FILE NAME: Quebec Asbestos Mining Association (QAMA)

DATE: 1980 July-Aug-Sept

DOC#: QAMA162

DOCUMENT DESCRIPTION: QAMA Bulletin Vol. 4, No. 4

Bulletin

PUBLISHED BY L'ASSOCIATION DES MINES D'AMIANTE DU QUEBEC · JUL./AUG./SEPT. 1980 VOL. 4/NO 4

Substitutes: higher cost, lesser quality

"If asbestos were banned in roof cements, the market would be flooded with products so inferior in quality that they cannot perform the purpose for which they are intended."

Such is the opinion expressed by an American expert at a symposium of national scope held in the United States on the whole question of substitutes for asbestos (National Workshops on Substitutes for Asbestos).

Mr. Eric Wormser, of Gibson-Homans, the largest U.S. manufacturer of sealing and coating compounds, was invited to review the numerous problems posed by the replacement of asbestos in various products. His analysis was based on the results of several studies and tests conducted by his company in an attempt to find and develop valid substitutes for asbestos.

According to Mr. Wormser, all the money and efforts invested in the search for substitutes have yet to give satisfactory results, particularly in the case of sealing and coating compounds for roofs. In these products, the asbestos fibre acts as a binding agent and helps to increase the cohesion, viscosity, elasticity and plasticity of the mixtures. Being inert, it is not subject to aging, and so enhances the resistance and the durability of the products.

Conclusive experiments

"In spite of the tremendous amount of work that has been done to try to find a substitute raw material that will produce satisfactory roof coatings and roof cements, to the best of our knowledge no one has found such a material. As the result of our company's vast research, by complicated formulating techniques, utilizing a variety of ingredients and techniques, we are now able to produce solvent base asphalt roof coatings and roof cements which do not include asbestos fibre. We do not yet offer these asbestos free roof coatings and cements for sale in the United States because they are about 15% more expensive to produce and we believe they are not as good as comparable products made with asbestos. It is difficult to justify selling an inferior product for more money."

"We are shipping considerable quantities of asbestos free coatings and cements to Sweden, where the use of asbestos fibre in such products has been banned. Therefore, we are gaining experience in the volume manufacture of such products and have the opportunity to observe their performance in large scale use."

Furthermore, Mr. Wormser feels that a ban on the use of asbestos in the manufacture of roof coatings and cements would be a great disservice to the public. *"Once the asbestos is bound in the roof coating and cement vehicles, it can do no harm to anyone. Therefore, a ban would not benefit anyone. On the other hand, it would force on the public a flood of very poor products at high prices."*

Energy savings

While admitting that it is possible to produce asbestos free products, Mr. Wormser further pointed out that such production goes against the current trends in industry and government policies regarding energy consumption.

"The only method we know for manufacturing reasonably satisfactory asbestos free roof coatings and roof cements is to combine some less than satisfactory substitute fibres with a variety of mineral fillers, wetting agents, plasticizers and synthetic thixotropes."

"We manufacture about 250 different roof coatings, cements and mastics. A variety of techniques must be used to achieve acceptable results in each of these products. The end result in every case is a product that contains considerably less asphalt, tar or other waterproofing oil and much more filler material than when asbestos is used. These fillers contribute nothing to the waterproofing properties or weathering of the products. To the contrary, these filler materials often detract from the desirable properties. These formulas require from 30 to 70% more energy in our plants to manufacture."

Health

Finally, bringing up the subject of health problems which are said to be ▶

The IOEH subsidizes a research project on exposure to different types of fibre

The different types of fibre which are commercially mined – chrysotile, amosite and crocidolite – have been and continue to be the object of studies aimed at determining their effects on health. Although up until now chrysotile has revealed itself to be less harmful, it would appear that a distinction must be made between two categories of chrysotile fibre: slip fibres and cross fibres.

Background

This distinction arises from the geological formation of the Eastern Townships which is such that in most of the asbestos deposits – those mined at Asbestos, Thetford Mines and Black Lake – the fibre presents itself in vertical rows, perpendicular to the rock, whereas in the deposits mined at East Broughton, the fibre presents itself horizontally or diagonally with the rock, as if it had "slipped". This fibre, which is principally found in the deposits mined by Carey-Canada, has properties which differ slightly from the other fibres.

