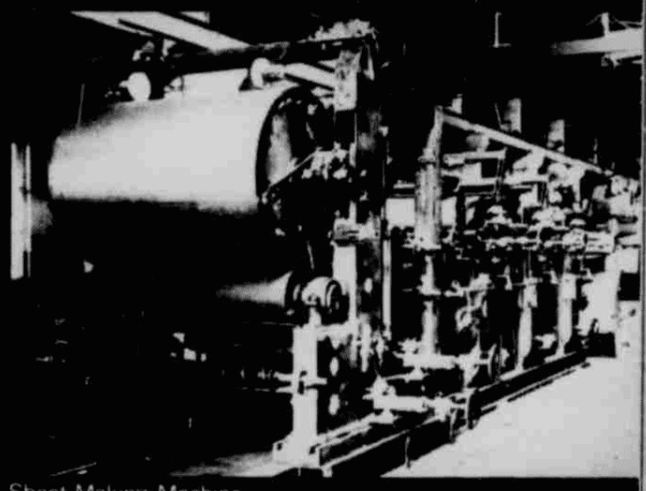
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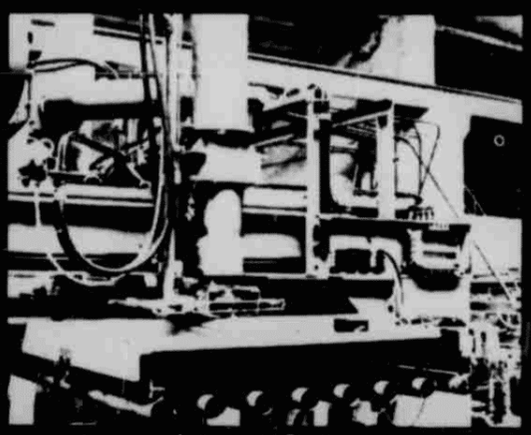
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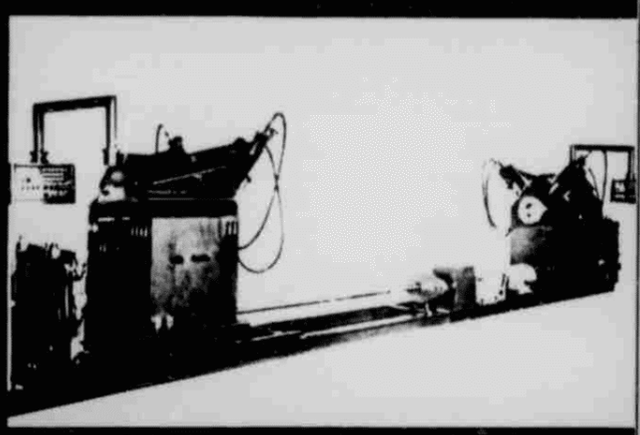


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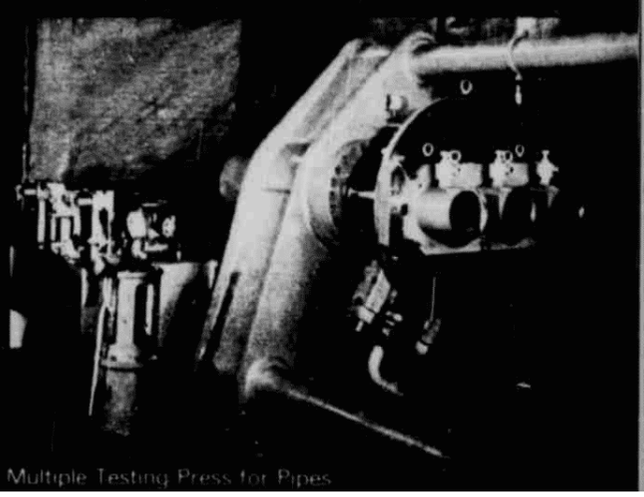
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Automatic Corrugating unit shown without it's Plastic rug



