Is Chrysotile Asbestos Safe and Healthy for the Developing World?

Zulmiar Yanri
Director of Occupational Health Inspection, MOMT, Rep. of Indonesia

Abstract

Indonesia has the fourth largest population in the world: 212 million in 2002. As a developing country with such a big population, Indonesia has become a potential market for hazardous chemicals and the relocation of hazardous chemical industries. Chrysotile asbestos is still widely used in Indonesia for building materials (roofs, ceilings, flat sheet board, corn block), heat insulation, brake systems (linings, pads) and many other products, which consume more than 60 metric tons annually (FICMA, 2004). Until now the government of Indonesia banned only crocidolite use (Government Regulation No. 74 of 2001, MOMT Decree No 3 of 1985), and allows only chrysotile to be imported. In the period 2001-2003 the total amount of imported chrysotile decreased slightly; however, it may increase in 2004 (FICMA, 2004).

Reported cases and surveillance of asbestos related diseases in Indonesia provide insufficient data to determine which type of asbestos is responsible for a given health effect (Indonesian NOSHC). On the other hand, while many studies on chrysotile asbestos have shown that chrysotile has a lower biopersistence than other kinds of asbestos (Dunnigan J, 2003; Bernstein DM, Rogers R and Smith P, 2004) and hence, it is argued, also a lower toxicity, it is still debatable whether the use of chrysotile is safe and healthy for workers and the environment.

At the recent UNEP and FAO meeting held in Geneva in September 2004 concerning the Rotterdam Convention, the inclusion of chrysotile into the PIC procedure was postponed due to insufficient data on the impact of chrysotile on health and the environment, and most important "economic reasons for its usage" (UNEP/FAO/RC/COP.1/15, Sept 2004). On the other hand, five types of amphibole asbestos (amosite, tremolite, crocidolite, actinolite and anthophyllite) have been included in the PIC procedure. That economic reasons were the most important factors behind the postponement of the inclusion of chrysotile asbestos may be inferred from the configuration of countries which proposed the inclusion (European Union, Switzerland and Chile) and countries which tried to maintain the chrysotile status quo (such as Canada, China, India, Indonesia and Russia). The first group are relatively developed industrialized countries, whereas the second group comprise highly populated and developing countries, except for Canada, which is the biggest chrysotile exporter to

Indonesia. The meeting also noted that economic and trade reasons are not justifiable considerations for not including hazardous chemicals in the PIC procedure.

This Global Asbestos Congress 2004 in Tokyo with main theme: ***Together for the future****, encourages collaborative initiatives to take concerted action against asbestos risks and stop their transfer to the developing world.* Therefore Indonesia is looking forward to participating actively in this effort

Introduction

Based on theoretical formulae, asbestos can be classified into 2 major groups and then into 6 types; they are:

A. Fibrous serpentine
   1. *chrysotile* (white asbestos): $Mg_3(Si_2O_5)(OH)_4$
B. Fibrous amphiboles
   2. *amosite* (brown asbestos): $(Fe,Mg)_7(Si_8O_{22})(OH)_2$
   3. *tremolite* : $Ca_2Mg_5(Si_8O_{22})(OH)_2$
   4. *crocidolite* (blue asbestos): $Na_2Fe_3^{2+}Fe_2^{3+}(Si_8O_{22})(OH)_2$
   5. *actinolite*: $Ca_2(Mg,Fe)_5(Si_8O_{22})(OH)_2$
   6. *anthophyllite* $(Mg,Fe)_7(Si_8O_{22})(OH)_2$

All types are hydrated silicates. They differ appreciably by their metal content. However, chrysotile asbestos, the only type of fibrous serpentine, has been indicated by many studies to have a lower biopersistence, and hence, it is argued, a lower toxicity than other types of asbestos (Dunnigan J, 2003, Bernstein DM, Rogers R and Smith P, 2004). The question of whether the use of chrysotile is safe for workers and the environment is still a matter of debate in some international forums such as the Rotterdam Convention meeting.