The results of studies published by McGill University in 1974 have led scientists to wonder whether the radiological changes detected in employees working with slip fibre, mined in the East Broughton area, are not less significant than those detected in workers from the other asbestos areas.

Dr Graham Gibbs, who until September this year was Director of the Institute of Occupational Health and Safety at McGill University entered the field of Occupational Health in England where he worked for seven years with the British Medical Research Council Department for Research in Industrial Medicine and Air Pollution Research Unit. He obtained his B.Sc. in Chemistry and Geology at the University of London, England, his M.Sc. in geology and his Ph.D. in Epidemiology and Medical Statistics at McGill University. Dr Gibbs is now a part time Associate Professor in the Department of Epidemiology and Health at McGill University. He is also an active member of many international committees concerned with occupational health and has published widely in this field.

In an attempt to answer this question, Dr Gibbs, in cooperation with a group of British scientists headed by Dr J.C. McDonald, has initiated a research program with the specific object of studying the relationship between radiological abnormalities detected in the lungs of workers and the different types of fibre to which they are exposed. This study is subsidized by the program of the Institute of Occupational and Environmental Health of Montréal which is funded by the asbestos mining industry.

Scientists already established several years ago that the harmfulness of asbestos is more closely related to the physical characteristics of the fibre, particularly its geometric shape, than to its chemical composition. Thus, fibres of different lengths and diameters would not have the same effect on health or provoke the same reactions in the organism.

For instance, it would appear that straight fibres penetrate the lungs more deeply. In short, according to Dr. Gibbs of McGill University, the possibility that asbestos fibres are at the root of lung diseases may be closely connected to penetration, deposit and retention of the fibre in the lungs, as well as the resulting biological reactions.

Methodology

The test group will be made up of approximately 200 employees working with slip fibres and groups of employees from the other mines, all born after 1921. Each test subject shall have worked with one type of fibre only for a minimum period of eight years, but initial exposure may not have taken place prior to 1958.

The X-rays taken at Thetford Mines

Substitutes: higher cost, ...

related to asbestos, Mr. Wormser, after stating that such problems had never arisen in his company, remarked that asbestos, being the best known of all minerals, is probably the easiest to control as well. Given the current state of research, the same assurances cannot be given about substitutes.

"The hazards of asbestos fibre have been thoroughly researched and documented. They are real but readily controllable and limited. We know little or nothing about the hazards of the variety of raw material we use in order to manufacture asbestos free roof coatings and cements. We get material safety data sheets from our supliers. None of the new raw materials are known carcinogens. It is unlikely, however, that anywhere near the amount of research into the health hazards of these materials has been devoted as has been to asbestos".

A new laboratory at Bell

As part of a general modernization program, Les Mines d'amiante Bell Ltée has just completed its new laboratory facilities. While the activities of the lab had been limited up until now to the usual quality control of the fibre, the new facilities now make it possible to include the evaluation of deposits by means of the analysis of drilling cores, as well as various other tests for the pilot mill. Concurrently, the environmental control department, whose program has been diversified and extended, is expanding considerably.

The new laboratory at Les Mines d'amiante Bell Ltée functional, modern and spacious

New facilities

The laboratory is now located in the no. 2 Shaft building, where it is sheltered from the mill vibrations and any possible shifting of the earth due to underground mining operations. The new facilities include: a filtering system which produces the pure water required in the quality control test on the fibre, stainless steel counters which, unlike arborite, do not absorb fibres or impurities and a general ventilation system which prevents dust emission. The sampling tables are moreover equipped with exhaust hoods and covered with glass panels which prevent the spreading of dust while still allowing light to penetrate. Finally, the samples which were previously delivered by messenger, are now sent directly from the mill to the laboratory by means of a pneumatic tube system, in just 35 seconds.

Environmental control

In addition to the daily measuring of dust levels, a quality control program for the environment has been established. The program deals with the analysis of the emissions from the mill chimneys and the monitoring of noise levels throughout the installations, at regular intervals or on request.

With the new underground operating methods which require the setting up of a large fleet of diesel vehicles, the environmental control department will have to make daily checks on the exhaust levels of the new vehicles as well as on the ventilation of the drifts in order to avoid saturation of the air by engine emissions.

