

Chrysotile

*Prepared by the Minerals and Metals Sector,
Natural Resources Canada.
Telephone: 613-995-0947
E-mail: questions@nrcan.gc.ca*

SUMMARY

Canadian chrysotile production is concentrated in Quebec's Eastern Townships and is derived from three mining operations: the Bell and Lac d'amiante mines owned by LAB Chrysotile, Inc. in the Thetford Mines area, and the Jeffrey mine operated by Jeffrey Mine Inc. in the town of Asbestos. Jeffrey Mine Inc. is mining residual ore reserves from the open pit at a reduced rate until the new underground mine is ready to produce.

After years of downsizing and the resulting impact on its suppliers and service providers, the chrysotile industry is currently estimated to provide approximately 900 direct seasonal jobs and at least 1000 indirect jobs in the industrial and service sectors in the immediate area of Thetford Mines (regional county municipality of Amiante) and across the administrative region of Chaudière-Appalaches.

The restructuring of Lab Chrysotile, Inc., now known as Lab Chrysotile, did not directly affect employment in the sector. At the time of writing this review, operations were alternating among the three Canadian chrysotile mines in Quebec to ensure major users had a continuous supply of chrysotile fibres for the production of chryso-cement construction materials and friction products.

Quebec has proven chrysotile reserves of upwards of 200 Mt with an average fibre content of 6%. The plants in Canada in which this ore is processed are the most productive in the world. They are also the safest in the world with concentrations of between 0.1 and 0.2 fibres per cubic centimetre of air in the direct working environment. It is also important to note that Canadian commercial chrysotile fibres are certified "zero tremolite."

Although this review is for 2006, it is nevertheless important to mention that on November 14, 2007, Jeffrey Mine Inc. and Lab Chrysotile created Chrysotile Canada Inc. (CCI) to jointly market approximately 10% of global

chrysotile consumption. An estimated 200 000 t of Canadian fibres will be produced annually and used on domestic and international markets.

It is assumed that world production and consumption of chrysotile in 2006 remained essentially the same as in 2005. It should be noted, however, that the rising trend observed since 2003 was expected to continue in 2006. However, for various reasons, a significant number of chrysotile production and use data are estimates and this apparent trend could not be confirmed in 2006. Canadian chrysotile production in 2006 is estimated at 175 000 t. The strength of the Canadian dollar, increased energy costs, and particularly rising transportation costs and other barriers to the delivery of chrysotile, are seriously harming the capability of the Canadian chrysotile industry to compete internationally with other producers.

The tremendous efforts that have been, and are still being, exerted by various countries and organizations to promote a ban on all forms of "asbestos" are having a serious impact on the capability of producer countries to respond to the legitimate needs of user countries, which have major infrastructure needs and, consequently, chryso-cement needs.

DIFFERENTIATION BETWEEN CHRYBOTILE AND AMPHIBOLE ASBESTOS FIBRES

Chrysotile represents nearly 100% of the "asbestos" produced and used worldwide. It does not have the same physical and chemical properties as amphibole asbestos, a silicate mineral commercially identified as "asbestos," but considered far more harmful than chrysotile by the international scientific community. Consequently, amphibole use has declined to little or none.

A recent expert review panel convened by the U.S. Environmental Protection Agency (EPA) concluded that "the available epidemiology studies provide compelling evidence that the carcinogenic potency [for mesothelioma] of amphibole fibers is two orders of magnitude [over one hundred times] greater than that for chrysotile fibers" and possibly five to seven times more potent for lung cancer. These conclusions reinforced the scientific findings of numerous studies and reviews conducted over the last

30 years, most notably the findings of the 1984 *Report of the Royal Commission on Matters of Health and Safety Arising From the Use of Asbestos in Ontario* (ORCA Report). According to the most recent and most thorough meta-analysis (Hodgson *et al.*, 2000), the danger of cancer from chrysotile is 10 to 500 times less than from amphiboles.

A recent World Health Organization (WHO) publication (Concha-Barrientos *et al.*, 2004) acknowledges that there is a difference in risk between chrysotile and the amphibole asbestos varieties. Based on historical data from 20 studies of at least 100 000 “asbestos” workers, it is estimated that “little excess lung cancer is expected from low exposure levels.”

Recently, a multi-centre case-control study in Europe (R. Carel *et al.*, 2006) has shown that occupational exposure to asbestos does not appear to contribute to the lung cancer burden in men in Central and Eastern Europe, whereas the lung cancer risk in the United Kingdom is higher following exposure to asbestos. The authors suggest that differences in fibre types (i.e., workers in Eastern Europe were mostly exposed to chrysotile, while amphibole fibres were widely used in Western Europe) and circumstances of exposure may explain their results.

EVALUATION OF CHRYSOTILE FIBRE SUBSTITUTES

While there are substantial efforts being made to identify and use acceptable chrysotile substitutes, there is no certainty at the moment that these synthetic or natural substitute fibres would be any safer than chrysotile. Substitutes that tend to be technically equivalent to chrysotile also tend to have similar properties. This means that, generally speaking, they are also fibrous and may pose similar threats to health as chrysotile and even amphibole asbestos in some cases. There is a serious gap in knowledge regarding the dangers of substitutes compared with the risks of chrysotile fibres, which poses an ever-increasing danger for workers and the public.

The International Agency for Research on Cancer (IARC) classifies certain substitutes as “possible carcinogens.” The IARC held a Workshop on Mechanisms of Fibre Carcinogenesis and Assessment of Chrysotile Asbestos Substitutes in Lyon, France, from November 8 to 12, 2005. A summary consensus report was made available for general distribution on January 23, 2006, but the scientific community interested in this matter is still awaiting the release of the final report.

It should be noted that several fibres presently used as chrysotile substitutes in the manufacture of corrugated fibre-cement sheets cannot even be categorized in terms of “hazard assessment.” In the Consensus Report, the hazard

from these fibres is categorized as “indeterminate.” This is the case for the polyvinyl alcohol (PVA) fibres, polypropylene, and even respirable cellulose fibres that are used by themselves or in combination with other products. Wollastonite, for which the hazard was identified as “likely to be low” in the report, was found to be active in different studies for genotoxicity. Wollastonite, mixed with other fibres, is used as a substitute for chrysotile in the production of flat sheets of fibre-cement.

International experts, decision-makers, and international organizations must address the issue and provide a scientifically sound answer to the above-noted legitimate concerns.

