

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, 186 deposits are in freehold, 1398 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		(In tonne)
			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	Reserves	Remaining Resources	(In tonne)
			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.)

National Mineral Inventory - An Overview

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.)

National Mineral Inventory - An Overview

Table-3 (Concld.)

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

(In '000 tonnes)

Lease status/Grade	Reserves		Remaining resources			Total resources			
	1.4.2010		Net change	1.4.2010		1.4.2010			
	1.4.2015	1.4.2010		1.4.2015	Net change				
All India : Total	27037	30104	(-)3067	695791	683415	(+)12379	722829	713520	(+)9309
Refractaory-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		(In '000 tonnes)
			Net Change
	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
Narsinghampur	-	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
Bhubaneswar	-	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.)

National Mineral Inventory - An Overview

Table-3 (Concl.d.)

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 - 1 : Reserves/Resources of Fuller's Earth 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		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010
All India/ Unclassified	3941	58	(+) 3883	257438	256594	(+) 844	261379	256652
Freehold								
Unclassified	-	58	(-) 58	212354	187243	(+) 25111	212354	187301
Leasehold (Private)								
Unclassified	3941	-	(+) 3941	45084	69351	(-) 24267	49025	69351
<i>figures rounded off</i>								
								(+) 4727
								(+) 25053
								(-) 20326

**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:

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Black Granite 2. Coloured Granite 3. Unclassified | <p>Where the estimations of granite are not available distinctly in the above grades.</p> |
|--|---|

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		
	1.4.2015		Net change	1.4.2015		Net change	1.4.2015		Net change
	1.4.2010	1.4.2010		1.4.2010	1.4.2010		1.4.2010	1.4.2010	
All India : Total	263692	263692	No change	46056098	45966608	(+)89490	46319790	46230300	(+)89490
Black Granite	16906	16906	No change	3158783	3158783	No change	3175688	3175688	No change
Coloured Granite	246786	246786	No change	42407795	42402874	(-)85080	42654581	42649661	(+)4920
Unclassified	-	-	No Change	489521	404951	(+)84570	489521	404951	(+)84570
Freehold	-	-	No Change	38455497	38366007	(+)89490	38455497	38366007	(+)89490
Black Granite	-	-	No Change	2411310	2411310	No Change	2411310	2411310	No change
Coloured Granite	-	-	No Change	35562472	35557552	(+)4920	35562472	35557552	(+)4920
Unclassified	-	-	No Change	481716	397146	(+)84570	481716	397146	(+)84570
Leasehold (Public)	15773	15773	No change	389167	389167	No Change	404940	404940	No change
Black Granite	968	968	No change	286456	286456	No Change	287424	287424	No change
Coloured Granite	14805	14805	No Change	102712	102712	No Change	117517	117517	No change
Unclassified	-	-	No Change	-	-	No Change	-	-	No Change
Leasehold (Private)	247919	247919	No change	7211434	7211434	No Change	7459353	7459353	No change
Black Granite	15938	15938	No change	461018	461018	No Change	476955	476955	No change
Coloured Granite	231981	231981	No change	6742612	6742612	No Change	6974593	6974593	No change
Unclassified	-	-	No Change	7805	7805	No Change	7805	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 metres 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
Maheana	-	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
Singbhum (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		
	Net change			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	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	1158816	(+)1641	1158457	1158816	(+)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			(In '000 tonnes)
	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 $\text{Fe}_2\text{O}_3:\text{Al}_2\text{O}_3$ ratio more than one and $\text{SiO}_2:\text{Fe}_2\text{O}_3$ ratio less than 1.33 is termed as ferruginous laterite while that having $\text{Fe}_2\text{O}_3:\text{Al}_2\text{O}_3$ ratio less than one and $\text{SiO}_2:\text{Al}_2\text{O}_3$ 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 - 1 : Reserves/Resources of Laterite as on 1.4.2015 vis-a-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves		Remaining resources		Total resources	
	1.04.2015	1.04.2010	Net change	1.04.2015	1.04.2010	Net change
All India : Total						
Unclassified	124733	24714	(+)10019	581819	446119	(+)135700
Freehold/						
Unclassified	-	-	-	475236	433325	(+)41911
Leasehold (Private) /						
Unclassified	122911	23182	(+)99729	106582	12764	(+)93818
Leasehold (Public) /						
Unclassified	1822	1532	(+)290	-	30	(-)30
					1822	1562
						(+)260

