10.1 BENTONITE

Introduction

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

Basis of Grade Classification

The resources in the inventory as on 1.4.2010 have been classified into following grades based on present trend of use by different industries.

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

Basis of Categorisation of Resources

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

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

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

Salient Features of the Inventory

All India scenarios of bentonite 'reserves', 'remaining resources' and 'total resources' as on 1.4.2010 vis-a-vis 1.4.2005, 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 1.4.2010 have been given.

The total resources of bentonite in the country as on 1.4.2010 are estimated at 568.4 million tonnes, of these 25.1 million tonnes (about 4%) fall under reserve category and the balance 543.3 million tonnes (96%) are remaining resources.

About 81% of the total resources at 462 million tonnes is in freehold and the remaining about 57 million tonnes (10%) is in leasehold (public) and 49 million tonnes (9%) is in leasehold (private) areas.

Out of the total resources, drilling fluid grade constitutes 9 million tonnes (1.6%), foundry grade 55 million tonnes (9.7%), poor/blendable grade 19 million tonnes (3.4%), unclassified 74 million tonnes (13%) and the balance 411 million tonnes resources (72.4%) have been placed under not known grade (Table - 1).

Of the total resources of 568.4 million tonnes, Rajasthan alone accounts for 75% (423 million tonnes), followed by Gujarat about 24% (134 million tonnes) and the balance 1% (11 million tonnes) is held together by three states namely Tamil Nadu, Jharkhand and Jammu &Kashmir (Table-2).

About 96% of the total resources estimated in the country is concentrated in four districts only. Of these, 72% is held by Barmer in Rajasthan followed by Kutch, 12% , Bhavnagar 7% and Sabarkantha 5% in Gujarat.

An increase of about 37.8 million tonnes of resources has been recorded in the inventory as on 1.4.2010 in comparison to the earlier inventory as on 1.4.2005. Out of the total increase, about 37.6 million tonnes have been accounted with addition of four freehold deposits (two in Kutch, one each in Sabarkantha and Surendranagar districts) in Gujarat. Besides, about 0.2 million tonnes increase has been reported in Pakur district, Jharkhand.

Table - 1 : Reserves/Resources of Bentonite as on 1.4.2010 vis-à-vis 1.4.2005
(By Lease Status/Grade)

(In '000 tonnes)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2010	1.4.2005	Net change	1.4.2010	1.4.2005	Net change	1.4.2010	1.4.2005	Net change
All India : Total	**25061**	**25061**	No Change	**543306**	**505513**	**(+)37793**	**568367**	**530574**	**(+)37793**
Drilling Fluid	-	-	-	9303	9303	No Change	9303	9303	No Change
Foundry	4158	4158	No Change	50889	50954	(-)66	55046	55112	(-)66
Poor/Blendable	-	-	-	18531	18531	No Change	18531	18531	No Change
Unclassified	2736	2736	No Change	71472	33847	(+)37625	74208	36583	(+)37625
Not known	18167	18167	No Change	393111	392878	(+)234	411279	411045	(+)234
Freehold	**-**	**-**	**-**	**462126**	**424332**	**(+)37794**	**462126**	**424332**	**(+)37794**
Drilling Fluid	-	-	-	6632	6632	No Change	6632	6632	No Change
Foundry	-	-	-	45173	45238	(-)66	45173	45238	(-)66
Poor/Blendable	-	-	-	4	4	No Change	4	4	No Change
Unclassified	-	-	-	71472	33847	(+)37625	71472	33847	(+)37625
Not known	-	-	-	338844	338611	(+)234	338844	338611	(+)234
Lesehold (Public)	**9865**	**9865**	No Change	**46900**	**46900**	**No Change**	**56765**	**56765**	No Change
Foundry	1168	1168	No Change	-	-	-	1168	1168	No Change
Not Known	8697	8697	No Change	46900	46900	No Change	55597	55597	No Change
Leasehold (Private)	**15196**	**15196**	**No Change**	**34281**	**34281**	No Change	**49477**	**49477**	No Change
Drilling Fluid	-	-	-	2671	2671	No Change	2671	2671	No Change
Foundry	2990	2990	No Change	5716	5716	No Change	8706	8706	No Change
Poor/Blendable	-	-	-	18527	18527	No Change	18527	18527	No Change
Unclassified	2736	2736	No Change	-	-	-	2736	2736	No Change
Not known	9470	9470	No Change	7367	7367	No Change	16837	16837	No Change

figures rounded off

Of the total resources of bentonite, about 265 million tonnes (47%) resources are under inferred (333) 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 in the country may improve.