CHRYSOTILE-BASED ENCAPSULATED PRODUCTS, SAFETY IN THEIR USE, AND RESPONSE TO PRESSING NEEDS

“Asbestos” has been the focus of extensive scientific and medical scrutiny. Findings have resulted in the elimination of substances harmful for human health, such as amphibole asbestos, and of methods and products that could allow fibres to be readily released into the air, such as spray insulation, which was discontinued in Canada in the 1970s.

In Canada, products likely to release free fibres into the environment under normal conditions of use, i.e., the “non-encapsulated” products, are regulated or prohibited under the *Hazardous Products Act*. In addition, all products containing “asbestos” used by children as either learning tools or games are prohibited from being imported, mentioned in advertising, or sold in Canada. A regulation of this kind has existed in Canada for 30 years.

Today’s chrysotile-based manufactured products, such as building materials, brake linings, water and sewer pipes, and other specialty products, can be used safely because the fibres they contain are encapsulated in a matrix such as cement or resin that cannot, under normal conditions, disperse into the environment. In the major chrysotile-based product manufacturing and consumer countries, more than 93% of chrysotile is used by the chryso-cement industry, while the remaining 7% is split roughly one-third into specialty products and two-thirds into friction products. Some chrysotile-based composite products and application techniques are also now available to consumers. These are more appealing from an architectural standpoint as they are structurally stronger, non-friable, and meet the highest construction standards.

Countless people in developing and developed countries benefit from the use of chrysotile each day because it is used in durable and affordable building products and essential public infrastructure for irrigation, public drinking water supply, and sewage treatment. Chrysotile is also used in brakes and clutches that enhance transportation safety and reliability.

INTERNATIONAL INSTRUMENTS SUPPORTING THE CONTROLLED-USE APPROACH TO CHRYBOTILE

It is necessary to address in this review the controlled and safe-use approach promoted by numerous producing and user countries, and to say a few words about the international and national instruments and practices supporting the controlled-use approach to chrysotile.

Canada was one of the key driving forces behind the development of the International Labour Organization (ILO) Convention 162 Concerning Safety in the Use of Asbestos. Among the more salient provisions of the Convention are Article 11 (requires the use of crocidolite and products containing that fibre to be prohibited) and Article 12 (requires spraying of all forms of asbestos to be prohibited). Articles 14, 15 and 17 are particularly important in implementing the safe and controlled use of chrysotile and its manufactured products.

Canada encourages and supports efforts by countries to ratify and/or implement Convention 162, while recognizing the need for countries to act in accordance with national circumstances and priorities. Convention 162 (1986) is supplemented by another formal ILO instrument, ILO Recommendation 172, which is intended to guide government action in implementing the Convention.

Legal, financial, political, or other barriers may preclude ratification of an ILO convention by a country. It is appropriate to look beyond whether or not a country has ratified Convention 162 and to consider national policies and practices before reaching any conclusion about its ability to manage risks associated with chrysotile. An example is India, which produces close to 2 Mt of chrysotile cement products annually. Recognizing the difference between various "asbestos" fibres, India banned the use of crocidolite in the early 1990s and finalized a policy on the manufacturing of chrysotile-based products in March 2003. Manual handling and opening of chrysotile fibre bags will be eliminated and replaced by fully automatic debagging systems. The policy limits airborne fibre concentrations in plants to 0.5 fibres per cubic centimetre, while atmospheric fibre emissions are limited to 0.2 fibres per cubic centimetre. In short, although India has not ratified Convention 162, its national policy recognizes the value of chrysotile products and it is implementing best practices to control risks.

The controlled and safe-use approach, implemented and advocated by Canada, is aimed at reducing the risks associated with chrysotile mining, milling, product manufacturing, transportation, handling, and disposal activities to safe levels, i.e., this means below levels where it is possible to detect the incidence of chrysotile-related diseases.

The controlled and safe-use approach is implemented through the enforcement of regulations to rigorously keep exposure levels low, compliance with ILO Convention 162,

the implementation of ILO Recommendation 172 (1986), and the voluntary actions of all major exporters and importers.

Crystalline silica is a good example to demonstrate that even substances classified as Group 1 carcinogens by the IARC can be managed, and are effectively managed, to societally acceptable risk levels. Standard industrial working-environment technology controls have allowed European Union (EU) members to successfully address the challenge of protecting the health and safety of more than two million workers from exposure to respirable crystalline silica. The Agreement on Workers' Health Protection Through the Good Handling and Use of Crystalline Silica and Products Containing It came into force on October 25, 2006. This first multi-sectoral "European social dialogue agreement" is aimed at improving the protection of EU workers from exposure to respirable crystalline silica and enhancing compliance with the European Union and EU member states' existing workers' health and safety legislation. The initiative was supported by the European Commission.

WORLD PRODUCTION

Global Trends

It is assumed that world production and consumption of chrysotile in 2006 remained essentially the same as in 2005. It should be noted, however, that the rising trend observed since 2003 was expected to continue in 2006. However, for various reasons, a good number of chrysotile production and use data are estimates and this apparent trend could not be confirmed in 2006. In Canada, production decreased by an estimated 5% from 2005. The table below provides production data recorded over the last three years for which information was available.

**CHRYBOTILE, WORLD PRODUCTION
BY COUNTRY, 2004-06**

Country (1)	2004	2005	2006
	(tonnes)		
Brazil	243 000	220 000	(e) 230 000
Canada	220 000	(e) 185 000	(e) 175 000
China	400 000	400 000	(e) 350 000
Colombia (2)	(r) 5 000	10 000	10 000
India	(r) 5 000	—	—
Kazakhstan	202 000	225 000	(e) 241 000
Russia	(r) 912 000	1 045 000	(e) 1 120 000
South Africa	6 000	—	—
Zimbabwe	(e,3) 107 000	115 000	(e) 110 000
Total	2 100 000	2 200 000	(e) 2 236 000

Sources: Natural Resources Canada; U.S. Geological Survey.
— Nil; (e) Estimated; (r) Revised.

(1) In addition to the countries listed, five other countries also produce chrysotile, but output is either not reported or the tonnage is below 5000 t. (2) Previous data reported in terms of crude ore. For 2005, data are reported in tonnes of fibres. (3) Production problems have reduced the planned output of 150 000 t by about 29%.

Brazil

In 2006, Brazilian production was estimated to be essentially unchanged from 2005. Brazil has become the fourth largest chrysotile producer after Russia, China, and Kazakhstan. It ranked third in 2004. It is estimated that Brazil exported close to 90 000 t of chrysotile in 2006, representing nearly 41% of its total production.

