7217237	2994709	(+) 4222529
Refractory - II	1208488	367982	(+) 840506	337555	1121944	(-) 784389	1546043	1489926	(+)56117
Unclassified	59835	57531	(+) 2304	148344	75848	(+) 72496	208179	133379	(+) 74800
Not Known	-	-	No Change	18778	18778	No Change	18778	18778	No Change
Others	66185	-	(+) 66185	981173	981716	(-) 543	1047358	981716	(+) 65642
Leasehold (Public)	12634	118112	(-) 105478	19263	126994	(-) 107731	31897	245106	(-) 213209
Not Known	-	-	No Change	-	2500	(-) 2500	-	2500	(-) 2500
Others	12634	118112	(-) 105478	19263	124494	(-) 105231	31897	242606	(-) 210709

figures rounded off

Pradesh recorded an increase of 101.49% to 7,561 thousand tonnes and that of Uttar Pradesh by 17.91% to 2,630 thousand tonnes as compared to resources as on 1.4.2010. The increase in resources in the current inventory as on 1.4.2015 was chiefly due to upward revision in the resources of existing deposits. Besides, six new deposits (4.75 million tonnes) were also added in the inventory as on 1.4.2015.

Of the total resources of diasporite, a sizeable quantity of about 1,092 thousand tonnes (11%) has

been estimated under inferred and reconnaissance categories. These resources have been estimated based on limited exploration. The confidence level of resource position in the country may improve if these areas are examined for detailed exploration.

A total of 73 deposits of diasporite have been covered in National Mineral Inventory as on 1.4.2015, out of which 18 deposits are in freehold areas and 55 under leasehold.

Table – 2 : Total Resources of Diasporite as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

(In tonne)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India: Total	10193251	5984818	(+) 4208433
Jammu & Kashmir	1277	1277	No Change
Madhya Pradesh	7561723	3752849	(+) 3808874
Uttar Pradesh	2630251	2230692	(+) 399559

Figures rounded off.

Table - 3 : District wise Reserves/Resources of Diasporite as on 1.4.2015

(In tonne)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	7882434	2310818	10193252
Jammu & Kashmir	-	1277	1277
Rajauri	-	30	30
Udhampur	-	1247	1247
Madhya Pradesh	5536358	2025365	7561723
Chhatarpur	931357	583762	1515119
Shivpuri	67226	-	67226
Tikamgarh	4537775	1441603	5979378
Uttar Pradesh	2346076	284175	2630251
Hamirpur	-	2700	2700
Jhansi	45918	38560	84478
Lalitpur	898736	241764	1140500
Mahoba	1401422	1152	1402574

figures rounded off

10.9 DOLOMITE

Introduction

Dolomite is a double carbonate of calcium and magnesium (CaCO_3 , MgCO_3), theoretically contains CaCO_3 54.35% and MgCO_3 45.65% or CaO 30.4%, MgO 21.9% and CO_2 47.7%. However, in nature, dolomite is not available in this exact proportion. Hence, in commercial parlance, the rock containing 40-45% MgCO_3 is usually called dolomite. Dolomite is high magnesium limestone which after calcination is used for refractory purpose as a substitute of magnesite refractory in linings of furnaces like basic open hearth, steel furnaces and bessemer converters. It is also used in chemical industry in the manufacture of paper, leather, glass, potteries and high magnesium lime. Dolomite is also used as a flux in iron, steel, ferro-alloys and glass industries. In agriculture, dolomite is used as a soil conditioner and as a filler in fertilizers, paints and varnishes.

Dolomite has been declared as a "Minor Mineral" under section 3 (e) of the MMDR Act, 1957 vide Gazette Notification 423 (E) dated 10.02.2015.

Basis of Grade Classification

In the inventory as on 1.4.2015 resources of dolomite have been classified into the following grades:

1. SMS (L.D) Grade	MgO 20-21% SiO ₂ 0.4 - 1.8% Al ₂ O ₃ 0.2 - 0.6% Fe ₂ O ₃ 0.2 - 0.4%
2. SMS (O.H) Grade	MgO 15 - 21% SiO ₂ 0.9 - 2.5% Insoluble Total 0.74 - 2.8%
3. B.F & Sintering Grade	MgO 19% (min) Acid Insoluble 12% (max)
4. Refractory Grade	CaO + MgO 27 - 33.6% MgO 18.7 - 21.3% (max) Acid Insoluble 0.1 - 5.2% SiO ₂ 0.6% (max)
5. Glass Grade	CaO + MgO 50% (min) Fe ₂ O ₃ 0.15% (max) SiO ₂ 2.5% (max)
6. Beneficial	MgO 15% SiO ₂ 6% (Max) Insoluble Total 12% (Max)
7. Others	Estimation of marketable/

useable grades which could not be classified into above grades.

- | | |
|-----------------|---|
| 8. Unclassified | Minimum and maximum ranges of chemical constituents are too wide to be fitted into any of the above grades. |
| 9. Not known | The information on chemical constituents is not available or potential/actual use is not reported. |

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, 'reserves' of dolomite have been placed under proved (111) and probable (121) & (122) categories.

The 'remaining resources' have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of dolomite in the country as on 1.4.2015 are estimated at 8,414,891 thousand tonnes, of these 677,884 thousand tonnes (8%) fall under 'reserve' category and 7,737,007 thousand tonnes (92%) are under 'remaining resource' category.

All India scenario of dolomite reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been appended in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grades and states. In Table-3 district wise reserves/resources as on 1.4.2015 have been given.

Out of the total resources, the share of freehold areas is 6,290,635 thousand tonnes (75%), leasehold public sector 461,845 thousand tonnes (5%) and leasehold private sector 1,662,411 thousand tonnes (20%).

Out of the total resources of dolomite, the share of BF/sintering grade is 1,973,535 thousand tonnes (23.5%), SMS (OH) grade 1,351,411 thousand tonnes

Table - 1 : Reserves/Resources of Dolomite as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
All India : Total	67784	738186	(-)60302	7737007	6992372	(+)744635	8414891	7730557	(+)684334
B.F/Sintering	177128	316641	(-)139513	1796407	1671625	(+)124782	1973535	1988266	(-)14731
SMS (O.H)	103605	67561	(+)36044	1247806	980213	(+)267593	1351411	1047774	(+)303637
SMS(L.D)	56300	98707	(-)42407	347186	176431	(+)170755	403487	275138	(+)128349
SMS (O.H & L.D Mixed)	53284	49719	(+)3565	281534	267987	(+)13547	334818	317706	(+)17112
B.F & SMS Mixed	54017	55478	(-)1461	329461	275744	(+)53717	383478	331221	(+)52257
Refractory	18859	28211	(-)9352	674244	668290	(+)5954	693103	696501	(-)3398
BF, SMS & Refractory	-	19877	(-)19877	8441	8441	No change	8441	28318	(-)19877
Glass	26446	23751	(+)2695	202669	201215	(+)1454	229114	224966	(+)4148
Others	104622	56777	(+)47845	349490	198390	(+)151100	454112	255168	(+)198944
Unclassified	81928	11413	(+)70515	728276	765040	(-)36764	810203	776453	(+)33751
Not Known	1695	10051	(-)8356	1771493	1778995	(-)7502	1773188	1789046	(-)15858
Freehold	-	-	-	6290635	6180017	(+)110618	6290635	6180017	(+)110618
B.F/Sintering	-	-	-	1512827	1505181	(+)7646	1512827	1505181	(+)7646
SMS (O.H)	-	-	-	989207	906598	(+)82609	989207	906598	(+)82609
SMS(L.D)	-	-	-	118963	116438	(+)2525	118963	116438	(+)2525
SMS (O.H & L.D Mixed)	-	-	-	265493	264670	(+)823	265493	264670	(+)823
B.F & SMS Mixed	-	-	-	199961	199960	(+)1	199961	199960	(+)1
Refractory	-	-	-	548817	548817	No change	548817	548817	No change
BF, SMS & Refractory	-	-	-	8441	8441	No change	8441	8441	No Change
Glass	-	-	-	175735	175735	No change	175735	175735	No change
Others	-	-	-	127188	124352	(+)2836	127188	124352	(+)2836
Unclassified	-	-	-	611789	580927	(+)30862	611789	580927	(+)30862
Not Known	-	-	-	1732214	1748897	(-)16683	1732214	1748897	(-)16683

(Contd.)

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Table - 1 (Concl'd.)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
Leasehold (Public)	213640	388194	(-)174554	248205	94695	(+)153510	461845	482889	(-)21044
B.F./Sintering	131611	248486	(-)116874	95839	56326	(+)39513	227450	304812	(-)77362
SMS (O.H)	7566	-	(+)7566	76464	798	(+)75666	84030	798	(+)83232
SMS(L.D)	-	62468	(-)62468	62468	-	(+)62468	62468	62468	No change
SMS (O.H & L.D Mixed)	41219	43880	(-)2661	-	-	-	41219	43880	(-)2661
B.F. & SMS Mixed	27330	32090	(-)4760	1430	16390	(-)14960	28760	48480	(-)19720
Refractory	5914	1270	(+)4644	2994	181	(+)2813	8908	1452	(+)7456
Others	-	-	-	9010	21000	(-)11990	9010	21000	(-)11990
Leasehold (Private)	464244	349992	(+)114252	1198167	717660	(+)480509	1662411	1067651	(+)594760
B.F./Sintering	45517	68155	(-)22638	187742	110119	(+)77623	233258	178274	(+)54984
SMS (O.H)	96039	67561	(+)28478	182135	72817	(+)109318	278174	140379	(+)137795
SMS (L.D)	56300	36239	(+)20061	165755	59992	(+)105763	222056	96231	(+)125825
SMS (O.H & L.D Mixed)	12065	5839	(+)6226	16040	3317	(+)12723	28106	9156	(+)18950
B.F. & SMS Mixed	26687	23388	(+)3299	128071	59393	(+)68678	154757	82781	(+)71976
Refractory	12945	26941	(-)13996	122433	119292	(+)3141	135378	146232	(-)10854
BF, SMS & Refractory	-	19877	(-)19877	-	-	-	-	19877	(-)19877
Glass	26446	23751	(+)2695	26934	25481	(+)1453	53379	49231	(+)4148
Others	104622	56777	(+)47845	213292	53038	(+)160254	317915	109815	(+)208100
Unclassified	81928	11413	(+)70515	116486	184113	(-)67627	198414	195526	(+)2888
Not Known	1695	10051	(-)8356	39279	30098	(+)9181	40974	40149	(+)825

figures rounded off

(16.1%), SMS (LD) grade 403,487 thousand tonnes (4.8%), SMS (OH & LD Mixed) grade 334,818 thousand tonnes (4%), BF & SMS mixed grade 383,478 thousand tonnes (4.6%), Refractory grade 693,103 thousand tonnes (8.2%), BF, SMS & Refractory mixed grade 8,441 thousand tonnes (0.1%), Glass grade 229,114 thousand tonnes (2.7%), Others 454,112 thousand tonnes (5.4%), unclassified 810,204 thousand tonnes (9.6%) and Not Known grade 1,773,188 thousand tonnes (21%).

Of the total resources, Madhya Pradesh is credited with 2,311,395 thousand tonnes (27.5%), followed by Andhra Pradesh, 1,298,722 thousand tonnes (15.4%), Chhattisgarh 917,657 thousand tonnes (11%), Odisha 849,892 thousand tonnes (10.1%), Karnataka 626,344 thousand tonnes (7.4%), Rajasthan 599,089 thousand tonnes (7.1%), Gujarat 544,056 thousand tonnes (6.5%), Maharashtra 417,994 thousand tonnes (5%), West Bengal 238,029 thousand tonnes (2.8%), Uttarakhand 206,053 thousand tonnes (2.4%) and Telangana 188,021 thousand tonnes (2.2%). The balance 217,639 thousand tonnes (2.6%) resources have been accounted together by Arunachal Pradesh, Haryana, Jharkhand, Sikkim, Tamil Nadu and Uttar Pradesh.

A net increase of 684,334 thousand tonnes resources have been recorded in the inventory as on 1.4.2015 in comparison to the earlier inventory as on 1.4.2010. These changes are mainly due to the upward revision of resources in the existing deposits of dolomite and 347,699 thousand tonnes due to addition of new 112 deposits reported across the state of Andhra Pradesh, Chhattisgarh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra and Odisha.

About 5,215,075 thousand tonnes and 224,194 thousand tonnes resources have been estimated under inferred (333) and reconnaissance (334) categories respectively. These together constitute about 65% of the total resources. These resources have been estimated based on a limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position of dolomite in the country may improve.

A total 858 deposits have been covered in the inventory as on 1.4.2015. Of these, 286 deposits are in freehold areas and the balance 572 deposits in leasehold areas comprising 555 deposits in private sector and 17 deposits in Public Sector.

Table – 2 : Total Resources of Dolomite as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

(In '000 tonnes)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	8414891	7730557	(+)684334
Andhra Pradesh	1298722	1182452	(+)116270
Arunachal Pradesh	77837	77837	No change
Chhattisgarh	917657	846682	(+)70975
Gujarat	544056	525473	(+)18583
Haryana	27633	29489	(-)1856
Jharkhand	24916	41434	(-)16518
Karnataka	626344	662116	(-)35772
Madhya Pradesh	2311395	2277803	(+)33592
Maharashtra	417994	420824	(-)2830
Odisha	849892	673045	(+)176847
Rajasthan	599089	460170	(+)138919
Sikkim	2756	2756	No change
Tamil Nadu	2145	2145	No change
Telangana	188021	-	(+)188021
Uttar Pradesh	82352	82352	No change
Uttarakhand	206053	207950	(-)1897
West Bengal	238029	238029	No change

figures rounded off

Table - 3 : District wise Reserves/Resources of Dolomite as on 1.4.2015

(In '000 tonnes)			
State/District	Reserves	Remaining Resources	Total Resources
All India : Total	677884	7737007	8414891
Andhra Pradesh	115045	1183677	1298722
Anantapur	103548	330367	433915
Cuddapah	341	3133	3474
Kurnool	11156	850178	861334
Arunachal Pradesh	-	77837	77837
West Kameng	-	77837	77837
Chhattisgarh	94218	823439	917657
Baloda Bazar	1434	253	1687
Bastar	-	139028	139028
Bemetara	3857	22641	26498
Bilaspur	24743	588541	613284
Durg	-	9585	9585
Janjgir-Champa	41087	36147	77234
Raigarh	23097	27112	50209
Raipur	-	132	132
Gujarat	71625	472431	544056
Bhavnagar	758	-	758
Chhota Udaipur	70867	98719	169586
Vadodara	-	373712	373712
Haryana	-	27633	27633
Ambala	-	1158	1158
Mahendragarh	-	26475	26475
Jharkhand	11230	13686	24916
Garwah	11230	11710	22940
Palamau	-	1976	1976
Karnataka	40612	585731	626344
Bagalkot	29076	174579	203655
Belgaum	771	193881	194652
Bijapur	-	34440	34440
Chitradurga	-	81851	81851
Mysore	4797	3090	7887
North Kanara	-	45460	45460
Tumkur	5968	52431	58399
Madhya Pradesh	52557	2258839	2311395
Alirajpur	-	13863	13863
Balaghat	1988	107165	109153
Chhatarpur	-	14440	14440
Chhindwara	10216	46136	56353
Damoh	-	140	140
Dewas	-	486740	486740
Harda	-	82130	82130
Hoshangabad	-	1383	1383
Jabalpur	1770	53763	55533
Jhabua	-	819265	819265
Katni	24018	56268	80286
Mandla	13092	148364	161456
Narasinhapur	1031	32525	33556
Sagar	-	91492	91492
Seoni	441	305164	305605

(Contd.)

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Table-3 (Concl.)

State/District	Reserves	Remaining Resources	Total Resources
Maharashtra	20416	397578	417994
Chandrapur	10173	117684	127857
Nagpur	7181	205651	212831
Yeotmal	3062	74244	77306
Odisha	150811	699082	849892
Bargarh	-	124600	124600
Keonjhar	-	63	63
Koraput	-	80342	80342
Sambalpur	-	5500	5500
Sundargarh	150811	488577	639388
Rajasthan	76483	522607	599089
Ajmer	-	13000	13000
Alwar	-	750	750
Bhilwara	-	9619	9619
Chittorgarh	-	11170	11170
Dausa	-	1957	1957
Jaipur	-	58532	58532
Jaisalmer	-	4646	4646
Jhunjhunu	-	581	581
Jodhpur	-	39857	39857
Rajsamand	64801	83699	148499
Sikar	-	3651	3651
Udaipur	11682	295146	306828
Sikkim	-	2756	2756
Sikkim West	-	2756	2756
Tamil Nadu	-	2145	2145
Salem	-	135	135
Tirunelveli	-	2010	2010
Telangana	42723	145298	188021
Khammam	42723	139510	182233
Warangal	-	5788	5788
Uttar Pradesh	-	82352	82352
Banda	-	66230	66230
Sonbhadra	-	16122	16122
Uttarakhand	2165	203888	206053
Chamoli	-	97	97
Dehradun	-	20243	20243
Nainital	-	60800	60800
Pithoragarh	2165	242	2407
Tehri Garhwal	-	122506	122506
West Bengal	-	238029	238029
Jalpaiguri	-	238029	238029

figures rounded off

10.10 DUNITE

Introduction

Dunite is a mono-mineralic, ultra-basic rock consisting of more or less olivine. Dunite typically contains 36 to 42% MgO and 36 to 39% SiO₂. Due to rising trend of its use as fluxing agent in blast furnace in place of dolomite, it was included in National Mineral Inventory as on 01.04.2000 for the first time. Pyroxenite is another high magnesium, ultra basic rock. It is composed of many silicate minerals and is also being used as flux. Hence, the NMI of dunite covers pyroxenite also.

Dunite has been declared as a "Minor Mineral" under section 3 (e) of the MMDR Act, 1957 vide Gazette Notification 423 (E) dated 10.02.2015.

Basis of Grade Classification

The use of the dunite/pyroxenite as flux is of recent origin and hence there is no standard classification of grades. However, fresh rocks and weathered rocks are considered as grade I and grade II, respectively as reported by consuming industry. The grade classification followed in inventory as on 1.4.2015 is as under:

1. Grade-I	MgO	41.12%
	SiO ₂	33.41%
	LOI	12.74%
	Cr ₂ O ₃	Below 1%

Physical : Fresh olive, green in colour, granular, glassy luster, conchoidal fracture, hardness 6.5 to 7, specific gravity 3 to 4.

2. Grade-II	MgO	32.44%
	SiO ₂	29.16%
	LOI	24.09%

Physical : Altered dunite, grey to greenish grey.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources are broadly classified into 'reserves' and 'remaining resources'.

According to norms of this system 'reserves' of dunite have been placed under proved (111) and probable (121 & 122) categories. The remaining resources have been placed under feasibility (211), pre-feasibility resources (221 & 222), measured (331),

indicated (332) inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of dunite in the country as on 1.4.2015 are estimated at about 188 million tonnes of which 13 million tonnes (7%) have been placed under reserves and 175 million tonnes (93%) under remaining resources.

All India scenario of dunite reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables-1 and 2. These tables give an idea about changes in terms of increase or decrease of resources as per lease status, grade and state. In Table-3 district wise reserves/resources as on 1.4.2015 have been given.

Out of the total resources of dunite as on 1.4.2015, about 63% have been estimated in leasehold private areas, 12% in leasehold public areas and remaining about 25% are in freehold areas. Of the total resources, about 83 million tonnes (44%) constitutes grade-I, 99 million tonnes (53%) grade-II and 6 million tonnes (3%) unclassified grade.