In the inventory as on 1.4.2010 total 59 deposits have been covered out of which 41 deposits are in freehold areas and 18 deposits in leasehold areas (public -01 and private - 17).

Table – 2 : Total Resources of Bentonite as on 1.4.2010 vis-à-vis 1.4.2005 (By States)

(In '000 tonnes)

State	Total Resources		Net Change
	As on 1.4.2010	As on 1.4.2005	
All India : Total	**568367**	**530574**	**(+)37793**
Gujarat	134179	96553	(+)37626
Jammu & Kashmir	147	148	(-)1
Jharkhand	980	812	(+)168
Rajasthan	423517	423517	No Change
Tamil Nadu	9544	9544	No Change

figures rounded off

Table - 3 : District wise Reserves/Resources of Bentonite as on 1.4.2010

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	**25060**	**543307**	**568367**
Gujarat	**12460**	**121719**	**134179**
Amreli	-	616	616
Bhavnagar	2990	33936	36926
Jamnagar	-	420	420
Kutch	-	67200	67200
Sabarkantha	9470	19502	28972
Surendranagar	-	45	45
Jammu & Kashmir	**-**	**147**	**147**
Jammu	-	147	147
Jharkhand	**609**	**371**	**980**
Pakur	609	234	843
Sahebganj	-	137	137
Rajasthan	**11991**	**411526**	**423517**
Barmer	11991	400096	412087
Jaisalmer	-	3270	3270
Jhalawar	-	8160	8160
Tamil Nadu	**-**	**9544**	**9544**
Chengai-Anna	-	9544	9544

figures rounded off

10.2 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.

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 1.4.2010.

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 probable (122) category.

The remaining resources have been placed under indicated (332) and inferred (333) categories.

Salient Features of the Inventory

All India scenario of fuller's earth reserves, remaining resources and total resources as on 1.4.2010 vis-a-vis 1.4.2005, 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 1.4.2010 have been given.

The total resources of fuller's earth in the country as on 1.4.2010 are estimated at 256,652 thousand tonnes, of these, about 58 thousand tonnes fall under reserve category and the balance 256,594 thousand tonnes are under remaining resources.

About 73% of the total resources are in freehold and the balance 27% in leasehold (private) areas (Table-1).

Of the four major states , Rajasthan is credited with 190,059 thousand tonnes (74%) resources, followed by Andhra Pradesh, 25,524 thousand tonnes (10%), Arunachal Pradesh 20,011 thousand tonnes (8%) and Assam 18,860 thousand tonnes (7%). The balance 2,198 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%). As such there is no change in the resource position in the inventory as on 1.4.2010 as compared to the inventory as on 1.4.2005 (Table -2).

Almost the entire resources of fuller's earth, 255,682 thousand tonnes (99.6%), are under inferred (333) 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 31 deposits covered in the mineral inventory as on 1.4.2010, 23 are freehold deposits and 8 deposits are in leasehold areas.

Table - 1 : Reserves/Resources of Fuller's Earth as on 1.4.2010 vis-à-vis 1.4.2005
(By Lease Status/Grade)

(In '000 tonnes)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2010	1.4.2005	Net change	1.4.2010	1.4.2005	Net change	1.4.2010	1.4.2005	Net change
All India/ Unclassified	**58**	**58**	**No change**	**256594**	**256594**	**No change**	**256652**	**256652**	**No change**
Freehold									
Unclassified	58	58	No change	187243	187243	No change	187301	187301	No change
Leasehold (Private)									
Unclassified	-	-	No change	69351	69351	No change	69351	69351	No change

figures rounded off

Table – 2 : Total Resources of Fuller's Earth as on 1.4.2010 vis-à-vis 1.4.2005 (By States)

(In '000 tonnes)