Canada

Canada's chrysotile production is estimated since there are only two producers and data are kept confidential. Production for 2006 is estimated at 175 000 t, a slight decrease from 2005. Total chrysotile fibre exports were 161 000 t, or 92% of total estimated production. Exports of manufactured goods containing chrysotile totaled \$30 million, of which 83% went to the United States. The total export value (fibres and manufactured products) was \$112 million. The total value of imported manufactured goods containing chrysotile was \$57 million and the value of manufactured goods containing chrysotile, cellulose, or other fibres was \$54 million, for a total of \$111 million.

Canadian chrysotile production is concentrated in Quebec's Eastern Townships and is derived from three mining operations: the Bell and Lac d'amiante mines owned by LAB Chrysotile and the Jeffrey mine operated by Jeffrey Mine Inc. LAB Chrysotile, Inc. continues to alternate between an underground mine and an open-pit operation. Canada was ranked the world's fifth largest producer of chrysotile, based on its estimated 2006 output, down one rank compared to 2004.

China

Chrysotile is produced in about 50 areas of China, mostly in the western part of the country. The most important chrysotile-producing areas are Qinghai, Sichuan, Shanxi, and Xinjiang, in decreasing order of importance. It is estimated that China produced 350 000 t in 2006 and that it will produce the same amount in 2007. While China can produce enough short fibres for its domestic market, it cannot produce enough long chrysotile fibres to meet its internal demand, which is increasing fairly rapidly; imports of these fibres are required and are predominantly from C.I.S. countries. An estimated 200 000 t were imported in 2006, which matches the 2005 level.

Commonwealth of Independent States (C.I.S.)

The C.I.S. produced 1.28 Mt of chrysotile in 2006, i.e., 1.05 Mt in Russia and 0.23 Mt in Kazakhstan. Russian production comes from JSC Uralasbest and JSC Orenburg-asbest. It is estimated that C.I.S. domestic use amounted to approximately 700 000 t in 2006, while exports were estimated at 580 000 t, or approximately 45% of total production.

Zimbabwe

In 2006, production in Zimbabwe was estimated at 115 000 t, which was unchanged from 2005 but represented a 7.5% increase over 2004 production (107 000 t). For 2006, it is estimated that approximately 20 000 t were for domestic consumption and the rest (95 000 t) was exported.

WORLD CONSUMPTION

In 2006, at least 22 countries were importing more than 1500 t from Canada, and Canada exported chrysotile fibres and/or manufactured products to at least 70 different countries. This represents about 40% of all the countries recognized by the United Nations. Even countries that have heavily legislated the use of chrysotile-based products and fibres still use specialty products for which no suitable substitutes exist. The three largest chrysotile-producing countries consume a relatively large percentage of their production domestically.

It is estimated that, in 2006, the C.I.S. consumed nearly 50% of its production.

Total demand for chrysotile fibres in China is estimated to have increased by at least 10% in 2006 compared to 2005 because of the tremendous economic development in this country. The manufacture of chrysotile-cement products accounts for 50% of China's consumption of chrysotile fibres, while friction materials and other specialty products account for the remainder. As mentioned above, China had to import about 200 000 t of long chrysotile fibres to meet its domestic needs in 2006. The demand for chrysotile is expected to increase at a conservative rate of 7% annually for the foreseeable future. However, this increase seems to be dependent on the safe use of the substance and on the population's understanding that chrysotile can and must be used safely.

In 2006, the Brazilian domestic market consumed an estimated 134 000 t, representing an increase of 7% over 2005. Brazil's consumption of chrysotile-based products is expected to continue to increase by 7% annually, a rate comparable with that of other emerging countries.

Canada exports about 92% of its total production of fibres. It has fewer immediate needs in terms of water, sewage, and building infrastructure than emerging countries, which is why most of its production is exported, primarily to emerging countries. However, as can be seen in the table on the next page, the per capita consumption of chrysotile fibres in Canada is the same as or higher than in India, Indonesia, and Mexico, and is comparable to per capita consumption in China, Vietnam, and South Korea. Canada's leading foreign markets are Asian countries, which account for more than 77% of its total exports. Notwithstanding the importance of the Asian market for Canada, the tonnage of Canadian chrysotile fibres exported to this market represents only about 10% of this market's total consumption.

PER CAPITA CONSUMPTION FOR MAJOR PRODUCERS AND USERS OF CHRYSTOLE FIBRES AT A LEVEL OF 98%+ FOR CHRYSTOLE-CEMENT AND FRICTION PRODUCTS, 2006

Country	2006	2006	Per Capita
	Production (1)	Apparent Use (2)	
	(tonnes)	(kilograms)	
China	350 000	(3) 650 000	0.5
Russia	1 120 000	(3) 540 000	4.0
India	..	(3) 205 000	0.2
Kazakhstan	241 000	(3) 182 000	12.6
Ukraine	..	160 000	3.2
Thailand	..	105 000	1.8
Iran	..	78 000	1.2
Brazil	230 000	(3) 125 000	0.7
Vietnam	..	40 000	0.5
Indonesia	..	31 000	0.1
South Korea	..	23 000	0.5
Mexico	..	20 000	0.2
Canada	175 000	60 000	0.2
Zimbabwe	110 000	..	..
South Africa	..	..	..
Colombia	10 000	..	..
Others	..	71 000	..
Total	2 236 000	2 236 000	..

.. Not available.

(1) Source: Natural Resources Canada (NRCAN). (2) Sources: U.S. Geological Survey plus NRCAN for 2005. (3) Use is estimated for 2006 based on actual production in 2006 and the increase or decrease planned for the identified countries.

Canada is a net exporter of chrysotile fibres, but is a net importer of manufactured products. In 2006, Canada imported manufactured products valued at \$111 million from more than 40 countries, unchanged from 2005. Aside from compressed chrysotile fibres, Canada imports mainly friction materials, tubes and pipes, corrugated sheets and panels, paper, millboard, clothing, and other chrysotile-based materials.

Because emerging countries in particular require new or modified infrastructure, they are the main consumers of chrysotile fibres, and chrysotile-cement products are the most efficient products for this purpose. While more than 93% of the chrysotile used in the world is for chrysotile-reinforced cement products, chrysotile fibres make up only a small percentage of the total content of the finished products (between 8% and 10%). Therefore, it is more cost-effective to manufacture these products near the end-user countries where such manufacturing also provides much needed employment.

