CHRYSOTILE ASBESTOS

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Despite continued controversy surrounding the use of chrysotile asbestos, global chrysotile asbestos demand appears to have expanded in 2003, enabling world production to move up to 2.08 Mt, an increase of about 5.4% over 2002. This increase is attributable to significant production hikes in Russia, Brazil and Zimbabwe, whereas production in countries such as Kazakhstan, Canada and India is believed to have decreased. Production in the People's Republic of China is thought to have remained stable at 2002 levels.

Chrysotile and its uses

Asbestos is a generic name for naturally occurring minerals with the common characteristic of fibrous form. Included under this designation are minerals from the serpentine group, namely chrysotile, and from the amphibole group, which includes crocidolite, amosite, anthophyllite, actinolite and tremolite. Of all these minerals, chrysotile is the least hazardous to human health and is essentially the only form currently extracted in the world. Because of its chemical and physical properties, such as high strength, incombustibility, resistance to chemicals, durability and versatility, asbestos is an extremely useful material that has been, and still is being, widely used throughout the world. Some 90% of all chrysotile currently produced globally is used in asbestos-cement (fibrocement) products, 7% is used in friction products such as brake linings and clutch facings, and 3% is used in textiles and various other applications. Most low-density products, such as sprayed asbestos insulation, which were linked to most of the diseases and mortalities caused by asbestos exposure in the workplace, have been prohibited since the 1970s.

Consumption

As most of the asbestos is used to manufacture cement products for the construction industry, global consumption is largely concentrated in developing countries with large infrastructure projects. Other than Russia, which consumes about 60% of its production, Asian countries in general are the world's most important users, accounting for about 45% of global demand. However, influenced by the European asbestos ban, consumption in Asian countries has decreased in recent years. Pursuing the trend started in 1998, demand from Japan decreased further as a result of the depressed state of its economy and the Japanese manufacturing industry's gradual switch to substitute materials. Moving in the opposite direction, demand from China, South Korea and Pakistan increased while that from other Asian countries either remained stable or declined slightly. For that matter, demand from the fibro-cement product manufacturing industries in India, Indonesia, Thailand and Malaysia remained strong as these products are still considered the best cost-benefit construction material in hot and humid climates.

Consumption in the Middle East (mostly in the United Arab Emirates and Iran) and in Africa (essentially in Algeria, Angola, Morocco and Senegal) accounts for about 20% of world demand. However, import levels to these regions have varied in recent years as a result of social unrest and the influence of European policy changes.

Also influenced by tendencies in Europe and under corporate pressure to substitute chrysotile asbestos – an important percentage of Latin American consuming companies are subsidiaries of companies headquartered in Europe – the Americas decreased its relative position but remained an important consumer of chrysotile, accounting for about 13% of world demand. Brazil, the world's fourth-largest producer of chrysotile, is the area's main supplier and user, while Colombia, Cuba, Ecuador, El Salvador, Mexico, Panama and Venezuela each have a dynamic chrysotile asbestos manufacturing industry. Consumption in the US during the year fell to about 6,000 t, compared with around 7,000 t in 2002, and reflected further substituting. However, demand is expected to stabilise at this lower level for the coming years, as the remaining uses for chrysotile are more difficult to substitute.

In Europe, which now accounts for less than 1% of global demand, the gradual compliance of countries to the European Union ban decision on chrysotile consumption led to a further drop in imports in 2003 compared with 2002. The change in demand registered during the year stems from the end of Spain's imports and Portugal's gradual switch to substitute fibres. Further decreases are still expected in the coming years as Portugal, the last remaining EU consuming country, reluctantly complies with the EU ban directive by the year 2005 and other European countries align their policies dealing with asbestos with that of the EU.

Production

Pursuing the trend of recent years, Kazakhstan, Russia, Brazil and Zimbabwe took advantage of the devaluation of their respective currencies and/or their low production costs to increase their market shares by further edging out Canada (See table).