Dunite resources are located mainly in Tamil Nadu and Karnataka. Tamil Nadu account for a major share of 65% (122 million tonnes) whereas Karnataka account for 17% (32 million tonnes) of the country's resources. The balance resources are distributed in Jharkhand (9%), Odisha (6%), and Nagaland (3%).

A net increase of 2.45 million tonnes resources have been recorded in the present inventory of dunite as compared to earlier inventory as on 1.4.2010. The increase is mainly due to addition of two new deposits one each in Namakkal district of Tamil Nadu (5044 thousand tonnes) and one deposit in Hassan district of Karnataka (55 thousand tonnes).

Of the total resources of dunite, about 38 million tonnes (20%) have been estimated under inferred and reconnaissance categories and need attention of exploration agencies to enhance the confidence level of estimation of these resources.

Out of the total 32 deposits covered in the inventory as on 1.4.2015, 21 deposits are in leasehold and 11 deposits are in freehold areas.

Table - 1 : Reserves/Resources of Dumite as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves				Remaining resources				Total resources						
	1.4.2015		1.4.2010		1.4.2015		1.4.2010		1.4.2015		1.4.2010		Net change		
				Net change				Net change							Net change
All India : Total	12768	17137	(-) 4369		175049	168231	(+) 6818		187818	185368	(+) 2450				
Grade - I	5953	7331	(-) 1378		77263	76158	(+) 1105		83216	83489	(-) 273				
Grade - II	6452	6468	(-)16		92113	87273	(+) 4840		98565	93741	(+) 4824				
Unclassified	363	3337	(-)2974		5674	4800	(+) 874		6037	8137	(-)2100				
Freehold	-	-	-		47244	42201	(+) 5043		47244	42201	(+) 5043				
Grade - I	-	-	-		27412	27241	(+) 171		27412	27241	(+) 171				
Grade - II	-	-	-		15032	10160	(+) 4872		15032	10160	(+) 4872				
Unclassified	-	-	-		4800	4800	-		4800	4800	-				
Leasehold (Private)	693	4280	(-) 3587		117392	116108	(+) 1284		118085	120389	(-)2304				
Grade - I	385	943	(-) 558		41132	40690	(+)442		41518	41633	(-) 115				
Grade - II	-	-	-		75385	75418	(-) 33		75385	75418	(-)33				
Unclassified	308	3337	(-) 3029		874	-	(+)874		1182	3337	(-) 2155				
Leasehold (Public)	12075	12856	(-) 781		10413	9222	(+) 491		22488	22778	(-) 290				
Grade - I	5568	6388	(-) 820		8718	8227	491		14285	14615	(-) 330				
Grade - II	6452	6468	(-) 16		1695	1695	-		8147	8163	(-) 16				
Unclassified	55	-	(+)55		-	-	-		55	-	(+)55				

figures rounded off

National Mineral Inventory - An Overview

**Table – 2 : Total resources of Dunite as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

(In '000 tonnes)

State	Total resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	187818	185368	(+) 2450
Jharkhand	17242	17358	(-) 116
Karnataka	31831	31998	(-)167
Nagaland	4800	4800	-
Odisha	12145	14333	(-) 2188
Tamil Nadu	121800	116879	(+) 4921

*figures rounded off***Table - 3 : District wise Reserves/Resources of Dunite as on 1.4.2015**

(In '000 tonnes)

State/District	Reserves	Remaining resources	Total resources
All India : Total	12768	175049	187818
Jharkhand	385	16857	17242
Saraikela-Kharaswan	-	7060	7060
Singhbhum (East)	385	9797	10182
Karnataka	3282	28549	31831
Chikmagalur	325	111	436
Hassan	55	56	112
Mysore	2902	28382	31283
Nagaland	-	4800	4800
Tuensang	-	4800	4800
Odisha	308	11837	12145
Jajpur	308	874	1182
Keonjhar	-	8590	8590
Sundargarh	-	2373	2373
Tamil Nadu	8793	113007	121800
Namakkal	-	5044	5044
Salem	8793	107963	116756

figures rounded off

10.11 FELDSPAR

Introduction

Feldspar is the most abundantly occurring rock forming mineral in nature consisting of aluminium silicate with potassium, sodium and calcium or mixture of these. The common feldspar is potassium feldspar namely orthoclase and microcline ($K_2O \cdot Al_2O_3 \cdot 6SiO_2$), sodium feldspar or albite ($Na_2O \cdot Al_2O_3 \cdot 6SiO_2$), and calcium feldspar or anorthite ($CaO \cdot Al_2O_3 \cdot 2SiO_2$). Feldspar occurs in various colours but pink, brown and grey are common.

Feldspar is mainly used in the manufacture of glass, pottery, ceramics, vitrified enamels, special electrical porcelain, wind plates and opalescent glasswares. In the ceramic industry feldspar is used both in the body and as a glaze for china ware. It is also used as a binding agent in the manufacture of abrasives.

Feldspar has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015 and therefore inventory of feldspar has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

Grade classification of the reserves/resources of feldspar is based on the actual use or potential use reported by the exploration and exploitation agencies. In the inventory as on 1.4.2015, the reserves/resources of feldspar are classified into the following grades :

- | | |
|---------------------|--|
| 1. Glass | SiO_2 65% (Min), Fe_2O_3 below 0.3%, $Na_2O_3 + K_2$ 15% (min) |
| 2. Pottery/Ceramics | SiO_2 68% (min), Fe_2O_3 0.1% (max), K:Na 2:1 |
| 3. Unclassified | Where more than one possible end-use has been identified but sufficient data to break up the resources into different end use are not available. |
| 4. Not Known | The information on the actual use/potential use is not reported |
| 5. Others | Those which cannot be classified into the above grades. |

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, reserves of feldspar have been placed under proved (111) and probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of feldspar in the country as on 1.4.2015 are estimated at 634 million tonnes. Of these, about 320 million tonnes (51%) fall under reserves category and the balance 314 million tonnes (49%) are remaining resources. Out of the total resources, about 38 million tonnes are in freehold, 595 million tonnes in leasehold (private) and only 0.9 million tonnes in leasehold (public). Of the total resources, about 83.97 million tonnes (13%) are of glass grade, 117.33 million tonnes (18%) are of pottery/ceramic grade, 36.28 million tonnes (6%) of others grade, 360.0 million tonnes (57%) of unclassified grade and 35.95 million tonnes (6%) of not known grade.

All India scenario of feldspar reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade, and state. In Table-3, district wise reserves/resources as on 1.4.2015 have been given.

Rajasthan is credited with 572 million tonnes (90%) share of total resources, followed by Telangana 23 million tonnes (4%), Andhra Pradesh 14 million tonnes (2%), Tamil Nadu 9 million tonnes (1%), Bihar and West Bengal 5 million tonnes (1% each) and the rest 1% resources have been accounted for by other states namely Jharkhand, Maharashtra, Haryana, Karnataka, Madhya Pradesh, Meghalaya and Uttar Pradesh.

A net increase of about 501.23 million tonnes resources has been recorded in the inventory as on

Table - 1 : Reserves/Resources of Feldspar as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	(In tonne)								
	Reserves			Total resources					
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change			
All India : Total	319841612	44503240	(+) 275338372	313725831	87832212	(+) 225893619	633567443	132335452	(+) 501231991
Glass	51183718	3151295	(+) 48032423	32786790	7624363	(+) 25162427	83970508	10775659	(+) 73194849
Pottery/Ceramic	46306435	36154731	(+) 10151704	71030537	45089400	(+) 25941137	117336972	81244131	(+) 36092841
Others	11519689	1026964	(+) 10492725	24761530	1284133	(+) 23477397	36281219	2311097	(+) 33970122
Unclassified	208799110	2443651	(+) 206355459	151228326	16097547	(+) 135130779	360027436	18541198	(+) 341486238
Not-Known	2032660	1726599	(+) 306061	33918649	17736767	(+) 16181882	35951309	19463366	(+) 16487943
Freehold	786031	47644	(+) 738387	37354221	36080706	(+) 1273515	38140252	36128350	(+) 2011902
Glass	721342	-	(+) 721342	1596242	1314474	(+) 281768	2317584	1314474	(+) 1003110
Pottery/Ceramic	51505	47644	(+) 3861	8057545	7078377	(+) 979168	8109050	7126021	(+) 983029
Others	-	-	-	206787	206585	(+) 202	206787	206585	(+) 202
Unclassified	13086	-	(+) 13086	12404383	12392080	(+) 12303	12417469	12392080	(+) 25389
Not-Known	98	-	(+) 98	15089263	15089189	(+) 74	15089361	15089189	(+) 172
Leasehold (Private)	319055581	43585327	(+) 275470254	275463460	51359456	(+) 224104004	594519041	94944782	(+) 499574259
Glass	50462376	2410181	(+) 48052195	30418053	6264158	(+) 24153895	80880429	8674339	(+) 72206090
Pottery/Ceramic	46254930	35977932	(+) 10276998	62841336	37668704	(+) 25172632	109096266	73646636	(+) 35449630
Others	11519689	1026964	(+) 10492725	24554743	1077548	(+) 23477195	36074432	2104512	(+) 33969920
Unclassified	208786024	2443651	(-) 206342373	138823942	3705467	(+) 135118475	347609966	61491118	(+) 341460848
Not-Known	2032562	1726599	(+) 305963	18825386	2643578	(+) 16181808	20857948	4370177	(+) 16487771
Leasehold (Public)	-	870269	(-) 870269	908150	392050	(+) 516100	908150	1262319	(-) 354169
Glass	-	741114	(-) 741114	772495	45731	(+) 726764	772495	786845	(-) 14350
Pottery/Ceramic	-	129155	(-) 129155	131655	342319	(-) 210664	131655	471474	(-) 339819
Not Known	-	-	-	4000	4000	-	4000	4000	-

figures rounded off

National Mineral Inventory - An Overview

1.4.2015 in comparison to the earlier inventory as on 1.4.2010. These changes have occurred due to addition of about 880 new deposits with estimated resources of 474.56 million tonnes. Out of the total increase, about 484.19 million tonnes (97%) resources have been accounted alone by Rajasthan due to addition of 757 new deposits in lease hold (private) mainly in Ajmer, Bhilwara and Rajsamand districts and also due to upward revision of resources in existing deposit.

In Telangana, about 8 million tonnes resources have increased due to addition of 47 new deposits followed by Tamil Nadu, 1 million tonnes (55 new

deposits), Andhra Pradesh, 0.3 million tonnes (21 new deposits). In other states minor changes are seen. Of the total resources of feldspar, about 153.38 million tonnes (24%) have been estimated under inferred & reconnaissance categories. These resources are based on a limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position of feldspar in the country may improve. A total 1596 deposits have been covered in the inventory as on 1.4.2015. Out of these, 187 deposits are in freehold, 1397 leasehold private and 12 leasehold public deposits.

Table – 2 : Total Resources of Feldspar as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	633567443	132335452	(+) 501231991
Andhra Pradesh	14056011	21798561	(-) 7742550
Bihar	4910841	4910841	No change
Haryana	72164	72164	No change
Jharkhand	1654621	1634788	(+) 19833
Karnataka	625676	637488	(-) 11812
Madhya Pradesh	356791	339851	(+) 16940
Maharashtra	1228903	1228903	No change
Meghalaya	37449	37449	No change
Rajasthan	572133185	87946235	(+) 484186950
Tamil Nadu	9941916	9002047	(+) 939870
Telangana	23387715	-	(+) 23387715
Uttar Pradesh	200000	200000	No Change
West Bengal	4962170	4527124	(+) 435046

Table - 3 : District wise Reserves/Resources of Feldspar as on 1.4.2015

State/District	(In tonne)		
	Reserves	Remaining Resources	Total Resources
All India : Total	319841612	313725831	633567443
Andhra Pradesh	3002311	11053700	14056011
Anantapur	29057	611708	640765
Cuddapah	-	117167	117167
Godavari (West)	-	598947	598947
Nellore	2973254	9701086	12674340
Vizianagaram	-	24793	24793

(Contd.)

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Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Bihar	-	4910841	4910841
Gaya	-	936000	936000
Jamui	-	4195	4195
Monghyr	-	3912447	3912247
Nawada	-	58199	58199
Haryana	-	72164	72164
Mahendragarh	-	72164	72164
Jharkhand	276104	1378517	1654621
Deogarh	-	139891	139891
Dhanbad	-	269519	269519
Dumka	-	44060	44060
Giridih	142772	285042	427814
Hazaribagh	-	19441	19441
Jamtara	57517	43325	100842
Kodarma	30954	138275	169229
Latehar	12221	114732	126953
Palamau	7042	308021	315063
Ranchi	25598	16211	41809
Karnataka	-	625676	625676
Bangalore	-	349343	349343
Belgaum	-	120000	120000
Chitradurga	-	84700	84700
Hassan	-	67733	67733
Raichur	-	3900	3900
Madhya Pradesh	-	356791	356791
Chhatarpur	-	16940	16940
Jabalpur	-	339819	339819
Shahdol	-	32	32
Maharashtra	-	1228903	1228903
Sindhudurg	-	1228903	1228903
Meghalaya	-	37449	37449
Garo Hills East	-	15449	15449
Jaintia Hills	-	22000	22000
Rajasthan	305666168	266467018	572133186
Ajmer	67539546	90769982	158309528
Alwar	-	44790	44790
Banswara	61468	152941	214409
Bhilwara	212625715	124792701	337418416
Bikaner	82817	354757	437574
Chittorgarh	4844	942	5786
Hanumangarh	1514282	575559	2089841

(Contd.)

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Table-3 (Concl'd.)

State/District	Reserves	Remaining Resources	Total Resources
Jaipur	2689289	1375455	4064744
Jhunjhunu	-	212446	212446
Pali	3258728	8432064	11690792
Rajsamand	4108270	31068367	35176637
Sikar	12680916	7379100	20060016
Sirohi	449271	403794	853065
Tonk	651022	368635	1019657
Udaipur	-	535485	535485
Tamil Nadu	769176	9172741	9941917
Coimbatore	51166	283271	334437
Dharmapuri	1576	1121	2697
Dindigul	46167	55464	101631
Erode	7359	617449	624808
Kanchipuram	-	66666	66666
Karur	140209	4364986	4505195
Madurai	-	936	936
Namakkal	69979	554469	624448
Salem	392000	2069274	2461274
Tiruchirapalli	17816	1077230	1095046
Tiruppur	42904	81874	124778
Telangana	10002573	13385142	23387715
Hyderabad	734526	376076	1110602
Khammam	305718	59899	365617
Mahboobnagar	5437212	6972728	12409940
Medak	59721	198033	257754
Nalgonda	281	637916	638197
Nizamabad	1763414	-	1763414
Rangareddy	1701701	5140490	6842191
Uttar Pradesh	-	200000	200000
Jhansi	-	200000	200000
West Bengal	125281	4836889	4962170
Bankura	-	201250	201250
Birbhum	125281	18639	143920
Purulia	-	4617000	4617000

10.12 Fireclay

Introduction

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 quality fireclay should have a high fusion point and good plasticity. The fusion point is higher than 1580°C, hence used for lining furnace as firebrick, manufacture of utensils, crucible saggars, retorts & glassware and due to good plasticity it can be shaped easily or moulded in desired shape. Fireclay containing high alumina and low iron oxide, lime, magnesia and alkalis are preferred by refractory manufacturers. The aluminous kaolinitic variety of fireclay is more refractory because it is hard and dense and shows absence of iron, giving it a white-burning colour. The absence of alkalis gives it a very high fusion temperature.

Occurrences of fireclay are widespread in the country. Major deposits of fireclay are associated with coal seams. India is comfortably placed in fireclay resources.

Fireclay has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015

Basis of Grade Classification

Fireclay is mainly used for making refractory bricks and hence end-use grade classification is primarily based on this. The following grade classifications have been adopted in the National Mineral Inventory as on 1.4.2015.

- | | |
|---|---|
| 1. Refractory
Non Plastic/
Semi Plastic | Al ₂ O ₃ 30% (min)
Fe ₂ O ₃ 2% (max)
PCE (Orton cone 30 min) |
| 2. Refractory
Plastic | Al ₂ O ₃ 18% (min)
Fe ₂ O ₃ 3% (max.)
PCE (Orton cone 18 min) |
| 3. Refractory
Unclassified | Fireclay which cannot be included in (1) & (2) above. |
| 4. Others | Fireclay which cannot be included in the above refractory grades. |
| 5. Unclassified | Fireclay with wide range of |

chemical analysis and which cannot be classified into any of the above grades.

6. Not Known Fireclay for which neither chemical analysis nor actual uses are available

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, reserves of fireclay have been placed under proved (111) and probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of fireclay in the country as on 1.4.2015 are estimated at 722,829 thousand tonnes. Of these, 27,037 thousand tonnes (3.7%) fall under reserve category and 695,791 thousand tonnes (96.3%) are under remaining resource category. Out of the total resources, the share of freehold area is 591,700 thousand tonnes (81.9%), leasehold public sector 34,991 thousand tonnes (4.8%) and leasehold private sector 96,138 thousand tonnes (13.3%).

All India scenario of fireclay reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grades and states. In Table-3 district wise reserves/resources as on 1.4.2015 have been given.

Out of the total resources of fireclay, the share of refractory non-plastic/semi-plastic grade is 117,211 thousand tonnes (16.2%), refractory plastic grade 268,321 thousand tonnes (37.1%), refractory unclassified grade 104,806 thousand tonnes (14.5%), others 65,362 thousand tonnes (9%), unclassified 14,604 thousand tonnes (2%) and not known grade 152,525 thousand tonnes (21.1%).

Occurrences of fireclay are widespread in the country. Out of the total resources of fireclay, Odisha

Table - 1 : Reserves/Resources of Fireclay as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

(In '000 tonnes)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
	All India : Total	27037	30104	(-)3067	695791	683415	(+)12379	722829	713520
Refractory Non Plastic/ Semi Plastic	3663	4642	(-)979	113548	105876	(+)7672	117211	110518	(+)6693
Refractory Plastic	5460	5220	(+)240	262861	255168	(+)7693	268321	260388	(+)7933
Refractory Unspecified	14248	16175	(-)1927	90558	96201	(-)5643	104806	112377	(-)7571
Others	1715	2786	(-)1071	63647	59297	(+)4350	65362	62084	(+)3278
Unclassified	1951	1013	(+)938	12653	10865	(+)1788	14604	11878	(+)2726
Not known	-	268	(-)268	152525	156006	(-)3481	152525	156275	(-)3750
Freehold	-	-	-	591700	585411	(+)6289	591700	585411	(+)6289
Refractory Non Plastic/ Semi Plastic	-	-	-	93925	93771	(+)154	93925	93771	(+)154
Refractory Plastic	-	-	-	252067	247015	(+)5052	252067	247015	(+)5052
Refractory Unspecified	-	-	-	67626	66559	(+)1067	67626	66559	(+)1067
Others	-	-	-	26282	26282	No Change	26282	26282	No Change
Unclassified	-	-	-	2477	2477	No Change	2477	2477	No Change
Not Known	-	-	-	149322	149306	(+)16	149322	149306	(+)16
Leasehold Private	26380	27713	(-)1332	69758	92394	(-)22636	96138	120107	(-)23971
Refractory Non Plastic/ Semi Plastic	3006	4042	(-)1036	15214	7472	(+)7742	18220	11515	(+)6705
Refractory Plastic	5460	5220	(+)240	10794	8153	(+)2641	16254	13373	(+)2881
Refractory Unspecified	14248	15803	(-)1555	22024	29107	(-)7083	36272	44910	(-)8638
Others	1715	1366	(+)349	8348	32574	(-)24226	10063	33940	(-)23877
Unclassified	1951	1013	(+)938	10176	8388	(+)1788	12126	9401	(+)2725
Not Known	-	268	(-)268	3202	6700	(-)3498	3202	6969	(-)3767
Leasehold Public	657	2392	(-)1735	34334	5610	(+)28724	34991	8002	(+)26989
Refractory Non Plastic/ Semi Plastic	657	600	(+)57	4409	4633	(-)224	5066	5233	(-)167
Refractory Unspecified	-	372	(-) 372	908	536	(+)372	908	908	No Change
Others	-	1420	(-) 1420	29017	441	(+) 28576	29017	1861	(+) 27156

figures rounded off.

is credited with 172,924 thousand tonnes (24%), followed by Madhya Pradesh 126,639 thousand tonnes (18%), Tamil Nadu 116,663 thousand tonnes (16%), Jharkhand 66,454 thousand tonnes (9%), Rajasthan 54,656 thousand tonnes and Gujarat 59,809 thousand tonnes (8% each), Chhattisgarh 21,558 thousand tonnes & Kerala 18,181 thousand tonnes (3% each), Andhra Pradesh 16,496 thousand tonnes, West Bengal 15,981 thousand tonnes, Karnataka 11,794 thousand tonnes, Meghalaya 10,999 thousand tonnes and Telangana 11,446 thousand tonnes (2% each). The balance 1% resources have been accounted by Assam, Bihar, Delhi, Maharashtra, Jammu & Kashmir, Tripura and Uttar Pradesh.

