PERLITE

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Between 1990 and 2003 the world perlite market grew from 1.7 Mt to 2.8 Mt/y. North America and Western Europe continue to be the main consuming regions, although strong growth is being experienced elsewhere and in Asia in particular. The main growth applications are in accoustic ceiling tiles (as lightweight, fireproof insulating aggregate) and in horticulture (as a porous growing medium).

Expanded perlite has excellent thermal and sound insulation properties and is widely used in construction as aggregate in insulation board, plaster and concrete, and as loose fill insulation in cavity walls. Other insulation uses include cryogenics, where it used in lining tanks for gases held at low temperature. It is also used in filtration (as filter media), in horticulture (as soil conditioner and rooting medium), and as a filler in paints, plastics and other products.

Production
World production (Table 1) of raw perlite was estimated to be 2.8 Mt in 2003 and the leading producers were the US, Greece (Table 2), China, Turkey and Japan. Their combined output accounted for over 85% of the world total.

World production and supply are dominated by three companies (Table 3): S&B Industrial Minerals SA (formerly Silver & Baryte Ores Mining Co), Grefco, and World Minerals. Through their network of subsidiaries and associates, these companies account for approximately 60% of world raw perlite output. S&B, alone, accounts for over one-third of world raw perlite output.

S&B is a Greek company, quoted on the Athens Stock Exchange, with 2003 sales revenue of €290 million. In recent years it has grown through expansion and acquisition to become a major industrial minerals group and a world leader in perlite and bentonite. The company is also Europe’s largest remaining bauxite producer through the activities of its subsidiaries, Greek Helikon Bauxites and Bauxite Parnasse.

The company’s main perlite and bentonite operations are based on the island of Milos in the Aegean where a number of open-pit mining operations serve the main processing plant at Vouthia Bay in the south of the island. Greece’s perlite exports totalled 587,629 t in 2003 and shipments to the US and Canada (45%) now exceed those to Western Europe (33%). It would appear that S&B has increased shipments from its Turkish and Italian operations to maintain market share in Europe. At the end of 2003, S&B acquired the Bulgarian perlite and bentonite producer, Bentonit AD of Kardzali.

S&B now operates perlite mining and processing facilities in Greece, Turkey, Italy, Bulgaria, and China, with total processed perlite capacity of over 1 Mt/y.

The company is the dominant supplier to European markets but also plays a significant role in North American markets, too, through its subsidiary, Eastern Industrial Minerals, which handles sales of Milos perlite in the US. S&B is able to take advantage of low freight rates by shipping in vessels of up to 30,000 t DWT and is thus competitive with US producers, particularly in the eastern states of the US and eastern provinces of Canada. According to US trade data, the US imported 245,000 t of crushed and graded perlite from Greece in 2003 equivalent to around 35% of total US consumption.

Grefco and World Minerals are both US companies and have their domestic operations based on the classic deposits at No Agua, New Mexico. Both are also highly active in the production and sales of expanded perlite and downstream products. In particular, these two companies dominate the world's perlite filter aid market.

Grefco's No Agua mine and plant and a second mine/plant unit at Socorro, New Mexico, are operated by a subsidiary, Dicaperl. The company also has raw perlite operations at Oriental in Puebla state in Mexico (Mineral Oriental) and at Aragats in Armenia (Aragats Perlite). In the US Grefco is also highly active in expanded perlite production through the activities of Dicalite (specialising in perlite filter aids) and Chemrock (specialising in insulation and construction products). The company also has a major expanded perlite plant at Ghent in Belgium, which is supplied by a combination of Turkish and Armenian raw perlite.

World Minerals is part of Alleghany Corp and conducts its perlite mining and processing activities through its Harborlite subsidiary. In addition to its 350,000 t/y facility at No Agua the company also operates perlite mine/plant units at Superior, Arizona, and at Diklili in the Bergama area of Turkey. Harborlite is also very active in the market for expanded perlite products (including filter aids) and operates expansion plants in France, the UK, Spain, and Italy.

Other established US perlite mining companies include Eagle-Picher Minerals in Nevada; American Perlite Co in California; Idaho Minerals in Idaho; Cornerstone Industrial Minerals in Oregon; Basin Perlite in Utah; and Wilkins Mining & Trucking in Nevada.

In Eastern Europe the main producer is Hungary through the Perlit 92 operations at Palhaza, now owned by Duna-Drava Cement Co. The company exported around 35,000 t to Germany and Austria in 2002.

In Turkey there are five main producers of raw perlite and the two largest producers are owned by major groups – Pabalk/Saba (S&B) and Harborlite Aegean (World Minerals). These two companies account for the bulk of Turkey's exports, which are currently in the region of 180,000 t/y (150,000 t/y to Western Europe). The remaining three producers of raw perlite – Perlitas, Persa, and Eti Holding (formerly Etibank) – now concentrate mainly on domestic and regional markets.

