PERLITE

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Between 1990 and 2002 the world perlite market grew from 1.7 Mt to 2.7 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, concrete, and as loose fill insulation in cavity walls. Other insulation uses include cryogenics where it is used in lining tanks for gases held at low temperature. It is also used in filtration, in horticulture (as soil conditioner and rooting medium), and as a filler in paints, plastics, and other products.

World production of raw perlite (Table 1) was estimated to be of the order of 2.7 Mt in 2002 and the leading producers were the US, Greece, China, Turkey and Japan, whose combined output accounted for over 85% of world total.

World production and supply is dominated by three companies – Silver & Baryte Ores Mining (S&B), 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 around 30% of world raw perlite output.

S&B is a Greek company, quoted on the Athens Stock Exchange. In recent years 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 (Table 2) 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 on the south of the island. Greece’s perlite exports total 462,000 t in 2002 and shipments to the US and Canada (52%) now exceed those to Western Europe (31%). It would appear that S&B has increased shipments from its Turkish and Italian operations to maintain market share in Europe.

S&B now operates perlite mining and processing facilities in Greece, Turkey, Italy, and China with total processed perlite capacity of around 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 and is thus competitive with US producers, particularly in the eastern states of the US and eastern provinces of Canada. According to EU data, Greece exported 240,000 t of crushed and graded perlite to the US in 2002.

US producers

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 soft market has resulted in reduced capacity utilisation, particularly at No Agua. 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 operation 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, Cornerstone Industrial Minerals in Oregon, and Basin Perlite in Utah. Smaller or potential operations include American Perlite Co. in California and Idaho Minerals in Idaho.

In Eastern Europe the main producer is Hungary through the operations of Perlit 92 at Palhaza, now owned by the 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 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 in the 250,000-300,000 t/y range for most of the past decade and virtually all production has been for domestic consumption.

Expanded perlite

Both Harborlite and Grefco are also major producers of expanded perlite (Table 3) 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, that accounts for 33% of US raw perlite consumption and 20% in Western Europe. 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$36/t in 2002. Average values for expanded perlite range from around US$145/t for acoustic ceiling tile grades through US$320/t for filter aids and some filler grades exceed US$400/t. The projection that the price of natural gas in the US will remain at high levels for several years is a major burden for perlite expanders, and prices are expected to increase as a result.

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

Similarly, the prices published on a regular basis in *Industrial Minerals* magazine have been virtually unchanged over the past five years (Table 4).

Outlook

The use of perlite in building and construction concerns such applications as an ultra-lightweight aggregate in plaster and concrete, 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 usage of perlite is in filter aids, where it is used 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 also 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.

Although currently limited in terms of volume, microspheres represent a growing value-added market for perlite as a lightweight, inert, inorganic, non-toxic, hollow glass filler. For example, Basin Perlite offers uncoated plus silicon- and silane-coated grades of perlite microspheres at 100% -100 mesh (160 microns) with an average particle size of 250 mesh (60 microns) and a density range of 7-9 lb/f^3. Another major supplier is Noble International SA with its Noblite® grades produced in Oklahoma and Nevada in the US and near Paris, France.

Table 1: World Perlite Production ('000 t)

	2000	2001	2002
Greece	625	650	650
China	500	550	600
US	672	588	521
Turkey	250	300	300
Japan	260	260	260
Hungary	140	150	150
Mexico	69	80	80
Italy	65	65	65
Armenia	40	40	40
Slovakia	17	20	20
Philippines	6	6	6
Others	30	30	30
Total	**2,674**	**2,739**	**2,722**

Source: Mainly BMC estimates

Table 2: Operating Companies

Country	Operating company	Location	Processed capacity (t/y)
Greece	Silver & Baryte	Milos	650,000
Turkey	Pabalk Maden (mining)	Biga	
	Saba Madencilik	Biga	120,000
Italy	Sarda Perlite	Oristano, Sardinia	80,000
China	Xinyang-Athenian Mining (mining)	Xinyang	
	Sino-Hellenic Industrial Minerals	Xinyang	150,000

Table 3: US Expanded Perlite Consumption by Application (t)

	2001	**2002**
Formed products	452,000	415,000
Horticultural	81,000	89,400
Filter aids	56,800	57,500
Fillers	54,400	57,300
Insulation	6,630	9,730
Concrete & plaster aggregate	9,030	6,670
Other	33,340	36,560
Total	**693,200**	**672,160**

Source: USGS

Table 4: *Industrial Minerals* Quotations May 2001 and 2002

	£/t	**US$/t**
Raw crushed and graded in bulk, cif UK	55-60	91-99
Aggregate, expanded, ex-works UK	210-300	347-495
Filter aids, expanded, milled, del UK	312-335	515-553
Filter aids, expanded, milled, ex-plant US		210-422