In the inventory as on 1.4.2015, a net increase of 9,311 thousand tonnes resources have been recorded as compared to the inventory as on 1.4.2010. These changes have occurred due to addition of about 79

deposits (23,608 thousand tonnes) and upward and downward revisions of resources in Andhra Pradesh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Telangana and West Bengal.

About 530,115 thousand tonnes (73.3%) resources of fireclay is under inferred and reconnaissance categories. These resources have been estimated based on a limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resources position of fireclay in the country may improve.

A total of 892 deposits have been reported in the inventory as on 1.4.2015. Of these, 501 deposits are in freehold areas and the balance 391 deposits in leasehold areas.

**Table – 2 : Total Resources of Fireclay as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

State	Total Resources		Net Change
	(In '000 tonnes)		
	As on 1.4.2015	As on 1.4.2010	
All India : Total	722829	713519	(+)9311
Andhra Pradesh	16496	12803	(+)3693
Assam	3161	3161	No Change
Bihar	44	44	No Change
Chhattisgarh	21558	20978	(+)580
Delhi	64	64	No Change
Gujarat	59809	58295	(+)1514
Jammu & Kashmir	4914	-	(+)4914
Jharkhand	66454	66619	(-)165
Karnataka	11794	14238	(-)2444
Kerala	18181	18181	No Change
Madhya Pradesh	126639	120314	(+)6325
Maharashtra	7455	7482	(-)27
Meghalaya	10999	10999	No Change
Odisha	172924	170076	(+)2848
Rajasthan	54656	66423	(-)11767
Tamil Nadu	116663	114258	(+)2405
Telangana	11446	10410	(+) 1036
Tripura	370	370	No Change
Uttar Pradesh	3221	3221	No Change
West Bengal	15981	15581	(+)400

figures rounded off.

Table - 3 : District wise Reserves/Resources of Fireclay as on 1.4.2015

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	27037	695791	722829
Andhra Pradesh	1934	14562	16496
Chittoor	-	10	10
Cuddapah	-	4934	4934
Godavari East	1684	8255	9940
Godavari West	250	512	762
Kurnool	-	400	400
Srikalulam	-	450	450
Assam	-	3161	3161
Dibrugarh	-	44	44
Karbi Anglong	-	2000	2000
North Cachar Hills	-	1070	1070
North Lakhimpur	-	47	47
Bihar	-	44	44
Bhagalpur	-	14	14
Purnea	-	30	30
Chhattisgarh	433	21126	21558
Bilaspur	-	335	335
Raigarh	433	7518	7950
Rajnandgaon	-	13274	13274
Delhi	-	64	64
Delhi	-	64	64
Gujarat	287	59522	59809
Bharuch	-	1	1
Kutch	32	83	115
Mehesana	-	75	75
Rajkot	-	33714	33714
Sabarkantha	-	571	571
Surat	-	7	7
Surendranagar	255	25070	25325
Jammu & Kashmir	-	4914	4914
Leh	-	4914	4914
Jharkhand	3	66450	66454
Dhanbad	3	14411	14414
Dumka	-	102	102
Giridih	-	1961	1961
Godda	-	22133	22133
Hazaribagh	-	16606	16606
Latehar	-	17	17
Palamau	-	6945	6945
Ranchi	-	2215	2215
Singbhum (West)	-	2061	2061
Karnataka	146	11648	11794
Bangalore	-	620	620
Chickballapura	-	4361	4361
Chitradurga	-	2598	2598
Dharwar	-	673	673
Kolar	-	73	73
Shimoga	-	303	303
Tumkur	146	3020	3166

(Contd.)

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Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Kerala	-	18181	18181
Alapuzha (Alleppy)	-	1000	1000
Ernakulam	-	843	843
Kannur	-	8200	8200
Kollam	-	8137	8137
Madhya Pradesh	7603	119036	126639
Betul	-	384	384
Chhindwara	-	45	45
Jabalpur	2297	13348	15645
Katni	4752	12360	17112
Narsinghapur	-	71497	71497
Panna	-	34	34
Sagar	129	257	386
Satna	121	1613	1734
Shahdol	-	18559	18559
Sidhi	60	209	268
Umaria	244	731	976
Maharashtra	709	6746	7455
Amravati	709	1658	2367
Chandrapur	-	1459	1459
Nagpur	-	3579	3579
Ratnagiri	-	50	50
Meghalaya	-	10999	10999
Garo Hills West	-	9810	9810
Khasi Hills East	-	1189	1189
Odisha	173	172751	172924
Angul	-	1222	1222
Bargah	-	23	23
Bhubaneshwar	-	200	200
Cuttack	173	22564	22737
Dhenkanal	-	103952	103952
Jharsuguda	-	38995	38995
Khurda	-	512	512
Puri	-	200	200
Sambalpur	-	1027	1027
Sundargarh	-	4055	4055
Rajasthan	10493	44163	54656
Alwar	-	286	286
Barmer	-	1200	1200
Bharatpur	-	45	45
Bikaner	10493	41429	51922
Dausa	-	74	74
Jaisalmer	-	69	69
Jhunjhunu	-	578	578
Karauli	-	418	418
Sawai Madhopur	-	65	65
Tamil Nadu	3136	113528	116663
Ariyalur	724	593	1317
Cuddalore	357	64425	64782
Kanchipuram	-	8016	8016
Perambalur	1843	5343	7186
Pudukkottai	-	30	30
Sivaganga	-	5431	5431
Thiruvallur	-	20530	20530
Tiruchirapalli	213	5937	6149
Villupuram	-	3217	3217

(Contd.)

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Table-3 (Concl.)

State/District	Reserves	Remaining Resources	Total Resources
Vellore	-	6	6
Telangana	762	10684	11446
Adilabad	762	9838	10600
Nalgonda	-	100	100
Rangareddy	-	746	746
Tripura	-	370	370
West Tripura	-	370	370
Uttar Pradesh	-	3221	3221
Sonbhadra	-	3221	3221
West Bengal	1359	14622	15981
Bankura	364	592	956
Birbhum	183	8620	8804
Burdwan	-	5009	5009
Purulia	811	401	1212

figures rounded off.

10.13 FULLER'S EARTH

Introduction

Fuller's earth, like bentonite, is also known as 'bleaching clay' due to its inherent bleaching properties. It has great commercial importance like bentonite. Bentonite is a swelling type clay but fuller's earth is a non- swelling type clay. This property difference is because of their chemical composition. Bentonite contains sodium whereas fuller's earth contains calcium. Calcium bentonite, sometimes called fuller's earth, can be converted into sodium bentonite by cation exchange process or acid activation. Activated fuller's earth is used mainly in bleaching and refining of vegetable and mineral oils.

As fuller's earth is "Minor Mineral", therefore inventory of fuller's earth has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

Due to lack of necessary data from exploration/exploiting agencies, no end-use grade classification could be attempted. Thus, without supporting data, all the available resources have been put under unclassified grade in the mineral inventory as on 1.4.2015.

Basis of Categorisation of Resources

As per United Nations Frame Work Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to norms of this system, reserves of fuller's earth have been placed under proved (111) category.

The remaining resources have been placed under pre-feasibility (222), indicated (332) and inferred (333) categories.

Salient Features of the Inventory

The total resources of fuller's earth in the country as on 1.4.2015 are estimated at 261,379 thousand tonnes. Of these, about 3,941 thousand

tonnes fall under 'reserves' category and the balance 257,438 thousand tonnes are placed under 'remaining resources' category.

All India scenario of fuller's earth reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010, have been given in Tables - 1 and 2. These tables reflect the changes in terms of increase or decrease of resources as per lease status, grades and states. In Table -3, district wise reserves/resources as on 1.4.2015 have been given.

About 81% of the total resources are in freehold and the balance 19% in leasehold (private) areas.

Of the four major states, Rajasthan is credited with 194,700 thousand tonnes (74%) resources, followed by Telangana 25,524 thousand tonnes (10%), Arunachal Pradesh 20,011 thousand tonnes (8%) and Assam 18,860 thousand tonnes (7%). The balance 2,284 thousand tonnes (1%) resources have been accounted together by Karnataka and Madhya Pradesh. About 99% of the total resources in Rajasthan have been estimated in two districts namely Bikaner (58%) and Barmer (41%).

An increase of 4,727 thousand tonnes in total resources as on 1.4.2015 in comparison to the previous updation as on 1.4.2010, was noticed. Increase in total resources was mainly due to addition of 18 new deposits (leasehold private-17 & freehold-1) possessing 4,758 thousand tonnes of resources.

Almost the entire resources of 256,467 thousand tonnes (98%) of fuller's earth are under inferred category. These resources are based on a very limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position of this mineral in the country may improve.

Out of total 49 deposits covered in the mineral inventory as on 1.4.2015, 26 are freehold deposits and 23 deposits are in leasehold private areas.

**Table – 2 : Total Resources of Fuller's Earth as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

(In '000 tonnes)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	261379	256652	(+) 4727
Andhra Pradesh	-	25524	(-) 25524
Arunachal Pradesh	20011	20011	No Change
Assam	18860	18860	No Change
Karnataka	2167	2081	(+) 86
Madhya Pradesh	117	117	No Change
Rajasthan	194700	190059	(+) 4641
Telangana	25524	-	(+) 25524

*figures rounded off***Table - 3 : District wise Reserves/Resources of Fuller's Earth as on 1.4.2015**

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	3941	257438	261379
Arunachal Pradesh	-	20011	20011
Tirap	-	20011	20011
Assam	-	18860	18860
Nalbari	-	18860	18860
Karnataka	-	2167	2167
Belgaum	-	576	576
Gulbarga	-	1591	1591
Madhya Pradesh	-	117	117
Mandla	-	117	117
Rajasthan	3941	190759	194700
Barmer	3131	78153	81284
Bikaner	800	111965	112765
Chittorgarh	10	-	10
Jaisalmer	-	641	641
Telangana	-	25524	25524
Medak	-	3378	3378
Rangareddi	-	22146	22146

figures rounded off

10.14 GRANITE (DIMENSION STONE)

Introduction

India possesses enormous resources of all types of dimension stone. In commercial parlance, the term granite has become synonymous with all those crystalline rocks which have pleasing colours, strength to bear the processes of quarrying and cutting, and polishing and are used commonly for decorative purposes. Being more resistant to wear and tear as well as weathering, granite is most sought after stone to be used as building as well as decorative stone. The fascination for granite is due to its taking mirror-like polish, and variety of colours, high compressive strength, longevity and beauty. Owing to these qualities, granite is more popular for use as tomb-stone, paving and curbing stone and as architectural material. Value of the products depends on uniform colour, shade, size, texture and absence of hairline cracks.

As Granite (Dimension stone) is "Minor Mineral", therefore inventory of Granite (Dimension stone) has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

In commercial parlance granite includes a wide range of hard rocks of different petrological composition. In trade, the granites are differentiated solely on dominant colour e.g. black, grey, pink, etc.

In the mineral inventory as on 1.4.2015, the following three fold classification of various granites based on colour has been adopted:

1. Black Granite
2. Coloured Granite
3. Unclassified Where the estimations of granite are not available distinctly in the above grades.

Basis of Categorisation of Resources

As per United Nations Frame Work Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, reserves of granite have been placed under proved (111) and probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of granite in the country as on 1.4.2015 are estimated at 46,319,790 thousand cubic metres, of these 2,63,692 thousand cubic metres (0.57%) fall under reserve category and 46,056,098 thousand cubic metres (99.43%) are under remaining resource category. Of the total resources, the share of freehold areas is 38,455,497 thousand cubic metres (83%), leasehold public sector 404,940 thousand cubic metres about (0.87%) and leasehold private sector 7,459,353 thousand cubic metres about (16.13%).

All India scenario of granite reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010, have been given in Tables - 1 and 2. These tables reflect the changes in terms of increase or decrease of resources as per lease status, grades and states. In Table -3 district wise reserves/resources as on 1.4.2015 have been given.

Of the total resources, black granite constitutes 3,175,688 thousand cubic metres (7%), coloured granite 42,654,581 thousand cubic metres (92%) and unclassified resources are about 489,521 thousand cubic metres (1%).

Occurrences of granite are widespread in the country. Of the total resources of granite, Karnataka is credited with 9,337,893 thousand cubic metres (20.2%), followed by Rajasthan 9,190,665 thousand cubic metres (19.8%), Jharkhand 8,875,340 thousand cubic metres (19.2%), Gujarat 8,501,947 thousand cubic metres (18.4%), Andhra Pradesh 2,360,396 thousand cubic metres (5.1%), Madhya Pradesh 1,994,084 thousand cubic metres (4.3%), Odisha 1,847,980 thousand cubic metres (3.9%), Maharashtra 1,158,847 thousand cubic metres (2.5%), Bihar 877,612 thousand cubic metres (1.9%), Assam 583,950 thousand cubic metres (1.3%), Tamil Nadu 559,435 thousand cubic metres (1.2%), Uttar Pradesh 494,819 thousand cubic metres (1.1%). The balance 1.16% resources have been accounted for by the states of Chhattisgarh, Haryana, West Bengal, Kerala, Jammu & Kashmir, Meghalaya and Telangana.

Table - 1 : Reserves/Resources of Granite (Dimension Stone) as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves		Remaining resources		Total resources		Net change
	1.4.2015	1.4.2010	1.4.2015	1.4.2010	1.4.2015	1.4.2010	
	Net change		Net change		Net change		
All India : Total	263692	263692	46056098	45966608	46319790	46230300	(+)89490
Black Granite	16906	16906	3158783	3158783	No change	3175688	No change
Coloured Granite	246786	246786	42407795	42402874	(-)85080	42649661	(+)4920
Unclassified	-	-	489521	404951	(+)84570	404951	(+)84570
Freehold	-	-	38455497	38366007	(+)89490	38366007	(+)89490
Black Granite	-	-	2411310	2411310	No Change	2411310	No change
Coloured Granite	-	-	35562472	35557552	(+)4920	35557552	(+)4920
Unclassified	-	-	481716	397146	(+)84570	397146	(+)84570
Leasehold (Public)	15773	15773	389167	389167	No Change	404940	No change
Black Granite	968	968	286456	286456	No Change	287424	No change
Coloured Granite	14805	14805	102712	102712	No Change	117517	No change
Unclassified	-	-	-	-	No Change	-	No Change
Leasehold (Private)	247919	247919	7211434	7211434	No Change	7459353	No change
Black Granite	15938	15938	461018	461018	No Change	476955	No change
Coloured Granite	231981	231981	6742612	6742612	No Change	6974593	No change
Unclassified	-	-	7805	7805	No Change	7805	No Change

Figures rounded off

In the inventory as on 1.4.2015, a net increase of 89,490 thousand cubic metres resources have been recorded as compared to the inventory as on 1.4.2010. These changes have occurred due to addition of 14 new deposits of 89,490 thousand cubic meters of resources.

In Odisha, an increase of 4,920 thousand cubic metres has been recorded in Gajapati, district due to addition of 11 new deposits and in Jammu & Kashmir, an increase of 84,570 thousand cubic metres has been recorded due to addition of 03 new deposits in Kargil districts.

An increase of 45,494 thousand cubic meter has been recorded from Telangana state which carved

out from erstwhile Andhra Pradesh.

About 43,056,124 thousand cubic metres of the total resources (93%) have been estimated under inferred and reconnaissance categories. These resources have been estimated based on limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resources position of granite in the country may improve.

In the inventory as on 1.4.2015, total 745 deposits have been reported. Of these, 524 deposits are in freehold areas and the balance 221 deposits in leasehold.

Table – 2 : Total Resources of Granite (Dimension Stone) as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

(In '000 cu m)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	46,319,790	46,230,300	(+)89,490
Andhra Pradesh	2,360,396	2,405,890	(-)45,494
Assam	583,950	583,950	No Change
Bihar	877,612	877,612	No Change
Chhattisgarh	50,057	50,057	No Change
Gujarat	8,501,947	8,501,947	No Change
Haryana	34,000	34,000	No Change
Jammu & Kashmir	84,570	-	(+)84,570
Jharkhand	8,875,340	8,875,340	No Change
Karnataka	9,337,893	9,337,893	No Change
Kerala	2,808	2,808	No Change
Madhya Pradesh	1,994,084	1,994,084	No Change
Maharashtra	115,8847	1,158,847	No Change
Meghalaya	286,467	286,467	No Change
Odisha	1,847,980	1843,060	(+)4,920
Rajasthan	9,190,665	9,190,665	No Change
Tamil Nadu	559,435	559,435	No Change
Telangana	45,494	-	(+)45,494
Uttar Pradesh	494,819	494,819	No Change
West Bengal	33,426	33,426	No Change

figures rounded off Being minor mineral, partial coverage of data.

