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THE ASBESTOS INSTITUTE

sensible management of a natural resource

Building partnerships for sound chrysotile management

When it comes to the use of chrysotile, industry, workers and different levels of government often have different objectives and approaches. But the Canadian model demonstrates that through open dialogue it is possible to find common ground that serves the interests of all concerned.

In this special edition of The Asbestos Institute Newsletter, we have invited the different stakeholders to discuss their approach towards the use of chrysotile. While it has not always been the case, their respective articles demonstrate that there is a strong common thread that holds this coalition of diverse interests together, namely a belief that the controlled-use approach can and does work.

A recent and concrete example of this partnership in action was the organization of two major international conferences this past September in Montreal. The *Scientific Workshop on the Health Effects of Chrysotile* and the *International Conference on the Safe and Responsible Use of Chrysotile Fibres* both required the close collaboration of the Quebec and Canadian governments, Canadian chrysotile producers, International Asbestos Assocation, and representatives from the labour movement. The outcomes of these conferences and the respective contributions of the partners is described in several articles in this edition.

In many areas of the world, chrysotile policy, and in fact regulatory policy in general, is driven by the dynamics of conflict. The articles outlining the position of the governments of Canada and Quebec, as well as that of the Quebec labour movement demonstrate that a cooperative effort is far more effective in fostering and balancing economic interests, industrial interests and most importantly, worker safety. ◄

Inside

European Union Committee criticizes anti-chrysotile report

A 1997 report commissioned by DG III (Industry) on chrysotile asbestos favoured the use of substitute materials. Less than a year later a peer review of the study sponsored by DG XXIV (Consumer Policy Service) came to a much different conclusion.

In December 1997, the Scientific Committee on Toxicity, Ecotoxicity and the Environment (SCTEE) of the Directorate General XXIV (DG XXIV) of the European Union received a mandate to peer-review the report of a study commissioned by Directorate General III (Industry). The report had been submitted by Environmental Resources Management, Oxford (ERM).

The terms of references set by the DG III ►

of the European Union for an opinion request addressed to the SCTEE were the following:

- Are the conclusions of the ERM study justified?
- As a secondary issue, the SCTEE may also wish to comment on the general quality of the (ERM) study.

Making sense of the threshold question

An important point arose out of the opinion of the SCTEE [1] in their Outcome of discussions: The question of the existence of a demonstrated threshold of exposure to chrysotile below which the lung cancer risk is zero. The authors of the ERM report state: "No threshold of exposure has been identified below which chrysotile does not pose carcinogenic risks."

For the SCTEE, this statement appears to be more "ritual than scientific." And the reason, the SCTEE explains, is that "a threshold implies the demonstration that an effect does not occur at or under a given dose level. The unequivocal demonstration (i.e. identification) of a negative effect is tantamount to impossible."

And the SCTEE hastens to add that given this inherent impossibility to prove a negative, there may well be a "practical threshold," such as would be suggested when "a huge bulk of good scientific information consistently provides convincing suggestion of a lack of effect."

Put differently, this would be a situation where repeated observations of large cohorts, followed over several decades consistently provide lack of evidence of measurable effects (i.e. excess lung cancer) at low exposure levels.

For exposure to chrysotile asbestos, data available from the longest follow-up (several decades) of the largest cohort of chrysotile workers (11,000 subjects) ever studied indicate that indeed there are exposure levels to chrysotile (300 mpcf.years) below which there are no measurable excess lung cancer risks. This was repeatedly confirmed in the studies published on Quebec chrysotile miners and millers [2].

It should be noted that the existence of a "demonstrated threshold," or of a "practical threshold" not only applies to exposure to chrysotile asbestos, but to all suspected carcinogens. Indeed, regarding the substitute fibrous materials, the SCTEE states that "the data presently available are by no means comprehensive and does not allow the assumption that a threshold level can be legitimately applied; hence, the conclusion that specific substitute materials pose a substantially lower risk to human health, particularly public health, than the current use of chrysotile is not well founded..."

In other words, if, for reasons mentioned above, there is no demonstrated evidence of a threshold for chrysotile exposure at "current" levels, there is no evidence for the substitute materials either.

The need for consistency

It follows that if regulations leading to a ban were to apply to all "no-demonstrated-threshold" substances, they should apply not only to chrysotile but also to all substitute materials for which, according to the SCTEE, "there is no significant epidemiological base to judge the human health risk." Thus, for these substances as well as for chrysotile, the sensible regulatory approach is to determine at what exposure level a "practical threshold" is reached, and set the permissible exposure levels accordingly.

Performance and safety of substitutes

With regard to the ERM's conclusions on substitute fibres, the SCTEE takes issue with the ERM's contention that three fibrous materials (polyvinylalcohol, cellulose and para-aramid fibres) are the "main" alternatives to chrysotile, without giving any evaluative information on the technical performance of these materials.

Most importantly, the SCTEE does not accept the conclusion reached by ERM to the effect that "...it would appear that these types of fibres are likely to pose less of a risk...than chrysotile," while at the same time recognizing that little research has been carried out on hazards and risks posed by candidate substitutes. The SCTEE notes that the ERM study offers no criteria for comparing hazards (i.e. the potential to cause harm) and "risks" (at the same level of technical performance) of chrysotile, MMMFs and other substitute fibres.

It is for these reasons that the SCTEE recommends:

- A proper evaluation of public, occupational and para-occupational health risks posed by the candidate substitutes for the permitted application of chrysotile;
- An assessment of current public and para-occupational levels of exposure to chrysotile;
- In judging alternatives to chrysotile, environmental impacts of substituted materials should be taken into consideration.

In summary, it is the opinion of the members of the SCTEE that, rather than entertaining endless discussions on threshold and non-threshold models, "the important aim is to reduce exposure to any potential hazard to its lowest possible level and to inform users." ◄

1. Full text of the SCTEE's Outcome of Discussions is available on the Internet at: http//:europa.eu.int/en/comm/dg24. Then look for the following links in succession: scientific committees, SCTEE and, finally, Outcome of Discusssions, which will lead to the index.

2. Liddell FDK, McDonald AD and McDonald JC (1997) The 1891-1920 Birth Cohort of Quebec Chrysotile Miners and Millers: Development from 1904 and Mortality to 1992. Ann Occup Hyg, 41:13-35.

Scientists meet in Montreal to discuss the health effects of chrysotile asbestos

World-renown scientist in the field of fibres and health and conference participant Dr. Arthur Langer reports on this international workshop and its conclusions.