figures rounded off

**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
Adilabad	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		1.4.2015		1.4.2010		1.4.2015		1.4.2010	
				Net change				Net change				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			(In '000 tonnes)
	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
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				(In '000 tonnes)
	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
Sikkin 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	Reserves				Remaining resources				Total resources				(In kg)
	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		Net change		Net change	
All India : Total	114432777	190741448	(-)76308671		520869364	341495531	(+)179373833		635302141	532236979	(+) 103065162		
Freehold													
Unclassified	-	-	-		118038705	12758705	(+)105280000		118038705	12758705	(+)105280000		
Leasehold/Private													
Unclassified	114432777	190741448	(-)76308671		402830659	328736826	(+)74093833		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			(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	36933805	54942176	(-) 18008371	130859201	89319089	(+) 41540111	167793006	144261265	(+) 23531741	
Red Ochre	30556539	51828170	(-) 21271631	115322840	73511805	(+) 41811035	145879380	125339975	(+) 20539405	
Yellow Ochre	5702158	2800124	(+) 2902034	12311856	13775294	(-)1463438	18014014	16575418	(+) 1438596	
Not Known	675108	313882	(+) 361226	3224504	2031990	(+) 1192514	3899613	2345872	(+) 1553741	
Freehold	-	-	-	27470017	26246535	(+) 1223482	27470017	26246535	(+)1223482	
Red Ochre	-	-	-	19102603	18584156	(+) 518447	19102603	18584156	(+) 518447	
Yellow Ochre	-	-	-	6923280	6882783	(+) 40497	6923280	6882783	(+) 40497	
Not Known	-	-	-	1444134	779596	(+) 664538	1444134	779596	(+) 664538	
Leasehold (Private)	36933805	54942176	(-) 18008371	103389184	63072554	(+) 40316630	140322990	118014730	(+) 22308260	
Red Ochre	30556539	51828170	(-) 21271631	96220237	54927649	(+) 41292588	126776777	106755819	(+) 20020958	
Yellow Ochre	5702158	2800124	(+) 2902034	5388576	6892511	(-)1503935	11090734	9692635	(+) 1398099	
Not Known	675108	313882	(+) 361226	1780371	1252394	(+) 527977	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			(In tonne)
	Total Resources		Net Change
	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				(In tonne)
	Reserves	Remaining Resources	Total Resources	
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.d.)

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			(In tonne)
	1.4.2010		Net change	1.4.2010		Net change	1.4.2010		Net change	
	1.4.2015	1.4.2010		1.4.2015	1.4.2010		1.4.2015	1.4.2010		
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	(+)757177	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	45335	-	(+)45335	153487	-	(+)153487	
Leasehold (Private)	23995110	21702764	(+)2292346	20223581	23530515	(-)3306934	44218691	45233279	(-)1014588	
Refractory	7591194	6260753	(+)1330441	2644360	2407118	(+)237242	10235554	8667871	(+)1567683	
Ceramic	4492951	3214236	(+)1278715	3224813	8402447	(-)5177634	7717765	11616683	(-)3898918	
Insecticide	3555101	3744463	(-)189362	6014233	4933220	(+)1081013	9569333	8677683	(+)891650	
Insecticide & ceramic mixed	6899564	6142387	(+)757177	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)**

			(In tonne)
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		Total Resources
	Reserves	Remaining 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		
	Net change			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	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	5484	5484	No Change	5484	5484	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	(+) 415857
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

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)

(In '000 tonnes)			
State	Total Resources		Net Change
	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
Saraikela-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
Garo Hills East	-	3836	3836
Garo 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	17367	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

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)

			(In '000 tonnes)
State	Total Resources		Net Change
	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 used 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 - 1 : Reserves/Resources of Shale 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		Net change	1.4.2015		Net change	1.4.2015		Net change
	1.4.2010	1.4.2010		1.4.2010	1.4.2010		1.4.2010	1.4.2010	
All India : Total	15472	15331	(+) 141	3781	580	(+)3201	19253	15911	(+)3342
Unclassified	15472	15331	(+) 141	3781	580	(+)3201	19253	15911	(+)3342
Leasehold (Public)	13852	14810	(-)958	-	-	-	13852	14810	(-)958
Unclassified	13852	14810	(-)958	-	-	-	13852	14810	(-)958
Leasehold (Private)	1620	521	(+) 1099	3781	580	(+)3201	5401	1101	(+) 4300
Unclassified	1620	521	(+) 1099	3781	580	(+)3201	5401	1101	(+) 4300

figures rounded off

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			
	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			(In '000 tonnes)
	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	Reserves	Remaining Resources	(In '000 tonnes)
			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 5040 Å
	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.	
8. Unclassified	The range of maximum and minimum values of the constituents are too wide to any of the grades.	

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.

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.

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, 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.

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.

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