Table - 3 : District wise Reserves/Resources of Granite (Dimension Stone) as on 1.4.2015

(In '000 cu m)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	263692	46056098	46319790
Andhra Pradesh	-	2360396	2360396
Anantapur	-	1096	1096
Chittoor	-	554075	554075
Cuddapah	-	265	265
Guntur	-	1195000	1195000
Nellore	-	13000	13000
Prakasam (Ongole H.Q)	-	381665	381665
Srikakulam	-	198271	198271
Vizianagaram	-	17024	17024
Assam	-	583950	583950
Goalpara	-	500800	500800
Kamrup	-	70100	70100
Karbi Anglong	-	13050	13050
Bihar	-	877612	877612
Bhagalpur	-	179000	179000
Gaya	-	21870	21870
Jahanabad	-	676000	676000
Jamui	-	742	742
Chhattisgarh	-	50057	50057
Bastar	-	45930	45930
Kanker	-	1250	1250
Raipur	-	2877	2877
Gujarat	-	8501947	8501947
Banaskantha	-	7773976	7773976
Mahesana	-	263949	263949
Panchmahals	-	96750	96750
Sabarkantha	-	367092	367092
Vadodara	-	180	180
Haryana	-	34000	34000
Bhiwani	-	34000	34000
Jammu & Kashmir	-	84570	84570
Kargil	-	84570	84570
Jharkhand	-	8875340	8875340
Deogarh	-	2574445	2574445
Dhanbad	-	26192	26192
Dumka	-	623480	623480
Giridih	-	153651	153651
Godda	-	360000	360000
Gumla	-	46250	46250
Hazaribagh	-	8320	8320
Jamtara	-	11900	11900
Koderma	-	32575	32575
Lohardaga	-	67500	67500
Palamau	-	35950	35950
Ranchi	-	176550	176550
Simdega	-	225	225
Singhbhum (East)	-	4758302	4758302

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Karnataka	67587	9270306	9337893
Bagalkot	4706	574452	579158
Bangalore	28408	5736975	5765383
Belgaum	2	2	4
Bellary	1590	15000	16590
Bijapur	146	650000	650146
Chamarajanagar	9399	30780	40179
Chickballapura	-	638	638
Chikmagalur	213	-	213
Chitradurga	128	-	128
Coorg	2802	6599	9401
Dharwar	-	853	853
Gadag	176	-	176
Gulbarga	38	489300	489338
Hassan	4768	29718	34486
Kolar	1167	31689	32856
Koppal	5988	437764	443752
Medikeri	-	3144	3144
Mandya	932	534	1466
Mysore	1079	600	1680
North Kanara	-	910	910
Raichur	4371	748410	752781
South Kanara	150	-	150
Tumkur	1347	495762	497109
Udupi	176	17176	17352
Kerala	140	2669	2808
Palakkad	-	99	99
Thiruvananthapuram	140	2570	2709
Madhya Pradesh	160	1993924	1994084
Betul	-	8153	8153
Chhatarpur	-	5675	5675
Chhindwara	-	780000	780000
Datia	-	108195	108195
Jhabua	-	8933	8933
Panna	-	32193	32193
Seoni	160	969064	969224
Shivpuri	-	81712	81712
Maharashtra	-	1158847	1158847
Bhandara	-	907820	907820
Chandrapur	-	60000	60000
Dhulia	-	2575	2575
Gadchiroli	-	9100	9100
Nagpur	-	13400	13400
Nanded	-	138625	138625
Nasik	-	30	30
Sindhudurg	-	26668	26668
Thana (Thane)	-	629	629
Meghalaya	-	286467	286467
Khasi Hills (West)	-	286467	286467
Odisha	80000	1767980	1847980
Angul	-	41340	41340
Baudh	-	25	25
Bolangir	-	240	240
Cuttack	-	4020	4020
Deogarh	-	25650	25650
Dhenkanal	-	5000	5000

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Concl.d.)

State/District	Reserves	Remaining Resources	Total Resources
Gajapati	-	4920	4920
Ganjam	-	153331	153331
Keonjhar	-	50195	50195
Khurda	-	7219	7219
Koraput	-	8798	8798
Mayurbhanj	-	11	11
Nawapara	80000	1394526	1474526
Raygada	-	67066	67066
Sambalpur	-	5640	5640
Rajasthan	110461	9080204	9190665
Ajmer	4098	521351	525449
Alwar	-	125000	125000
Banswara	-	14000	14000
Barmer	-	1894500	1894500
Bhilwara	2842	273228	276070
Chittorgarh	-	129000	129000
Jaipur	-	278487	278487
Jaisalmer	-	1958614	1958614
Jalore	79693	1597962	1677655
Jhunjhuu	-	93900	93900
Jodhpur	-	34820	34820
Pali	-	577640	577640
Rajsamand	7675	67797	75472
Sawai Madhopur	-	2400	2400
Sikar	-	187750	187750
Sirohi	16153	1194705	1210858
Tonk	-	97050	97050
Udaipur	-	32000	32000
Tamil Nadu	1686	557749	559435
Dharmapuri	238	33682	33920
Erode	-	16940	16940
Kanchipuram	-	555	555
Madurai	-	8225	8225
P. Muthuramalingam	-	1103	1103
Salem	1448	315772	317220
Thiruvannamalai	-	6141	6141
Tiruchirapalli	-	47606	47606
Tirulnelveli	-	1720	1720
Vellore	-	3823	3823
Villupuram	-	122182	122182
Telangana	-	45494	45494
Khammam	-	20	20
Medak	-	2150	2150
Nalgonda	-	125	125
Rangareddy	-	Negligible	Negligible
Warangal	-	43200	43200
Uttar Pradesh	-	494819	494819
Banda	-	432718	432718
Lalitpur	-	25430	25430
Mahoba	-	36671	36671
West Bengal	3658	29768	33426
Bankura	-	3222	3222
Birbhum	-	358	358
Purulia	3658	26189	29847

figures rounded off

10.15 GYPSUM

Introduction

Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) is a hydrated calcium sulphate used widely in industry because of its special property of losing three-fourths the combined water of crystallisation when moderately heated (calcined) to about 130°C. Besides, calcined gypsum when cooled, finally ground and made plastic with water can be spread out, cast or moulded to any desired surface or form. On drying, it resumes its original state and sets into a hard rock like form. Raw uncalcined gypsum is used for controlling the setting time of portland cement. It is added to the clinker just before final grinding to finished cement. Gypsum blocks are used like concrete blocks in building construction. Primarily gypsum board is used as a finish for walls and ceilings and known in construction as drywall.

Gypsum has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015 and there fore inventory of gypsum has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ is the key constituents of gypsum for grade classification. The following grade classifications have been adopted in the inventory as on 1.4.2015.

1. Surgical plaster $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$: 96% (min.)
NaCl : 0.01% (max.)
MgO : 0.5% (max.)
2. Fertilizer/Pottery $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$: 85% (min.)
MgO : 1% (max.)
NaCl : 0.03% (max.)
 $\text{Fe}_2\text{O}_3 + \text{Al}_2\text{O}_3$ 1.5% (max.)
3. Cement/Paint $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$: 70% (min.)
MgO : 3% (max.)
NaCl : 0.5% (max.)
4. Soil Reclamation $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$: 50% (min.)
 Na_2O : Upto 1%
5. Others. Estimation for such grade though usable/marketable but cannot be classified into the above grade.

6. Unclassified Where the range of chemical constituents are too wide to be classified under any of the above grades.

7. Not Known Where data is not available to classify the resources as per their end use.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources are broadly classified into 'reserves' and 'remaining resources'.

According to norms of this system reserves of gypsum has been placed under proved (111) and probable (121) & (122) categories.

The Remaining Resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of gypsum in the country as on 1.4.2015 are estimated at 1,329,513 thousand tonnes, out of this 36,621 thousand tonnes (3%) falls under reserve category and 1,292,892 thousand tonnes (97%) under remaining resources.

All India scenario of gypsum reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables - 1 and 2. These tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grades and states. In Table-3 district wise reserves/resources as on 1.4.2015 have been given.

Of the total resources, about 1,158,457 thousand tonnes (87%) have been estimated under freehold areas, and the balance 142,494 thousand tonnes (about 11%) and 28,562 thousand tonnes (about 2%) under leasehold public sector and leasehold private sector, respectively.

An analysis of grade wise resources as on 1.4.2015 reveals that resources under 'Soil Reclamation' grade have been increased by 19%, Cement/Paint grade increased by 16% and Unclassified grade by 15% as compared to inventory as on 1.4.2010. Minor increase was also observed in case of Fertilizer/Pottery 1% and

Table - 1 : Reserves/Resources of Gypsum as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
All India : Total	36621	39096	(-)2475	1292892	1247402	(+)45490	1329513	1286498	(+)43015
Surgical Plaster	621	776	(-)155	4894	4894	No Change	5515	5670	(-)155
Fertilizer/Pottery	18978	8454	(+)10524	1043211	1043030	(+)181	1062189	1051484	(+)10705
Cement/Paint	12549	26200	(-)13651	164315	126616	(+)37699	176864	152816	(+)24047
Soil Reclamation	-	-	-	13576	11396	(+)2180	13576	11396	(+)2180
Others	3	-	(+)3	11	-	(+)11	14	-	(+)14
Unclassified	413	-	(+)413	41621	36625	(+)4996	42034	36625	(+)5409
Not Known	4057	3666	(+)391	25265	24842	(+)423	29322	28508	(+)814
Freehold	-	-	-	1158457	1156816	(+)1641	1158457	1156816	(+)1641
Surgical Plaster	-	-	-	3643	4243	(-)600	3643	4243	(-)600
Fertilizer/Pottery	-	-	-	1032792	1032792	No Change	1032792	1032792	No Change
Cement/Paint	-	-	-	47133	47139	(-)6	47133	47139	(-)6
Soil Reclamation	-	-	-	13478	11298	(+)2180	13478	11298	(+)2180
Unclassified	-	-	-	36569	36569	No Change	36569	36569	No Change
Not Known	-	-	-	24843	24776	(+)67	24843	24776	(+)67
Leasehold (Public)	34146	36736	(-)2589	108348	66346	(+)42002	142494	103083	(+)39412
Surgical Plaster	621	776	(-)155	-	-	-	621	776	(-)155
Fertilizer/Pottery	18978	8454	(+)10524	1234	1053	(+)181	20211	9507	(+)10704
Cement/Paint	10124	23840	(-)13716	101638	65107	(+)36531	111762	88947	(+)22815
Soil Reclamation	-	-	-	74	74	No Change	74	74	No Change
Unclassified	367	-	(+)367	4990	56	(+)4934	5356	56	(+)5300
Not Known	4057	3666	(+)391	412	56	(+)356	4470	3722	(+748)
Leasehold (Private)	2475	2360	(+)114	26087	24240	(+)1848	28562	26600	(+)1962
Surgical Plaster	-	-	-	1251	651	(+)600	1251	651	(+)600
Fertilizer/Pottery	-	-	-	9185	9185	No Change	9185	9185	No Change
Cement/Paint	2425	2360	(+)65	15544	14370	(+)1174	17969	16730	(+)1239
Soil Reclamation	-	-	-	24	24	No Change	24	24	No Change
Others	3	-	(+)3	11	-	(+)11	14	-	(+)14
Unclassified	46	-	(+)46	63	-	(+)63	109	-	(+)109
Not Known	-	-	-	10	10	No Change	10	10	No Change

figures rounded off.

not known grade 3%. However, Surgical plaster grade resources has been decreased by 3%.

Rajasthan alone is credited with 1,080,306 thousand tonnes (81.26%) of the total resources, followed by Jammu & Kashmir 192,588 thousand tonnes (14.49%), Tamil Nadu 27,282 thousand tonnes (2.05%), Gujarat 16,407 thousand tonnes (1.23%). The balance 12,930 thousand tonnes (0.97%) is accounted together by other states namely Andhra Pradesh, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh and Uttrakhand.

A net increase of 43,015 thousand tonnes resources of gypsum has been recorded in the inventory as on 1.4.2015 in comparison to the earlier inventory as on 1.4.2010. Resources of gypsum has been increased by about 18,841 thousand tonnes due to addition of 11 new deposits in the inventory as on 01.04.2015.

Of the total increase, Rajasthan alone

accounts for about 24.76 million tonnes (58%), which was due to addition of one new deposit and upward revision in the resources of existing deposits. In Jammu and Kashmir, overall resource was also increased by 14.82 million tonnes (34%) due to addition of 3 new deposits. In Haryana, 2,180 thousand tonnes (5%) of resources have been increased due to addition of one freehold deposit. In Gujarat, 1,232 thousand tonnes (3%) of resources have been increased due to addition of one new deposit. In Tamil Nadu, minor increase of 0.03 million tonnes of resources have been reported due to addition of 5 new deposits.

About 33% of the total resources of gypsum have been estimated under inferred and reconnaissance categories. These resources are based on a limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position of gypsum in the country may improve.

A total 511 deposits have been covered in the inventory as on 1.4.2015, of which 408 deposits are in freehold areas and the balance 103 deposits are in leasehold areas.

Table – 2 : Total Resources of Gypsum as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	1329513	1286498	(+) 43015
Andhra Pradesh	404	404	No Change
Gujarat	16407	15175	(+)1232
Haryana	2180	-	(+)2180
Himachal Pradesh	4446	4446	No Change
Jammu & Kashmir	192588	177772	(+) 14816
Karnataka	3784	3784	No Change
Madhya Pradesh	69	69	No Change
Rajasthan	1080306	1055546	(+) 24760
Tamil Nadu	27282	27255	(+) 27
Uttrakhand	2047	2047	No Change

figures rounded off.

Table - 3 : District wise Reserves/Resources of Gypsum as on 1.4.2015

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	36621	1292892	1329513
Andhra Pradesh	-	404	404
Guntur	-	1	1
Nellore	-	400	400
Prakasam (Ongole H.Q)	-	3	3
Gujarat	33	16374	16407
Bhavnagar	-	64	64
Jamnagar	-	8774	8774
Junagarh	-	3626	3626
Kutch	33	3797	3830
Surendranagar	-	113	113
Haryana	-	2180	2180
Hissar	-	2180	2180
Himachal Pradesh	-	4446	4446
Chamba	-	11	11
Sirmur	-	4396	4396
Solan	-	40	40
Jammu & Kashmir	11977	180611	192588
Baramulla	2259	93841	96100
Doda	-	43311	43311
Ramban	9719	43238	52956
Reasi	-	220	220
Karnataka	-	3784	3784
Gulbarga	-	3784	3784
Madhya Pradesh	-	69	69
Shahdol	-	69	69
Rajasthan	24428	1055878	1080306
Barmer	1462	6810	8272
Bikaner	8513	42359	50872
Churu	-	12193	12193
Ganganagar	6429	16832	23262
Hanumangarh	-	2981	2981
Jaisalmer	4188	4730	8918
Jalore	137	1958	2095
Nagaur	3698	967123	970821
Pali	-	893	893
Tamil Nadu	183	27099	27282
Coimbatore	-	9639	9639
Perambalur	-	2716	2716
Ramnathapuram	-	203	203
Tiruchirapalli	183	13455	13638
Tirunelveli	-	86	86
Tuticorin	-	963	963
Virudhunagar	-	36	36
Uttarakhand	-	2047	2047
Dehradun	-	70	70
Pauri Garhwal	-	1250	1250
Tehri Garhwal	-	727	727

figures rounded off.

10.16 LATERITE

Introduction

Laterite is a residual ferruginous rock, commonly found in tropical regions and has close genetic association with bauxite. The term 'laterite' was originally used for highly ferruginous deposits first observed in Malabar Region of coastal Kerala and Dakshin Kannad and other parts of Karnataka. It is highly weathered material, rich in secondary oxides of iron, aluminium or both. It is either hard or capable of hardening on exposure to moisture and drying.

Laterite and bauxite show a tendency to occur together. Aluminous laterites and ferruginous bauxites are quite common. The most common impurity in both is silica. Laterite gradually passes into bauxite with decrease in iron oxide and increase in aluminium oxide. The laterite deposits may be described on the basis of the dominant extractable minerals in it : (i) aluminous laterite (bauxite). (ii) ferruginous laterite (iron ore), (iii) manganiferous laterite (manganese ore), (iv) nickeliferous laterite (nickel ore) and (v) chromiferous laterite (chrome ore). Laterite with $Fe_2O_3:Al_2O_3$ ratio more than one and $SiO_2:Fe_2O_3$ ratio less than 1.33 is termed as ferruginous laterite while that having $Fe_2O_3:Al_2O_3$ ratio less than one and $SiO_2:Al_2O_3$ ratio less than 1.33 is termed as aluminous laterite.

The compact and ferruginous variety of laterite is used widely as a road metal and as a local stone for culverts and buildings. Laterite as a building stone possesses one advantage that it is soft when quaried and can easily be cut and dressed into blocks and bricks which on exposure to air become hard. The industrial use of laterite is in the cement industry. It is used as an additive for lowering the clinkerization temperature and supplementing aluminous and iron contents required in the manufacture of cement. R&D on use of laterite for removal of fluoride from contaminated drinking water is being investigated.

Laterite has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015.

Basis of Grade Classification

Due to lack of necessary data from

exploration/exploiting agencies, no end-use grade classification could be attempted. Thus, without supporting data, all the available resources have been put under unclassified grade in the National Mineral Inventory.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to norms of this system, reserves of laterite have been placed under proved (111) and probable (121 & 122) categories. The remaining resources have been placed under feasibility (211), pre-feasibility (221 & 222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory :

The total resources of laterite in the country as on 1.4.2015 are estimated at 706,552 thousand tonnes. Of these, about 124,733 thousand tonnes (18%) fall under reserve category and the balance 581,819 thousand tonnes (82%) are under remaining resources category.

The preparation of inventory for laterite has been initiated for the first time during 1.4.2010. All India reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.04.2010 have been given in Tables 1 & 2. In Table-3, district-wise reserves/resources as on 1.4.2015 have been given.

About 67% of the total resources of laterite fall under freehold and 33% in leasehold private deposits. A meager quantity is recorded in leasehold public deposits.

Of the four major states, Madhya Pradesh is credited with 392,143 thousand tonnes (55.5%) resources, followed by Rajasthan 123,350 thousand tonnes (17.5%), Telangana 63,701 thousand tonnes (9%), Andhra Pradesh 48,572 thousand tonnes (6.9%), and Gujarat 45,981 thousand tonnes (6.5%). The balance 32,805 thousand tonnes (4.6%) resources have been accounted together by Jharkhand, Kerala, Maharashtra and Odisha. About 81% of the total resources in Madhya Pradesh have

**Table – 2 : Total Resources of Laterite as on 1.4.2015 vis-a-vis 1.4.2010
(By States)**

(In '000 tonnes)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	706552	470833	(+) 235719
Andhra Pradesh	48572	26257	(+)22315
Gujarat	45981	9570	(+)36411
Jharkhand	570	570	No change
Kerala	18826	18397	(+)429
Madhya Pradesh	392143	288688	(+)103455
Maharashtra	12181	4000	(+)8181
Odisha	1227	-	(+)1227
Rajasthan	123350	123350	No change
Telangana	63701	-	(+)63701

*figures rounded off***Table - 3 : District wise Reserves/Resources of Laterite as on 1.4.2015**

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	124733	581819	706552
Andhra Pradesh	15964	32608	48572
Cuddapah	1253	2612	3865
Godavari (East)	13129	26065	39195
Guntur	-	93	93
Nellore	1504	2144	3648
Visakhapatnam	78	1694	1772
Gujarat	36418	9562	45981
Kutch	26698	9562	36261
Porbandar	9720	-	9720
Jharkhand	-	570	570
Gumla	-	570	570
Kerala	1156	17670	18826
Alapuzha (Alleppy)	-	142	142
Kannur	93	725	818
Kasargod	1063	16717	17780
Mallapuram	-	86	86
Madhya Pradesh	23807	368336	392143
Chhatarpur	-	80	80
Jabalpur	13888	13048	26936
Katni	4268	8491	12759
Mandsaur	-	317169	317169
Nimach	-	2292	2292
Rewa	663	21	684
Sagar	-	12000	12000
Satna	4988	15014	20001
Shahdol	-	222	222

(Contd.)

National Mineral Inventory - An Overview

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
Maharashtra	278	11903	12181
Chandrapur	278	7119	7397
Kolhapur	-	4784	4784
Odisha	-	1227	1227
Koraput	-	1227	1227
Rajasthan	-	123350	123350
Alwar	-	1080	1080
Baran	-	34110	34110
Jhalawar	-	88160	88160
Telangana	47110	16591	63701
Adilabaaad	517	1697	2214
Khammam	-	313	313
Medak	129	505	634
Nalgonda	276	1132	1408
Nizamabad	5401	1733	7134
Rangareddi	25111	6577	31688
Warangal	15677	4634	20310

figures rounded off

been estimated in Mandsaur district and about 99% resources in Rajasthan have been estimated in two districts namely Jhalawar (71%) and Baran (28%).