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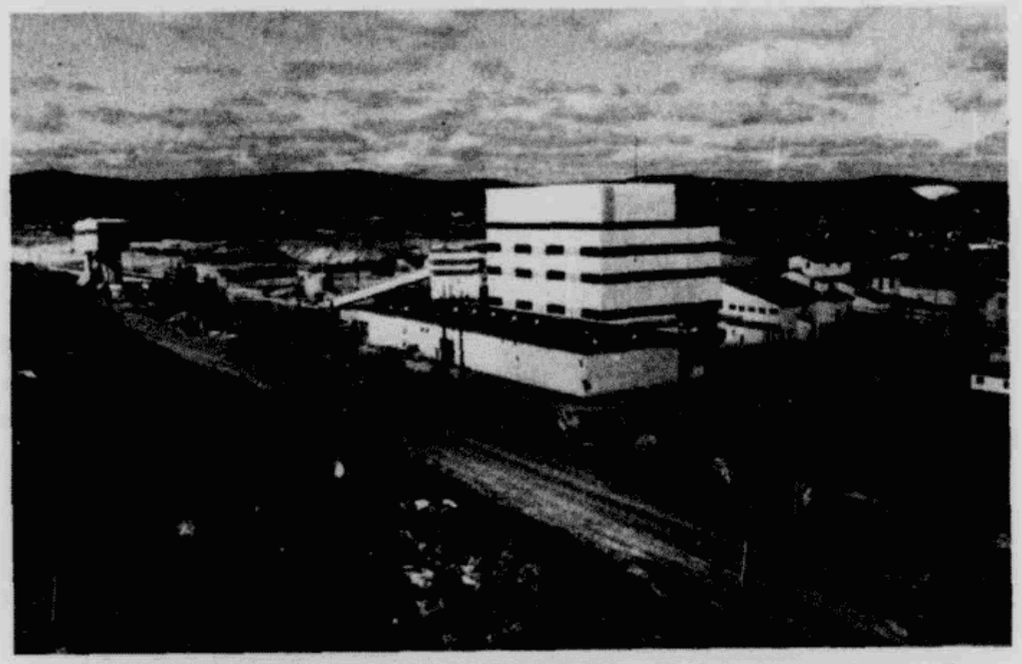


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VOLUME 59 **MARCH 1978** **NUMBER 9**

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IMPORTANT NEWS FROM AIA/NA

DUST SAMPLING & COUNTING PROGRAM—The Asbestos Information Association/North America (AIA/NA) is sponsoring a study whereby 47 laboratories are participating in a blind round-robin air sampling and monitoring program to obtain information on the empirical precision of the procedure of measurement of airborne asbestos concentrations in the workplace which is required by the Asbestos (Manufacturing) Standard of the Occupational Safety and Health Administration (OSHA). Use of the membrane filter at 400-450 magnification with phase contrast illumination for all determinations of airborne concentrations of asbestos fibers is the method in the Standard as prescribed by the National Institute for Occupational Safety and Health for OSHA. Results of the study, which will be made available to OSHA and NIOSH, will provide heretofore unavailable data on counting and sampling variability under actual workplace conditions. The initial phase of the project (the first round of sampling and counting) is expected to be completed mid-summer. Technical experts from Bendix Corporation, Johns-Manville Corporation, National Gypsum Company, Raybestos-Manhattan, Inc., and Union Carbide Corporation compose the AIA/NA Monitoring Committee which developed the protocol for the study.

AIA/NA TO PARTICIPATE IN HEARING—AIA/NA has requested to make a presentation at the forthcoming public hearing on OSHA's proposed rulemaking for identification, classification and regulation of toxic substances posing a potential occupational carcinogenic risk (OSHA Generic Cancer Policy; See February 1978 ASBESTOS, page 24). The Association proposes to discuss the need for special consideration of the construction and other industries characterized by non-fixed places of employment and the relationship of the proposed generic standard to the current and proposed Asbestos Standards. The hearing on the generic cancer concept for regulating carcinogens in the workplace (which would affect virtually every industry in the United States) is scheduled to commence mid-May and last at least two months.