With five times its previous space, a larger staff and a more complete and more modern range of equipment the laboratory at Bell is no longer limited to the quality control of the fibre and dust levels in the work place. Its new assignments indicate a real desire to improve the environment, for both the workers and the area residents.

this fall will be examined by a team of radiologists specialized in reading X-rays for epidemiological studies.

After establishing the radiological abnormalities and then the different levels of exposure and the history of each worker, it will be possible to determine the frequency of the radiological changes according to exposure levels, according to the mines, and consequently according to the types of fibre.

Interpretation

In addition to providing with greater accuracy whether exposure to slip fibres and exposure to cross fibres really differ in their effects on health, the study will provide useful data on the value of the measures taken to prevent asbestosis.

Indeed, all the subjects selected were only exposed after 1958, the year environmental controls were introduced in the asbestos industry, and consequently, all of them have worked for most of the period of employment in an environment approaching that which exists today.

The results of this study, which will be available by the summer of 1981, could prove that certain types of fibre are safer to handle than others and will allow the evaluation "in the field" of the effectiveness of the controls implemented in the last 20 years in reducing radiological abnormalities.

Packaging asbestos:

27 million bags, 500 000 cu m. of wood, 435 tons of nails

What a long way we have come from the early part of the century when the men had to use their ingenuity to think up better, faster and easier ways of filling sacks with fibre. Nowadays, technicians monitor dials and signal lights as the bags of fibre roll by on conveyors.

It is doubtless because they dreamed of advanced automation that the workers in the mills were also inventors. We owe to their experience and creative minds, along with considerable investments, many of the machines and techniques which have made it possible to improve working and environmental conditions

Burlap, needle and thread

There was a time when asbestos fibre was not bagged but "sacked". The burlap sacks were made in Québec with imported jute, mostly from India. The problem of recycling the asbestos sacks was non-existent back then since they were used over and over, as long as they could still be mended Mending was moreover an important activity which kept several dozen people busy at the mill.

Mending was also part of the day-to-day work of the men who filled and handled the sacks, they always had needle and thread on them so they could immediately repair any ripped or split sacks, in short the result of some miscalculated move.

Before the advent of pressure packing, the fibre used to be shovelled into sacks and packed down with a few good thrusts of the knee

With a little experience, a "hand sewed" sack could be filled, packed and closed in three minutes The full sacks were sent up to the warehouse roof where they were tossed down through a trap to the floor 25 feet below Not everyone was handy at tossing the sacks without splitting them open, and according to the few who remember, more than one was split and mended before one got "the knack"!

The past, at the beginning of the century, bagging of the fibre and bag handling were entirely manual

Around 1935, the operation was modernized the sack was now held open on a cylindrical rack rather than by the worker and the knee which packed the fibre was replaced by a piston

A major improvement: pressure packing

Pressure packing, which was developed by Johns-Manville in 1950, was adopted by the other mills a few years later and marked the beginning of automation which from then on was very rapid Although still packaged in burlap, the fibre was soon being emptied, weighed and conveyed by machines, man's role being confined to stacking and loading

The discovery of pressure packing was a turning point for the asbestos industry, to such an extend in fact that research is still being done to improve this technique and derive the greatest benefit from it.

In addition to solving part of the dust problems, pressure packing has made handling easier, reduced the amount of storage and transportation space required and, in so doing, cut down the cost inherent in these operations

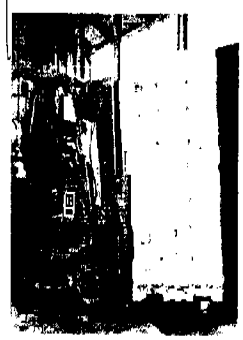
From burlap to paper

A world burlap shortage in 1970, combined with a growing preoccupation with health and environmental problems, brought into question the use of burlap sacks which did not offer a sufficiently hermetic wrapping, allowing fibres to escape during handling and shipping From this moment, the asbestos industry was to become one of the most important customers of the packaging industry in Québec, consuming an average of 98 sq km of paper annually (based on an average consumption of 30 million 3-ply paper bags, before plastic came into use) Paper was gradually replaced by polyethylene and polypropylene, later lined with a reinforcing fabric thread

The present bagging is automatic and man's role is essentially limited to monitoring the machines

In 1976, in order to further reduce contact with the fibre and to make handling easier, the asbestos mines began to offer their customers a completely soluble wrapping – paper, ink and glue – which could be incorporated into the mixtures used in the manufacturing of finished products.