ENVIRONMENTAL AND NATIONAL REGULATORY INITIATIVES FOR THE SAFE AND CONTROLLED USE OF CHRYSTOLE

Canada follows a controlled-use approach to chrysotile, strictly controlling exposure through federal, provincial and territorial workplace exposure limits and regulating some

categories of consumer and workplace products and practices under the *Hazardous Products Act*. All federal, provincial and territorial regulations comply with ILO Convention 162 Concerning Safety in the Use of Asbestos. Since there have been numerous peer-reviewed scientific studies on “asbestos” and chrysotile since the publication of the *Report of the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario* (ORCA Report) in 1984, Canada is considering updating its own risk assessment of “asbestos” and chrysotile in 2007.

Among the most recent authoritative studies, the following are considered the most comprehensive: a) reviews done by the U.S. Environmental Protection Agency (EPA) and the United Kingdom’s Health and Safety Executive; b) the *Report on the Peer Consultation Workshop to Discuss a Proposed Protocol to Assess Asbestos-Related Risk*, U.S. EPA, 2003; c) *The Quantitative Risks of Mesothelioma and Lung Cancer in Relation to Asbestos Exposure*, Hodgson and Darnton, 2000; and d) *The Biopersistence of Canadian Chrysotile Asbestos Following Inhalation: Final Results Through One-Year After Cessation of Exposure*, D.M. Bernstein *et al.*, 2005.

At the time of writing, no regulations were pending in the United States regarding the manufacture or use of “asbestos” and products containing “asbestos.” However, as is the case in Canada, certain products containing asbestos are prohibited in the United States since the EPA so decided in 1989. These banned products are corrugated paper, roll-board, commercial paper, flooring felt, and specialty paper.

The U.S. EPA has regulated “asbestos” since the early 1970s without regard to fibre type. In 2001, the EPA started the process of reviewing the most recent science on “asbestos” as part of its Integrated Risk Information System. Three workshops and panels of experts were convened in the past two years. The EPA’s current assessment of “asbestos” toxicity is based primarily on an “asbestos” assessment completed in 1986. However, the EPA acknowledges that, since 1986, there have been substantial improvements in “asbestos” measurement techniques and in the understanding of how “asbestos” exposure contributes to disease. In August 2006, the EPA announced that its Science Advisory Board would set up an Asbestos Expert Panel to provide technical advice in updating the risk assessment for “asbestos” and called for nominations. The proposed EPA’s review exercise would incorporate the knowledge gained over the last 17 years into its toxicity assessment for “asbestos.” The results of this initiative should be available in late 2007 or early 2008.

About two months ago, the U.S. Senate unanimously approved Bill S. 742, *Ban Asbestos in America Act of 2007*, introduced by Senator Murray. Senator Murray had previously introduced two similar bills in 2002 and 2003 that were defeated in committee. The next stage in the U.S. legislative process is to pass the bill in the House of Representatives. Normally, bills such as S. 742 must be considered by an appropriate committee and then approved by that committee and the House of Representatives before

they can be submitted for the President's signature and become law.

In Brazil, the federal government has the exclusive responsibility and authority to legislate over "asbestos" and chrysotile issues, and the status quo continues to apply with respect to the legislative powers of state governments versus the federal government.

China is a major producer and consumer of chrysotile fibres and chrysotile-based manufactured products. It is one of the top three countries in the world in terms of chrysotile reserves and is continuing to put more emphasis on improving mining conditions. It is adopting effective dust control measures and promoting the safe and rational use of chrysotile resources. Since August 2006, the chrysotile industry has been implementing a comprehensive plan for the safe use of chrysotile. As part of this plan, detailed reports are being sent to government departments and ongoing collaborative dialogue has been instituted. Chinese scientists have conducted interesting studies on the use of chrysotile in China, and the study reports have been submitted to departments and ministries under the comprehensive plan to maintain measures for the safe and controlled use of chrysotile and chrysotile-based products. In partnership with Canadian industry, Chinese industry is importing Canadian knowledge to ensure the quality and safety of its chrysotile processing plants.

In India, a major consumer of chrysotile and producer of chrysotile-based products, many improvements have been achieved and are ongoing in work practices and new regulations since the Ministry of Environment and Forests' policy on the manufacture of chrysotile-based products was finalized in March 2003. Under the new policy, the chrysotile-cement industry, in collaboration with the regulatory agency, is working to improve working conditions by eliminating the manual handling and opening of chrysotile fibre bags; fully automatic debagging systems are currently being implemented throughout the manufacturing process.

In Indonesia, the Directorate of Occupational Safety and Health (OSH) Norm Supervision, the Directorate General of Manpower Supervision Development, and the Ministry of Manpower and Transmigration of the Republic of Indonesia, in collaboration with the Fibre Cement Manufacturers Association Ltd., have developed and just launched a technical guide on occupational safety and health in the use of materials containing asbestos.

The purpose of this guide is to ensure the implementation of occupational health and safety standards and to provide optimum protection to workers from raw material procurement and storage through to product manufacturing and waste management. The guide was developed following numerous consultations and discussions with experts, field observations, and a study based on the ILO code of good practice regarding occupational safety and health in "asbestos" use.

In Pakistan, the government, recognizing the important needs of its population and the value of chryso-based products, decided in 1999 to differentiate between amphibole asbestos and chrysotile fibres. As a result, only chrysotile fibres can be imported to Pakistan, effectively banning amphibole asbestos fibres. Many other countries have made the same decision. The Government of Pakistan also advocates the adoption of measures for the safe use of high-density chrysotile products.

In Latin America, Peru, Colombia and Venezuela also recognize that chrysotile can be used safely under controlled conditions, and they are working in close collaboration with Canada, Mexico, Brazil, and other countries to facilitate the implementation of the controlled-use approach inspired by ILO Convention 162 and Recommendation 172.

INTERNATIONAL CONVENTIONS AND ORGANIZATIONS – POSITIONING AND INITIATIVES REGARDING CHRYSOTILE USE

In October 2006, at the third Conference of the Parties to the Rotterdam Convention in Geneva, a proposal was put forward to add chrysotile to the list of substances subject to the Prior Informed Consent (PIC) procedure. During the debates concerning the proposal, Canada was the first country to register its views. Canada opposed the PIC procedure listing of chrysotile under the Convention. Other countries were also opposed to the listing. In the Conference of the Parties process, decisions are made on the basis of consensus. Notwithstanding its position, Canada participated in a working group tasked by the President of the Conference with reviewing key issues related to the proposed addition of chrysotile to the list of substances subject to the PIC procedure. Canada then joined all other Parties in agreeing to defer consideration of the listing of chrysotile until the fourth Conference of the Parties in October 2008.