State	Total Resources		Net Change
	As on 1.4.2010	As on 1.4.2005	
All India : Total	**256652**	**256652**	**No Change**
Andhra Pradesh	25524	25524	No Change
Arunachal Pradesh	20011	20011	No Change
Assam	18860	18860	No Change
Karnataka	2081	2081	No Change
Madhya Pradesh	117	117	No Change
Rajasthan	190059	190059	No Change

figures rounded off

Table - 3 : District wise Reserves/Resources of Fuller's Earth as on 1.4.2010

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	**58**	**256594**	**256652**
Andhra Pradesh	**-**	**25524**	**25524**
Medak	-	3378	3378
Rangareddi	-	22146	22146
Arunachal Pradesh	**-**	**20011**	**20011**
Tirap	-	20011	20011
Assam	**-**	**18860**	**18860**
Nalbari	-	18860	18860
Karnataka	**58**	**2023**	**2081**
Belgaum	-	576	576
Gulbarga	58	1447	1505
Madhya Pradesh	**-**	**117**	**117**
Mandla	-	117	117
Rajasthan	**-**	**190059**	**190059**
Barmer	-	78153	78153
Bikaner	-	111265	111265
Jaisalmer	-	641	641

figures rounded off

10.3 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.

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 1.4.2010, the following three fold classification of various granites based on colour has been adopted:

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

Basis of Categorisation of Resources

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

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

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

Salient Features of the Inventory

All India scenario of granite reserves, remaining resources and total resources as on 1.4.2010 vis-a-vis 1.4.2005, 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 1.4.2010 have been given.

The total resources of granite in the country as on 1.4.2010 are estimated at 46,230,300 thousand cubic metres, of these 2,63,692 thousand cubic metres (0.57%) fall under reserve category and 45,966,608 thousand cubic metres (99.42%) are under remaining resource category. Of the total resources, the share of freehold areas is 38,366,007 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%).

Of the total resources, black granite constitutes 3,175,688 thousand cubic metres (7%), coloured granite 42,649,661 thousand cubic metres (92%) and unclassified resources are about 404,951 thousand cubic metres (1%) (Table-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 (20.1%), followed by Rajasthan 9,190,665 thousand cubic metres (19.8%), Jharkhand 8,875,340 thousand cubic metres (19.1%), Gujarat 8,501,947 thousand cubic metres(18.3%), Andhra Pradesh 2,405,890 thousand cubic metres (5.2%), Madhya Pradesh 1,994,084 thousand cubic metres (4.3%), Odisha 1,843,060 thousand cubic metres (3.9%), Maharashtra 1,158,847 thousand cubic metres (2.5%), Bihar 877,612 thousand cubic metres (1.8%). Assam 583,950 thousand cubic metres (1.2%), Tamil Nadu 559,435 thousand cubic metres (1.2%), Uttar Pradesh 494,819 thousand cubic metres (1.0%). The balance 0.87% resources have been accounted for by the states of Meghalaya, Chhattisgarh, Haryana, West Bengal and Kerala (Table-2).

In the inventory as on 1.4.2010, a net increase of 8,804,299 thousand cubic metres resources have been recorded as compared to the inventory as on 1.4.2005.

Table - 1 : Reserves/Resources of Granite as on 1.4.2010 vis-à-vis 1.4.2005
(By Lease Status/Grade)

(In '000 cu m)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2010	1.4.2005	Net change	1.4.2010	1.4.2005	Net change	1.4.2010	1.4.2005	Net change
All India : Total	**263692**	**1130024**	**(-)866332**	**45966608**	**36295977**	**(+)9670631**	**46230300**	**37426001**	**(+)8804299**
Black Granite	16906	16116	(+)790	3158783	3144393	(+)14390	3175688	3160509	(+)15179
Coloured Granite	246786	1113908	(-)867122	42402875	32792449	(+)9610426	42649661	33906357	(+)8743304
Unclassified	-	-	No Change	404951	359135	(+)45816	404951	359135	(+)45816
Freehold	**-**	**976929**	**(-)976929**	**38366007**	**28684245**	**(+)9681762**	**38366007**	**29661174**	**(+)8704833**
Black Granite	-	384	(-)384	2411310	2408996	(+)2314	2411310	2409380	(+)1930
Coloured Granite	-	976545	(-)976545	35557551	25923919	(+)9633632	35557551	26900464	(+)8657087
Unclassified	-	-	-	397146	351330	(+)45816	397146	351330	(+)45816
Leasehold (Public)	**15773**	**21045**	**(-)5272**	**389167**	**315540**	**(+)73627**	**404940**	**336585**	**(+)68355**
Black Granite	968	6646	(-)5678	286456	280829	(+)5627	287423	287475	(-)52
Coloured Granite	14805	14399	(+)406	102712	34711	(+)68001	117517	49110	(+)68407
Leasehold (Private)	**247919**	**132050**	**(+)115869**	**7211434**	**7296192**	**(-)84758**	**7459353**	**7428242**	**(+)31111**
Black Granite	15938	9086	(+)6852	461018	454568	(+)6450	476955	463654	(+)13301
Coloured Granite	231981	122964	(+)109017	6742612	6833819	(-)91207	6974593	6956783	(+)17810
Unclassified	-	-	-	7805	7805	No Change	7805	7805	No Change