In 1973, an engineer at Asbestos Corporation's Normandie Mine designed a machine which could automatically position the bags to receive the fibre and shortly afterwards, all the companies adopted this technique. That same year, all the machines in the mills were covered and closed off, so as to further diminish exposure of the employees to dust



The container, the lift truck, the pallet, all are elements contributing to the safe transportation of asbestos fibre

Bagging has changed over the years because environmental protection demanded it but also because technology allowed it Thus in 1970 the growing popularity of containers and the appearance of lift trucks made the use of pallets indispensable to ensure the stability of the loads and the safety of the operations

Pallets: an industry in their own right

From this time on, a veritable pallet industry developed near the mines, thus creating local activity which grew rapidly For the customer, the pallet which is available in 40 different models, represents an additional cost of \$4 to \$14 for every two tons of fibre, depending whether he orders a reusable pallet for shipping his own finished product or a disposable model. North American customers may even rent pallets, under an agreement with the rail companies which allows them to send back free of charge one wagonload of pallets for each order to five wagons of fibre.

Today, of the seven million pallets manufactured in Québec annually, around 600 000 are used by the asbestos producers The manufacturing involves 500 000 cubic metres of wood, 435 tonnes of nails and creates, at the regional level, about a hundred jobs

Metric conversion

Since the bagging of fibre began, the industry has used 100 and 125 pound burlap sacks, then 100 pound paper or plastic bags, such standardization making it easier for the manufacturers to develop their mixtures.

The adoption of the metric system by producers in January 1980, required numerous adjustments to the packaging machinery and the reinforcement of several machines which were not meant to handle the additional weight and pressure

In fact, the conversion from 100 lb to 50 kg bags which means an additional 4.4 kg of fibre, without changing the dimensions of the sacks, required an increased pressure of 55 lb/cu. ft. as opposed to 50 lb/cu. ft To help them correct the dosage in their mixtures accordingly, the asbestos manufacturing industries received samples of this more compressed fibre before generalized conversion to the metric system was completed.

Comment - burlap was certainly replaceable before 1970, and lift trucks were around well before then, too.

Packaging asbestos...

As regards packaging, metric conversion will reduce consumption of bags by about 5% for both producer and their customers. At present, this consumption can be estimated at approximately 27 million bags annually, of which 90% are plastic and 10% are paper. Altogether the plastic bags used on a yearly basis by the asbestos mines of Québec (excluding the production of Asbestos Hill) would cover an area of 26 sq. km. Moreover, a drop in shipping costs may also be anticipated as a result of metric conversion, as an identical volume of fibre now weighs 5% more than before and the container which used to transport 18 tons can now carry 20 tons.

Fibre shipped in blocks

In spite of the considerable progress made in the last century in the area of fibre packaging, research is still being done in order to discover a technique which will ensure maximum safety in accordance with the strictest regulations.

Thus it is that Johns-Manville Canada Inc., after many years of research, has perfected a technique which appears to bring a solution to the few remaining safety problems posed by the handling and shipping of asbestos.

Wrapping of high density blocks of fibre

Numerous tests

Around 1972, Gérard Lambert, Project Director, perfected the process and the machine for manufacturing high density blocks of fibre. Before arriving at the block we know today, which is compressed to 100 lb/cu ft. contains 4% humidity and measures 9"x12"x16", a good deal of testing was necessary at various degrees of humidity and with different-sized molds in which the mixing was done manually. Finally, the first machine was put into operation in the pilot plant and shortly afterward four units, with an annual production capacity of 35 000 tons, were installed at the mill.

Although the fibre is literally locked-in by the pressure and the humidity, for maximum safety the blocks are individually wrapped in paper or polyethylene and then stacked on pallets. The whole pallet can then be wrapped in plastic film if desired.

Future prospects

In 1981, four other machines will be installed, thus bringing the production capacity for high density blocks up from 35 000 to 70 000 tons. The advantages inherent in an expanded marketing of the blocks are twofold: safety and profitability.