At the request of the Government of Quebec, in September 1997, 31 scientists from 7 countries met in Montreal to discuss the latest data regarding the health effects of chrysotile asbestos. More specifically, we were asked to provide data to assist governments and regulatory agencies in deciding whether or not to use chrysotile in the future. We were to review the biological potential of the different asbestos types, to compare the experience of workers exposed to chrysotile fibre with the experience of workers exposed to the amphibole asbestos types, and to determine the risks associated with current chrysotile use. We were to explore what had been done in the past to control these risks and what could be done in the future to reduce them further. The following is a summary of some of the key points and conclusions of this 3-day workshop.

Legacy of past exposures — chrysotile or amphiboles?

Exposure to asbestos dust in the past has produced the diseases that we see today. The epidemiological studies of cohorts of men exposed to amphibole asbestos or mixed fibre types are frequently cited in asbestos risk documents. However, we stated that asbestos is a generic term and the use of the generic name can be misleading. The risk associated with one fibre type need not be the same as risks associated with another. Drs. Johnson and Mossman described the well-established factors of dose, durability, and dimension in controlling fibre activity. For example, they described the lack of durability of chrysotile in a biological host as one crucial factor in reducing its biological potential. In addition to increase in removal kinetics, the loss of magnesium from the structure has been shown to blunt the fibre's action on cells.

We concluded that the mesothelioma risk model used today by regulatory agencies and governments was developed from cohorts exposed to amphibole and mixed-fibre types. The amphibole-exposed cohorts have produced many mesotheliomas; there are few mesotheliomas following exposure to chrysotile asbestos only.

There was also a discussion concerning the relative hazards of amphibole asbestos minerals as compared to chrysotile asbestos. For example, data on insulation workers in the U.S., a population which had experienced very high exposures in the past, indicate that about 9.3% currently die of mesothelioma as compared to 0.4% of workers in the chrysotile-exposed population, and a 16% mortality due to excess lung cancers as compared to no excess lung cancers. These figures taken in context of exposure differences indicate that the biological potency among the fibre types is very different. These and other data lead to the general conclusion that malignant diseases following exposure to chrysotile in the workplace was very much lower than those found for workers exposed to amphibole asbestos in similar circumstances.

Environmental mesothelioma

Dr. Kevin Browne reviewed a number of studies of mesothelioma cases detected in communities in the vicinity of asbestos mining, milling and manufacturing operations in South Africa, Australia, Corsica, Greece and Turkey, as well as around shipyards in Europe. In each of these cases, the agents implicated are amphiboles: amosite, crocidolite and tremolite. When these experiences are compared with those around mines and mills of chrysotile producers and chrysotile-using industries, they are very different. Virtually no mesotheliomas have been identified around chrysotile sites.

Dr. Wagner stated that only one environmental mesothelioma has been associated with chrysotile mining and milling in South Africa; Dr. Nolan, with Drs. Shcherbakov, and Kashansky, reported no environmental mesotheliomas in Asbest City, in the Russian Federation, around the mine, mills, and numerous chrysotile production facilities. Dr. Gibbs reported no environmental mesotheliomas linked to chrysotile in the Eastern Townships of Canada. Drs. Camus and Siemiatycki reported no excess mortality due to lung cancer among women in households of chrysotile workers, from the Townships although calculated cumulative exposures were about 25 f/ml-years. Some cancers of the pleura were detected and these are currently under investigation.

(*see* Scientific workshop, *page 11)*

Editorial Comment

More than ever, asbestos is at the centre of a political debate

Over the course of the past few months, there have been several developments with regard to the safe use of chrysotile asbestos. These developments have followed either of two opposing trends. On the one hand, some countries in Europe, Africa, and the Middle East have adopted or signalled their intention to adopt restrictive measures for chrysotile asbestos, thereby contributing to fears concerning its use. On the other hand, the controlled-use policy has been shown to be both sound and practicable and the risks associated with lesser-known chrysotile substitutes have been clearly demonstrated. These findings are consistent with the Health and Safety Executive's conclusions regarding the existence of a practical threshold for exposure to chrysotile, the evidence presented at the scientific conference and the conference on the safe and responsible use of chrysotile held in September 1997 in Montreal, and the European Union's DG XXIV Scientific Committee's position on these issues. The dichotomy that currently prevails with regard to the use of chrysotile asbestos tells us that the nature of the debate is political rather than scientific.

Numerous laboratory studies and epidemiological data have shown that prolonged exposure to respirable fibres is harmful to human health; consequently, the use of such fibres must be regulated. This position also applies to all products that have been shown to pose a health risk, including, in the view of the International Agency for Research on Cancer (IARC), a wide range of modern industrial products. Can an argument based on risk be used to justify a ban on asbestos? Certainly not--according to the experts of the E.U. DG XXIV Scientific Committee who assert that, despite the lack of unanimity in the scientific community regarding the existence of a practical threshold at current levels of exposure to chrysotile, there is no proof whatsoever of the existence of such a threshold for substitute materials. The fact that workers who manufacture non-asbestos products have not incurred the unfortunate health problems that have affected asbestos workers does not necessarily mean that substitute products are less harmful. It simply illustrates that the epidemiological record is incomplete since the use of substitute products is a relatively recent development and/or the levels of exposure associated with them have always been less than the levels for all industrial products. The most recent scientific findings have confirmed this view.

Workers must exercise caution when they are asked to replace chrysotile--a material that has been subjected to comprehensive study and whose effects are well-known--with an allegedly safer substitute product. No one is at greater risk than they are of paying for this false sense of security. Scientific evidence tells us we should treat all industrial fibres and all recognized carcinogenic products in the same manner, namely, by lowering the risk below a threshold at which an increased incidence of ill effects is undetectable. At a European Commission meeting held in March 1998, a Scandinavian delegate stated that the ban on asbestos-containing products had led to the slackening of risk-monitoring practices in the workplace. Faced with such evidence of irresponsible conduct, citizens should ask themselves what the proponents of a ban on asbestos are really trying to achieve.

We have recently learned of Belgium's decision to ban the use of asbestos products and of statements by government ministers in Britain in favour of a swift legislative ban on asbestos. As in the case of France, these countries made extensive use of asbestos-cement products in their post-war reconstruction projects. Today, millions of tons of asbestos-cement coating is present in dwellings and farm buildings. What message are these governments sending to their citizens by banning asbestos? The events of the mid-eighties in the U.S. and of the past two years in France have shown us that biased and alarmist reports associated with asbestos bans lead people to take drastic measures, such as the removal of products that pose no health risks to the population. This reaction is understandable. If the government, which presumably makes decisions on the basis of adequate information and oversees the protection of public health, seems to endorse the view that chrysotile is a health hazard even at low levels of ►

exposure, why run the risk of exposure? Given this state of affairs, we applaud the communiqué issued by the Health and Safety Executive on March 11, 1998 which urges that all amendments to the regulations governing asbestos use be delayed as information concerning the use of substitute products is still clearly inadequate to permit enlightened decision-making on this matter.