figures rounded off

The scenario of these changes have been illustrated in the following paragraphs:

1) In Gujarat, an increase of 8,080,651 thousand cubic metres has been recorded in Banaskantha, Mahesana, Panchmahal, Sabarkantha and Vadodara district due to addition of 12 new deposits.

2) In Karnataka, an increase of 30,215 thousand cubic metres has been recorded due to addition of 65new deposits and blocks, mainly in Bangalore, Chamarajanagar, Coorg, Hassan, Koppal and Mysore districts.

3) In Jharkhand, an increase of 27976 thousand cubic metres has been recorded due to addition of 6 new deposits (one deposit each in Deogarh, Giridih, Hazaribagh, Jamtara,Kodarma and Simdega districts).

4) In Rajasthan, an increase of 665,457 thousand cubic metres has been recorded due to addition of 30 new deposits In Ajmer, Bhilwara, Jaisalmer, Jaipur, Jalore, Jodhpur, Pali, Rajsamand and Sirohi districts.

About 42,499,338 thousand cubic metres of the total resources are under inferred (333) category and 467,296 thousand cubic metres are under reconnaissance (334) category. These together account for about 93% of the total resources. 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 1.4.2010, total 731 deposits have been reported. Of these, 510 deposits are in freehold areas and the balance 221 deposits in leasehold areas comprising 180 deposits in leasehold private and 41 in public sector.

Table – 2 : Total Resources of Granite as on 1.4.2010 vis-à-vis 1.4.2005 (By States)

(In '000 cu m)

State	Total Resources		Net Change
	As on 1.4.2010	As on 1.4.2005	
All India : Total	**46230300**	**37426001**	**(+)8804299**
Andhra Pradesh	2405890	2405890	No Change
Assam	583950	583950	No Change
Bihar	877612	877612	No Change
Chhattisgarh	50057	50057	No Change
Gujarat	8501947	421296	(+)8080651
Haryana	34000	34000	No Change
Jharkhand	8875340	8847364	(+)27976
Karnataka	9337893	9307678	(+)30215
Kerala	2808	2808	No Change
Madhya Pradesh	1994084	1994084	No Change
Maharashtra	1158847	1158847	No Change
Meghalaya	286467	286467	No Change
Odisha	1843060	1843060	No Change
Rajasthan	9190665	8525208	(+)665457
Tamil Nadu	559435	559435	No Change
Uttar Pradesh	494819	494819	No Change
West Bengal	33426	33426	No Change

figures rounded off

Table - 3 : District wise Reserves/Resources of Granite as on 1.4.2010

(In '000 cu m)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	**263692**	**45966608**	**46230300**
Andhra Pradesh	**-**	**2405890**	**2405890**
Anantapur	-	1096	1096
Chittoor	-	554075	554075
Cuddapah	-	265	265
Guntur	-	1195000	1195000
Khammam	-	19	19
Medak	-	2150	2150
Nalagonda	-	125	125
Nellore	-	13000	13000
Prakasam (Ongole H.Q)	-	381665	381665
Srikakulam	-	198271	198271
Vizianagaram	-	17024	17024
Warangal	-	43200	43200
Assam	**-**	**583950**	**583950**
Goalpara	-	500800	500800
Kamrup	-	70100	70100
Karbi Anglong	-	13050	13050
Bihar	**-**	**877612**	**877612**
Bhagalpur	-	179000	179000
Gaya	-	21870	21870
Jahanabad	-	676000	676000
Jamui	-	742	742
Chhattisgarh	**-**	**50057**	**50057**
Bastar	-	45930	45930
Kanker	-	1250	1250
Raipur	-	2877	2877
Gujarat	**-**	**8501947**	**8501947**
Banaskantha	-	7773976	7773976
Mahesana	-	263949	263949
Panchmahals	-	96750	96750
Sabarkantha	-	367092	367092
Vadodara	-	180	180
Haryana	**-**	**34000**	**34000**
Bhiwani	-	34000	34000
Jharkhand	**-**	**8875340**	**8875340**
Deogarh	-	2574445	2574445
Dhanbad	-	26192	26192
Dumka	-	623480	623480
Giridih	-	153651	153651
Godda	-	360000	360000
Gumla	-	46250	46250
Hazaribagh	-	8320	8320
Jamtara	-	11900	11900
Koderma	-	32575	32575
Lohardaga	-	67500	67500
Palamau	-	35950	35950
Ranchi	-	176550	176550
Simdega	-	225	225
Singhbhum (East)	-	4758302	4758302
Karnataka	**67587**	**9270306**	**9337893**
Bagalkot	4706	574452	579158
Bangalore	28408	5736975	5765383