Indonesia has the fourth largest population in the world: 212 million in 2002. As a developing country with such a big population, Indonesia has become a potential market for hazardous chemicals and also a target for the relocation of hazardous chemical industries. Chrysotile asbestos is still widely used in Indonesia for building materials (roof, ceiling, flat sheet board, cone-block), heat insulation, brake systems (linings and pads) and many other products, which consume more than 60 metric tons annually (FICMA, 2004). The number of workers involved in asbestos related industries is 7233. Until now the government of Indonesia banned only crocidolite use (Government Regulation No. 74 of 2001, MOMT Decree No 3 of 1985), and allows only chrysotile to be imported. During the period 2001-2003 the total amount of imported chrysotile decreased slightly; however, it may increase in 2004 (FICMA, 2004).

At international forums such as the Rotterdam Convention meeting, Indonesia takes the position of maintaining the use of chrysotile asbestos, perhaps due to economic reasons. As a developing country, scientific studies on health and environment impacts of asbestos in

Indonesia are scarce; therefore we have to refer to studies carried out in industrialized countries. Both the recording and reporting of asbestos related diseases in Indonesia are insufficient, and do not yield data that could attribute health effects to particular types of asbestos or asbestos use (Indonesian NOSHC).

INDONESIAN POLICY ON ASBESTOS

In order to reduce the impact of asbestos use on public and workers' health and the environment, the government of Indonesia has issued a number of regulations:

1. Government Regulation No. 74 of 2001, concerning Managing Hazardous and Toxic Substances. This regulation bans only crocidolite, and allows chrysotile use.
2. Ministry of Manpower Decree No. 03 of 1985, concerning Occupational Safety and Health Conditions in the Use of Asbestos. This decree also bans crocidolite and prohibits the use of other types of asbestos by spraying. The content of the Decree referred to the ILO Code of practice on safety in the use of asbestos, published by the ILO in 1984, which establishes the principles of national policy and action at the national level.
3. Ministry of Manpower Circulars No. 01 of 1997, concerning Threshold Limit Values (TLV) of Chemical Factors in the Working Environment. This circular stipulated the TLV of chrysotile to be 2 fibers/ml. Chrysotile is classified as a confirmed human carcinogen (A1).

Chrysotile asbestos use in and import into Indonesia

Asbestos related industries employ large numbers of workers; therefore, it will require a strategic effort to establish occupational safety and health conditions of asbestos use, to protect their health and safety. The types of products, chrysotile consumption per year and numbers workers directly involved in asbestos industries are shown in Table 1.

Table 1

Types of Product	Use of Chrysotile Ton/Year	No of Workers
1. Asbestos Roof	57,400	2,134
2. Ceiling, Heat, Insulation, Cone Block	360	590
3. Brake System, Living, Pads, etc	200	4,120
4. Others	100	389
T o t a l	**58,060**	**7,233**

To supply the demand for chrysotile, Indonesia has to import most of it. During the period 2001-2003 the total amount of imported chrysotile decreased slightly; however, it may increase in 2004 (FICMA, 2004). The use of chrysotile in Indonesia is influenced by economic conditions and development. On the other hand, the awareness of the public and workers about the health and environmental impacts of asbestos is still low. Data on the total amount of imported chrysotile asbestos and the countries of origin are shown in table 2.

Table 2

Country of Origin	2001 (MT)	2002 (MT)	2003 (MT)	2004 (Jan-Apr) (MT)
Africa	7,475	8,570	6,290	3,180
Brazil	4,980	5,336	5,928	6,300
Canada	21,438	18,634	10,420	4,470
Greece			656	
Hungary	133			
Russia	7,868	10,155	10,420	5,300
Poland	1,251	230	137	
USA	833			
Others (Germany, Japan, Holland, China, Taiwan, Turkey)	1,068			969
Total	**45,047**	**43,082**	**33,929**	**20,219**

The Asbestos Institute of Canada in cooperation with the Fiber Cement Manufacturers Association of Indonesia (FICMA) conducted a scientific meeting in Jakarta in March 2004, and convinced the audience that chrysotile asbestos is safe and healthy for workers and also the environment. Moreover they named the scientific meeting “SAVING LIVES WITH CHRYSOTILE ASBESTOS.” The sincerity of the theme of this scientific meeting should be treated with suspicion, since Canada is the biggest exporter of chrysotile to Indonesia.

Asbestos related diseases in Indonesia

Reported cases and surveillance of asbestos related diseases in Indonesia provide insufficient data to determine which type of asbestos is responsible for a given health effect (Indonesian NOSHC). Only one cases of mesothelioma has been identified so far; however, there was no significant evidence that this mesothelioma was caused by asbestos exposure, due to an incomplete job history of the victim. Recently, during September to November 2004, the National Occupational Safety and Health Center of Indonesia conducted a study on the health conditions of 750 workers employed in asbestos industries in 5 provinces (of the 32 provinces in Indonesia). The study elements were:

1. questionnaire about respiratory symptoms, job history and disease history;

2. lung function test with spirometer;
3. chest X-rays on 10% of the sample.