It is unfortunate that the companies that have built their reputation on the quality and durability of asbestos-cement products have had little to say on the issue. Some of these companies have even argued in favour of an asbestos ban in order to open the market to the substitute products that they manufacture--yet these products require more demanding manufacturing processes, perform less well, and represent an unknown quantity as far as potential health risks for workers are concerned. In reality, the proposed ban on chrysotile is a strategy that is intended to protect trade rather than public health. ◄

Denis Hamel
Director

The HSC publishes a consultative report on asbestos regulations

In April 1998, the Health & Safety Commission (HSC) in the United Kingdom published a major consultative report that sets out regulatory proposals intended to provide greater protection for workers from exposure to asbestos.

The report proposes strengthening two existing regulations in Great Britain: the Asbestos (Licensing) Regulations, 1983 (ASLIC) and the Control of Asbestos at Work Regulations, 1987 (CAW). Among the changes proposed to the regulations are the tightening of exposure limits for chrysotile asbestos and further safety training for workers.

The document also seeks views on the principle of introducing regulations to require employers to better identify and control asbestos-related risks in the workplace and on the development of a new code of practice to provide guidance on how to meet these obligations most effectively.

With regard to chrysotile, the CAW regulations already require the prevention of exposure where reasonably practicable and the use of substitutes in manufacturing and installation. However, the HSC states that restrictions on chrysotile, including the importation, supply, and new uses of the material, can only be put in place when the safety of substitutes has been clearly demonstrated. An independent scientific Committee of the EU has recently found that the scientific evidence available on substitute fibres was insufficient to determine their relative safety. In light of this finding, the HSC has recommended to the British government that public consultation on amendment to the Asbestos Prohibition Regulations be delayed until the scientific evidence regarding substitutes becomes clearer. This delay would also discourage costly legal challenges that could result from any U.K. action to further restrict chrysotile use without a solid scientific basis for such action. ◄

The complete document is available on the Internet at:
www.open.gov.uk/hse/condocs

Government of Quebec promotes safe use of chrysotile at home and abroad

Since the early 1980s there have been significant reductions in employment in the asbestos industry in Quebec due to the adoption by certain importing countries of anti-asbestos policies and restrictive regulations. In the eighties, the asbestos industry was, to a great extent, vertically integrated and controlled by large international corporations (Eternit, St-Gobain, Manville Corporation, Jim Walters, etc.). Following the pull-out of their parent companies, producers in Quebec were forced to rationalize operations in order to remain competitive in their markets. Consequently, the government of Quebec became more involved and supported the asbestos industry by adopting a safe-use policy.

Quebec recognizes that asbestos can be produced and used without detectable health risks for workers and the general population when appropriate techniques are employed and regulations observed. Regulatory policies in Quebec include safe-use standards for 660 contaminants present in workplaces, including the many types of asbestos fibres. We should keep in mind that friable asbestos products are prohibited in Quebec and that the responsible-use policy also applies to in-place asbestos products. The government of Quebec has taken various steps over the last few years to familiarize the world's principal users of asbestos with the safe-use policy.

The Quebec government's position is based on scientific evidence that indicates that very low concentrations of chrysotile asbestos--such as are found in workplaces today--present no detectable health risk for workers. This finding was reiterated at a scientific conference on the health effects of chrysotile asbestos held in Montreal from September 14 to 16, 1997.

The conference, financed by the government of Quebec and co-sponsored by the Asbestos Institute, the Government of Canada, and unions representing asbestos workers, was organized by Brooklyn College of the City of New York and brought together 31 scientists from 7 countries. The experts in attendance concluded that all types of amphibole asbestos were considerably more toxic than chrysotile asbestos and that the use of chrysotile involved very low levels of risk. The government of Quebec also co-sponsored, with the Asbestos Institute and the unions, the *International Conference on the Safe and Responsible Use of Chrysotile Asbestos* — an event organized by the federal Department of Natural Resources and held in Montreal from September 16 to 19, 1997. Representatives from several Quebec government agencies took part in the conference. One of the subjects they discussed was the system of equal representation used to administer matters of health and workplace safety in this area in Quebec. At the conference, representatives from companies, workers' groups, and the government of Quebec presented an official request to the Government of Canada to challenge within the framework of the World Trade Organization the ban on asbestos imposed by the French government.

At the international level, several government missions have targeted the various countries where asbestos is used. These missions, conducted by the Provincial State Minister for Mines and Land Use, Denise Carrier-Perreault, consisted mainly of meetings with the governing authorities in those countries. At these meetings, Quebec government officials explained the safe-use policy for asbestos and encouraged their hosts to adopt a similar policy. Since 1996, missions of this kind have been organized for France, Belgium, the U.K., Algeria, Tunisia, Morocco, Colombia, Peru, Mexico, Malaysia, and Vietnam. Moreover, in May 1997, a government delegation from Vietnam travelled to Quebec to study the measures put in place to protect workers' health.

As the missions overseas have made clear, there is a need for information and training, among other things, in the various government agencies of the host countries. Therefore, the government of Quebec has developed the tools required for responding to these countries' needs for information and training, notably, in such areas as monitoring exposure to fibres, monitoring the workplace environment, monitoring the health of workers, identifying fibres, and regulation. Above all, these tools target cooperation at the institutional level, namely, with the government departments and agencies in foreign countries responsible for health in the workplace. Such cooperation requires an equal sharing of activity-related costs and is available to nations that sign an agreement to this effect with the government of Quebec.

In the view of the government of Quebec, the physical and chemical properties of chrysotile asbestos make many products, such as asbestos-cement, absolutely indispensable for developing countries with a need for durable and low-cost construction materials. ◄

Government of Canada sponsors *International Conference on the Safe and Responsible Use of Chrysotile Fibres*

During the international conference in Montreal, industry, governments and labor unions of chrysotile producing and consuming countries agreed to work in close cooperation to ensure the safe use of chrysotile asbestos worldwide. Results of discussions held may lead to support from the international community for Canadian interventions in defence of chrysotile.

The International Conference on the *Safe and Responsible Use of Chrysotile Fibres* was organized by the government of Canada in partnership with the government of Quebec, the Asbestos Institute, Quebec labour unions and the Asbestos International Association. This conference attracted 300 delegates representing industry, government and labour unions from 45 chrysotile producing and consuming countries. It was organized to disseminate information on the safe and responsible use of chrysotile asbestos. During the four days several speakers presented data on regulation, dust surveys in different industries and the most recent control technology and work practices. The importance of controlling chrysotile products throughout their whole life cycle was highlighted and several papers were dedicated to the implementation of the safe and responsible use of chrysotile, including case studies in countries where actions have already taken place.