(Contd.)

Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
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	-	286467	286467
Odisha	**80000**	**1763060**	**1843060**
Angul	-	41340	41340
Baudh	-	25	25
Bolangir	-	240	240
Cuttack	-	4020	4020
Deogarh	-	25650	25650
Dhenkanal	-	5000	5000
Ganjam	-	153331	153331
Keonjhar	-	50195	50195
Khurda	-	7219	7219

(Contd.)

Table-3 (Concld.)

State/District	Reserves	Remaining Resources	Total Resources
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
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

10.4 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.

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 (121) & (122) category.

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

Salient Features of the Inventory

All India scenarios of marble reserves, remaining resources and total resources as on 1.4.2005 vis-à-vis 1.4.2000, 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 1.4.2005 have been given.

The total resources of marble in the country as on 1.4.2005 are estimated at 1,792,638 thousand tonnes of these, a meagre quantity of about 4,700 thousand tonnes (0.3%) fall under reserve category and 1,787,938 thousand tonnes (99.7%) are under remaining resource category.

Of the total resources, the share of freehold areas is 604,295 thousand tonnes (33.8%), leasehold public sector 3,427 thousand tonnes (0.2%) and leasehold private sector 1,184,916 thousand tonnes (66%).

Out of the total resources, white colour marble constitutes 8,566 thousand tonnes (0.5%), off colour marble 677,543 thousand tonnes (38%), unclassified 1,080,531 thousand tonnes (60%) and not known grade 25,998 thousand tonnes (1.5%) (Table - 1).

Statewise, distribution of resources reveals that Rajasthan is credited with 1,122,435 thousand tonnes (62.6%) followed by Jammu & Kashmir 404,703 thousand tonnes (22.6%), Gujarat 93,740 (5.2%), Chhattisgarh 83,000 thousand tonnes (4.6%), Maharashtra 58,047 thousand tonnes (3.2%), Haryana 22,328 thousand tonnes (1.2%), The balance 8,385 thousand tonnes resources have been accounted by Uttarakhand, Sikkim and Andhra Pradesh (Table -2).

In the inventory as on 1.4.2005, a net increase of 1,329 thousand tonnes resources have been recorded as compared to the inventory as on 1.4.2000. Out of which about 2,601 thousand tonnes resources have been increased in Alwar district, Rajasthan due to addition of one new deposit, where as about 1,271 thousand tonnes resources have been decreased in Banaskantha district, Gujarat due to downward revision of resources in leasehold private deposit.

About 1,506,688 thousand tonnes (84%) resources have been estimated under inferred (333) category. 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.

A total 82 deposits have been reported in the inventory as on 1.4.2005. Of these, 54 deposits are in freehold areas and the balance 28 deposits are in leasehold areas. Out of the total freehold deposits, resources have not been estimated in 30 deposits.