Russia, the world's largest asbestos producer, is estimated to have produced 870,000 t of chrysotile asbestos in 2003, an increase of 16% from 2002. The Russian chrysotile mining industry consists of three companies: Joint Stock Combine (JSC) Uralasbest, JSC Orenburgasbest, and JSC Tuvaasbest. They operate four open-pit mines located in the Urals (three) and in the Tuva region (one) in southern Russia near the border with Mongolia. An important portion of the country's production is for domestic consumption or is transformed before being exported. About 40% is exported as fibre concentrates, and the rest is used to manufacture asbestos-cement products (80%) and technical products (20%) such as friction material products, thermal and electric insulation materials, etc. Chrysotile asbestos production in China is estimated at 360,000 t in 2003, the same level as was produced the year before. Output is mostly from the country's western provinces of Xinjiang and Qinghai, and from the eastern provinces of Liaoning and Hebei.

This production is intended primarily for domestic consumption in the manufacturing of asbestos-cement products used in the development of the country's infrastructure. Asbestos consumption in China is expected to keep pace with the increasing construction activity, which may result in an increase in imports.

The Canadian chrysotile industry, the world's third-largest producer and a major exporter, is concentrated in the province of Quebec in eastern Canada. Production comes from three mines: the Black Lake open pit and the Bell underground mine operated by LAB Chrysotile Inc, and the Jeffrey open pit operated by Jeffrey Mine Inc.

In 2003, as a result of fierce competition for market share by other world producers and a contraction in demand following the adoption of regulatory restrictions by a number of client countries, Canadian chrysotile producers had to scale down their production substantially. LAB Chrysotile proceeded to reduce its output by operating its two mines alternately throughout the year. Meanwhile, Jeffrey Mine pursued its restructuring under the protection of the Companies' Creditors Arrangement Act. Jeffrey Mine Inc was forced to file for bankruptcy protection on October 7, 2002, as a result of financial pressure put on it by plummetting market demand and the costs associated with the development of an underground operation to extend the life of its mine. During 2003, the company was nonetheless allowed to run its operation for three-month stints to treat ore stockpiled at the mine and to fill specific client orders.

Chrysotile asbestos production in Kazakhstan, the fourth-largest world producer, comes from the Kostanai region, where JSC Kostanaiasbest operates the Dzhetygarinsk open-pit mine. Production in 2003 is estimated at 200,000 t, down from about 235,000 t in the previous year. Taking advantage of its lower cost base, the combine has significantly increased its production since 1998 and is planning additional investments by 2005 to modernise its operations further.

Brazil's sole chrysotile asbestos producer, Sociedade Anonima Mineraçao do Amianto (SAMA), produced approximately 209,000 t in 2003, about 16.1% more than in 2002. A large portion of this production is consumed by Brazil's chrysotile cement manufacturing industry, which in turn exports a fair amount of its output, mostly to Latin American countries. A rough estimate puts Brazil's domestic consumption of chrysotile-based products at about 32% of total production. SAMA's mine is located at Minaçu in the state of Goiás.

In Zimbabwe, despite political and economical instability during the year, chrysotile production at the Shabanie and Mashaba mines reached about 170,000 t, an increase of about 26% compared with 2002. The company was also able to increase its sales on account of the devaluation of the country's currency. Domestic consumption is estimated at 6% of production and is used to manufacture asbestos-cement sheets.

Production of chrysotile fibres in South Africa stopped in 2002 as a result of the closure of the country's mining operations. However, as a result of drawdowns from stockpiles, sales of about 13,000 t were recorded, including about 5,600 t for export. Production was provided in recent years by Msauli Asbes Beperk, which operated an underground mine and processing plant in the Barberton area of Mpumalanga, and by Kaapsehoop Asbestos and Stella Asbestos, which both operated smaller mines in the same area as above and supplied the local markets.

In India, small-scale mining occurs in a number of states, notably in Rajasthan and Bihar, and annual asbestos production is about 15,000 t. Other than from Canada and domestic mines, India's asbestos requirements are sourced mostly from Zimbabwe and Russia. Indian consumption of asbestos is nearly exclusively for the manufacture of asbestos-cement products used by the construction industry, such as roofing sheets and pressure pipes for the transport of drinking water. Currently, there are about 75 plants engaged in the production of asbestos products across India. These are mainly located in the states of Gujarat, Karnataka, Madhya Pradesh and Andhra Pradesh.