Delegates were briefed on the previous scientific workshop, *Health Effects of Chrysotile Asbestos: Contribution of Science to Risk Management decisions.* The workshop reviewed the current database concerning the biological potential of the different asbestos types and to determine the risk associated with the use of chrysotile asbestos. The 31 scientists from 7 countries participating in the workshop confirmed that chrysotile asbestos is the least carcinogenic asbestos fibre and "that there is low risk associated with its usage." It was also mentioned that "chrysotile producers should export their technology and their expertise with their fibre."

Acting on this, bilateral meetings between Canadian representatives and various consuming countries were held at the end of the conference to define the needs in training and technical cooperation. Such meetings are a follow-up to Asbestos Institute surveys on present occupational controls in the consuming countries.

To support export of Canadian expertise, Ralph Goodale, federal Minister of Natural Resources Canada, announced on September 17, 1997, a new quarter-million dollar training program to help promote the responsible use of chrysotile asbestos in targeted consuming countries. These new funds will complement the half-million dollars announced in October 1996 through various activities to demonstrate that chrysotile asbestos can be used safely.

The new training program will provide Canadian expertise to train workers in targeted countries to increase their knowledge of safe and responsible chrysotile asbestos manufacturing techniques. Developed by the Asbestos Institute in cooperation with labour and the governments of Canada and Quebec, the program, which will begin next month, will promote the International Labour Organisation's Convention 162, *Safety in the Use of Asbestos.*

Taking advantage of the presence of labour union delegates at the conference, the three Quebec labour unions organized a parallel meeting to discuss how best to assess the training needs of countries consuming fibre-based products to ensure workers are well informed and trained to use them safely. Participants at this meeting, representing the labour movements of eight countries discussed the different means to achieve this in their respective countries. They also agreed to have this matter discussed at the Conference of the International Confederation of Free Trade Unions which took place in Brussels on October 15, 1997.

Following a special meeting of its board of directors, the Asbestos International Association announced during the conference that it was moving its headquarters to Montreal. This decision underlines Canada's international leadership and expertise in dealing with the chrysotile asbestos situation. ►

The international conference provided the Canadian government with an opportunity to outline its position on the asbestos issue ,which is one of controlled use. "Controlled use" means the enforcement of appropriate regulations for the safe handling of asbestos and the rigorous control of exposure. Where exposure and subsequent risk cannot be properly controlled, use in those specific cases should be prohibited. .

Over the past twenty years Canada's controlled-use position on asbestos was expanded to apply to all minerals and metals to ensure their safe use. This safe-use principle, based on a risk assessment/risk management approach, is a key element in the federal government's Minerals and Metals Policy. There is no new scientific evidence to support a ban on asbestos, nor is there any certainty that substitutes for asbestos products are safer. This view was taken up by the European Commission's Directorate General XXIV Scientific Committee on Toxicity, Ecotoxicity and the Environment (SCTEE) on February 9, 1998, following its peer review of the Environmental Research Management (ERM) Report. In effect the SCTEE stated in an interim report that "The ERM Report provides no new evidence which indicates that a change in the risk assessment for chrysotile is appropriate."

Until such evidence is provided the federal government in cooperation with its domestic and international partners will pursue its efforts on the international scene for the defence of chrysotile asbestos and the safe-use principle to ensure that decisions affecting this industry are based on good science. ◄

Quebec's chrysotile workers encourage other countries to adopt same high safety standards

Many thousands of Quebecers worked for years and in some cases their whole lives in the chrysotile mines of the Thetford and Asbestos regions, as well as processing plants, the construction industry and shipyards. In 1998, there are only 200 workers left in the mines and 1,000 in transformation. Representing them are three labour confederations – the Steelworkers' Union of America, affiliated to the Fédération de travailleurs et travailleuses du Québec (FTQ) [Canadian Labour Congress (CLC), International Confederation of Free Trade Unions (ICFTU)], the Centrale des Syndicats Démocratiques (CSD), and the Confédération des Syndicats Nationaux (CSN).

Participation in international conventions

In September 1997, the International ►

The battle by Quebec unions

Asbestos workers fought hard to obtain the working conditions they currently enjoy. Founded on the concept that it is unacceptable for workers to sacrifice their lives in order to earn a living, union action for health and safety is based on the following principles:

- Adapt work environment and practices to the vital needs of workers, not the other way around;
- Give absolute priority to the prevention of occupational diseases and accidents;
- Control dangers at the source.

For decades, asbestos workers faced the most dreadful working conditions imaginable – very high dust levels in mines and mills, extremely dangerous work processes, including sprayed (friable) asbestos, and the use of amphibole asbestos, and chrysotile mixtures. Rather than asking for a ban on this mineral, Quebec workers – following two major and lengthy strikes (1949 and 1974-75) – demanded major improvements in their working conditions. They also brought about major amendments in the legislation, especially concerning the recognition and compensation of respiratory disorders caused by asbestos, and the implementation of workplace inspections. These strikes also enabled workers' representatives to play an ongoing role in maintaining and improving work conditions and practices, as well as the monitoring of neighbouring communities.

Consensus reached at the conference

- For the protection of workers and the general population, all products and practices hazardous to the health and safety of workers must be controlled, and the disease and accident index reduced to zero.
- Technology and work practices now exist for protecting the health and safety of workers. Employers and governments are responsible for taking steps to ensure they are efficiently used.
- Workers must have the means and power to ensure that safety measures and practices are respected and must be protected against intimidation when exercising this power.
- Workers must be entitled to health and safety training and be able to take part in and contribute to this training. Employers in the asbestos sector and their governments must provide union organizations with the means to achieve this objective.
- The AIA must shoulder part of the responsibility for health and safety training and education in developing countries, and facilitate union participation in this area.
- Chrysotile and all replacement products must be used safely and responsibly, in accordance with the restrictions applying to all chemicals (ILO Convention 162, 170)
- Use of amphibole asbestos must be prohibited and sprayed asbestos insulation banned.
- Scientific studies should be conducted on the harmful effects of replacement products.
- Chrysotile must be used in a safe manner. This mineral is an important factor in the low-cost development of infrastructures for developing countries; it makes a major contribution to improving public hygiene while maintaining and creating stable jobs.
- Producer and user companies must sign agreements making themselves responsible for the safe use of chrysotile throughout its life cycle. Unions must be able to participate in the process.
- Technology exchanges must be intensified to achieve control and the improvement of international cooperation at all levels.
- Every country should consult user countries before reaching decisions about banning, because of the negative impact of this measure on large numbers of workers.
- To promote the circulation of information, union participants in this conference undertake to make the consensus on the safe and responsible use of chrysotile as widely known as possible, aiming especially to counter the arguments of asbestos critics.