Since the first inventory of laterite taken up from 1.04.2010, a record 213 new deposits were added in the five years span of National Mineral Inventory as on 1.04.2015. This has resulted in cumulative increase of 212 million tonnes of resources of laterite.

About 494,322 thousand tonnes (70%) resources of laterite are under inferred and

reconnaissance categories. These resources are based on a very limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position of this mineral in the country may improve.

A total of 270 deposits of laterite have been covered in the mineral inventory as on 1.4.2015 of which 24 deposits are in freehold, 244 in leasehold private and 2 in leasehold public areas.

10.17 MARBLE

Introduction

Technically marble is defined as the crystalline metamorphosed form of limestone. In commercial terms, any crystalline rock consisting of minerals with a hardness between 3 & 4 on the Moh's scale, such as calcium carbonate or magnesium carbonate or serpentine and amenable to cutting and polishing is classified as marble. Its internal demand has always remained high and most of the production along with the imported quantities are consumed within the country. Among the building and monumental stone marble occupies a unique position. In India, Makrana marble from Rajasthan is famous.

Mining of marble in India was known since long. Historical monuments like Taj Mahal at Agra, Victoria Memorial at Kolkata, Dilwara temple at Mount Abu are constructed of marble with pleasing colours, shades, attractive designs and patterns. Marble is a 'minor mineral' as defined under Clause (e) of section 3 of Mines and Minerals (Development) Act.1957 and therefore inventory of marble has been updated based on data received from various exploration and exploitation agencies.

As marble is "Minor Mineral", therefore inventory of marble has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

Marble occurs in white as well as host of other colours/shades, but white marble is more valued. The resources of marble have, therefore, been classified based on colours into two grades viz. white colour and off colour marble. In addition, unclassified and not known grades have also been included to cover other varieties.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, reserves of marble have been placed under probable (122) category.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), indicated (332) and inferred (333) and reconnaissance(334) categories.

Salient Features of the Inventory

The total resources of marble in the country as on 1.4.2015 are estimated at 1,945,892 thousand tonnes. Of these, a meagre quantity of about 4,551 thousand tonnes (0.23%) fall under 'reserve' category and 1,941,341 thousand tonnes (99.76%) are under 'remaining resource' category.

All India scenarios of marble reserves, remaining resources and total resources as on 1.4.2015 vis-à-vis 1.4.2010, have been given in Tables - 1 and 2. These tables reflect the changes in terms of increase or decrease of resources as per lease status, grades and states. In Table -3 district wise reserves/resources as on 1.4.2015 have been given.

Of the total resources, the share of freehold areas is 939,929 thousand tonnes (48.30%), leasehold public sector 2 thousand tonnes (negligible %) and leasehold private sector 1,005,961 thousand tonnes (51.69%).

Out of the total resources, white colour marble constitutes 330,727 thousand tonnes (16.99%), off colour marble 1,071,485 thousand tonnes (55.06%), unclassified 534,573 thousand tonnes (27.48%) and not known grade 9,107 thousand tonnes (0.47%).

Statewise, distribution of resources reveals that Rajasthan is credited with 1,231,429 thousand tonnes (63.28%) followed by Jammu & Kashmir 414,581 thousand tonnes (21.31%), Gujarat 123,571 thousand tonnes (6.35%), Chhattisgarh 83,000 thousand tonnes (4.26%), Maharashtra 58,047 thousand tonnes (2.98%), Haryana 22,328 thousand tonnes (1.14%), The balance 12,936 thousand tonnes (0.66) resources have been accounted by Uttarakhand, Sikkim, Madhya Pradesh and Telangana.

In the inventory as on 1.4.2015, a net increase of 14,429 thousand tonnes resources have been recorded as compared to the inventory as on 1.4.2010. These changes have occurred due to addition of 5 new deposits, containing 14,429 thousand tonnes total resources.

About 1,455,586 thousand tonnes (74.80%) resources have been estimated under inferred and reconnaissance categories. These resources have been estimated based on a limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position of marble in the country may improve.

Table - 1 : Reserves/Resources of Marble* as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
All India : Total	4551	276495	(-) 271944	1941341	1654968	(+) 286373	1945892	1931463	(+) 14429
White Colour	-	197204	(-) 197204	330727	133523	(+) 197204	330727	330727	No Change
Off Colour	-	79095	(-) 79095	1071485	992390	(+) 79095	1071485	1071485	No Change
Unclassified	4551	-	(+) 4551	530022	520382	(+) 9640	534573	520382	(+) 14191
Not Known	-	196	(-) 196	9107	8673	(+) 434	9107	8869	(+) 238
Freehold	-	-	No Change	939929	930051	(+) 9878	939929	930051	(+) 9878
White Colour	-	-	No Change	8360	8360	No Change	8360	8360	No Change
Off Colour	-	-	No Change	485900	485900	No Change	485900	485900	No Change
Unclassified	-	-	No Change	442831	433191	(+) 9640	442831	433191	(+) 9640
Not Known	-	-	No Change	2838	2600	(+) 238	2838	2600	(+) 238
Leasehold (Private)	4551	276495	(-) 271944	1001410	724915	(+) 276495	1005961	1001410	(+) 4551
White Colour	-	197204	(-) 197204	322367	125163	(+) 197204	322367	322367	No Change
Off Colour	-	79095	(-) 79095	585583	506488	(+) 79095	585583	585583	No Change
Unclassified	4551	-	(+) 4551	87191	87191	No Change	91742	87191	(+) 4551
Not known	-	196	(-) 196	6269	6073	(+) 196	6269	6269	No Change
Leasehold (Public)	-	-	No Change	2	2	No Change	2	2	No Change
White Colour	-	-	No Change	Negligible	Negligible	No Change	Negligible	Negligible	No Change
Off Colour	-	-	No Change	2	2	No Change	2	2	No Change

figure rounded off . * Being a minor mineral, paucity of data, hence coverage may not be complete.

National Mineral Inventory - An Overview

A total 80 deposits have been reported in the inventory as on 1.04.2015. Of these, 40 deposits are in freehold areas and balance 40 deposits are in leasehold areas including 2 deposit in leasehold (public).

**Table – 2 : Total Resources of Marble as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
			(In '000 tonnes)
All India : Total	1945892	1931463	(+) 14429
Andhra Pradesh	-	3	(-)3
Chhattisgarh	83000	83000	No Change
Gujarat	123571	123571	No Change
Haryana	22328	22328	No Change
Jammu & Kashmir	414581	404703	(+) 9878
Madhya Pradesh	4551	-	(+) 4551
Maharashtra	58047	58047	No Change
Rajasthan	1231429	1231429	No Change
Sikkim	2382	2382	No Change
Telangana	3	-	(+)3
Uttarakhand	6000	6000	No Change

figures rounded off

Table - 3 : District wise Reserves/Resources of Marble as on 1.4.2015

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	4551	1941341	1945892
Chhattisgarh	-	83000	83000
Bastar	-	83000	83000
Gujarat	-	123571	123571
Banaskantha	-	120481	120481
Vadadora	-	3090	3090
Haryana	-	22328	22328
Mahendragarh	-	22328	22328
Jammu & Kashmir	-	414581	414581
Kishtwar	-	2200	2200
Kupwara	-	406981	406981
Leh	-	5400	5400
Madhya Pradesh	4551	-	4551
Sidhi	4551	-	4551
Maharashtra	-	58047	58047
Bhandara	-	607	607
Nagpur	-	57440	57440

National Mineral Inventory - An Overview

Table-3 (Concl.d.)

State/District	Reserves	Remaining Resources	Total Resources
Rajasthan	-	1231429	1231429
Ajmer	-	171904	171904
Alwar	-	182600	182600
Banswara	-	287820	287820
Bhilwara	-	20965	20965
Bundi	-	25000	25000
Chittorgarh	-	1500	1500
Dungarpur	-	5000	5000
Jaipur	-	4196	4196
Jaisalmer	-	94000	94000
Jalore	-	500	500
Jodhpur	-	17500	17500
Nagaur	-	56000	56000
Rajasamand	-	294900	294900
Sikar	-	4023	4023
Sirohi	-	5321	5321
Udaipur	-	60200	60200
Sikkim	-	2382	2382
Sikkim East	-	2	2
Sikkim North	-	2380	2380
Telangana	-	3	3
Khammam	-	3	3
Uttarakhand	-	6000	6000
Dehradun	-	6000	6000

figures rounded off

10.18 MICA

Introduction

Muscovite or ruby mica and phlogopite are the two commercially important varieties of mica. Muscovite is valued most because of its excellent splitability. It chiefly finds use in electrical and electronics industries. India had been known as the leading producer and exporter of mica in the world.

Although mica pegmatite occurrences have been reported from many states, mica is worked commercially in well known mica belts of Andhra Pradesh, Bihar, Jharkhand and Rajasthan. In Bihar and Jharkhand, the muscovite mica is of excellent variety. It is stained and spotted in Andhra Pradesh and green and ruby muscovite in Rajasthan.

Mica has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015.

Basis of Grade Classification

It has been argued that the classification of resources of mica according to its end use at the time of estimation of resources may be difficult as the mica mineralisation is highly erratic and its occurrence in a pegmatitic body is extremely irregular in nature. Considering all these factors, resources of mica have been classified in the inventory as 'unclassified grade'.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, the reserves of mica have been placed under proved (111) and probable (121) & (122) categories. The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of mica in the country as on 1.4.2015 have been estimated at about 635,302,141 kg. Out of these 114,432,777 kg (18%) have been placed under 'reserves' category and the balance 520,869,364 kg (82%) under 'remaining resources' category. About 118,038,705 kg (19%) resources have been estimated in freehold where as 517,263,436 kg (81%) in leasehold private.

All India scenario of mica reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade, and states. In Table- 3, district wise reserves/resources as on 1.4.2015 have been given.

Andhra Pradesh leads with 40.5% share in the country's total resources followed by Rajasthan (27.7%), Odisha (16.6%), Maharashtra (12.8%), Bihar (2%) and Jharkhand (0.3%).

In the inventory as on 1.4.2015, the overall increase of 103,065,162 kg of resources was reported (increase of 105,280,000 kg in freehold deposits and decrease of 2,214,838 kg in leasehold private deposits) as compared to the earlier inventory as on 1.4.2010.

23 new leasehold private deposits were added in the five year span of National Mineral Inventory from 1.04.2010 to 1.04.2015 resulting in cumulative increase of 93,384,990 kg of mica resources.

Resources of mica are reported from Andhra Pradesh, Bihar, Jharkhand, Odisha, Rajasthan and Telangana. Out of these states only Andhra Pradesh and Rajasthan show increase in resources, Telangana is a new state created in 2014 from Andhra Pradesh and the remaining states do not show any change in resources in the present inventory as compared to inventory as on 1.04.2010.

Andhra Pradesh has highest resources of mica (258 thousand tonnes) and it reports an increase of 36.8 thousand tonnes of resources. Nellore district has highest number of mica deposits in India with 254 thousand tonnes of resources where eight new deposits contribute to increase all India resources by 16 thousand tonnes. Three new deposits contribute to increase of 3 thousand tonnes of mica resources in Visakhapatnam district.

Rajasthan is the other state with 176 thousand tonnes of mica resources and it reported an increase of 65.7 thousand tonnes of resources. In Bhilwara district maximum number of mica deposits are located. Increase of resources of mica from Rajasthan state is due to addition of 12 new deposits in Bhilwara District.

**Table - 1 : Reserves/Resources of Mica as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)**

Lease status/Grade	(In kg)					
	Reserves		Remaining resources		Total resources	
	1.4.2015	1.4.2010	1.4.2015	1.4.2010	1.4.2015	1.4.2010
						Net change
All India : Total	114432777	190741448	520869364	341495531	635302141	532236979 (+) 103065162
Freehold						
Unclassified	-	-	118038705	12758705	118038705	12758705 (+)105280000
Leasehold/Private						
Unclassified	114432777	190741448	402830659	328736826	517263436	519478274 (-)2214838

figures rounded off

National Mineral Inventory - An Overview

A substantial quantity of total resources, about 148,040,668 kg (23%), have been estimated in inferred & reconnaissance categories. These estimations are based on a preliminary geological assessment. A detailed exploration in these areas may enhance the

confidence level of resource endowment.

A total 120 deposits of mica have been covered in the National Mineral Inventory as on 1.4.2015. Out of these, 19 are freehold deposits and 101 are leasehold private deposits.

**Table – 2 : Total Resources of Mica as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	635302141	532236979	(+)103065162
Andhra Pradesh	257589211	220786228	(+)36802983
Bihar	13074367	13074367	No Change
Jharkhand	1665130	1665130	No Change
Maharashtra	81036000	81036000	No Change
Odisha	105280000	105280000	No Change
Rajasthan	176072548	110395254	(+) 65677294
Telangana	584885	-	(+) 584885

figures rounded off

Table - 3 : District wise Reserves/Resources of Mica as on 1.4.2015

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	114432777	520869364	635302141
Andhra Pradesh	80236085	177353126	257589211
Visakhapatnam	1002000	2094300	3096300
Nellore	79234085	175258826	254492911
Bihar	-	13074367	13074367
Nawada	-	13074367	13074367
Jharkhand	-	1665130	1665130
Giridih	-	778830	778830
Koderma	-	886300	886300
Maharashtra	-	81036000	81036000
Sindhudurg	-	81036000	81036000
Odisha	-	105280000	105280000
Sonepur	-	105280000	105280000
Rajasthan	34196692	141875856	176072548
Ajmer	618034	844243	1462277
Bhilwara	33578656	61993276	95571934
Rajasamand	-	10337	10337
Tonk	-	79028000	79028000
Telangana	-	584885	584885
Khammam	-	584885	584885

figures rounded off

10.19 OCHRE

Introduction

Natural pigments occurring in various shales and colours like yellow, red, brown and white are named earth colours or ochres. The pigmentary quality is mainly due to the presence of iron oxide. Ochre is essentially a mixture of hematite, limonite and clay. The hydrated iron oxide imparts yellow colour and anhydrous iron oxide red colour. The quality and value of ochre is judged by its staining power, brilliance and texture. Red and yellow ochres are extensively used for colouring roofing tiles, concrete and slabs, cement, etc.

Ochre has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015.

Basis of Grade Classification

There is no BIS specification for ochre. In the inventory as on 1.4.2015, the resources have been classified into 'Red Ochre' and 'Yellow Ochre' based on their colour. 'Not known' grade includes the data where information/data is not available/reported to classify resources into any of the above mentioned grades.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to norms of this system, reserves of ochre has been placed under proved (111) and probable (121) & (122) categories. The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of ochre in the country as on 1.4.2015 are estimated at about 168 million tonnes. Out of these, about 37 million tonnes (22%) are placed under reserves category and the balance 131 million tonnes (78%) under remaining resources category. Of the total resources, about 28 million tonnes (17%) have been estimated in freehold and 140 million tonnes (83%) in leasehold private.

All India scenario of ochre reserves, remaining

resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables-1 and 2. The tables give an idea about changes in terms of increase or decrease of resources as per lease status, grades and state. In Table - 3, district wise reserves/resources as on 1.4.2015 have been given.

Out of the total resources, red ochre accounts for about 146 million tonnes (87%), yellow ochre 18 million tonnes (11%) and balance 4 million tonnes (2%) are of 'Not-known' grade.

About 78% of the total resources are concentrated in Rajasthan, followed by Madhya Pradesh 11%, Andhra Pradesh 7% and the remaining 4% resources are distributed in Gujarat, Karnataka, Maharashtra, Jharkhand, Chattisgarh and Uttar Pradesh.

A net increase of 23.53 million tonnes resources has been recorded in the current inventory as compared to the inventory as on 1.4.2010. Of the total increase, Rajasthan alone accounts for about 13.90 million tonnes (59%), which was due to addition of 12 new deposits (8.5 million tonnes) and re-estimation of resources in existing deposits mainly in the leasehold. In Madhya Pradesh resource was also increased 8.41 million tonnes (about 36%) due to 39 new deposits (7.1 million tonnes). The other states where minor increase in resources has been recorded are Andhra Pradesh, Chattisgarh and Gujarat. However, resources in Jharkhand have marginally decreased due to downward revision of resources in the existing deposits. In Maharashtra and Uttar Pradesh there is no change of deposit.

About 34 million tonnes (20%) resources have been estimated under inferred (333) and reconnaissance (334) categories. These estimates are based on a limited preliminary exploration. If these areas are examined for further exploration, the confidence level of resources in the country may improve.

A total of 262 deposits of ochre have been covered in the National Mineral Inventory as on 1.4.2015, of which 111 deposits are in freehold and 151 in leasehold (Private) areas.

Table - 1 : Reserves/Resources of Ochre as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves		Remaining resources		Total resources		Net change	Net change
	1.4.2015	1.4.2010	1.4.2015	1.4.2010	1.4.2015	1.4.2010		
All India : Total	36933805	54942176	130859201	89319089	167793006	144261265	(+) 23531741	
Red Ochre	30556539	51828170	115322840	73511805	145879380	125339975	(+) 20539405	
Yellow Ochre	5702158	2800124	12311856	13775294	18014014	16575418	(+) 1438596	
Not Known	675108	313882	3224504	2031990	3899613	2345872	(+) 1553741	
Freehold	-	-	27470017	26246535	27470017	26246535	(+)1223482	
Red Ochre	-	-	19102603	18584156	19102603	18584156	(+) 518447	
Yellow Ochre	-	-	6923280	6882783	6923280	6882783	(+) 40497	
Not Known	-	-	1444134	779596	1444134	779596	(+) 664538	
Leasehold (Private)	36933805	54942176	103389184	63072554	140322990	118014730	(+) 22308260	
Red Ochre	30556539	51828170	96220237	54927649	126776777	106755819	(+) 20020958	
Yellow Ochre	5702158	2800124	5388576	6892511	11090734	9692635	(+) 1398099	
Not Known	675108	313882	1780371	1252394	2455479	1566276	(+)889203	

figures rounded off

**Table – 2 : Total Resources of Ochre as on 1.4.2015 vis-a-vis 1.4.2010
(By States)**

State	Total Resources		Net Change
	(In tonne)		
	As on 1.4.2015	As on 1.4.2010	
All India : Total	167793006	144261265	(+) 23531741
Andhra Pradesh	12217802	10883065	(+) 1334737
Chattisgarh	142	-	(+)142
Gujarat	3166633	3056298	(+)110335
Jharkhand	214	215095	(-) 214881
Karnataka	1786367	1786367	No Change
Madhya Pradesh	18848495	10443262	(+) 8405233
Maharashtra	493020	493020	No Change
Rajasthan	131210333	117314158	(+) 13896175
Uttar Pradesh	70000	70000	No Change

*figures rounded off***Table - 3 : District wise Reserves/Resources of Ochre as on 1.4.2015**

State/District	Total Resources		
	Reserves	Remaining Resources	(In tonne)
All India : Total	36,933,805	130,859,201	167,793,006
Andhra Pradesh	5,349,592	6,868,210	12,217,802
Anantapur	290,988	123,400	414,388
Cuddapah	2,896,547	2,670,587	5,567,134
Godavari West	-	5,000	5,000
Guntur	-	1,787,220	1,787,220
Kurnool	2,162,057	2,259,530	4,421,587
Visakhapatnam	-	22,473	22,473
Chattisgarh	-	142	142
Rajnandgaon	-	142	142
Gujarat	113,565	3,053,068	3,166,633
Bhavnagar	-	2,771,470	2,771,470
Kutch	-	50,000	50,000
Patan	113,565	231,598	345,163
Jharkhand	-	214	214
Singhbhum (West)	-	214	214
Karnataka	-	1,786,367	1,786,367
Bellary	-	1,752,967	1,752,967
Bidar	-	13,400	13,400
Kolar	-	20,000	20,000

(Contd.)

