

VERMICULITE



Indian Minerals Yearbook 2013

(Part- III : Mineral Reviews)

52nd Edition

VERMICULITE

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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January, 2015

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Vermiculite is a term applied commercially to micaceous minerals (essentially hydrated silicates of Al, Mg and Fe), usually alteration products of biotite or phlogopite micas, formed by the removal of much alkalies and addition of water. Vermiculite differs from mica in its characteristic property, i.e., exfoliation. Crude vermiculite is always exfoliated before use.

RESOURCES

The total resources of vermiculite as on 1.4.2010 as per UNFC system are placed at 2.5 million tonnes of which about 68% are placed under reserves category. and balance 32% are placed under remaining resources category. Resources are located in Tamil Nadu (75%), Andhra Pradesh (14%), Karnataka (8%), Rajasthan (2%) and Jharkhand (1%). Minor resources are located in Gujarat, Madhya Pradesh and West Bengal (Table-1).

PRODUCTION, STOCKS & PRICES

Production of vermiculite at 7,689 tonnes in 2012-13 decreased by 25 % as compared to that in the previous year due to less demand. There were 6

reporting mines as against 5 mines in pervious year. Besides, production of vermiculite was reported as associated mineral by five mines in 2012-13 as against two mines in previous year. One producer from Tamil Nadu and five from Andhra Pradesh reported 98% output in 2012-13. About 48% of the total production was reported as an associated mineral by an apatite, felspar, mica & quartz mines in Andhra Pradesh. The share of public sector was 20 % as compared to 15 % in the preceding year.

Andhra Pradesh was the leading producing state of vermiculite in 2012-13 and accounted for 80% of the total output and remaining 20% was from Tamil Nadu (Tables - 2 to 4).

Mine-head stocks at the end of 2012-13 were 12,264 tonnes as against 10,685 tonnes in the beginning of the year (Table - 5).

The average daily employment of labour during the year was 98 as against 88 in the preceding year.

Domestic prices of vermiculite are furnished in the General Review on 'Prices'.

Table – 2 : Principal Producers of Vermiculite, 2012-13

Name & address of producer	Location of mine	
	State	District
Gomupalli Aruna, 8/445, Puri palem, P. O. Ranganayakulapet, SPSR Nellore-524 001, Andhra Pradesh.	Andhra Pradesh	Nellore
Dugar Insulation India(P) Ltd, Dugar Nagar, Gudur, Distt. Nellore-524 102, Andhra Pradesh.	Andhra Pradesh	Nellore
Tamil Nadu Minerals Ltd, 31, Kamrajjar Salai, Chepauk, Chennai-600 005, Tamil Nadu.	Tamil Nadu	Vellore
Sadhana Minerals, 1/116 Masthanvali Complex, N.H.-5, P.O. Chillakur-524 412, SPSR Nellore, Andhra Pradesh.	Andhra Pradesh	Nellore
Ani Mines & Minerals, V.L. Prasama, 27-2-18504, 9 th Lane, Ramji Nagar, Distt. Nellore-524 001, Andhra Pradesh.	Andhra Pradesh	Nellore

* Associated mine with mica.

**Table-1: Reserves/Resources of Vermiculite as on 1.4.2010
(By Grades/States)**

(In tonnes)

Grade/State	Reserves				Remaining resources							Total resources (A+B)	
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334		Total (B)
		STD121	STD122			STD221	STD222						
All India: Total	1628475	24593	50939	1704007	22733	75790	71744	35195	24930	569012	3600	803004	2507011
By Grades													
Refractory	32217	-	14238	46455	-	-	-	-	-	807	-	807	47262
Unclassified	1596258	24593	36701	1657552	22733	75790	71744	35195	24930	568205	3600	802197	2459749
By States													
Andhra Pradesh	102058	24593	50939	177590	1912	3981	2750	35195	9878	119270	3600	176586	354176
Gujarat	-	-	-	-	-	-	-	-	-	1960	-	1960	1960
Jharkhand	-	-	-	-	-	-	-	-	-	30048	-	30048	30048
Karnataka	-	-	-	-	-	69050	64500	-	1562	66658	-	201770	201770
Madhya Pradesh	-	-	-	-	197	-	66	-	-	66	-	329	329
Rajasthan	-	-	-	-	20623	2759	4428	-	13000	2883	-	43693	43693
Tamil Nadu	1526417	-	-	1526417	-	-	-	-	-	343051	-	343051	1869468
West Bengal	-	-	-	-	-	-	-	-	490	5076	-	5566	5566