"The ban on chrysotile today does nothing to repair the damage caused to the health of workers in the past, any more than it resolves the present-day problem of long-banned practices, such as sprayed asbestos insulation of buildings."

Conference on the *Safe and Responsible Use of Chrysotile Fibres*, organized jointly by the federal government, the provincial government, the Asbestos Institute and the Asbestos International Association, provided an opportunity for Quebec union representatives to meet with their counterparts from seven other countries. Some of these countries, such as Brazil, Zimbabwe and Greece, are chrysotile producers; others, including Colombia, Morocco, Mexico and Algeria are users. During discussions, delegates from the various unions agreed upon the objectives and strategy to be adopted for maintaining permanent jobs and work conditions ensuring the physical safety of workers in the asbestos industry.

They also reached the conclusion that the unrestricted use of amphibole asbestos and work methods dating from before 1975 create a false sense of security among today's workers in replacement product industries. Ascribing the illness and death of thousands of workers to practices that are no longer used and types of asbestos now prohibited makes people regard anything that is not asbestos as safe. As a result, once asbestos is eliminated, it is assumed that safety precautions can be reduced.

This is all the more absurd because the ban on chrysotile today does nothing to repair the damage caused to the health of workers in the past, any more than it resolves the present-day problem of long-banned practices, such as sprayed asbestos insulation of buildings.

In October 1997, the International Confederation of Free Trade Unions (ICFTU) organized a conference on synthetic mineral fibres, in cooperation with the FTQ and CLC. The outcome was a general restatement of support for Convention 162 of the ILO, with all affiliates of participating organizations being urged to put pressure on their governments to ratify Convention 162.

The Conference recommended that the ILO organize an urgent meeting of experts to draft a code of conduct for the safe use of insulation materials. Moreover, it was suggested that the International Agency for Research on Cancer (IARC) and other international organizations should increase their research into the dangers associated with synthetic mineral fibres.

International cooperation among workers

Taking part in this conference were many representatives from European unions, most of them in favour of a total ban on asbestos, as well as representatives of producing countries such as Russia, Zimbabwe and Brazil, and user countries like India, Mexico and Tunisia.

A number of members from various union organizations expressed the hope that reciprocal visits between delegations from different countries would promote training in occupational health and safety. With this in mind, Brazilian and Quebec workers have for some time been in regular touch and are currently considering sending joint delegations to South Africa, Russia and India.

For asbestos workers in these two producing countries, the industry's survival is vital. However, they fully realize that this survival must include safety measures for workers in industries using chrysotile worldwide. They therefore regard it as essential to spread full information systematically about safe work methods and modern manufacturing processes for chrysotile-based products, in particular chrysotile cement.

The asbestos workers of Quebec and Brazil are already enjoying a work environment in which they can function without undue risk to their health. Following the Montreal conference, these workers are now doubly determined to bring the benefit of their experience and knowledge to other workers at every opportunity. ◄

Scientific workshop...

The tremolite issue

Professor Williams-Jones presented his mineralogical study (carried out with his graduate student, Mr. Normand) of a major chrysotile producing pit in the Eastern Townships of Quebec. He focussed on tremolite fibre as it is associated with chrysotile ore. His data showed that tremolite does not occur within the ore zone but rather among the associated (barren) rocks. The geology and geochemistry were well described and the physical-chemical conditions required for the formation of tremolite were outlined. His data also show that it is both feasible to mine chrysotile and to avoid the barren zones which contain tremolite. What may have been inadvertently incorporated into processed chrysotile in the past may be eliminated from chrysotile ore in the future. The ore body must be mapped in detail and the barren zones avoided during mining and thereby eliminated from the milling process. The significance of the tremolite issue was broadly discussed in reference to the asbestos diseases, especially mesothelioma. There exist some broad relationships that reinforce the association between mesothelioma proportional mortality and tremolite content of ore.

Risk associated with low-level exposure

It appears that virtually everyone who lives in industrial countries today has chrysotile asbestos fragments in their pulmonary tissues. It was noted that the presence of these fibres is not associated with the presence of asbestos-related lesions or diseases. Dr. Pooley reported that in many occupational settings the amphibole content of lungs correlates better with malignant disease than does chrysotile.

Dr. Wilson stressed the need to use comparative risks to place in perspective risk at low-level exposure to chrysotile. A risk of asbestos disease of 1 in 100,000 deaths has some meaning when expressed in terms of well-known risks, e.g. those associated with cigarette smoking. The latter risk in heavy smokers is approximately 30,000 tobacco-associated deaths per 100,000 smokers. The asbestos-associated risk of 1 in 100,000 is the same as smoking about 1.5 packs of cigarettes over a 50-year period (less than 1 cigarette per year).

Dr. Hoskins spoke about possible thresholds. Although hazardous, a material that is a human carcinogen does not necessarily produce cancer. These substances display thresholds. Chrysotile may possess a practical threshold. That is, an exposed person may require a latency which exceeds the human lifetime. But despite evidence of a practical threshold for chrysotile, most in attendance believed that, at present, the linear dose-response model is the most "protective" model.

Mesothelioma and other agents

The workshop participants discussed agents other than asbestos that have been etiologically linked with the appearance of human mesothelioma. The zeolite mineral, erionite, is implicated as an agent in the induction of mesothelioma in Central Turkey (the Karain area on the Cappadocian Plateau); the use of the diagnostic medium Thorotrast was implicated as the agent in the production of peritoneal mesotheliomas in Germany some 30 years ago; the use of the drug isoniazid in the first trimester of pregnancy was implicated in pediatric mesothelioma some years ago.

Drs. Carbone and Mutti and Dr. Giordano presented some fascinating research findings concerning the ability of a specific virus to cause mesothelioma in laboratory animals. This finding prompted an investigation of human mesothelioma tissues. In the late 1950s through the early 1960s, polio vaccines utilizing live polio viruses were prepared in monkey tissues. Some of these tissues contained animal viruses, including a virus which was later found to be oncogenic, now called SV-40 (Simian-Virus 40). Their hypothesis is that this virus may play a role in the induction of some human mesotheliomas.

