PERLITE

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Between 1990 and 2001 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, particularly in Asia. 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 (as filter media), in horticulture (as soil conditioner and rooting medium), and as a filler in paints, plastics and other products.

World Perlite production ('000 t)

	1999	2000	2001
US	711	672	588
Greece	600	625	650
China	450	500	550
Turkey	250	250	300
Japan	260	260	260
Hungary	141	140	150
Slovakia	19	17	20
Mexico	62	69	70
Philippines	10	6	6
Italy	65	65	65
Armenia	40	40	40
Others	30	30	30
Total	**2,638**	**2,674**	**2,729**

Source: USGS and BMC estimates

World production of raw perlite was estimated to be of the order of 2.7 Mt in 2001 and the leading producers were the US, Greece, China, Turkey and Japan. Their 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 - which, through their network of subsidiaries and associates, 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, and 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 now exceed 500,000 t/y and are shipped principally to Western Europe (60%), the US and Canada (30%), and the Middle East (10%).

The major acquisition programme during the past decade has seen S&B become a major international perlite producer with operations in Greece, Turkey, Italy, and China, and a total processed perlite capacity of nearly 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. US imports from Greece were 137,000 t in 2001.

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

S&B is predominantly a supplier of raw (crushed and graded) perlite and its current involvement in perlite expansion and downstream products is primarily focused on Greek domestic markets served by its plant at Ritsona. This situation appeared to be changing when the company took over the German company, Otavi Minen, and thus became owner of plants at Buelstringen and Dorfprozelten in Germany for the production of expanded perlite and downstream products. However, these plants were sold to Deutsche Perlite in January 2002. Otavi continues its minerals distribution activities as a subsidiary of S&B.

The US

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 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 in 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; Wilkins Mining & Trucking and USF Corp. in New Mexico. Some of the newer perlite producers have been beset by problems in recent years but appear to be turning the corner and making some impact in the market. They these include: Cornerstone Industrial Minerals in Oregon (now owned by Seven Peaks Mining); Idaho Minerals in Idaho (now part-owned by the Hess Pumice group); and Basin Perlite (formerly Pearl Queen) in Utah.

In Eastern Europe, the main producer is Hungary through the Perlit 92 operations at Palhaza. Until recently the company has operated as a subsidiary of the Irish company, Navan Resources, but was acquired in 1999 by a major domestic consumer, Duna-Drava Cement. The company exported around 40,000 t to Germany and Austria in 1999.

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.

US Expanded Perlite Consumption by Application (t)

	1991	2001
Concrete & plaster aggregate	19,800	9,030
Fillers	29,100	54,400
Filter aids	69,300	56,800
Formed products	264,200	452,000
Horticultural	48,400	81,000
Insulation*	14,600	6,630
Other	6,400	33,340
Total	**451,800**	**693,200**

Source: USGS

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, 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 five 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$36.50/t in 2001. Average values for expanded perlite range from around US$145/t for accoustic ceiling tile grades through US$320/t for filter aids, and some filler grades exceed US$400/t.

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, as follows:

Industrial Minerals quotations May 2000 and 2001

	£/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

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 uses for perlite are 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.