Table - 1 : Reserves/Resources of Marble as on 1.4.2010 vis-à-vis 1.4.2005
(By Lease Status/Grade)

(In '000 tonnes)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2010	1.4.2005	Net change	1.4.2010	1.4.2005	Net change	1.4.2010	1.4.2005	Net change
All India : Total	**276495**	**4700**	**(+)271795**	**1654968**	**1787938**	**(-)132970**	**1931463**	**1792638**	**(+)138825**
White Colour	197204	373	**(+)196831**	133523	8193	(+)125330	330727	8566	(+) 322161
Off Colour	79095	108	**(+)78987**	992390	677435	(+)314955	1071485	677543	(+) 393942
Unclassified	-	-	-	520382	1080531	(-)560149	520382	1080531	(-) 560149
Not Known	196	4219	(-) 4023	8673	21779	(-)13106	8869	25998	(-)17129
Freehold	**-**	**157**	**(-) 157**	**930051**	**604138**	**(+)325913**	**930051**	**604295**	**(+)325756**
White Colour	-	49	(-) 49	8360	1390	(+) 6970	8360	1439	(+) 6921
Off Colour	-	108	(-) 108	485900	171208	(+)314692	485900	171316	(+) 314584
Unclassified	-	-	-	433191	428940	(+) 4251	433191	428940	(+) 4251
Not Known	-	-	-	2600	2600	No Change	2600	2600	No change
Leasehold (Public)	**-**	**-**	**-**	**2**	**3427**	**(-)3425**	**2**	**3427**	**(-)3425**
White Colour	-	-	-	Negligible	-	-	Negligible	-	
Off Colour	-	-	-	2	3427	(-)3425	2	3427	(-)3425
Unclassified	-	-	-	-	-	-	-	-	-
Leasehold (Private)	**276495**	**4543**	**(+) 271952**	**724915**	**1180373**	**(-)455458**	**1001410**	**1184916**	**(-)183506**
White Colour	197204	324	**(+) 196880**	125163	6803	(+) 118360	322367	7127	(+) 315240
Off Colour	79095	-	(+) 79095	506488	502800	(+)3688	585583	502800	(+) 82783
Unclassified	-	-	-	87191	651591	(-)564400	87191	651591	(-) 564400
Not known	196	4219	(-)4023	6073	19179	(-)13106	6269	23398	(-) 17129

figure rounded off

Table – 2 : Total Resources of Marble as on 1.4.2010 vis-à-vis 1.4.2005 (By States)

(In '000 tonnes)

State	Total Resources		Net Change
	As on 1.4.2010	As on 1.4.2005	
All India : Total	**1931463**	**1792638**	**(+)138825**
Andhra Pradesh	3	3	No Change
Chhattisgarh	83000	83000	No Change
Gujarat	123571	93740	(+) 29831
Haryana	22328	22328	No Change
Jammu & Kashmir	404703	404703	No Change
Maharashtra	58047	58047	No Change
Rajasthan	1231429	1122435	(+)108994
Sikkim	2382	2382	No Change
Uttarakhand	6000	6000	No Change

figures rounded off

Table - 3 : District wise Reserves/Resources of Marble as on 1.4.2010

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	**276495**	**1654968**	**1931463**
Andhra Pradesh	**-**	**3**	**3**
Khammam	-	3	3
Chhattisgarh	**-**	**83000**	**83000**
Bastar	-	83000	83000
Gujarat	**-**	**123571**	**123571**
Banaskantha	-	120481	120481
Vadadora	-	3090	3090
Haryana	**-**	**22328**	**22328**
Mahendragarh	-	22328	22328
Jammu & Kashmir	**-**	**404703**	**404703**
Kupwara	-	404703	404703
Maharashtra	**324**	**57723**	**58047**
Bhandara	324	283	607
Nagpur	-	57440	57440
Rajasthan	**276171**	**955258**	**1231429**
Ajmer	77595	94309	171904
Alwar	-	182600	182600
Banswara	-	287820	287820
Bhilwara	12900	8065	20965
Bundi	-	25000	25000
Chittorgarh	-	1500	1500
Dungarpur	-	5000	5000
Jaipur	196	4000	4196
Jaisalmer	-	94000	94000
Jalore	-	500	500
Jodhpur	-	17500	17500
Nagaur	-	56000	56000

(Contd.)

Table-3 (Concld.)

State/District	Reserves	Remaining Resources	Total Resources
Rajasamand	180980	113920	294900
Sikar	-	4023	4023
Sirohi	4500	821	5321
Udaipur	-	60200	60200
Sikkim	**-**	**2382**	**2382**
Sikkim East	-	2	2
Sikkin North	-	2380	2380
Uttarakhand	**-**	**6000**	**6000**
Dehradun	-	6000	6000

figures rounded off