New products and risk

Asbestos cement and friction products manufacturing accounts for over 95% of current chrysotile asbestos production worldwide. Dr. Rickards also presented data that indicated that analysis of 23,000 work area samples and 5,400 personal air samples, showed that 97.3% of area samples produced values less than 1 f/ml of air. Dr. Dunnigan also noted that these non-friable materials have been found to be stable and do not emit fibres at levels in excess of 0.004 f/ml; many achieve values of 0.0002 f/ml of air. Dr. Rickards indicated that manufacturing of chrysotile products in AIA reporting countries is now achieved at levels of exposure that are historically associated with little or no risk. He shared his concern of point-sources of exposure in manufacturing sites, apparently related to poorly-trained workers who do not follow established work practices or procedures. These, he indicated, need to be addressed by plant owners and unions. The shop steward needs to be involved. These point sources appear to account for 4% of all air measurements, those in excess of 2 f/ml of air.

Export expertise as well as technology

The members of the workshop firmly support the principle of exporting technology along with fibre. Dr. Bragg's work showed that implementation of modern control technologies has been effective in allowing industry to meet regulatory statutes. In addition to technological control of dust,

(*see* Scientific workshop, *page 15)*

OSHA standards for asphalt roof coatings and sealants overturned

In a decision rendered in July 1997, the U.S. Court of Appeals, Fifth Circuit, reversed the Occupational Safety and Health Administration's (OSHA) 1994 construction and shipyard asbestos standards regarding the regulation of asphalt roof coatings and sealants. In light of the lack of evidence in the record, the Court concluded that the OSHA regulation was invalid as applied to these asbestos-containing asphalt products.

The participants in the case

In 1986, OSHA issued a rule regulating occupational exposure to asbestos, parts of which were remanded by the D.C. Circuit for further action. Accordingly, in 1994 OSHA published a Final Rule. The challenge to OSHA's Final Rule was launched by the Asbestos Information Association/North America (AIA/NA) on behalf of its representative members: asbestos miners and manufacturers of asbestos-containing products. This particular case represented the last unsettled petition for review of the 1994 Rule.

The basis for the AIA/NA's case

Roofing sealants and coatings are among the few remaining asbestos products manufactured in the United States: they consist of asphalt mixtures containing asbestos fibres. During the manufacturing process solid asphalt is dissolved in paint thinner to turn it into a black sirupy liquid to which sufficient chrysotile asbestos fibres are added to produce a stiff paste that can be used to seal cracks and fissures. Following its application, the solvent evaporates and the asphalt acts as a highly resistant and waterproof sealant. The same process is used to produce roof coatings; however, as a result of their thinner consistency, they can be applied with a brush. The basis for the AIA/NA's case is that the manufacturing process encapsulates the fibres in asphalt: as a result, asbestos fibres cannot become airborne and workers cannot inhale or swallow the fibres by accident. In addition, the AIA/NA pointed out that there was no evidence that these products had ever been found to result in worker exposure to asbestos fibres. On these grounds, the AIA/NA objected to the application of OSHA's regulation regarding the work practice, training, use, and hazard communication of asphalt coatings and sealants.

The Court's decision

The decision by the Court of Appeals was two-fold: it held that the AIA/NA had a standing to challenge the regulations issued by OSHA; and that these regulations were not supported by evidence in the record. As to the first part of the decision, the Court recognized that the "[b]urden is on Occupational Safety and Health Administration (OSHA) to show need for challenged regulation on basis of substantial evidence." Furthermore, the Court found that the AIA/NA had met "its burden of establishing that it [had] sustained an injury in fact" as a result of the Final Rule and had been "adversely affected."

OSHA argued that asbestos-containing roofing sealants might break down and result in exposure in ways analogous to similar kinds of roofing materials, but the Court found that the evidence in the rulemaking record refuted this contention. According to the Court's review of the evidence, asbestos fibres cannot escape from roofing sealants and become airborne. In conclusion, it stated: "We hold that, because of the lack of substantial evidence in the record, the challenged regulations are invalid as to asbestos-containing asphalt roof coatings and sealants."

Fibre News

Evidence of pulmonary fibrosis from exposure to fibreglass

Reports of the carcinogenicity and fibrogenicity of asbestos fibres have led to the search for and use of substitutes for insulation work. Fibreglass is now often used for this purpose in lieu of asbestos. While some animal and human experiments have suggested that fibreglass is a relatively inert material with no carcinogenic or fibrogenic properties, a recent review of reports regarding the carcinogenicity of fibreglass (Infante et al. 1994) suggested that it is as potent as that of asbestos fibres. A team of Japanese researchers has now contributed further evidence to this debate in an article published in the *American Journal of Industrial Medicine* in 1996. The scientists report that they have found evidence of pulmonary fibrosis in a worker exposed to fibrous glass.

The worker, a 56-year-old carpenter, had been employed in packing fibreglass into wall and roof spaces for thermal insulation and had never used a dust mask. He had been inhaling large amounts of dust consisting of fibreglass as was clear from the glass fibre particles found in his mouth and nose. His chest X rays revealed the presence of small opaque nodes and multiple cystic lesions in the lungs. Analytical electron microscopy detected widespread depositions of small glass fibres in the lungs, suggesting their possible contribution to the development of pulmonary fibrosis.

The particulars of this case also provide some measure of support to a study (Goldsmith, 1986) that reported that man-made mineral fibres (MMMFs) appear to be at least as toxic as asbestos. In that report it was suggested that the "important risk factors are duration of exposure, cumulative exposure, fibre characteristics, exposure to other pollutants and smoking." As the report by the Japanese researchers makes clear, these important factors in pulmonary injury were present in the case of the fibreglass worker suffering from fibrosis.

Goldsmith JR (1986) "Comparative epidemiology of men exposed to asbestos and man-made mineral fibers." *Am J Ind Med* 10: 534-552.

Infante PF et al. (1994) "Fibrous glass and cancer." *Am J Ind Med 26: 559-584.*

Takahashi T et al. (1996) "Pulmonary fibrosis in a carpenter with long-lasting exposure to fiberglass." *Am J Ind Med* 30: 596-600.

European MMMF Review: 1995

In 1995, the European Community's (EC) Scientific Expert Group was mandated to produce a report that would enable the EC to determine whether man-made mineral fibres (MMMFs) should be considered as carcinogens. In its study, the Expert Group was required to consider only scientific assessments and disregard economic issues. This initiative was intended to bridge the gap between the different national positions within the EC regarding the classification of MMMFs. Deep divisions characterized the various national stances: Germany wanted to classify MMMFs as carcinogenic, while France held a diametrically opposed view. In general, the issue is receiving more attention in Europe than in North America, where the U.S. has listed fibreglass as a substance "reasonably anticipated to cause cancer."