At a glance, no occupational diseases caused by asbestos were detected by this study. The study did reveal that occupational exposure was not only to chrysotile, but also to mixed asbestos types containing amosite, tremolite and other kinds of dust. (NOSHC, 2004)

Chrysotile bio-persistence and toxicity

Biopersistence can be simply defined as *the time that an inhaled particle remains in the lung before it is eventually cleared.* Compared to other types of asbestos, chrysotile has a lower half-time clearance period from the lung: 15 days compared with 466 days for amosite. Bernstein stated that the lower biopersistence of chrysotile is caused by:

a. chemical composition: contains Mg 38-42%, which is biosoluble in the lung;
b. shape of fiber: chrysotile has rope-like fine fibrils, whereas amphiboles have solid rod-like fibers;
c. solubility: chrysotile is soluble in water and acid.

Those studies were conducted in laboratories, on pure chrysotile, like Canadian chrysotile asbestos (Bernstein, 2003), Calidria chrysotile (Bernstein DM, Chevalier J, Smith P 2003), Cana Brava chrysotile (Bernstein 1999, 2000). However, in many industries in the developing world, the chrysotile in use may be not pure, but mixed or polluted with amphiboles, such as usually exist in chrysotile mines. Therefore, the results of the studies should be interpreted carefully, by taking into consideration many factors as a safety precaution.

Chrysotile in international debate

At the recent UNEP and FAO meeting held in Geneva in September 2004 concerning the Rotterdam Convention, the inclusion of chrysotile into the PIC procedure was postponed due to insufficient data on the impact of chrysotile on health and the environment, and most important "economic reasons for its usage" (UNEP/FAO/RC/COP.1/15, Sept 2004). The Rotterdam Convention seeks to regulate the international trade of toxic pesticides and other hazardous chemicals listed in the PIC procedure. The PIC (Prior Informed Consent) procedure means that the countries exporting these substances will be bound to obtain the importer's prior informed consent before shipping. Until September 2004, the PIC procedure applied to 29 pesticides and 9 hazardous chemicals, including 5 types of asbestos: amosite, tremolite, crocidolite, actinolite and anthophyllite. Only chrysotile is not included yet in the PIC procedure, due to the postponement requested by some countries. The Rotterdam Convention has been ratified by 62 countries, including Canada. Indonesia has not ratified the convention yet.

That economic reasons were the most important factors behind the postponement of the inclusion of chrysotile asbestos may be inferred from the configuration of countries which

proposed the inclusion (European Union, Switzerland and Chile) and countries which tried to maintain the chrysotile status quo (such as Canada, China, India, Indonesia and Russia). The first group are relatively developed industrialized countries, whereas the second group comprise highly populated and developing countries, except for Canada, which is the biggest chrysotile exporter to Indonesia. The meeting also noted that economic and trade reasons are not justifiable considerations for not including hazardous chemicals in the PIC procedure.

In order to protect Indonesian workers' health and the environment, a definitive hazard evaluation of chrysotile is urgently needed. This definitive evaluation can be obtained through collaborative action on research, sharing information and transparency on trade and economic matters.

Conclusion and recommendations

1. Indonesia (and the developing world) is a potential market for hazardous chemicals, including asbestos.
2. Chrysotile asbestos is widely used in Indonesia and the asbestos industry employs a large number of workers; therefore, establishing occupational safety and health conditions for using asbestos will require a strategic effort to protect workers' health and the environment.
3. Economic factors still play an important role in shaping policies on using or banning hazardous chemicals in global trade, even though the Rotterdam Convention discourages the use of economic arguments when considering the status of chemicals in international trade. The definitive hazard evaluation of chrysotile asbestos should be based on a scientific analysis of its impacts on health and the environment rather than economic reasons for its usage.
4. Collaborative efforts in obtaining a definitive hazard evaluation of chrysotile are needed urgently, through joint research, sharing information and common stands at international forums.
5. Indonesia is looking forward to participating actively in concerted actions against asbestos risks and their transfer to the developing world through global initiatives.

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