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Table-3 (Concl.)

State/District	Reserves	Remaining Resources	Total Resources
Madhya Pradesh	3,695,346	15,153,150	18,848,495
Chatarpur	-	290,118	290,118
Dhar	-	6,000	6,000
Gwalior	-	147,048	147,048
Jabalpur	1,273,204	1,956,372	3,229,576
Katni	-	890,068	890,068
Mandla	-	289,206	289,206
Rewa	744,298	422,022	1,166,320
Satna	1,677,844	8,507,564	10,185,407
Shahdol	-	2,392,307	2,392,307
Umaria	-	252,445	252,445
Maharashtra	38,260	454,760	493,020
Chandrapur	-	94,602	94,602
Nagpur	38,260	360,158	398,418
Rajasthan	27,737,043	103,473,290	131,210,333
Baran	-	760	760
Bharatpur	860601	1,086,724	1,947,325
Bhilwara	9,836,824	2,045,073	11,881,897
Bikaner	-	191,165	191,165
Chittorgarh	8,892,546	90,542,895	99,435,441
Jaipur	-	2,800	2,800
Jodhpur	292,980	65,712	358,692
Pratapgarh	-	396,900	396,900
Sawai Madhopur	-	5,299	5,299
Sikar	564,200	804,860	1,369,060
Udaipur	7,289,892	8,331,102	15,620,994
Uttar Pradesh	-	70,000	70,000
Banda	-	70,000	70,000

figures rounded off.

10.20 PYROPHYLLITE

Introduction

Pyrophyllite ($\text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$) is a hydrous silicate of aluminium. It resembles talc in many physical and optical properties. It imparts thermal shock resistance to ceramic bodies. It is mainly used in high grade ceramic products, electric insulators and refractories. In glass industry, pyrophyllite is used instead of feldspar as a source of aluminium.

Pyrophyllite has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015.

Basis of Grade Classification

The following end use grade classification of pyrophyllite have been adopted in the inventory as on 1.4.2015.

- | | |
|-----------------|--|
| 1. Refractory | Al_2O_3 23% (min)
SiO_2 60% (max)
Alkalies 1% (max) |
| 2. Ceramic | Al_2O_3 25% (min)
SiO_2 60% (max)
Fe_2O_3 1% (max)
TiO_2 1% (max)
MgO 0.5% (max)
CaO 0.5% (max) |
| 3. Insecticide | LOI 6% (max)
Matter Soluble in HCl 3% (max)
Fe_2O_3 1.5% (max) |
| 4. Others | Estimation for such grade though useable/marketable but can not be classified into the above grades. |
| 5. Unclassified | The range of maximum and minimum values of the constituents are such that it does not enable to classify under any grades. |
| 6. Not Known | Such estimation about which information/data is not available/ reported to be classified under any of the grades |

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, the reserves of pyrophyllite as on 1.4.2015 have been placed under proved (111) and probable (121) & (122) categories. The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of pyrophyllite in the country as on 1.4.2015 have been estimated at about 60 million tonnes. Out of these, about 25 million tonnes (42%) have been placed under reserves category and 35 million tonnes (58%) under remaining resources category. About 23% resources are estimated in freehold whereas 3% resources are in leasehold public and 74% are in leasehold private sector.

All India scenario of pyrophyllite reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables-1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade, and states. In Table-3, district wise reserves/resources as on 1.4.2015 have been given.

Out of the total resources, about 17 million tonnes (28.5%) are of refractory grade, 11 million tonnes (18.5%) of ceramic grade, 13 million tonnes (21.8%) of insecticide grade, 8.5 million tonnes (14.3%) of insecticide & ceramic mixed grade, 6 million tonnes (10.1%) of others, and remaining about 4.1 million tonnes (6.9%) of unclassified and not known grades.

The resources of Pyrophyllite are mainly distributed in Madhya Pradesh (48%), Odisha (23%), Uttar Pradesh (13%), Maharashtra (10%), Andhra Pradesh (3%), and the balance 3% resources are reported from Rajasthan and Jharkhand.

The inventory of Pyrophyllite as on 1.4.2015 shows a net increase of about 3.5 million tonnes resources as compared to the earlier inventory as on 1.4.2010.

The increase in resources was mainly recorded in Uttar Pradesh (2.1 million tonnes), Maharashtra (2 million tonnes), Odisha (1.4 million tonnes), Rajasthan (0.95 million tonnes) and Andhra Pradesh (0.3 million tonnes). However, Madhya Pradesh recorded depletion of 3.0 million tonnes of resources.

Table - 1 : Reserves/Resources of Pyrophyllite as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
	(In tonne)								
All Indian : Total	24932958	23275450	(+)1657508	34682745	32807450	(+)1875295	59615703	56082901	(+)3532803
Refractory	8420890	7833439	(+)587451	8549460	5852332	(+)2697128	16970350	13685771	(+)3284579
Ceramic	4492951	3214236	(+)1278715	6604215	8858648	(-)2254433	11097166	12072884	(-)975718
Insecticide	3555101	3744463	(-)189362	9487536	8406523	(+)1081013	13042636	12150986	(+)891650
Insecticide & ceramic mixed	6899564	6142387	(+)7571177	1594660	3804287	(-)2209627	8494224	9946674	(-)1452450
Others	674929	1730058	(-)1055129	5185553	3321155	(+)1864398	5860482	5051213	(+)809269
Unclassified	565360	392405	(+)172955	2881163	2225095	(+)656068	3446523	2617500	(+)829023
Not Known	324163	218462	(+)105701	380158	339410	(+)40748	704321	557872	(+)146449
Freehold	-	-	-	13673953	7964583	(+)5709370	13673953	7964583	(+)5709370
Refractory	-	-	-	5715224	2682862	(+)3032362	5715224	2682862	(+)3032362
Ceramic	-	-	-	3379402	456202	(+)2923200	3379402	456202	(+)2923200
Insecticide	-	-	-	3473303	3473303	No Change	3473303	3473303	No Change
Insecticide & ceramic mixed	-	-	-	222508	220800	(+)1708	222508	220800	(+)1708
Others	-	-	-	79314	20850	(+)58464	79314	20850	(+)58464
Unclassified	-	-	-	716342	967856	(-)251514	716342	967856	(-)251514
Not Known	-	-	-	87860	142710	(-)54850	87860	142710	(-)54850
Leasehold (Public)	937848	1572686	(-)634838	785211	1312352	(-)527141	1723059	2885038	(-)1161979
Refractory	829696	1572686	(-)742990	189876	762352	(-)572476	1019572	2335038	(-)1315466
Unclassified	-	-	-	550000	550000	No Change	550000	550000	No Change
Not Known	108152	-	(+)108152	43335	-	(+)45335	153487	-	(+)153487
Leasehold (Private)	23995110	21702764	(+)2292346	2022581	23530515	(-)3306934	44218691	45233279	(-)1014588
Refractory	7591194	6260753	(+)1330441	2644360	2407118	(+)237242	10235554	8667871	(+)1567683
Ceramic	4492951	3214236	(+)1278715	3224813	8402447	(-)5177634	771765	11616683	(-)3898918
Insecticide	3555101	3744463	(-)189362	6014233	4933220	(+)1081013	9569333	8677683	(+)891650
Insecticide & ceramic mixed	6899564	6142387	(+)7571177	1372152	3583487	(-)2211335	8271716	9725874	(-)1454158
Others	674929	1730058	(-)1055129	5106239	3300305	(+)1805934	5781168	5030363	(+)750805
Unclassified	565360	392405	(+)172955	1614821	707239	(+)907582	2180181	1099644	(+)1080537
Not Known	216011	218462	(-)2451	246963	196700	(+)50263	462974	415162	(+)47812

figures rounded off.

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The total of 9 new deposits with resources of about 1.8 million tonnes were included during 1.4.2015; out of which, 5 deposits (0.98 million tonnes) were from Madhya Pradesh, 3 deposits (0.81 million tonnes) from Uttar Pradesh and 1 deposit from Maharashtra with meagre resources.

The increase in resources was mainly attributed to the addition of 9 new deposits and re-assessment of resources in the existing deposits.

Of the total resources of pyrophyllite, about 7.9 million tonnes has been estimated under inferred and reconnaissance categories. Further exploration of these resources may improve confidence level of resource estimation.

A total 135 deposits of pyrophyllite have been covered in National Mineral Inventory as on 1.4.2015. Out of these, 37 deposits are in freehold, and 98 in leasehold areas (94 leasehold private and 4 leasehold public sector).

Table – 2 : Total Resources of Pyrophyllite as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	59615703	56082901	(+)3532802
Andhra Pradesh	1648407	1350232	(+)298175
Jharkhand	1185	1185	No Change
Madhya Pradesh	28559313	31570073	(-)3010760
Maharashtra	5937861	4127448	(+)1810413
Odisha	13688848	12292135	(+)1396713
Rajasthan	2059571	1108745	(+)950826
Uttar Pradesh	7720518	5633083	(+)2087435

figures rounded off.

Table - 3 : District wise Reserves/Resources of Pyrophyllite as on 1.4.2015

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	24932958	34682745	59615703
Andhra Pradesh	48817	1599590	1648407
Anantapur	48817	209670	258487
Chittoor	-	372978	372978
Cuddapah	-	1016942	1016942
Jharkhand	1185	-	1185
Saraikela-Kharaswan	1185	-	1185
Madhya Pradesh	13936102	14623211	28559313
Chhatarpur	5081971	7927929	13009900
Sagar	-	213143	213143
Shivpuri	1179062	-	1179062
Tikamgarh	7675069	6482139	14157208
Maharashtra	705169	5232692	5937861
Bhandara	705169	452692	1157861
Chandrapur	-	4780000	4780000
Odisha	3876791	9812058	13688848
Keonjhar	3876791	9812058	13688848
Rajasthan	763158	1296413	2059571
Alwar	3995	176400	180395
Bhilwara	170711	208837	379548
Jhunjhunu	47095	4193	51288
Rajsamand	-	55950	55950
Udaipur	541357	851033	1392390
Uttar Pradesh	5601736	2118782	7720518
Hamirpur	-	321214	321214
Jhansi	248279	270973	519252
Lalitpur	1513713	1475295	2989008
Mahoba	3839744	51300	3891044

figures rounded off.

10.21 QUARTZ & SILICA SAND

Introduction

Quartz is the most abundant and widely distributed of all the rock forming minerals. A large part of sandstone, quartzite and sand is composed of quartz. Quartz occurs in many forms with properties such as hardness of 7, high melting point of 1710°C, colourless when pure (otherwise in many colours) resistant to weathering, insoluble in all acids except hydrofluoric acid and not readily soluble in alkaline solutions. The Piezo-electric variety of quartz finds application in radio-frequency instruments.

The physical and chemical characteristics of quartz are made use in various industries such as abrasives, glass, ferro-silicon, ceramics & pottery, foundry, etc.

Quartz & Silica sand has been declared as a "Minor Mineral" under section 3 (e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E), dated 10.02.2015 and therefore inventory of quartz & silica sand has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

The following grade classifications adopted in the inventory as on 1.4.2015 is based on the recommendations of the report on Classification of Minerals with regards to their Possible Optimum Industrial Use (September, 2004).

1. Glass	SiO ₂ 99.3% to 99.9% Fe ₂ O ₃ 0.1% (max)
2. Ferro-Silicon	SiO ₂ 92% to 99% Al ₂ O ₃ 0.4% to 0.8%
3. Sodium Silicate	SiO ₂ 98% to 99% Fe ₂ O ₃ 0.5% to 0.8%
4. Ceramic & Pottery	SiO ₂ 97% to 99% Fe ₂ O ₃ 0.18% to 1.15% Al ₂ O ₃ 0.21% to 1.12%
5. Foundry & Moulding	SiO ₂ 90% to 98% Al ₂ O ₃ 2% (max)
6. Abrasive	SiO ₂ 94% (min) Fe ₂ O ₃ 2.54% (max) MgO 0.08% (max)
7. Others	Estimation of marketable

grade which could not be classified into the above grade.

- | | |
|-----------------|---|
| 8. Unclassified | Minimum and maximum ranges of chemical constituents are too wide to be classified into any of the above grade. |
| 9. Not known | Neither the chemical analysis is available nor the end-use has been reported by the exploration/ exploitation agencies. |

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, the 'reserves' of quartz & silica sand have been placed under proved (111) and probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of quartz & silica sand in the country as on 1.4.2015 are placed at 3,908 million tonnes. Out of these about 648 million tonnes (16.57%) have been estimated under reserve and the balance 3,260 million tonnes (83.43%) under remaining resources. Out of the total estimated resources, about 60% are in freehold areas and the remaining 40% under leasehold.

All India scenario of quartz & silica sand reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables -1 and 2. These tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grades and states. District wise reserves/ resources as on 1.4.2015 are given in Table 3.

Grade wise, resources of foundry & moulding grade are 18.82%, glass 16.63%, ceramic & pottery 11.22%,

Table - 1 : Reserves/Resources of Quartz & Silica Sand as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
	(In '000 tonnes)	(In '000 tonnes)	(In '000 tonnes)	(In '000 tonnes)	(In '000 tonnes)	(In '000 tonnes)	(In '000 tonnes)	(In '000 tonnes)	(In '000 tonnes)
All India : Total	647522	429223	(+) 218297	3260297	3069808	(+) 190489	3907819	3499031	(+) 408788
Glass	249886	158792	(+) 91094	399820	314289	(+) 85531	649706	473081	(+) 176625
Ferro-Silicon	17283	11464	(+) 5819	166679	167853	(-) 1174	183963	179317	(+) 4646
Sodium Silicate	4376	3254	(+) 1122	38976	38568	(+) 408	43351	41822	(+) 1529
Ceramic & Pottery	67373	130411	(-) 63038	371070	265362	(+) 105708	438443	395773	(+) 42670
Foundry & Moulding	130167	83175	(+) 46992	605421	576148	(+) 29273	735589	659323	(+) 76266
Abrasive	48	2425	(-) 2377	8043	5628	(+) 2415	8091	8053	(+) 38
Others	31004	22358	(+) 8646	1006625	977523	(+) 29102	1037629	999881	(+) 37748
Unclassified	144204	7781	(+) 136423	395855	461781	(-) 65926	540060	469562	(+) 70498
Not Known	3180	9564	(-) 6384	267808	262656	(+) 5152	270988	272220	(-) 1232
Freehold	-	9558	(-) 9558	2345381	2334999	(+) 10382	2345381	2344557	(+) 824
Glass	-	-	No Change	141488	141934	(-) 446	141488	141934	(-) 446
Ferro-Silicon	-	-	No Change	115547	115396	(+) 151	115547	115396	(+) 151
Sodium Silicate	-	38	(-) 38	35775	35663	(+) 112	35775	35701	(+) 74
Ceramic & Pottery	-	-	No Change	205499	205421	(+) 78	205499	205421	(+) 78
Foundry & Moulding	-	1226	(-) 1226	444191	442711	(+) 1480	444191	443937	(+) 254
Abrasive	-	-	No Change	584	584	No Change	584	584	No Change
Others	-	8294	(-) 8294	881864	873058	(+) 8806	881864	881352	(+) 512
Unclassified	-	-	No Change	277140	277140	No Change	277140	277140	No Change
Not Known	-	-	No Change	238393	238192	(+) 201	238393	238192	(+) 201
Leasehold (Private)	642982	404881	(+) 238101	886174	708418	(+) 177756	1529156	1113299	(+) 41857
Glass	249515	153662	(+) 95853	241477	155222	(+) 86255	490992	308884	(+) 182108
Ferro-Silicon	17283	11464	(+) 5819	44720	46045	(-) 1325	62003	57509	(+) 4494
Sodium Silicate	4376	3216	(+) 1160	3201	2905	(+) 296	7576	6121	(+) 1455
Ceramic & Pottery	67277	128913	(-) 61636	162976	58627	(+) 104349	230253	187540	(+) 42713
Foundry & Moulding	126359	75963	(+) 50396	161206	132591	(+) 28615	287565	208554	(+) 79011
Abrasive	48	255	(-) 207	389	143	(+) 246	437	398	(+) 39
Others	30764	14064	(+) 16700	124761	104465	(+) 20296	155525	118529	(+) 36996
Unclassified	144180	7781	(+) 136405	118698	184623	(-) 65925	262878	192404	(+) 70474
Not Known	3180	9564	(-) 6384	28746	23796	(+) 4950	31926	33360	(-) 1434
Leasehold (Public)	4540	14784	(-) 10244	28743	26391	(+) 2352	33283	41175	(-) 7892
Glass	371	5131	(-) 4760	16855	17134	(-) 279	17226	22264	(-) 5038
Ferro-Silicon	-	-	No Change	6413	6413	No Change	6413	6413	No Change
Ceramic & Pottery	96	1498	(-) 1402	2595	1313	(+) 1282	2691	2811	(-) 120
Foundry & Moulding	3808	5986	(-) 2178	24	845	(-) 821	3832	6831	(-) 2999
Abrasive	-	2170	(-) 2170	2170	-	(+) 2170	2170	2170	No Change
Others	240	-	(+) 240	-	-	No Change	240	-	(+) 240
Unclassified	25	-	(+) 25	17	17	No Change	42	17	(+) 25
Not Known	-	-	No Change	669	669	No Change	669	669	No Change

figures rounded off

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ferro-silicon 4.71%, sodium silicate 1.1% , abrasive grades constitute 0.21% of the total resources. A substantial share of about 47.30% of the total resource are placed under others, unclassified and not-known grades.

Though the resources are spread all over the country, Haryana (42.32%) holds a bulk of all India resources followed by Rajasthan (18.94%), Andhra Pradesh (6.06%), Tamil Nadu (5.16%), Maharashtra (4.60%), Jharkhand (3.87%), Uttar Pradesh (3.60%), Gujarat (3.39%), Kerala (3.2%), Karnataka (2.43%), Telangana (2.05%), Odisha (1.9%) and the balance about 2.48% resources have been reported from eleven states namely Bihar, Goa, Meghalaya, West Bengal, Punjab, Jammu & Kashmir, Himachal Pradesh, Madhya Pradesh, Assam, Chhattisgarh and Tripura.

The overall resources of the country have increased by about 409 million tonnes (11.68%) as compared to earlier inventory as on 1.4.2010. The major

increase in resources has been reported from Rajasthan 408 million tonnes, Telangana 80 million tonnes, Gujarat 32 million tonnes, Andhra Pradesh 28 million tonnes and Uttar Pradesh 35 million tonnes. The overall increase in resources are mainly due to addition of new deposits and upward revision of the resources in the existing deposits. A total 1244 new deposits with 543 million tonnes resources were reported in the inventory as on 01.04.2015.

Of the total resources of quartz and silica sand, a substantial quantity of about 1,919 million tonnes (49%) are under inferred and reconnaissance categories. The detailed exploration may improve confidence level of resource estimation in the country.

A total of 3286 deposits of quartz & silica sand have been covered in the National Mineral Inventory as on 1.4.2015. Out of these, 702 deposits are in freehold areas and 2584 deposits are under leasehold.