Figures rounded off.

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**Table – 3 : Production of Vermiculite, 2010-11 to 2012-13
(By States)**

(Qty in tonnes; value in ₹'000)

State	2010-11		2011-12		2012-13(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	19234	13132	10194	7085	7689	5544
Andhra Pradesh	17081	8314	8652	3631	6169	2118
Tamil Nadu	2153	4818	1542	3454	1520	3426

**Table – 4 : Production of Vermiculite, 2011-12 and 2012-13
(By Sectors/States/Districts)**

(Qty in tonnes; value in ₹'000)

State/District	No. of mines	2011-12		No. of mines	2012-13 (P)	
		Quantity	Value		Quantity	Value
India	5(2)	10194	7085	6(5)	7689	5544
Public sector	1	1542	3454	1	1520	3426
Private sector	4(2)	8652	3631	5(5)	6169	2118
Andhra Pradesh	4(2)	8652	3631	5(5)	6169	2118
Nellore	4(1)	8113	3182	5(4)	6129	2085
Visakhapatnam	(1)	539	449	(1)	40	33
Tamil Nadu	1	1542	3454	1	1520	3426
Vellore	1	1542	3454	1	1520	3426

Figures in parentheses indicate the number of associated mines with apatite, feldspar, mica and quartz.

**Table – 5 : Mine-head Stock of Vermiculite, 2012-13(P)
(By States)**

(Qty in tonnes)

State	At the beginning of the year	At the end of the year
India	10685	12264
Andhra Pradesh	5608	3995
Rajasthan	-	100
Tamil Nadu	5077	8169

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USES

Vermiculite is known for its horticultural applications. It is a common component in potting soils. Unfoliated (unexpanded) vermiculite has only minor uses, such as for circulation in drilling muds and in the annealing of steel. In order to convert raw vermiculite into a product suitable for industrial use, it must be exfoliated or expanded by heating, a process termed 'exfoliation'. Vermiculite is chemically inert, fireproof, non-conductor of electricity and a good insulator against heat (both radiant and conducted), cold and sound. Unlike cork and other organic lightweight insulating material, it does not rot, is not attacked by vermin and has a fair mechanical strength.

It is also used as a carrier in fertilizers, herbicides and insecticides. Cementing mixtures of exfoliated vermiculite and binding agents, such as gypsum and plaster, have been important products and are applied to structural steel members in commercial buildings.

The mineral is used in various types of building boards. Fine-sized, untreated vermiculite concentrates are included in the preparation of fireproof plaster boards. The exfoliated product forms the basis of some lightweight plasterboard, whilst ground, exfoliated vermiculite is used in various refractory board products.

The principal uses of expanded vermiculite are based on its thermal insulating quality (due to presence of innumerable air cells), low-density, fireproof nature and granular form. Larger vermiculite granules are used as a loose fill for thermal insulation for homes, industrial structures, cold storage, refrigeration and high temperature and low temperature industrial equipment.

The high absorbency and chemical inertness of exfoliated vermiculite has made it suitable for a wide range of absorbent packing materials as well as for packaged units for the containment of oil and similar liquids.

SUBSTITUTES

Expanded perlite is a substitute for vermiculite in lightweight concrete and plaster. Other more dense

but less costly material substitutes in these applications are expanded clay, shale, slag and slate. In agriculture, substitutes include peat, perlite, sawdust, bark and other plant materials and synthetic soil conditioners.