India, a major consumer of chrysotile fibres, strongly opposed the addition of chrysotile to the list of substances subject to the PIC procedure at the third Conference of the Parties. India stated that the epidemiological studies cited by the European Union, Chile, and Australia in drafting the Decision Guidance Document in support of the submission for listing chrysotile all pertained to the use of mixed fibres consisting predominantly of amphibole varieties. India claimed that numerous other epidemiological studies concluded that chrysotile fibres alone, used in the manufacturing of chryso-cement products, did not substantially increase the incidence of lung cancer. It was further mentioned that in India, crocidolite, which caused most of the lung-related diseases in the western part of the country, has been banned since 1994.

At the 95th session of the International Labour Conference held in 2006, a resolution that was not part of the agenda was introduced by the workers' group. The resolution called for the prohibition and elimination of the use of all forms of "asbestos," including chrysotile. The Government of Canada did not support the resolution adopted by the International Labour Conference calling for elimination of the use of "asbestos." Canada did not agree with the process used to bring the resolution by the workers' group, but rather agreed with the views expressed by the employers' group and a number of other countries that the Conference Committee was not the appropriate forum to discuss this complex issue.

Canada did not support and does not consider itself bound by the International Labour Conference's decision because the process used to adopt the resolution was unacceptable. Canada stated that there are controlled and safe ways of producing and using chrysotile.

In July 2006, the Occupational and Environmental Health Division of the World Health Organization (WHO) issued an information paper on the elimination of asbestos-related diseases. Since then, the information paper has been posted on the WHO web site as an official WHO document.

It is unfortunate to note that the document is in total disagreement with the most recently published scientific evidence. One of the main gaps in the aforementioned information paper is the lack of recognition of the difference in potency between chrysotile fibres and amphibole fibres. Current international scientific literature shows that there is a vast difference in pathogenic potential between chrysotile fibres and amphibole fibres. Recently published evidence from epidemiological studies (Hogson and Darnton, 2000) and toxicological experimentation (Bernstein *et al.*, 2006) support this view, yet there is no mention of this fundamental point in the draft policy paper.

There are numerous peer-reviewed studies indicating that below some low exposure levels to chrysotile, there is no demonstrated increased risk to health in the general population and in the workplace. The aforementioned information paper does not refer to these studies and concludes that there is no safe threshold level of exposure to "asbestos."

Finally, there is no mention in that paper of the risk associated with the use of modern chrysotile-based products, such as chrysotile-cement, friction materials, and other specialty materials. Yet, recent analyses have been published on the absence of demonstrable risk from chrysotile use in controlled conditions (Paustenbach *et al.*, 2004).

Many international governments and scientists have expressed concerns about the WHO's information paper. While the elimination of asbestos-related diseases is an excellent objective, the recommendations proposed by the Occupational and Environmental Health Division of the WHO are not justifiable and do not have enough basis in

fact to pass the test of objectivity required from such a credible organization.

It is important to note that the WHO's *Environmental Health Criteria 203: Chrysotile Asbestos*, Geneva, 1998, is now outdated and needs to be revisited in the context of the most recent scientific literature, which has shed new and more realistic light on the modern uses of chrysotile.

Although this review focuses on the events of 2006, it is nevertheless important to mention the document entitled *Workers' Health: Global Plan of Action*, presented at the 60th World Health Assembly held May 23, 2007, which states that the "WHO will work with Member States to strengthen the capacities of the ministries of health to provide leadership for activities related to workers' health, to formulate and implement policies and action plans, and to stimulate intersectoral collaboration. Its activities will include global campaigns for elimination of asbestos-related diseases – **bearing in mind a differentiated approach to regulating its various forms** – in line with relevant international legal instruments and the latest evidence for effective interventions." Therefore, the WHO recognizes that not all forms of "asbestos" can be regulated in the same way.

Albeit tentative, this approach does recognize a difference in the hazard levels between chrysotile and amphibole fibres. It also recognizes the difference in the hazard levels between modern use of chrysotile fibre-based products and past use of products or practices that were either amphibole-based or mixes of amphibole and other fibres for which the risks are still being managed today.

It should be noted that Canada has always been one of the first countries to recognize and strive to eliminate occupational diseases, particularly those related to prior conditions and practices.

OUTLOOK

It is unfortunate that supporters of the movement to ban all forms of "asbestos," which include worker groups with vested interests and, unfortunately, some governments and global organizations, have decided to ignore the facts about chrysotile and refuse to recognize the differences, both physical and chemical, between amphibole asbestos and chrysotile, and the differences between past problems and modern realities.

Such campaigns will probably have some impact on the global use of chrysotile, but are unlikely to change the present trend toward increased production and use of chrysotile fibres and chrysotile-based products. Increases of at least 7% are not uncommon in many countries that use chrysotile and its derived products. In China where chrysotile fibres are both produced and exported, consumption is keeping pace with or exceeding the growth rate of the global Chinese economy.

On the strength of more than 100 years of experience in the chrysotile sector and following many struggles, including major labour strikes in 1949 and 1975, Canadian chrysotile workers benefit from working conditions that do not endanger their lives. Moreover, all the major producers and users of chrysotile have adopted similar working conditions and implemented regulations that comply with ILO Recommendation 172 and Convention 162 Concerning Safety in the Use of Asbestos.

While neither Canada nor any other chrysotile-producing country has the legal authority to monitor chrysotile exposure in other countries, Canadian chrysotile producers have agreed not to export to companies that do not use chrysotile in a manner that is consistent with Canada's safe and controlled-use approach. While such agreements have limitations, they are a valuable component of a comprehensive approach. Canada and many other countries use similar agreements to enlist the cooperation of industries in preventing misuse of many substances, including weapons precursors, explosives precursors, and drug precursors, within a broader framework that may include international agreements, domestic legislation, regulations, or other elements.