Despite the divergence of views among the member states of the EC, it was expected that the various national governments would follow the Expert Group's recommendations regarding the classification of MMMFs. The decision to treat substitute fibres as carcinogenic raises three options for manufacturers and users. The first possible course is to eliminate these materials altogether. Should that prove impracticable, the second option would be to limit their use to a "closed system." The final option is to require all users of MMMFs to wear protective gear.

Recent findings regarding the inhalation of RCFs

Three articles published in the May-June 1995 issue of *Inhalation Toxicology* report on the findings of chronic toxicity/carcinogenicity inhalation studies involving refractory ceramic fibres (RCFs) conducted in Fischer 344 (F344) rats and Syrian golden hamsters. In the two studies with F344 rats, exposure-related pulmonary neoplasms (bronchoalveolar adenomas and carcinomas combined) were observed in all groups. While no pulmonary neoplasms were observed in the study with Syrian golden hamsters, 41.2% of the RCF-exposed hamsters developed pleural mesotheliomas. In this same study, in "recovery animals, there was no further progession of either pulmonary or pleural lesions following cessation of exposure."

Mast RW et al. (1995) "Studies on the chronic toxicity (inhalation) of four types of refractory ceramic fiber in male Fischer 344 rats." *Inhalation Toxicology* 7(4): 425-467.

Mast RW et al. (1995) "Multiple-dose chronic inhalation toxicity study of size-separated kaolin refractory ceramic fiber in male Fischer 344 rats." *Inhalation Toxicology* 7(4): 469-502.

McConnell EE et al. (1995) "Chronic inhalation toxicity of a kaolin-based refractory ceramic fiber in Syrian golden hamsters." *Inhalation Toxicology* 7(4): 503-532.

Cancer mortality among MMVF production workers

A report published in the review *Epidemiology* in May 1997 has provided updated results gauging cancer mortality in a cohort study of man-made vitreous fibre (MMVF) production workers from Denmark, Finland, Norway, Sweden, the U.K., Germany, and Italy from 1982 to 1990. This follow-up report states that "insofar as respirable fibers were an important component of the ambient pollution of the working environment, they may have contributed to the increased risk" that was measured during the study.

Man-made vitreous fibres, which encompass fibrous inorganic substances made primarily from rock, clay, slag, or glass, are thought to be potentially carcinogenic in humans given that they have "shown carcinogenic activity in experiments based on intratracheal instillation or intracavitary injection." The results of the mortality analysis of the aforementioned follow-up study lend credence to the suspicion concerning the carcinogenicity of MMVFs. In this analysis, 22,002 production workers contributed 489,551 person-years, during which there were 4,521 deaths. Increased mortality rates were recorded for workers with less than 1 year of employment (their standardized mortality ratio (SMR) was 1.45; 95% confidence interval = 1.37-1.53), while workers with 1 year or more of employment had an SMR of 1.05 (95% confidence interval = 1.02-1.09). It was found that "[a]mong rock/slag wool workers, the risk of lung cancer increased with time-since-first-employment and duration of employment." Furthermore, "[t]obacco smoking and other factors linked to social class, as well as exposures in other industries, appear unlikely to explain the whole increase in lung cancer mortality among rock/slag wool workers."

Boffetta P et al. (1997) "Cancer mortality among man-made vitreous fiber production workers." *Epidemiology* 8: 259-268.

Malignant mesothelioma and the safety evaluation of synthetic vitreous fibres

An article which appeared in the September 1996 issue of *CIIT Activities*, a review published by the Chemical Industry Institute of Toxicology (CIIT) in the United States, provides an overview of CIIT studies on fibre toxicology with an emphasis on evaluating the potential risks of mesothelioma induction. According to the authors of the article, a fuller understanding of the disease through laboratory testing is essential to determine the risks posed by synthetic vitreous fibres.

The authors state that malignant mesotheliomas have unusual pathologic features and growth characteristics that make these neoplasms difficult to diagnose and especially resistant to therapy. They insist that the elucidation of the mechanisms which govern fibre-induced mesotheliomas — including the preneoplastic stage which is not recognizable in mesothelial cells using current technology — would reduce the uncertainty that prevails with regard to the determination of risks brought about by low exposures to fibrous particulates. "Understanding the development of this disease in laboratory bioassays," they add, "will provide cost-effective, short-term approaches for assessing the potential hazards posed by useful new synthetic fibrous materials."

Everitt JI et al. (1996) "Malignant mesothelioma: A legacy of asbestos that affects the safety evaluation of synthetic vitreous fibers." *CIIT Activities* 16(9): 1-6.

The classification of RCFs for carcinogenicity

In the mid-1990s, the Health and Safety Executive in the U.K. asked the EC's Committee on Toxicity, Mutagenicity and Carcinogenicity to express an opinion with regard to the classification of refractory ceramic fibres (RCFs) for carcinogenicity under the criteria stipulated in the Dangerous Substances Directive of the European Community.

The Committee evaluated the available carcinogenicity studies, including new investigations sponsored by an industrial consortium and conducted at the Research Consulting Company (RCC) laboratories in Geneva. These new studies, which the Committee found to be of a high standard, provided information on the carcinogenicity of four types of RCFs in rats "using inhalation exposures to the maximum tolerated dose level (MTD)." The RCC study indicated that RCFs "induced broncho-alveolar adenomas and carcinomas" in rats and some evidence for the "induction of pleural mesotheliomas." On the basis of these and other findings, the Committee recommended a category 2 classification for RCFs using the criteria for the classification of chemicals in the European Community under the terms of the Dangerous Substances Directive.

Fibre news...

The toxicity of wool and cellulose fibres

A paper presented at the Symposium on the Health Effects of Fibrous Materials (excluding Asbestos) used in Industry makes the case for more extensive toxicological studies on wool and cellulose fibres. The author points out that due to their historical usage, these materials have not been "subjected to full modern toxicological testing"; therefore, their biological activity cannot be described with any certainty. He reminds us, however, that both these materials "have been reported as causing some degree of pulmonary damage among factory workers and such biological testing as has been undertaken has shown evidence of toxicity."

According to the author's review of the available evidence regarding the use of cellulose and wool in work environments such as paper-shredding facilities and textile mills, respirable dusts are produced during the industrial process despite the relative coarseness of these fibres. The author states that "once they reach the lung tissue, [these dusts] have significant biological activity which can include the stimulation of pulmonary fibrosis." In the absence of strict controlled-use measures, there is the possibility that exposure to respirable dust could be high. Since the current record suggests that pulmonary fibrosis is a significant possibility, "the production of pulmonary tumours cannot be ruled out in the present state of knowledge since fibre-related tumours most usually occur where pulmonary fibrosis had developed."