In bulk shipments to countries not equipped to handle containers, the bags of fibre are frequently damaged, releasing the fibre into the air and thus increasing the risk of exposure for the workers. This is the case for instance in India where the dockworkers use hooks to unload the shipments. In an attempt to solve this problem and as an experiment, Johns-Manville has just shipped 60 tons of the high density blocks of fibre to this country.

Promising technique

Another advantage is that this process ensures a greater stability of the pallets by diminishing the height of the load, for the same weight. It also makes it possible to cut back the consumption of paper and plastic wrapping and to reduce the required storage space by half. There can be no doubt that all these factors together point to a substantial saving for fibre producers and even more for customers, particularly in terms of transport. Currently, Johns-Manville ships its entire production to the United States, Great Britain and Japan.

For an equal weight of fibre, high density blocks (at right) occupy half the space

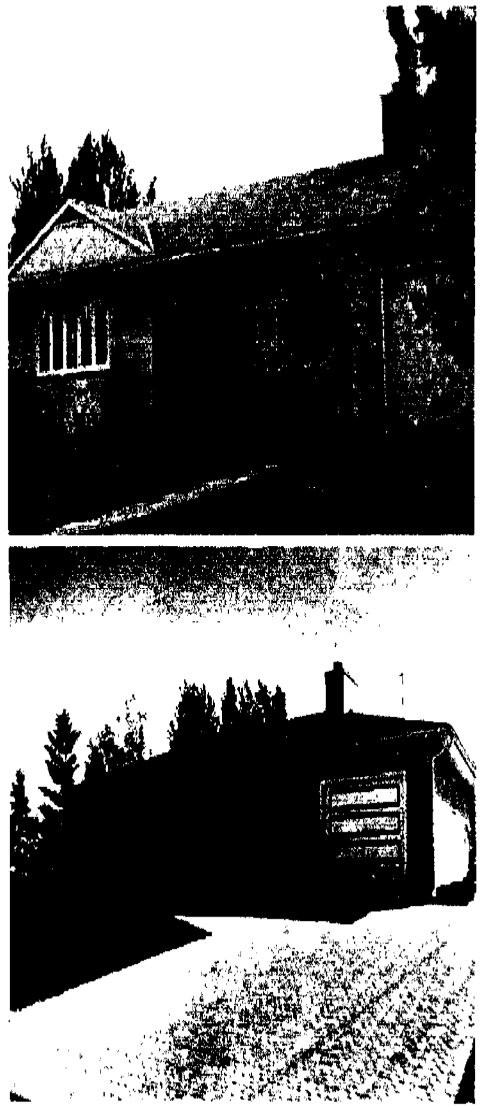
The technical problems related the high density blocks have now been solved for all grades of fibre, as regards both the manufacture of the blocks and their use by manufacturers. Nevertheless, rare are the manufacturing industries which are already equipped with machines adequate enough to break up the blocks of fibre, a necessary operation before incorporating the asbestos into any kind of mixture.

Even though the production capacity of Johns-Manville Canada Inc. does not, for the moment, make it possible to consider wide scale marketing of the high density blocks of fibre, the technique is still the one for the future because of the solutions it offers for environmental problems.

Home renovation and asbestos-cement

Although principally used in industrial and commercial building, asbestos-cement is also a choice material for home renovation.

Actual proof of this can now be seen in the asbestos region itself, thanks to the work done on two Black Lake homes by the architectural firm of Caouette and Vachon, whose services were retained in 1979 by LAQ. Before carrying out these repair and renovation projects, the architects were also entrusted with the task of researching the use of asbestos-derived construction materials in order to promote their use in home building and to emphasize their numerous qualities. After several months of research and of visiting the manufacturers of asbestos-cement, products by Eternit, of Belgium, were finally selected for the wall and roof coverings.



Top photo, a Black Lake house, before renovation, bottom photo, the same house, renovated with "Granitex" type asbestos-cement panels

The materials

Rectangular sheets of slate measuring 60"x30" were selected to cover a double pitch roof. Of mineral origin, the slate is a compressed material, made of artificial Portland cement and reinforced with uniformly distributed fibres. Its composition ensures that the roofing material is fireproof, watertight and resistant to all chemical and atmospheric agents including hail, snow and corrosive smoke and gases.