The Chrysotile Institute of Canada is helping to build capacity and expertise in chrysotile user countries to better ensure safe use. To that end, the Institute periodically collects data from industry on a range of workplace exposures in chrysotile-producing and using countries. As a result of all of these initiatives, other major exporters of chrysotile have joined Canada in efforts to encourage safe handling practices through the ILO, the Institute, and agreements with other governments and with industry. Very few other, if any, hazardous substances have received so much care and attention. This ongoing cooperative effort began well before the concept of Prior Informed Consent emerged.

The possible addition of chrysotile to the list of substances subject to the PIC procedure could change the future for chrysotile and chrysotile-based products. Several countries consider that such a listing would send a global signal that chrysotile must be severely regulated or banned outright if it is listed among substances for which there is little scope for safe use. Yet the fact remains that chrysotile can be used safely under controlled conditions.

Emerging countries that need to develop their housing, water supply, and sewage infrastructure rely on chrysotile-cement products since these are the most cost-effective and durable products available. Substitute products cannot achieve the same value for money in addressing particular physical conditions of use, as in the case of water supply and water sewage piping.

The main chrysotile producers are likely to remain the same. Canada, now the fifth world producer, is being confronted with relatively high production and transportation costs, as well as fierce competition that is keeping global

prices down. However, it is expected to remain an important player since the price structure of chrysotile and chrysotile-based products is progressively adjusting itself to demand and to production costs.

Asian countries, particularly India and China, will continue to increase their consumption of chrysotile in response to their pressing infrastructure needs and growing industrial development.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 65. (2) Data used are from December 2006. Other information such as on international events is more current. (3) This and other reviews, including previous editions, are available on the Internet at www.nrcan.gc.ca/mms/cmty/com_e.html.

NOTE TO READERS

The intent of this document is to provide general information and to elicit discussion. It is not intended as a reference, guide or suggestion to be used in trading, investment, or other commercial activities. The author and Natural Resources Canada make no warranty of any kind with respect to the content and accept no liability, either incidental, consequential, financial or otherwise, arising from the use of this document.

TARIFFS

Item No.	Description	Canada			United States	EU	Japan
		MFN	GPT	USA	Canada	Conventional Rate (1)	WTO (2)
2524.00.10	Asbestos: crude	Free	Free	Free	Free	Free	Free
2524.00.90	Asbestos: other	Free	Free	Free	Free	Free	Free
68.11	Articles of asbestos-cement, of cellulose fibre-cement or the like						
6811.10	Corrugated sheets	5%	Free	Free	Free	1.7%	2.6%
6811.20	Other sheets, panels, tiles and similar articles	5%	Free	Free	Free	1.7%	2.6%
6811.30	Tubes, pipes, and tube or pipe fittings	5%	Free	Free	Free	1.7%	2.6%
6811.90	Other articles	5%	Free	Free	Free	1.7%	2.6%
68.12	Fabricated asbestos fibres; mixtures with a basis of asbestos or with a basis of asbestos and magnesium carbonate; articles of such mixtures or of asbestos						
6812.50	Clothing, clothing accessories, footwear and headgear	15.5%	Free	Free	Free-8.3%	3.7%	2.6%
6812.60	Paper, millboard and felt	Free	Free	Free	Free	3.7%	2.6%
6812.70	Compressed asbestos fibre jointing, in sheets or rolls	Free	Free	Free	Free	3.7%	2.6%
6812.90	Other	Free	Free	Free	Free	1.7-3.7%	2.6%
68.13	Friction material and articles thereof, not mounted, for brakes, for clutches of the like with a basis of asbestos, of other mineral substances or of cellulose, whether or not combined with textile or other materials						
6813.10	Brake linings and pads	5-7%	Free-5%	Free	Free	2.7%	Free-2.3%
6813.90.00	Other	Free	Free	Free	Free	2.7%	Free-2.3%

Sources: Canadian *Customs Tariff*, effective January 2006; Canada Border Services Agency; *Harmonized Tariff Schedule of the United States, 2006*; *Official Journal of the European Union* (October 27, 2005 Edition); *Customs Tariff Schedules of Japan, 2006*.

(1) The customs duties applicable to imported goods originating in countries that are Contracting Parties to the General Agreement on Tariffs and Trade or with which the European Community has concluded agreements containing the most-favoured-nation tariff clause shall be the conventional duties shown in column 3 of the Schedule of Duties. (2) WTO rate is shown; lower tariff rates may apply circumstantially.

TABLE 1. CANADA, CHRYBOTILE (ASBESTOS) PRODUCTION AND TRADE, 2004-06

		2004		2005		2006 (p)	
		(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS							
2524.00.10	Crude asbestos						
	India	9 041	3 200	11 899	3 766	16 837	4 754
	United States	254	64	288	69	200	44
	Total	9 295	3 264	12 187	3 835	17 037	4 798
2524.00.21	Asbestos milled fibres, group 3 grades						
	Pakistan	2 424	1 550	3 711	2 373	3 563	2 366
	Mexico	1 102	1 431	933	1 209	1 709	1 611
	United Arab Emirates	1 743	2 265	726	943	471	612
	China	810	262	150	201	250	337
	India	3 435	2 834	206	268	204	266
	Peru	288	374	204	266	88	116
	Other countries	233	287	237	290	129	129
	Total	10 035	9 003	6 167	5 550	6 414	5 437
2524.00.22	Asbestos milled fibres, groups 4 and 5 grades						
	India	36 470	24 908	30 200	19 872	24 872	16 425
	Algeria	1 410	1 315	1 910	1 770	4 920	4 582
	Sri Lanka	5 142	4 459	5 162	4 562	4 502	3 749
	Indonesia	12 803	5 630	16 907	7 429	9 035	3 443
	Thailand	20 573	9 232	17 523	8 355	8 050	3 409
	Mexico	1 768	1 120	2 695	1 966	3 055	2 372
	Brazil	2 880	2 057	2 220	1 796	2 206	1 568
	United Arab Emirates	2 200	2 176	1 732	1 655	1 652	1 547

TABLE 1 (cont'd)