Table – 2 : Total Resources of Quartz & Silica Sand as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

State	Total Resources		Net Change
	(In '000 tonnes)		
	As on 1.4.2015	As on 1.4.2010	
All India : Total	3907819	3499031	(+)408788
Andhra Pradesh	236690	209031	(+) 27659
Assam	1790	1790	No Change
Bihar	25755	26773	(-) 1018
Chhattisgarh	11636	9111	(+) 2525
Goa	20004	20004	No Change
Gujarat	132425	100771	(+) 31654
Haryana	1653650	1811231	(-) 157581
Himachal Pradesh	3035	3035	No Change
Jammu & Kashmir	3110	3110	No Change
Jharkhand	151192	156521	(-) 5329
Karnataka	94993	90848	(+) 4145
Kerala	128481	128135	(+) 346
Madhya Pradesh	7201	2861	(+) 4340
Maharashtra	179726	176989	(+) 2737
Meghalaya	7083	7083	No Change
Odisha	74225	73940	(+) 285
Punjab	3927	3927	No Change
Rajasthan	740333	332468	(+) 407865
Tamil Nadu	201496	228598	(-) 27102
Telangana	80074	-	(+) 80074
Tripura	490	490	No Change
Uttar Pradesh	140727	105886	(+)34841
West Bengal	9779	6430	(+)3349

figures rounded off

Table - 3 : District wise Reserves/Resources of Quartz & Silica Sand as on 1.4.2015

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	647522	3260297	3907819
Andhra Pradesh	111599	125090	236690
Adilabad	-	211	211
Anantapur	7571	29097	36668
Chittoor	780	930	1711
Cuddapah	1611	10024	11635
Godavari West	590	1304	1894
Guntur	688	1279	1967
Krishna	208	397	605
Kurnool	37189	22915	60104
Nellore	57752	29643	87395
Prakasam (Ongole H.Q)	815	10962	11777
Srikakulam	-	427	427
Visakhapatnam	1112	4871	5983
Vizianagaram	3283	13029	16311
Assam	-	1790	1790
Nowgong	-	1790	1790
Bihar	-	25754	25754
Bhagalpur	-	5245	5245
Jamui	-	7200	7200
Monghyr	-	10922	10922
Nalanda	-	11	11
Nawada	-	2376	2376
Chhattisgarh	1780	9857	11637
Durg	-	457	457
Jashpur	102	167	269
Mahasamund	1058	371	1429
Raigarh	26	433	459
Rajnandgaon	594	8429	9022
Goa	-	20004	20004
North Goa	-	4000	4000
South Goa	-	16004	16004
Gujarat	48769	83656	132425
Bharuch	15438	23286	38724
Bhavnagar	-	0.24	0.24
Dahod	1357	8909	10266
Kheda	215	303	518
Kutch	19868	7167	27036
Panchmahals	5867	13327	19194
Rajkot	-	1035	1035
Sabarkantha	2186	1076	3262
Surat	2519	-	2519
Surendranagar	1320	26189	27509
Vadodara	-	2310	2310
Valsad	-	54	54
Haryana	-	1653649	1653649
Bhiwani	-	351	351
Faridabad	-	570088	570088
Gurgaon	-	1079479	1079479
Mahendragarh	-	3731	3731
Himachal Pradesh	8	3027	3035
Una	8	3027	3035

(contd.)

National Mineral Inventory - An Overview

Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Jammu & Kashmir	-	3110	3110
Anantnag	-	2000	2000
Doda	-	1030	1030
Udhampur	-	80	80
Jharkhand	1070	150122	151192
Deogarh	14	964	978
Dhanbad	-	308	308
Dumka	21	466	487
Giridih	280	421	701
Godda	-	1100	1100
Hazaribagh	-	1707	1707
Jamtara	-	23	23
Koderma	169	23	192
Latehar	5	48	53
Palamau	13	335	348
Ranchi	88	1176	1264
Sahebganj	480	142531	143011
Saraikeela-Kharaswan	-	230	230
Singhbhum (West)	-	790	790
Karnataka	10199	84794	94993
Bagalkot	-	7429	7429
Bangalore	-	674	674
Belgaum	620	2278	2899
Bellary	-	11384	11,384
Chamarajanagar	-	17	17
Chickballapura	-	86	86
Chikmagalur	-	18	18
Chitradurga	-	524	524
Dawangere	281	2581	2862
Dharwar	-	93	93
Gadag	-	562	562
Gulbarga	-	20767	20767
Hassan	25	265	290
Haveri	605	1088	1693
Kolar	-	1278	1278
Koppal	-	30	30
Mandya	-	168	168
Mysore	-	1012	1012
North Kanara	309	2115	2423
Raichur	-	13	13
Shimoga	-	5318	5318
South Kanara	-	3394	3394
Tumkur	357	12870	13228
Udupi	8002	10829	18832
Kerala	389	128092	128481
Alapuzha (Alleppy)	389	122371	122760
Kasargod	-	3720	3720
Thiruvananthapuram	-	1178	1178
Wynad	-	823	823
Madhya Pradesh	1940	5261	7201
Balaghat	107	395	501
Chhatarpur	-	1506	1506
Dewas	-	173	173
Dhar	-	32	32
Jabalpur	19	27	46
Katni	-	79	79

(contd.)

National Mineral Inventory - An Overview

Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Khargaon (W Nimar)	47	79	125
Morena	-	450	450
Rewa	-	1451	1451
Shahdol	-	87	87
Tikamgarh	1767	983	2751
Maharashtra	25265	154461	179726
Bhandara	184	225	409
Chandrapur	356	-	356
Gadchiroli	-	850	850
Gondia	701	163	864
Kolhapur	-	600	600
Nagpur	89	88	177
Ratnagiri	10271	19753	30023
Sindhudurg	13665	132782	146447
Meghalaya	-	7083	7083
Garro Hills East	-	3836	3836
Garro Hills West	-	140	140
Khasi Hills East	-	3106	3106
Odisha	1401	72824	74225
Angul	-	66	66
Bargarh	-	252	252
Baudh	-	400	400
Bolangir	-	1561	1561
Dhenkanal	538	196	734
Kalahandi	288	66202	66489
Keonjhar	-	262	262
Mayurbhanj	-	351	351
Raygada	-	326	326
Sambalpur	-	306	306
Sonepur	535	2208	2743
Sundergarh	41	694	735
Punjab	-	3927	3927
Hoshiarpur	-	3927	3927
Rajasthan	348894	391439	740333
Ajmer	34412	50646	85057
Alwar	1955	858	2813
Barmer	37	4	41
Bharatpur	3732	115988	119720
Bhilwara	169517	67902	237419
Bikaner	-	2580	2580
Bundi	13520	22	13542
Chittorgarh	51438	2289	53727
Dausa	6338	9806	16144
Jaipur	4848	39342	44190
Jaisalmer	1775	1689	3464
Jhunjhunu	-	373	373
Jodhpur	-	23	23
Karauli	14613	17666	32279
Kota	-	9300	9300
Pali	16260	2684	18944
Rajsamand	1766	4959	6725
Sawai Madhopur	16	3136	3152
Sikar	21159	16287	37446
Sirohi	1630	180	1810
Tonk	5486	43912	49397

(contd.)

National Mineral Inventory - An Overview

Table-3 (Concl.d.)

State/District	Reserves	Remaining Resources	Total Resources
Udaipur	393	1792	2185
Tamil Nadu	29779	171717	201496
Chengai-Anna	-	134	134
Coimbatore	51	368	419
Cuddalore	-	15641	15641
Dharmapuri	33	3116	3150
Dindigul	24	167	191
Erode	6	324	330
Kanchipuram	221	445	666
Karur	1840	107089	108929
Madurai	-	48	48
Nagapattinam	519	676	1195
Namakkal	853	1087	1939
Perambalur	-	4818	4818
Periyar	-	76	76
Salem	14828	717	15544
Thiruvallur	320	6487	6807
Tiruchirapalli	105	331	436
Tiruppur	10896	18379	29275
Vellore	-	6920	6920
Villupuram	83	4840	4923
Virudhunagar	-	54	54
Tripura	-	490	490
Agartala	-	50	50
West Tripura	-	440	440
Telangana	26824	53250	80074
Hyderabad	-	300	300
Karimnagar	1437	-	1437
Khammam	149	1161	1310
Mahabubnagar	11003	16850	27854
Medak	3730	7588	11318
Nalgonda	2151	4719	6870
Nizamabad	459	-	459
Rangareddy	7893	22626	30519
Warangal	-	6	6
Uttar Pradesh	35413	105314	140727
Aligarh	-	100	100
Allahabad	32900	67352	100252
Banda	-	32081	32081
Chitrakut	2513	5781	8249
West Bengal	4193	5586	9779
Bankura	1431	129	1559
Birbhum	124	124	248
Burdwan	54	-	54
Hoogly	-	4500	4,500
Purulia	2584	833	3417

Figures rounded off.

10.22 QUARTZITE

Introduction

Quartzite is a form of silica (SiO_2) and used in a number of industries, the important being glass, foundry, sodium silicate, silicon alloys, iron & steel, refractory and ceramic industries. Quartzite is also used in the manufacture of silica refractories, as a flux in iron & steel industry and in ceramic/pottery industries. Quartzite used in refractory industries should be fine grained, compact and crypto-crystalline.

Quartzite has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E) dated 10.2.2015 and therefore inventory of Quartzite has been updated based on data received from various exploration and exploitation agencies.

Basis of Grade Classification

The following grade classification of the reserves/resources of quartzite has been adopted in the inventory as on 1.4.2015.

1. Refractory-I : SiO_2 (+) 98%
 Al_2O_3 (-) 0.75%
 Fe_2O_3 (-) 0.75%
Physical - compact, granular, homogeneous, medium to fine grained, free from iron bands.
2. Refractory-II : SiO_2 (+) 96%
 Al_2O_3 (-) 1%
 Fe_2O_3 (-) 1.5%
Physical - occasional iron patches may be allowed, free from iron bands.
3. Ferro-Silicon : SiO_2 98% (min)
 Al_2O_3 0.4% (max)
 Fe_2O_3 0.2% (max)
4. B.F. Grade : SiO_2 95% (min)
 Al_2O_3 1% (max)
Physical - lumpy
5. Ceramic & Pottery : SiO_2 97% (min)
 Fe_2O_3 1% (max)
 Al_2O_3 2% (max)

6. Low Grade : Chemical and physical properties below the specification of the different grades mentioned above.
7. Others : Estimation for such grade though usable/marketable but can not be classified into the above grades.
8. Unclassified : The range of max. and min. value of the constituents are such that it does not enable to classify under any grades.
9. Not known : Such estimation about which information / data is not available / reported to be classified it under any of the grades.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources are broadly categorised into 'reserves' and 'remaining resources'.

According to the norms of this system, the reserves of quartzite have been placed under proved (111) and probable (121) and (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of quartzite in the country as on 1.4.2015 are estimated at 1,659 million tonnes, of these 84 million tonnes (5%) falls under reserves category and the balance 1,575 million tonnes (95%) are under remaining resources.

Table - 1 : Reserves/Resources of Quartzite as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
	(In '000 tonnes)								
All India : Total	83472	86599	(-3127)	1575325	1164648	(+410677)	1658798	1251247	(+407551)
Refractory - I	49597	75120	(-25523)	391482	259745	(+131737)	441079	334865	(+106241)
Refractory - II	1384	2411	(-1027)	136987	123115	(+13872)	138371	125526	(+12845)
Ceramic & Pottery	177	1581	(-1404)	215741	219093	(-3352)	215918	220673	(-4755)
Low	284	1985	(-1701)	14789	12846	(+1943)	15073	14830	(+243)
Ferro-Silicon	-	-	No Change	12955	4794	(+8161)	12955	4794	(+8161)
B.F.	-	1500	(-1500)	66503	65003	(+1500)	66503	66503	No change
Others	9956	2195	(+7761)	98745	15870	(+82875)	108701	18065	(+90636)
Unclassified	19182	249	(+18933)	543373	369566	(+173807)	562555	369815	(+192740)
Not Known	2892	1558	(+1334)	94750	94616	(+134)	97642	96174	(+1468)
Freehold	-	-	No Change	881402	859123	(+ 22279)	881402	859123	(+22279)
Refractory - I	-	-	No Change	25671	23638	(+2033)	25671	23638	(+2033)
Refractory - II	-	-	No Change	130081	122701	(+7380)	130081	122701	(+7380)
Ceramic & Pottery	-	-	No Change	196482	195897	(+585)	196482	195897	(+585)
Low	-	-	No Change	4615	4615	No change	4615	4615	No change
Ferro-silicon	-	-	No Change	2691	-	(+2691)	2691	-	(+2691)
B.F.	-	-	No Change	63157	62787	(+370)	63157	62787	(+370)
Others	-	-	No Change	1942	1942	No change	1942	1942	No change
Unclassified	-	-	No Change	364006	354906	(+9100)	364006	354906	(+9100)
Not Known	-	-	No Change	92758	92638	(+120)	92758	92638	(+120)
Leasehold (Private)	83472	18419	(+65053)	616003	295785	(+320218)	699476	314204	(+385272)
Refractory - I	49597	6940	(+42657)	287891	226367	(+61524)	337488	233306	(+104182)
Refractory - II	1384	2411	(-1027)	6907	415	(+6492)	8290	2826	(+5464)
Ceramic/Pottery	177	1581	(-1404)	19259	23196	(-3937)	19436	24776	(-5340)
Low	284	1985	(-1701)	10175	8231	(+1944)	10458	10216	(+242)
Ferro Silicon	-	-	No Change	10265	4794	(+5471)	10265	4794	(+5471)
B.F.	-	1500	(-1500)	3346	2216	(+1130)	3346	3716	(-370)
Others	9956	2195	(+7761)	96803	13928	(+82875)	106760	16124	(+90636)
Unclassified	19182	249	(+18933)	179367	14660	(+164707)	198549	14909	(+183640)
Not Known	2892	1558	(+1334)	1991	1978	(+13)	4884	3536	(+1348)
Leasehold (Public)	-	68180	(-68180)	77920	9740	(+68180)	77920	77920	No change
Refractory - I	-	68180	(-68180)	77920	9740	(+68180)	77920	77920	No change

figures rounded off

National Mineral Inventory - An Overview

All India scenario of quartzite reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade, and state. In Table - 3 district wise reserves/resources as on 1.4.2015 have been given.

Out of the total resources, about 881 million tonnes are in freehold (53%), 78 million tonnes in leasehold public (5%) and 700 million tonnes in leasehold private (42%).

Of the total resources, refractory grade constitutes (34.93%), ceramic/pottery grade (13.01%), B.F. (4%) and low grade (1%). The bulk of the resources (about 46.35%) are under others/unclassified/not known grade, while ferro-silicon grade is meager 0.8% .

Of the total resources, Haryana is credited with 884 million tonnes (53.30%), followed by Bihar 278 million tonnes (16.8%), Odisha 141 million tonnes (8.5%), Maharashtra 91 million tonnes (5.5%), Punjab 82 million tonnes (4.9%), Andhra Pradesh 64 million tonnes (3.9%), Jharkhand 41 million tonnes (2.5%), Jammu & Kashmir 18 million tonnes, (1.1%), Sikkim 17

million tonnes (1%), Karnataka 8 million tonnes (0.5%), Arunachal Pradesh 5 million tonnes (0.3%), Rajasthan & Madhya Pradesh each less than 1 million tonnes and Himachal Pradesh & West Bengal have negligible quantity.

A net increase of about 408 million tonnes resources have been recorded in the inventory as on 1.4.2015 as compared to 1.4.2010. In the present inventory, about 326 million tonnes of resources has been increased mainly due to inclusion of 64 new deposits in lease hold private areas reported from Andhra Pradesh, Haryana, Chhattisgarh, Jammu & Kashmir, Jharkhand, Odisha and West Bengal states.

Of the total resources of Quartzite, about 880 million tonnes (53%) resources have been estimated under inferred (333) & reconnaissance (334) categories. These resources are based on very limited preliminary exploration. A detailed exploration in these areas may improve the confidence level of resources.

A total of 237 deposits have been covered in the inventory as on 1.4.2015. Out of this 98 deposits are in freehold, 138 deposits are in leasehold private and one deposit is in leasehold public.

Table - 2 : Total Resources of Quartzite as on 1.4.2015 vis-a-vis 1.4.2010 (By States)

State	Total Resources		Net Change
	(In '000 tonnes)		
	As on 1.4.2015	As on 1.4.2010	
All India : Total	1658798	1251247	(+)407551
Andhra Pradesh	64295	23583	(+)40712
Arunachal Pradesh	5270	5270	No Change
Bihar	277824	276334	(+)1490
Chhattisgarh	28566	26584	(+)1982
Haryana	884188	621980	(+)262208
Himachal Pradesh	57	57	No Change
Jammu & Kashmir	18158	1558	(+)16600
Jharkhand	40708	40592	(+)116
Karnataka	7584	3321	(+)4263
Madhya Pradesh	832	832	No Change
Maharashtra	90697	90716	(-)19
Odisha	140554	60400	(+)80154
Punjab	81912	81912	No Change
Rajasthan	968	991	(-)23
Sikkim	17119	17119	No Change
West Bengal	66	-	(+)66

figures rounded off

Table - 3 : District wise Reserves/Resources of Quartzite as on 1.4.2015

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	83472	1575325	1658798
Andhra Pradesh	17390	46905	64295
Chittoor	-	2775	2775
Cuddapah	-	1245	1245
Kurnool	7651	9380	17030
Srikakulam	-	2104	2104
Visakhapatnam	-	++	++
Vizianagaram	9739	31402	41141
Arunachal Pradesh	-	5270	5270
West Kameng	-	5270	5270
Bihar	12542	265282	277824
Lakhisarai	12075	-	12075
Monghyr	467	252387	252854
Nalanda	-	12895	12895
Chhattisgarh	3696	24870	28566
Durg	1018	4450	5468
Raigarh	1713	19819	21532
Raipur	-	212	212
Rajnandgaon	965	389	1354
Haryana	-	884188	884188
Faridabad	-	10920	10920
Gurgaon	-	873268	873268
Himachal Pradesh	41	16	57
Una	41	16	57
Jammu & Kashmir	1558	16600	18158
Anantnag	1558	-	1558
Kishtwar	-	9100	9100
Udhampur	-	7500	7500
Jharkhand	181	40527	40708
Singhbhum (East)	-	40527	40527
Singhbhum (West)	181	-	181
Karnataka	231	7353	7584
Belgaum	231	5623	5854
Bellary	-	1730	1730
Madhya Pradesh	-	832	832
Sehore	-	832	832
Maharashtra	9026	81671	90697
Bhandara	-	77920	77920
Gadchiroli	9026	3660	12686
Gondia	-	62	62
Nagpur	-	30	30
Odisha	38582	101971	140554
Angul	-	158	158
Bolangir	-	121	121
Dhenkanal	-	737	737
Jajpur	-	2083	2083
Jharsuguda	37643	34208	71851

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Concl.d.)

State/District	Reserves	Remaining Resources	Total Resources
Keonjhar	109	53910	54020
Mayurbhanj	830	4519	5348
Sambalpur	-	318	318
Sundargarh	-	5916	5916
Punjab	-	81912	81912
Hoshiarpur	-	81620	81620
Ropar	-	292	292
Rajasthan	226	742	968
Ajmer	-	85	85
Alwar	-	10	10
Jhunjhunu	-	36	36
Nagaur	-	171	171
Sawai Madhopur	226	440	666
Sikkim	-	17119	17119
Sikkim West	-	17119	17119
West Bengal	-	66	66
Bankura	-	66	66

figures rounded off ++ : Negligible

10.23 SHALE

Introduction

Shale is a fine-grained sedimentary rock that forms from the compaction of silt and clay-size mineral particles that we commonly call 'mud'. This composition places shale in a category of sedimentary rocks known as 'mudstones'. Shale is distinguished from other mudstones because it is fissile and laminated.