CONSUMPTION

In 2012-13, the consumption of vermiculite was estimated at 1,610 tonnes. The asbestos-product and refractory industries were the main consumers of vermiculite (Table - 6).

POLICY

Imports of vermiculite (unexpanded) are allowed freely under HS Code 25301010, as also those of vermiculite insulation bricks under HSCode 69029030 as per the Export-Import Policy, 2009-2014 and the Foreign Trade Policy there under.

**Table - 6 : Consumption of Vermiculite
2010-11 to 2012-13
(By Industries)**

	(In tonnes)		
Industry	2010-11	2011-12(R)	2012-13(P)
All Industries	900	3780	1610
Asbestos products	700(1)	NA	NA
Refractory	200(5)	NA	NA

Figures rounded off.

Figures in parentheses denote the number of units in organised sector reporting consumption.*

(Includes actual reported consumption and/or estimates made wherever required).*

NA: Industry wise figures not available.

WORLD REVIEW

The World reserves of vermiculite at the end of the year 2012 were estimated as per Mineral Commodity Summaries 2014. The details are given in Table-7.

In 2012, the World production was estimated at 461 thousand tonnes. USA, Japan, Saudi Arabia were the principal producers (Table-8).

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**Table – 7: World Reserves of Vermiculite
(By Principal Countries)**

(In '000 tonnes)

Country	Reserve
World: Total (Rounded)	NA
Brazil	15800
Bulgaria	NA
China	NA
India*	1700
Russia	NA
South Africa	14000
USA ^(e)	25000
Uganda	NA
Other countries	15000

Source: Mineral Commodity Summaries, 2014.

* The total resources of vermiculite as per UNFC System as on 1.4.2010 are estimated at 2.51 million tonnes.

**Table – 8: World Production of Vermiculite
(By Principal Countries)**

(In '000 tonnes)

Country	2010	2011	2012
Australia	8	8	9 ^(e)
Brazil	50	55	55 ^(e)
China ^(e)	120	120	120
India*	19	10	8
Japan ^e	6	6	6
Russia ^e	30	30	30
South Africa	199	171	133
USA ^{(e)#}	100	100	100

Source : World Mineral Production, 2008-2012.

Sold or used by producers.

*India's production of vermiculite during 2010-11, 2011-12 & 2012-13 was 19.23 thousand tonnes, 10.19 thousand tonnes and 7.69 thousand tonnes respectively.

FOREIGN TRADE

Exports

Exports of vermiculite were decreased sharply to 647 tonnes in 2012-13 compared to 1,139 tonnes in 2011-12. Exports were mainly to UAE (51%), Norway (22%) and New Zealand (9%) (Table-9).

Imports

Imports of vermiculite decreased considerably to 171 tonnes in 2012-13 from 222 tonnes in 2011-12. Imports were mainly from USA (46%) & South Africa (25%) and Singapore (14%) (Table - 10).

**Table – 9: Exports of Vermiculite
(By Countries)**

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	1139	10019	647	5502
UAE	293	1947	327	3282
Norway	118	535	144	745
Belgium	73	951	25	357
UK	22	261	24	350
Denmark	-	-	10	249
Chinese Taipei/ Taiwan	-	-	15	199
Japan	223	1887	21	178
New Zealand	-	-	60	71
Singapore	27	385	16	48
Sri Lanka	1	9	5	19
Other countries	382	4044	++	4

**Table – 10: Imports of Vermiculite
(By Countries)**

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	222	8227	171	8263
USA	18	679	79	3149
Japan	21	801	12	1936
Saudi Arabia	2	1342	1	995
South Africa	124	3331	43	993
Singapore	-	-	24	841
Korea, Rep. of	2	212	1	153
China	11	806	10	117
Italy	-	-	1	79
Other countries	44	1056	-	-