		2004		2005		2006 (p)	
		(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS (cont'd)							
	Bangladesh	1 600	774	2 600	1 097	2 560	1 112
	Colombia	995	841	1 354	1 199	1 184	1 094
	El Salvador	720	601	714	594	1 250	1 002
	Malaysia	3 326	2 152	2 704	1 601	1 534	938
	Pakistan	4 360	3 246	1 740	1 544	1 344	864
	Philippines	2 558	1 393	1 080	585	1 620	790
	Senegal	467	448	638	612	648	621
	Turkey	575	403	550	522	500	614
	Ecuador	760	756	424	380	594	482
	Morocco	346	242	283	197	542	381
	Vietnam	272	295	1 018	421	800	367
	Angola	502	413	524	420	360	330
	Singapore	–	–	–	–	801	258
	Peru	380	219	372	200	386	199
	Tunisia	–	–	–	–	160	196
	Other countries	7 711	5 491	2 902	2 546	665	480
	Total	107 818	68 171	95 252	59 323	73 240	46 823
2524.00.29	Asbestos shorts, groups 6, 7, 8 and 9 grades						
	India	15 125	6 043	16 029	6 423	22 067	10 484
	Thailand	5 152	2 184	10 120	4 557	9 225	4 309
	Colombia	4 064	1 460	4 690	1 744	5 642	1 902
	Indonesia	4 544	1 429	3 954	1 160	3 811	1 404
	South Korea	12 197	4 646	5 783	1 634	4 059	1 138
	Taiwan	2 179	793	2 296	795	2 418	978
	Sri Lanka	1 860	930	918	473	1 448	728
	United States	1 968	594	1 927	860	1 776	655
	Mexico	2 399	648	2 064	711	2 462	630
	Algeria	410	193	270	127	1 080	508
	Malaysia	2 970	975	1 748	630	1 282	436
	Senegal	740	300	914	370	952	386
	Venezuela	2 012	667	1 816	623	1 197	372
	Philippines	452	194	400	151	738	331
	United Arab Emirates	508	218	1 428	686	546	261
	China	2 774	469	2 244	383	1 094	217
	El Salvador	240	125	232	121	400	208
	Iran	800	120	4 400	1 351	1 575	185
	Other countries	5 894	2 380	3 170	1 096	2 039	684
	Total	66 288	24 368	64 403	23 895	63 811	25 816
		(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)
6811.10	Corrugated sheets of asbestos-cement, of cellulose fibre-cement, or the like						
	United States	..	10	..	5	..	50
	Saint Pierre and Miquelon	..	3	–	–	–	–
	Total	..	13	..	5	..	50
6811.20	Sheets n.e.s., panels/tiles, etc., of abestos-cement, cellulose fibre-cement, etc.						
	United States	..	10 483	..	10 055	..	10 889
	Cuba	..	62	..	313	..	698
	Bermuda	–	–	..	34	..	127
	Other countries	..	102	..	183	..	51
	Total	..	10 647	..	10 585	..	11 765
6811.30	Tubes, pipes, and tube or pipe fittings of abestos-cement, of cellulose fibre-cement, etc.						
	Bahamas	–	–	–	–	..	273
	Cuba	–	–	–	–	..	1
	Other countries	..	...	..	17	–	–
	Total	..	...	..	17	..	274

TABLE 1 (cont'd)

		2004		2005		2006 (p)	
		(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)
EXPORTS (cont'd)							
6811.90	Articles n.e.s. of asbestos-cement, of cellulose fibre-cement, or the like						
	United States	..	91	..	115	..	105
	Fiji	-	-	-	-	..	16
	Costa Rica	-	-	-	-	..	1
	Other countries	..	28	..	10	-	-
	Total	..	119	..	125	..	122
6812.50	Asbestos clothing, clothing accessories, footwear and headgear						
	Dominican Republic	-	-	-	-	..	97
	Indonesia	-	-	-	-	..	13
	United Arab Emirates	-	-	..	10	..	10
	Cuba	-	-	-	-	..	4
	Other countries	..	113	..	119	..	...
	Total	..	113	..	129	..	124
6812.60	Asbestos paper, millboard and felt						
	Taiwan	-	-	-	-	..	26
	New Zealand	-	-	-	-	..	15
	Seychelles	-	-	-	-	..	10
	New Caledonia	..	1	-	-	..	8
	Bahamas	-	-	-	-	..	4
	Fiji	..	1	..	1	..	2
	Other countries	..	12	..	4	..	...
	Total	..	14	..	5	..	65
6812.70	Compressed asbestos fibre jointing, in sheets or rolls						
	United States	..	661	..	735	..	686
	Cuba	..	51	..	53	..	168
	Taiwan	-	-	-	-	..	12
	India	-	-	-	-	..	4
	Israel	-	-	-	-	..	4
	Other countries	..	16	..	...	..	...
	Total	..	728	..	788	..	874
6812.90.10	Asbestos building material, n.e.s.						
	Cuba	..	55	..	394	..	745
	Zimbabwe	-	-	-	-	..	330
	Qatar	-	-	..	56	..	263
	Russia	..	22	..	132	..	216
	Bermuda	..	101	..	817	..	143
	Japan	..	16	..	152	..	125
	Jamaica	..	1	-	-	..	79
	Other countries	..	779	..	1 721	..	227
	Total	..	974	..	3 272	..	2 128
6812.90.90	Other asbestos fabricated products, n.e.s.						
	Cuba	..	98	..	40	..	29
	United States	..	117	..	12	..	13
	Other countries	..	46	..	6	..	...
	Total	..	261	..	58	..	42
6813.10	Asbestos brake linings and pads						
	United States	..	48 244	..	14 731	..	12 717
	China	..	30	..	527	..	979
	New Zealand	..	189	..	163	..	104
	Italy	..	25	..	17	..	86

TABLE 1 (cont'd)