In November 2003, the Indian Asbestos Information Center, a member of the Asbestos International Association, in cooperation with the Canadian Asbestos Institute, organised an International Conference on Chrysotile Asbestos Cement Products under the theme 'Scientific Review on Health & Environment Aspects and Economic Relevance'. The conference essentially provided an update to participants on the state of knowledge on asbestos and substitute fibres and served to disseminate information on the safe and responsible use of chrysotile asbestos.

Despite the closure in 2002 of the only domestic chrysotile asbestos mine, King City Asbestos Corp's New Idria operation near Coalinga, California, the US exported 2,821 t of chrysotile in 2003, essentially to Japan and Mexico. US consumption of chrysotile asbestos fibre, based on 2003 imports of about 6,000 t and from domestic stockpiles, was split among roofing products (71%), gaskets (18%), friction products (5%), and other products (6%). The main US import based on tonnage is asbestos-cement sheets, panels and tiles; based on value, its main import is friction products such as brake linings and pads. Total imports of asbestos products in 2003 were valued at US$576 million, up by 3.6% over that in 2002. US exports of asbestos-containing products (mostly brake linings, mounted brake linings and other friction products) amounted to about US$291 million, up 42% from 2002.

Asbestos litigation – affecting some 8,400 companies – continued to have a damaging effect on the US economy during the year by forcing additional companies into bankruptcy. The failings of the US judicial system were made apparent by the fact that most of the claimants involve people that were exposed to asbestos in one way or another, but that have not developed a related illness, because such claims must be filed before statutory deadlines are reached. The US Congress is under mounting pressure to address the situation, such as having medical criteria established for non-malignant

asbestos-related illnesses and exempting potential claimants from statutory deadlines for filing such claims until their condition meets the criteria. The legislation contemplated would remove asbestos claims from the tort system and provide a no-fault compensation system through the creation of a privately-funded trust fund to pay for medical care and compensation for persons suffering from asbestos-related illnesses. However, at year's end the Senate Judiciary Committee was still at work to reach an agreement on key elements of an asbestos reform bill such as the amount of fair compensation to asbestos victims and adequate and secure funding to ensure payment of that compensation.

At the regulatory level during 2003, the US Environmental Protection Agency (EPA) pursued the development of a revised methodology for conducting risk assessments of asbestos to take into account the substantial improvements that have occurred since 1986 in asbestos measurement techniques and in the understanding of how asbestos exposure contributes to disease. The EPA's current assessment of asbestos toxicity, based primarily on an assessment completed in 1986, considers all mineral forms of asbestos and all asbestos fibre sizes to be of equal carcinogenic potency. However, the proposed risk assessment methodology distinguishes between fibre sizes and fibre types in estimating potential health risks related to asbestos exposure. It incorporates the knowledge gained over the past 17 years into the Agency's toxicity assessment for asbestos.

The EPA convened a peer consultation workshop to seek input on the scientific merit of the proposed methodology. This workshop included the participation of 11 expert panelists and took place at a meeting open to the public on February 25-27, 2003, in San Francisco, California. The panel strongly endorsed the conceptual approach of developing an updated cancer risk assessment methodology that takes into account fibre type and fibre dimension. It also recommended that the EPA proceeds in an expeditious manner to consider the panelists' conclusions and recommendations with a goal of having an updated asbestos risk assessment methodology. A report summarising the technical discussions among the expert panelists and listing comments provided by observers can be consulted at: www.epa.gov/superfund/programs/risk/ asbestos/pdfs/asbestos_report.pdf. Additional research recommended by the peer-review panel is ongoing and should enable the protocol to be completed in 2005. The US Integrated Risk Information System will likely integrate all studies and draft recommendations in 2006 in order to update its database in 2007 to reflect the revised methodology.

Regulatory developments

Adopted on September 10, 1998, the *Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade* is a multilateral environmental agreement jointly administered by the United Nations Environment Programme (UNEP) and the Food and Agriculture Organisation (FAO) of the United Nations. The objectives of the Convention are:

- to promote shared responsibility and co-operative efforts among participating countries in the international trade of certain hazardous chemicals and pesticides in order to protect human health and the environment from potential harm; and

- to contribute to the environmentally sound use of those hazardous chemicals and pesticides by facilitating information exchange, providing for a national decision-making process on their import and export, and disseminating these decisions to participating countries.