Davis J (1996) "The toxicity of wool and cellulose fibres." *J Occup Health Safety—Aust NZ* 12(3): 341-344.

National conference on silicosis

The National Conference to Eliminate Silicosis, sponsored by the Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), the Mine Safety and Health Administration, and the American Lung Association, was held in Washington, D.C. in March 1997. The Conference, which included twenty workshops that dealt with the prevention of silicosis and deaths among workers exposed to silica dust in specific industries and industrial operations, focused on the preventability of this disease for which there is no cure.

According to OSHA, more than 1 million workers in the U.S. alone are exposed to silica dust in the workplace and one-tenth of them are at risk for developing silicosis. NIOSH has published several warnings of silicosis risks for workers involved in breaking concrete or sandblasting, rock drilling, laying railroad tracks, manufacturing glass, ceramics, abrasives, or soaps, and other industrial or construction operations. Accordingly, it has suggested practical steps to reduce exposure and the risks of developing what it terms a clearly preventable disease. NIOSH Director, Linda Rosenstock, has pointed out, "The human and economic costs of silicosis are unacceptable. It is vital that government, industry, labor, and the public health community work together to help employers and workers recognize these risks and take action to avoid them."

Scientific workshop...

the enormous expertise of the older producing countries should be used by consumer nations as well. This should include both training in handling and use of chrysotile products and the introduction of good work practices.

Does chrysotile present an acceptable risk?

The other day my colleague Dr. Jacques Dunnigan made coffee in his hotel room. On the package of the sugar substitute, a label read: "USE OF THIS PRODUCT MAY BE HAZARDOUS FOR YOUR HEALTH. THIS PRODUCT CONTAINS SACCHARIN, WHICH HAS NOW BEEN DETERMINED TO CAUSE CANCER IN LABORATORY ANIMALS." I don't mean to belittle or cavalierly dismiss risk associated with chrysotile usage, but what I would like to illustrate is that we all accept risks in our everyday life. I am not asking a working population to embrace my idea, or Dr. Dunnigan's concept, of personal risk. The acceptance of risk is for the various countries, the various memberships and constituencies that are exposed to asbestos to consider. The risk associated with use of saccharin is so minuscule that I would consider it to be a phantom risk. Perhaps some of you also support that characterization. I also believe that use of chrysotile asbestos comes with an acceptable risk; if this material is used properly, it will be associated with a vanishingly small, undetectable risk. Should we use chrysotile asbestos? That is your decision. ◄

Research Notes

Animal study finds no evidence of asbestosis at low levels of exposure

Researchers from the University of Vermont have studied the effects of two airborne concentrations (0.18 and 8.2 mg/m^3) of chrysotile asbestos on Fischer 344 rats at time periods from 3 to 20 days after inhalation. As expected, exposure to chrysotile at the higher concentration was associated with evidence of fibrosis and other cellular effects. Indicators of inflammation, increased cell proliferation and pulmonary fibrosis were not observed in the lungs of rats exposed to the lower concentration of chrysotile. These results indicate that cellular and molecular markers of inflammation and proliferation are dose-related. Many researchers believe that these and other results from animal and epidemiological studies support the concept of a threshold for chrysotile at low levels.

Quinian TR, Berube KA, Marsh JP, Janssen YMW, Taishi P, Leslie KO, Hemenway D, Oshaughnessy PT, Vacek P & Mossman BT (Sept. 1995). "Patterns of inflammation, cell proliferation, and related gene expression in lung after inhalation of chrysotile asbestos." *American Journal of Pathology*, 147(3):728-739.

Austrian study finds that asbestos cement pipe does not contribute to fibre levels in drinking water

To help determine the relative contributions of natural asbestos deposits or the use of asbestos cement to levels of asbestos fibre found in drinking water, Austrian researchers examined 50 water samples from different sources and compared them to both treated and untreated control samples. Standardized EPA/BGA methodology with transmission electron microscopy, energy dispersive X-ray analysis and selected area electron refraction were used to quantify concentrations of different sized chrysotile and amphibole fibres. In 10 areas with natural asbestos deposits and in 14 areas where asbestos cement pipe is used, asbestos fibre concentrations in drinking water were low and not significantly different than those found in the 6 control areas (median 32,000 total asbestos fibres per litre). The highest concentration was actually found in an area with natural deposits at the source of the water supply. In areas without natural deposits, the increase of asbestos concentrations from origin to consumer was not significant and unrelated to water aggressiveness, age and length of asbestos cement pipe.

Neuberger M, Frank W, Golob P & Warbichler (March 1996). "Asbestos concentrations in drinking water - asbestos cement pipes and geogen sources in Austria," *Zentralblatt Für Hygiene und Umweltmedizin*, 198 (4):293-306.

Smoking a critical factor in asbestos-related lung cancer

Several models attempt to explain the synergistic increase in lung cancer among workers exposed to asbestos fibres, who were smokers at the same time. It is known that reactive oxygen species (ROS) are important mediators in asbestos-induced diseases, especially cancer. To help better understand the relationship, researchers from the University of Athens studied the formation of ROS in aqueous buffer suspensions containing crocidolite or chrysotile alone, and in combination with aqueous cigarette tar extracts. It was observed that asbestos and cigarette tar act in a cooperative or synergistic way in the generation of hydroxyl radical spin of the adducts. These results are consistent with the fact that lung cancer has been found in asbestos-exposed workers who were smokers, but rarely among non-smokers.

Valavanidis A, Balomenou H, Macropoulou I & Zarodimos I (1996). "A study of the synergistic interaction of asbestos fibers with cigarette tar extracts for the generation of hydroxyl radicals in aqueous buffer solution." *Free Radical Biology and Medicine*, 20 (6):853-858.

Asbestos, SV40 and malignant mesothelioma

As has been previously reported in The Asbestos Institute Newsletter, a large cohort of people in Europe and North America was accidentally vaccinated with a live Simian Virus (SV40) through contaminated polio vaccines given between 1959 and 1961. According to some researchers, SV40 may be an important factor in the current continuing rise in the incidence of mesothelioma in the United States, Britain and Europe. One recent study investigated the presence of SV40 antigens in recently diagnosed cases of mesothelioma in the UK. Six of the nine mesothelioma cases studied indicated SV40 markers. The author concluded that the data provide evidence of an association of SV40 antigens with human pulmonary mesothelioma in the British population.

Stenton SC (1997). "Asbestos, Simian Virus 40 and malignant mesothelioma," *Thorax*, 52 (suppl. 3):S52-S57.