		2004		2005		2006 (p)	
		(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)
EXPORTS (cont'd)							
	Trinidad and Tobago	..	49	..	29	..	55
	Chile	..	19	..	—	..	22
	Jamaica	..	55	..	—	..	10
	Netherlands	..	4	..	9	..	9
	Other countries	..	305	..	204	..	31
	Total	..	48 920	..	15 680	..	14 013
6813.90	Asbestos friction material and articles, n.e.s.						
	United States	..	28	..	25	..	15
	Other countries	..	63	..	83	..	10
	Total	..	91	..	108	..	25
	Total exports	..	166 686	..	123 375	..	112 356
		(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
IMPORTS							
2524.00.00.10	Crude asbestos						
	Belgium	—	—	...	...	—	—
2524.00.00.90	Other asbestos						
	South Africa	—	—	—	—	37	36
	United States	3	3	—	—	7	7
	Other countries	114	81	121	116	—	—
	Total	117	84	121	116	44	43
6811.10	Corrugated sheets of asbestos-cement, of cellulose fibre-cement, or the like						
	United States	1	1	203	238	260	327
	France	—	—	2	2	—	—
	Total	1	1	205	240	260	327
6811.20	Sheets n.e.s., panels/tiles, etc., of asbestos-cement, cellulose-fibre cement, etc.						
	United States	44 082	30 954	58 555	40 880	64 634	48 733
	Mexico	1 905	1 000	1 473	634	2 300	1 263
	Japan	142	170	167	227	437	627
	Switzerland	8	95	153	130	177	313
	Other countries	2 007	2 192	1 978	1 336	213	238
	Total	48 144	34 411	62 326	43 207	67 761	51 174
6811.30	Tubes, pipes, and tube or pipe fittings of asbestos-cement, cellulose fibre-cement, etc.						
	Mexico	370	356	311	332	534	389
	Pakistan	1 067	462	317	147	482	209
	Other countries	2	4	1	2	1	3
	Total	1 439	822	629	481	1 017	601
6811.90	Articles n.e.s., of asbestos-cement, cellulose fibre-cement or the like						
	China	11	32	21	56	165	1 173
	United States	177	600	212	689	106	472
	Denmark	115	155	53	114	55	174
	Other countries	49	167	47	51	4	37
	Total	352	954	333	910	330	1 856
6812.50	Asbestos clothing, clothing accessories, footwear and headgear						
	China	6	150	5	121	6	138
	United States	...	6	...	8	1	39
	Denmark	—	—	...	7	...	6
	Other countries	4	59	...	11	...	...
	Total	10	215	5	147	7	183

TABLE 1 (cont'd)

		2004		2005		2006 (p)	
		(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)
IMPORTS (cont'd)							
6812.60	Asbestos paper, millboard and felt						
	United States	..	173	..	470	..	582
	United Kingdom	..	5	..	1	..	2
	Other countries	..	41	..	6	..	...
	Total	..	219	..	477	..	584
		(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
6812.70	Compressed asbestos fibre jointing, in sheets or rolls						
	Brazil	13	244	13	216	16	229
	Slovenia	...	5	...	2	1	36
	United States	21	454	1	10	2	20
	South Korea	1	19	1	30	1	19
	China	...	2	1	10	1	11
	Other countries	1	37	3	78	...	14
	Total	36	761	19	346	21	329
6812.90.00.10	Asbestos belting						
	United States	531	1 433	408	613	313	577
	Japan	186	237	115	224	77	205
	Germany	32	117	43	108	13	47
	Sweden	...	...	...	...	7	21
	United Kingdom	8	46	2	5	5	11
	Other countries	8	30	32	82	4	16
	Total	765	1 863	600	1 032	419	877
		(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)
6812.90.00.90	Other asbestos fabricated products, n.e.s.						
	United States	..	39	..	39	..	49
	China	..	10	..	38	..	37
	Brazil	..	2	..	...	..	9
	Germany	..	1	..	2	..	5
	Taiwan	..	14	..	3	..	4
	United Kingdom	..	...	..	2	..	2
	India	-	-	..	1	..	2
	Other countries	..	21	..	3	..	...
	Total	..	87	..	88	..	108
6813.10	Asbestos brake linings and pads						
	United States	..	43 000	..	33 007	..	28 745
	Brazil	..	15 711	..	14 514	..	6 713
	China	..	3 841	..	3 446	..	6 117
	Japan	..	3 566	..	3 437	..	3 691
	Germany	..	925	..	790	..	997
	South Korea	..	364	..	508	..	741
	Mexico	..	794	..	670	..	599
	Chile	..	331	..	328	..	438
	Colombia	..	612	..	642	..	411
	United Kingdom	..	705	..	657	..	380
	India	..	212	..	303	..	341
	Italy	..	40	..	63	..	214
	Hungary	..	179	..	336	..	124
	Other countries	..	2 003	..	860	..	465
	Total	..	72 283	..	59 561	..	49 976
6813.90	Asbestos friction material and articles, n.e.s.						
	United States	..	4 297	..	4 316	..	4 426
	China	..	140	..	154	..	160
	United Kingdom	..	54	..	73	..	101
	Germany	..	49	..	25	..	95
	Mexico	..	20	..	22	..	39

TABLE 1 (cont'd)

	2004		2005		2006 (p)	
	(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)
IMPORTS (cont'd)						
Japan	..	31	..	39	..	37
France	..	4	..	12	..	36
Italy	..	50	..	49	..	29
Chile	..	2	..	31	..	25
Sweden	..	13	..	10	..	24
Taiwan	..	15	..	11	..	10
Other countries	..	95	..	91	..	40
Total	..	4 770	..	4 833	..	5 022
Total imports	..	116 470	..	111 438	..	111 080

Sources: Natural Resources Canada; Statistics Canada.

– Nil; .. Not available; . . . Amount too small to be expressed; (p) Preliminary.

Note: Numbers may not add to totals due to rounding.

TABLE 2. CANADIAN CHRYSOTILE PRODUCERS, 2006

Producer	Mine Location	Normal Mill Capacity		Remarks
		Ore/Day	Fibres/Year	
(tonnes)				
LAB CHRYSOTILE, INC. (1)				Hundred percent (100%) owned by LAQ.
Lac d'Amiante du Québec, Ltée (LAQ)	Black Lake, Que.	9 000	185 000	Open-pit. Since September 1989, LAQ has been owned by Jean Dupéré and successors, and Connell Bros. Company, Ltd. of the United States.
Bell Asbestos Mines, Ltd.	Thetford Mines, Que.	2 700	100 000	Owned by Mazarin Mining Exploration Inc. since 1992. Operated in 2006 by Lab Chrysotile, Inc.
JEFFREY MINE INC.				Partnership owned 65% by Fibre Forte du Québec Inc. and 35% by Cooperative des Travailleurs JM Asbestos Inc.
Jeffrey Mine	Asbestos, Que.	15 000	250 000	Open-pit (effective capacity reduced by 75% since 2002 until the projected underground mine is completed).
Total of three producers at year-end		26 700	535 000	

Sources: Natural Resources Canada; The Chrysotile Institute; U.S. Geological Survey; South Africa Department of Minerals and Energy.

(1) A partnership involving two operating companies. Lab Chrysotile, Inc. became Lab Chrysotile in 2007.

Note: For the purpose of this review and because of the time of writing it, it is assumed that, notwithstanding the fact that the split between LAQ and Mazarin occurred during the 2007 calendar year, LAB Chrysotile as such was an existing entity by itself in 2006 and was operating the Bell underground mine owned by Mazarin Mining Exploration Inc.