This new tool will assist developing countries and countries with economies in transition to better understand and manage the risks associated with the use of toxic chemicals and pesticides. The PIC procedure covers a total of 37 chemicals currently subject to the interim PIC procedure. Among these chemicals are 22 pesticides, nine industrial chemicals and six severely hazardous pesticide formulations, referred to as PIC substances. In February 2002, a decision was made to initiate the addition of all forms of asbestos to the PIC procedure. A committee proceeded to draft a Decision Guidance Document (DGD) on asbestos. This document will provide a summary of toxicological and environmental characteristics, known usage, possible exposure routes, measures to reduce exposure, and regulatory actions taken by countries to ban or restrict the use of asbestos. Chrysotile will be described in a separate chapter to distinguish it from other more toxic forms of asbestos. The DGD for asbestos was submitted for approval to the governing body of the Convention at its meeting in November 2003. Countries supported the listing of the four amphibole forms of asbestos to the Convention. However, a decision about the listing of chrysotile was deferred until the next meeting of the parties, which is expected in September 2004, owing to concerns raised by a number of countries.

In the UK, the implementation on November 24, 1999, of Commission Directive 1999/77/EC prohibiting the use, import and manufacture of chrysotile asbestos, brought to the fore the issue of potential health risks associated with in-place asbestos products. To address this issue, the UK's Health and Safety Executive developed a law in 2002 to force commercial property owners to have an inspection done to identify all asbestos containing material - even asbestos-cement products such as roof tiles - and to put into force a written management plan to deal with it. However, mounting negative publicity highlighting the significant costs of removing asbestos products compared to the trivial benefits derived, forced the UK Government to review its policy on the matter and postpone its entry into force. The law was still under review at the end of 2003.

Outlook

Battling a negative image it started acquiring in the 1960s that was linked to the demonstrated cancer risk associated with exposure to high concentrations of asbestos dust in the workplace, the industry suffered further negative publicity in 2003 from ongoing asbestos litigation in the US and from bad press related to past work practices and past inappropriate uses such as

sprayed insulation. However, the ongoing debate concerning the absence of cancer risk at low-level exposure to chrysotile and the growing evidence of the potential toxicity of the main substitute fibres may eventually change the industry's outlook. Among new scientific studies released in 2003 that may alter views on the issue was the publication of a study on the *Biopersistence of Canadian Chrysotile Asbestos Following Inhalation.* This study documented the very low persistence of chrysotile in human lungs (it is dissolved by acids in the lungs), one of the criteria used by scientists to identify the toxicity of a substance. In comparison, cellulose – one of the main substitutes for asbestos in cement applications – is documented as being more biopersistent than chrysotile, which may result in more scarring of the lungs to occur, hence its potential toxicity.

Markets should stabilise at the 2 Mt/y consumption level experienced in recent years as increased demand for infrastructure development in Asia and Latin America offsets the loss in demand brought about by the switch to substitute materials in certain countries. A significant increase in use is expected to occur in the short and medium term in a number of Asian countries such as Indonesia, Thailand, the Philippines, and Vietnam as their economies continue to strengthen. However, India, South Korea, and particularly China appear to be the leading forces of the growth in demand in Asia as these three countries are involved in large infrastructure development programs. A further decrease in consumption is still expected in the coming years in Europe, as Portugal complies with the EU ban directive by the year 2005, and in Japan, as its manufacturing industry gradually turns to substitute materials. Meanwhile, demand from the Americas should be stable overall at the 2003 level as slightly lower US consumption is counterbalanced by increases in Argentina, Brazil and Cuba. Similarly, consumption on the African subcontinent should remain at current levels in the short term.

In developing countries, the benefits of chrysotile-cement products continue to be recognised despite increasing competition from substitute fibres, PVC and galvanized steel. In particular, chrysotile-cement pipes are essential to the distribution of potable water and irrigation in many countries where soil conditions and economic parameters are not appropriate for substitute products.

Table
World Asbestos Production 2003 (t)

Russia	870,000
China	360,000
Brazil	209,000
Kazakhstan	200,000
Zimbabwe	170,000
Others	269,000
Total	2,078,000

Canada's production is not specified in the table but is lumped under the 'Others' category. This is done in order to comply with Canadian statistics regulation, which allows these numbers to remain confidential when there are less than three producing companies.