Shale is composed mainly of clay-sized mineral grains. These tiny grains are usually clay minerals such as illite, kaolinite and smectite. Shale usually contains other clay sized mineral particles such as quartz, chert and feldspar. Other constituents might include organic particles, carbonate minerals, iron oxide minerals, sulfide minerals and heavy mineral grains. These 'other constituents' in the rock are often determined by the shale's environment of deposition and often determine the color of the rock. Shale is relatively fragile in nature, therefore, very rare use for building materials or industrial use in raw form, where properly processed it can be used as an additive in cement and art clay product. It has few exterior/interior uses as well as in construction industry.

Shale has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E) dated 10.2.2015.

Basis of Grade Classification

Shale is used as filler in paint, plastic roofing cement, as raw material for cement bricks and in some cases as a source of oil.

The resources of shale in the inventory as on 01.04.2015, have been placed under 'Unclassified' grade.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, reserves of shale as on 1.4.2015 have been placed under proved (111) and probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources as on 01.04.2015 of shale in the country have been estimated at about 19.25 million tonnes. Out of these, 15.47 million tonnes (80 %) have been estimated under 'reserves' category and the balance 3.78 million tonnes (20 %) under 'remaining resources' category. About 72% resources are estimated in public leasehold and the remaining 28% in private leasehold.

All India scenario of shale reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade and state. In Table - 3, district wise reserves/resources as on 01.04.2015 have been given.

Telangana alone is credited with 13.85 million tonnes (72%) of total resources estimated in India. Besides, resources have been estimated in Andhra Pradesh 3.55 million tonnes (18%) and Madhya Pradesh 1.85 million tonnes (10%).

A net increase of 3.34 million tonnes has been recorded in the inventory as on 1.4.2015 in comparison to the earlier inventory as on 1.4.2010. These changes are mainly due to the downward revision of resources in the existing deposits and 4,324 thousand tonnes due to addition of 21 new deposits reported from the state of Andhra Pradesh and Madhya Pradesh. Of the total resources of shale, about 1.3 million tonnes (7%) resources are under inferred & reconnaissance categories. These resources are based on limited exploration and further detail exploration may improve confidence level of resource estimation.

Total 26 deposits (25 leasehold private and one leasehold public) have been covered in National Mineral Inventory as on 01.04.2015.

Table - 2 : Total Resources of Shale as on 1.4.2015 vis-a-vis 1.4.2010

(In '000 tonnes)

State	Total Resources		Net change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	19253	15911	(+) 3342
Andhra Pradesh	3548	15911	(-) 12363
Madhya Pradesh	1853	-	(+) 1853
Telangana	13852	-	(+) 13852

figures rounded off.

Table - 3 : District wise Reserves/Resources of Shale as on 1.4.2015

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	15472	3781	19253
Andhra Pradesh	1554	1994	3548
Anantpur	1293	1179	2471
Cuddapah	-	715	715
Kurnool	262	100	362
Madhya Pradesh	66	1787	1853
Mandsaur	66	1787	1853
Telangana	13852	-	13852
Rangareddy	13852	-	13852

figures rounded off.

10.24 SLATE

Introduction

Slate is a fine grained, foliated, homogenous metamorphic rock derived from an original shale type sedimentary rock viz. claystone, shale, or siltstone composed of clay or volcanic ash through low to very low grade regional metamorphism. The foliation plane developed in a slate may not corresponds to the original sedimentary layering. Slate is well known for its very marked cleavage planes which enables it to split manually or mechanically into relative thin slabs.

Slate is a low-cost decorative stone used for exterior and interior decoration of buildings and it is also a low cost alternative to granite and marble which are comparatively expensive. It is one of the important materials used for roofing. Slate is particularly suitable as roofing material as it has extremely low water absorption index of less than 0.4%. Its low tendency to absorb water makes it very resistance to frost damage and breakage due to freezing. Slate is also used as school slate and also as building dimension stone.

Most slate are grey in colour and range in a continuum of shades from light to dark grey. It also occurs in shades of green, red, black, purple, and brown. The colour of slate is often determined by the amount and type of iron and organic material that are present in the rock.

The exports of slate have increased over the years resulting in a boost to slate mining industry in the country. Micaceous and chlorite slates are generally preferred.

Slate has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E) dated 10.2.2015.

Basis of Grade Classification

The total resources of slate in the inventory as on 1.4.2015 have been classified under unclassified grade as the information on end use grade have not been suitably reported by exploration and exploitation agencies. The end use grade classification of slate with corresponding chemical & physical specifications will be included in the next updation.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources are broadly classified into 'reserves' and 'remaining resources'.

According to the norms of this system, the reserves of slate have been placed under proved (111) & probable(121) categories and the remaining resources of slate have been placed under pre-feasibility (222) category and inferred (333) category.

Salient Features of the Inventory

All India resources of slate in the inventory as on 01.04.2015 are estimated at 22.87 million tonnes. Out of which 20.29 million tonnes(88.7%)are categorised as reserves and remaining 2.58 million tonnes (11.3%) as remaining resources.

All India scenario of slate reserves, remaining resources and total resources as on 1.4.2015 has been given in Tables-1 & 2. These tables provide resource information as per lease status, grade and state. In Table-3 district wise reserves/resources as on 1.4.2015 have been given.

Out of the total resources as on 1.4.2015, Haryana has a major share of 19.51 million tonnes (85.3%) and balance 3.36 million tonnes(14.7%) are contributed by Andhra Pradesh.

The resources of slate have been increased enormously by 20.50 million tonnes. This increase was mainly due to reporting of 1 new deposit in Rewari district of Haryana having resources of 19.51 million tonnes. In addition, the resources of 1 deposit in Andhra Pradesh has been re-estimated.

The resources of slate have been reported from private leaseholds only. The resources are reported from 6 deposits of Prakasam (Ongole H.Q) district, Andhra Pradesh and 1 deposit from Rewari district of Haryana.

A total of 07 deposits have been covered in National Mineral Inventory as on 1.4.2015, in leasehold private areas. Of the total resources of slate, 1.51 million tonnes (6.61%) have been estimated under inferred(333) category.

**Table - 1 : Reserves/Resources of Slate as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)**

Lease status/Grade	(In '000 tonnes)									
	Reserves			Remaining resources			Total resources			Net change
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net chnge	1.4.2015	1.4.2010	Net change	
All India : Total	20286	-	(+)20286	2586	2369	(+)217	22872	2369	(+) 20503	
Unclassified	20286	-	(+)20286	2586	2369	(+)217	22872	2369	(+) 20503	
Leasehold/Private										
Unclassified	20286	-	(+)20286	2586	2369	(+)217	22872	2369	(+)20503	

figures rounded off

**Table – 2 : Total Resources of Slate as on 1.4.2015 vis-a-vis 1.4.2010
(By States)**

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	22,872	2,369	(+) 20,503
Andhra Pradesh	3,362	2,369	(+)993
Haryana	19,510	-	(+)19,510

*figures rounded off***Table - 3 : District wise Reserves/Resources of Slate as on 1.4.2015**

State/District	(In '000 tonnes)		
	Reserves	Remaining Resources	Total Resources
All India : Total	20,286	2586	22,872
Andhra Pradesh	776	2586	3,362
Prakasam (Ongole H.Q)	776	2586	3,362
Haryana	19,510	-	19,510
Rewari	19,510	-	19,510

figures rounded off

10.25 TALC/STEATITE/SOAPSTONE

Introduction

Talc is a very pure hydrous, metasilicate of magnesium of chemical formula $H_2Mg_3(SiO_3)_4$ or $Mg_3Si_4O_{10}(OH)_2$. It is greenish white to grey in colour with a theoretical composition of 63.5% SiO_2 , 31.7% MgO , 4.8% H_2O . True talc is rare in nature and occurs in association with other minerals like chlorite, tremolite, calcite, magnesite, etc.

Soapstone is massive, soft, greenish rock made of a mixture of talc and other magnesium silicates whereas steatite is a compact, massive talcose rock without any visible grains.

The important properties of minerals in this group are softness (hardness of 1 on Moh's scale), good luster, chemical inertness, good retention as a filler, high fusion point, high specific heat, low moisture content, low heat & electrical conductivity, good degree of oil absorption. Accordingly, their uses are in cosmetics, paper, insecticide, rubber, paint and ceramics.

The important deposits of economic value occur in basic igneous rocks viz. peridotites, dunite or meta-sediments like marble or dolomitic limestone. Good grade deposits in India are located in Bhilwara, Udaipur and Jaipur districts of Rajasthan, Jabalpur and Jhabua districts of Madhya Pradesh and Durg district of Chhattisgarh. Massive soapstone deposits associated with dolomite occur in Almora and Pithoragarh districts of Uttarakhand.

Talc/Steatite/Soap stone has been declared as a "Minor Mineral" under section 3(e) of MMDR Act, 1957 vide Gazette Notification No. S.O. 423(E) dated 10.2.2015.

Basis of Grade Classification

The following end use grade classification was adopted in the National Mineral Inventory as on 1.4.2015.

1. Paper & Textile	Brightness	80% (min.) for blue light of wave length 5040A'
	Fe_2O_3	0.3% (max)
	LOI	3% (max)
	Colour	white
	Grit	0.03% (max)

2. Cosmetics	Colour	white
	Grit	Nil
	pH	9.5 (max)
	Arsenic as As_2O_3	2 ppm (max)
	Heavy metals (as lead)	20 ppm (max)
	Magnesium (as MgO)	20(max)
	Percent by mass	

LOI	7.05% (max)
Acid soluble iron, Percent by mass	1.5% (max)

3. Insecticide	LOI	7% (max)
	Fe_2O_3	1.5% (max)
	Matter soluble in HCL	3% (max)

4. Ceramics	Colour	White or light cream
	LOI	6.5% (max)
	SiO_2 % by mass	56(max)
	Al_2O_3 % by mass	2.5 (max)
	Fe_2O_3 % by mass	1.5 (max)
	CaO % by mass	3.5 (max)
	MgO % by mass	28(min)

5. Paint	Brightness	87%
	LOI	4 to 7%
	SiO_2	40 to 56%
	MgO	20 to 32%
	Fineness	98% of 2 microns

6. Plastic	Whiteness	92 to 98% (max)
	Fe_2O_3	0.5%
	Fineness	100 mesh to 5 micron

7. Others	Estimation for such grade which are useable/marketable but cannot be classified into grades given above.	
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8. Unclassified	The range of maximum and minimum values of the constituents are too wide to any of the grades.	
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9. Not known Such estimation about which information/data is not available/reported to be classified under any of the above grades.

Out of the total resources, paper and textile grade constitutes 68.1 million tonnes (21.58%), cosmetic 27 million tonnes (8.64%) insecticide 66 million tonnes (20.92%) and the share of ceramic, paint and other grades together is about 13 million tonnes (4.25%). However, the largest share in total estimated resources is held by unclassified grade 129 million tonnes (40.84%) while about 12 million tonnes (3.76%) resources have been placed under 'Not known' grade due to paucity of data for classifying these resources into any specific end use grade.

Basis of categorisation of resources

As per United Nations Framework Classification (UNFC), the resources are broadly classified into 'reserves' and 'remaining resources'. According to norms of this system, the reserves of talc/steatite/soapstone have been placed under proved (111) and probable (121) & (122) categories.

The estimation of remaining resources have been placed under feasibility (211), pre-feasibility (221 & 222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Of the total resources, Rajasthan is credited with 179 million tonnes (57%) followed by Uttarakhand about 78 million tonnes (25%), Maharashtra 17 million tonnes, Kerala 14 million tonnes (5%), Andhra Pradesh and Madhya Pradesh each 10 million tonnes (3% each) and Tamilnadu 3 million tonnes (1%) and the rest of the resources (about 1%) are together accounted for by Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Odisha, Sikkim and Tamil Nadu.

Salient Features of the Inventory

The total resources of talc/steatite/soapstone in the country as on 1.4.2015 have been estimated at 315 million tonnes, of these 106 million (34%) are reserve and 209 million tonnes (66%) are under remaining resources.

In the inventory as on 1.4.2015, a net increase of about 47 million tonnes resources have been recorded as compared to the inventory as on 1.4.2010. These changes have occurred mainly due to addition of 38 new deposits (10.28 million tonnes) and upward revision of resources in Madhya Pradesh, Jharkhand, Rajasthan and Tamil Nadu.

All India scenario of talc/steatite/soapstone reserves, remaining resources and total resources as on 1.4.2015 vis-vis 1.4.2010 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade, and states. In Table- 3, district wise reserves/resources as on 1.4.2015 have been given.

Out of the total resources, about 135 million tonnes (43%) have been estimated under inferred & reconnaissance categories. These estimates are based on a limited and preliminary exploration. If the areas having these resources are examined for further detailed exploration, the confidence level of resources in the country may enhance.

About 96 million tonnes (30%) resources have been placed in freehold and the balance 219.34 million tonnes (69%) in leasehold private areas and a little amount of 0.79 million tonnes in leasehold public areas.

In the inventory as on 1.4.2015, about 786 deposits have been covered, of which 287 deposits are in freehold and 499 are in leasehold.

Table - 1 : Reserves/Resources of Talc/Steatite/Soapstone as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
All India : Total	106490	90026	(+)16464	209434	178996	(+)30438	315924	269023	(+)46901
Paper & Textile	31887	31581	(+)306	36283	28721	(+)7562	68170	60302	(+)7868
Cosmetic	12368	26008	(-)13640	14932	8819	(+) 6113	27300	34827	(-)7527
Insecticide	26759	19353	(+)7406	39337	31194	(+) 8142	66095	50547	(+)15548
Ceramic	205	968	(-)763	367	724	(-)357	572	1691	(-)1119
Paint	594	640	(-)46	341	360	(-)19	935	1000	(-)65
Others	811	1785	(-)974	11122	8513	(+)2609	11934	10297	(+)1637
Unclassified	33462	9690	(+)23772	95573	89188	(+)6385	129035	98878	(+)30157
Not Known	404	3	(+)401	11479	11476	(+)3	11883	11479	(+)404
Freehold	-	-	-	95782	95374	(+)408	95782	95374	(+)408
Paper & Textile	-	-	-	334	337	(-)3	334	337	(-)3
Cosmetics	-	-	-	11	11	No Change	11	11	No Change
Insecticide	-	-	-	7127	7031	(+)96	7127	7031	(+)96
Ceramic	-	-	-	52	52	No Change	52	52	No Change
Others	-	-	-	6897	6564	(+)333	6897	6564	(+)333
Unclassified	-	-	-	72551	72570	(-)19	72551	72570	(-)19
Not Known	-	-	-	8810	8810	No Change	8810	8810	No Change
Leasehold Public	794	730	(+)64	-	-	No change	794	730	(+)64
Paper & Textile	513	513	No change	-	-	No Change	513	513	No Change
Insecticide	217	217	No change	-	-	No Change	217	217	No Change
Unclassified	64	-	(+)64	-	-	No change	64	-	(+) 64
Leasehold Private	105697	89297	(+)16400	113652	83622	(+) 30030	219348	172919	(+)46429
Paper & Textile	31374	31068	(+)306	35948	28384	(+) 7564	67322	59452	(+)7870
Cosmetic	12368	26008	(-)13640	14921	8809	(+)6112	27289	34816	(-)7528
Insecticide	26542	19136	(+)7406	32209	24163	(+) 8046	58751	43299	(+) 15452
Ceramic	205	968	(-)763	315	672	(-)357	520	1639	(-)1119
Paint	594	640	(-) 46	341	360	(-)19	935	1000	(-)65
Others	811	1785	(-) 974	4225	1949	(+)2276	5036	3734	(+)1302
Unclassified	33399	9690	(+)23709	23023	16619	(+)6404	56421	26309	(+)30112
Not Known	404	3	(+) 401	2670	2667	(+)3	3073	2670	(+)403

figures rounded off

Table – 2 : Total Resources of Talc/Steatite/Soapstone as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

(In '000 tonnes)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	315924	269023	(+)46901
Andhra Pradesh	10495	11243	(-)748
Bihar	149	152	(-)3
Chhattisgarh	107	108	(-)1
Gujarat	37	37	No change
Jharkhand	739	338	(+)401
Karnataka	2081	2068	(+)13
Kerala	14390	14390	No change
Madhya Pradesh	10235	9119	(+)1116
Maharashtra	16827	16827	No change
Odisha	827	820	(+)7
Rajasthan	178965	132162	(+)46803
Sikkim	60	60	No change
Tamil Nadu	3110	2661	(+)449
Telengana	20	-	(+)20
Uttarakhand	77881	79037	(-)1156

*figures rounded off***Table -3 : District wise Reserves/Resources of Talc/Steatite/Soapstone as on 1.4.2015**

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	106490	209434	315924
Andhra Pradesh	3358	7137	10495
Anantapur	396	1527	1923
Chittoor	20	839	859
Cuddapah	380	253	633
Kurnool	2562	4519	7081
Bihar	-	149	149
Monghyr	-	149	149
Chhattisgarh	29	78	107
Durg	-	70	70
Kanker	29	8	37
Gujarat	4	33	37
Sabarkantha	4	33	37
Jharkhand	419	319	739
Giridih	16	196	212
Kodarma	-	6	6
Palamau	-	14	14
Saraikela-Kharswan	403	-	403
Singhbhum (East)	-	73	73
Singhbhum (West)	-	31	31
Karnataka	280	1800	2081
Bellary	-	280	280
Chikmagalur	-	126	126
Chitradurga	-	367	367
Hassan	280	112	392
Mandya	-	176	176
Mysore	-	99	99
Raichur	-	154	154
Tumkur	-	487	487

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Concl.d.)

State/District	Reserves	Remaining Resources	Total Resources
Kerala	-	14390	14390
Kunnur	-	2340	2340
Wynad	-	12050	12050
Madhya Pradesh	283	9952	10235
Chhatarpur	252	311	563
Dhar	-	969	969
Jabalpur	31	1689	1720
Jhabua	-	4210	4210
Katni	-	189	189
Narasinhapur	-	2049	2049
Sagar	-	95	95
Sidhi	-	440	440
Maharashtra	-	16827	16827
Bhandara	-	337	337
Ratnagiri	-	10375	10375
Sindhudurg	-	6115	6115
Odisha	10	817	827
Ganjam	-	135	135
Mayurbhanj	10	471	481
Sambalpur	-	3	3
Sundargarh	-	208	208
Rajasthan	77990	100975	178965
Ajmer	-	173	173
Alwar	-	929	929
Banswara	332	2469	2801
Bharatpur	-	17	17
Bhilwara	24816	14162	38978
Chittorgarh	-	54	54
Dausa	-	763	763
Dungarpur	7225	17797	25022
Jaipur	256	1965	2221
Jhunjhunu	-	110	110
Karauli	-	125	125
Pali	-	20	20
Rajasamand	13010	4051	17061
Sawai Madhopur	216	3344	3560
Sikar	110	47	157
Sirohi	-	6	6
Tonk	-	81	81
Udaipur	32025	54862	86888
Sikkim	-	60	60
Sikkim West	-	60	60
Tamil Nadu	-	3110	3110
Coimbatore	-	584	584
Salem	-	1512	1512
Tiruchirapalli	-	779	779
Vellore	-	235	235
Telangana	-	20	20
Khammam	-	20	20
Uttarakhand	24115	53765	77881
Almora	93	748	841
Bageshwar	22357	38875	61232
Chamoli	-	676	676
Pithoragarh	1666	13466	15132

figures rounded off