Japan's industry is dominated by production from Mitsui Mining & Smelting in Kushiro and Kitakata; Ube Kosan in Yamaguchi prefecture; and Asano Perlite (now part of Taiheiyo Cement) in Chiba. Production has been around 250,000 t/y for most of the past decade and virtually all production has been for domestic consumption.

The expanded perlite market

Both Harborlite and Grefco are also major producers of expanded perlite and downstream products. A large number of companies operate in the expanded perlite sector but the largest by far in volume terms is Armstrong, a major producer of accoustic ceiling tiles. These tiles account for 33% of US raw perlite consumption and 20% in Western Europe (Table 4). Other important expanded perlite producers include: Silbrico, USG, GAF, Permalite, and Celotex in the US; CECA, Deutsche Perlit (Knauf), Tilcon, BPB, Pull, and Peletico in Europe; and Mitsui Mining and Tokyo Perlite in Japan

Prices

Perlite prices tend to remain fairly stable. During the past six years, the average ex-works value of perlite sold to expanders in the US has increased gradually from US$33/t in 1997 to US$39/t in 2003. Average values for expanded perlite range from around US$145/t for accoustic ceiling tile grades through US$327/t for filter aids, and some filler grades exceed US$400/t.

In Europe, fob prices in 2003 for crushed and graded raw perlite ranged from around US$20-25/t for fines (ie, tile grade) to US$50-80/t for coarse grades. Expanded perlite aggregate ex-works prices (for construction, insulation, and horticultural applications) remain in the US$300-450/t range.

The prices published on a regular basis in *Industrial Minerals* magazine have been very stable in recent years although expanded perlite prices in Europe increased during the 2003-04 period in response to rising fuel costs.

Outlook

Perlite in building and construction is used as an ultra-lightweight aggregate in plaster and concrete, as loose-fill insulation and as a prime ingredient in insulating board and ceiling tiles. Some of these markets – particularly insulating board and ceiling tiles – have shown exceptional growth in recent years whereas the others can only be described as declining or low-growth markets.

The other main industrial use for perlite is in filter aids for: water treatment and purification, beer and wine clarification, and the processing of sugar and sweeteners; oils and fats; and chemicals and pharmaceuticals. Such markets are well established in North America and Western Europe but still offer useful growth elsewhere. However, the most promising area for growth is in horticulture, where expanded perlite is finding increasing usage as a substrate for greenhouse crops and in fine form as a peat replacement.

Table 1: World perlite production ('000 t)

	2001	2002	2003
Greece	650	650	700
China	550	600	650
US	588	521	493
Turkey	300	300	300
Japan	260	260	260
Hungary	150	150	150
Mexico	80	80	90
Italy	65	65	65
Armenia	40	40	40
Others	30	30	30
Slovakia	20	20	20
Philippines	6	6	6
Total	**2,739**	**2,722**	**2,804**

Source: Mainly BMC estimates

Table 2: Greek perlite exports (t)

Destination	2002	2003
US	194,021	229,640
Israel	67,127	81,540
Germany	77,063	81,010
Netherlands	25,898	44,652
Canada	45,421	34,960
Spain	20,310	31,598
Cyprus	1,518	17,138
Austria	6,989	14,765
Russia	4,008	12,330
France	3,310	9,692
Italy	10,117	9,059
UK	2,303	6,550
Saudi Arabia	2,500	4,520
Other	1,389	10,175
Total	**461,974**	**587,629**

Table 3			
Country	**Operator**	**Location**	**Capacity**
Greece	Silver & Baryte	Milos	650,000
Turkey	Pabalk Maden (mining)	Biga	
	Saba Madencilik	Biga	120,000
Italy	Sarda Perlite	Oristano, Sardinia	80,000
Bulgaria	Bentonit AD	Kardzali	40,000
China	Xinyang-Athenian Mining	Xinyang	
	Shimco (Sino-Hellenic Ind Mins)	Xinyang	250,000

Table 4: US expanded perlite consumption by application (t)

	2002	**2003**
Formed products – tiles, board, etc	415,000	401,000
Horticultural	89,400	86,400
Fillers	57,300	66,600
Filter aids	57,500	59,600
Other	36,560	33,630
Concrete & plaster aggregate	6,670	10,460
Insulation inc. cryogenics	9,730	7,000
Total	**672,160**	**664,690**

Source: USGS

Table 5: *IIndustrial Minerals* quotations (per tonne)

	May-03	**May-04**
Raw, crushed, graded, bulk, fob Turkey	US$32-60	US$32-60
Aggregate, expanded, ex-works UK	£200-375	£320-380
Filter aids, expanded, ex-works US	US$210-410	US$210-410