Finally, asbestos-cement slate requires no maintenance and, particularly important to the Canadian market, is completely resistant to extreme temperatures. Different wall coverings were selected for each of the homes: "Bardit" and "Granitex" panels. "Bardit" panels offer all the traditional qualities of asbestos-cement, combined with the attraction of a product designed in several shades and in a shape which takes into account the esthetic and functional preoccupations of modern architecture. The "Granitex" panels are textured sheets with a rough finish, generally available in sand, grey or natural shades. Better known on the North American continent than the coloured Bardit-type panels, the textured asbestos-cement sheets have been marketed in North America for years and are mainly used in the exterior finishing of office buildings. As they require no heavy framing, all these materials can be attached to wooden

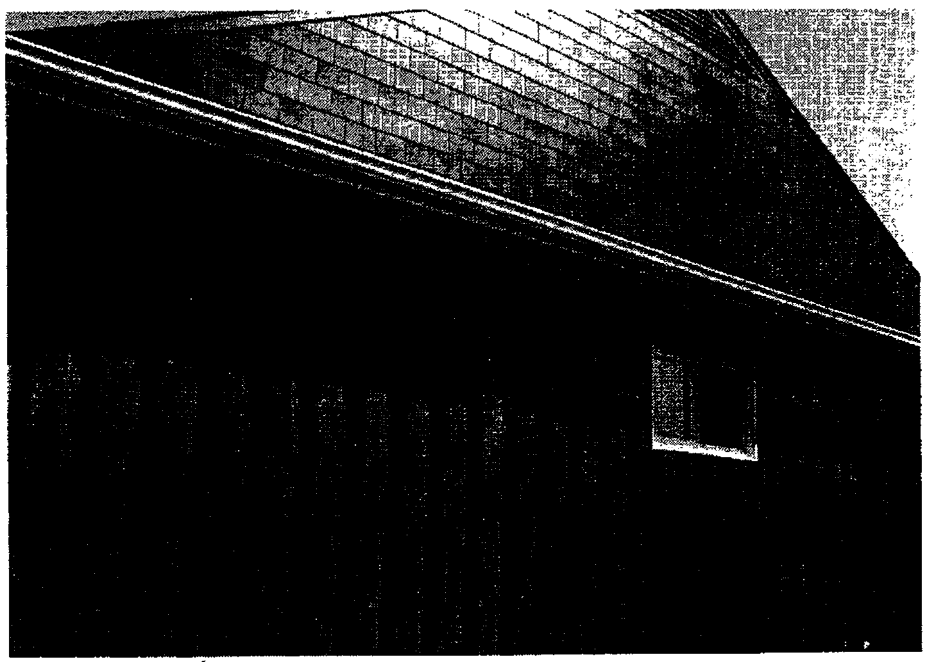
Home renovation...

backing as the Black Lake experience has shown.

A successful experiment

Once their work completed, the architects expressed satisfaction with this new experiment in the field of home renovation. In addition to their elegance and their technical qualities, these products, although designed in accordance with European standards were adapted to Canadian needs with no trouble at all, whether at the level of local materials or labour.

It was a first for most of those who participated in the project but according to the architects, "all of the work executed by regular, semi-skilled, regional labour was done in a normal and proper manner, resulting in a quality product, within a reasonable time period and at an acceptable cost".



The roof and the wall coverings of that house are attached to wooden backings (Top photo). After renovation, the roof is covered with asbestos-cement slate, and wall coverings made with "Bardit" type panels.

Bulletin

This BULLETIN is published by l'Association des mines d'amiante du Québec, 1130 Sherbrooke Street West, Suite 410, Montréal H3A 2M8.

The Post Office Department in Ottawa has authorized postage paid in cash and forwarding of the publication by third class mail.

Canada Post Postage paid / Postes Canada Port payé

Bulk third class / En nombre troisième classe

F-264

Montréal, P.Q.

MR. BARRY I. CASTLEMAN
ENVIRONMENTAL CONSULTANT
P.O. BOX 230A VALLEY ROAD
KNOXVILLE, MARYLAND 21758, U.S.A.