ASBESTOS REGULATIONS HANDBOOK REVISED—The Association's Handbook on U.S. Asbestos Regulations has recently been revised. The new publication, titled *Asbestos-Federal and State Regulations*, comes in a three-ring binder and includes reprints of all existing regulations, background data on regulatory agencies, a review of standards development and a copy of the proposed revision to the OSHA Asbestos (Manufacturing) Standard. The Handbook is available to non-members at a cost of $16.50, plus a mailing charge for destinations outside the United States. Future revisions to the Handbook will be provided at no additional cost. For copies or further information, contact AIA/NA, 1745 Jefferson Davis Highway, Arlington, Virginia 22202.

OTHER LITERATURE STILL AVAILABLE FROM AIA/NA—Pamphlets titled What You Should Know About Asbestos and Health [25¢] and Asbestos In The Atmosphere — A Hazard To Health? [15¢]; six posters concerned with Asbestos Health Hints For The Workplace [40¢ each]; a heavy-coated-stock poster containing What You Should Know About Asbestos and Health [25¢]; and five Recommended Work Practice Manuals for Fabrication and Use of Asbestos Paper Products, Shop and Field Fabrication of Asbestos Sheet Products, Molding and Fabrication of Asbestos Containing Plastic Products, Fabrication and Use of Asbestos Friction Materials and the Use and Handling of Asbestos Textile Products [$1.35 each, plus postage].

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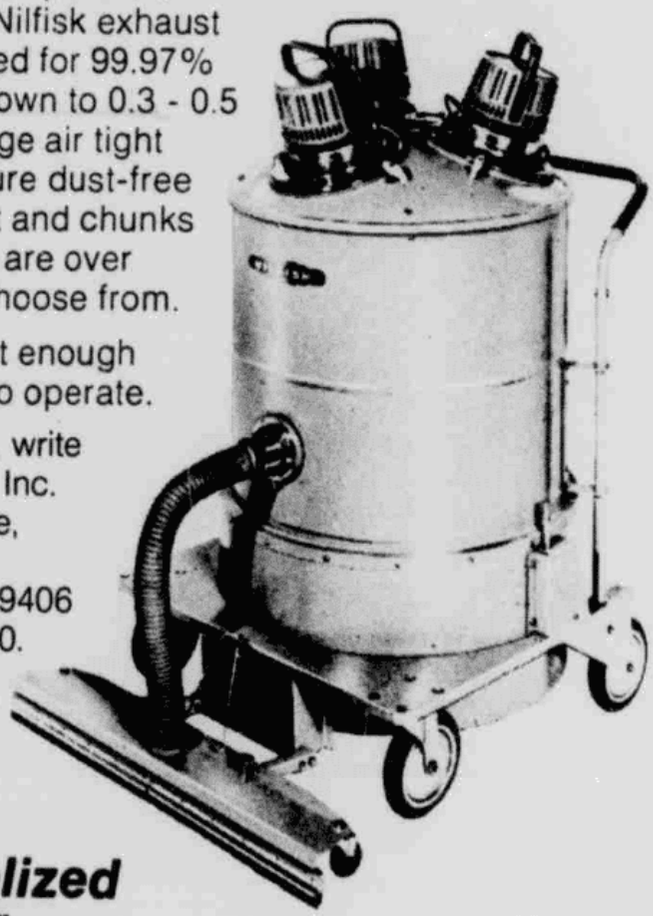
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IDENTIFICATION AND MEASUREMENT OF ASBESTOS FIBERS BY ELECTRON MICROSCOPY

BY: E. J. CHATFIELD, M.A., Ph.D. [CANTAB.]*

PART II

This is the second and final part of the article by Dr. Chatfield which began in the February 1978 issue of "ASBESTOS".

SAMPLE PREPARATION

Before a sample, either in the form of a liquid suspension or an air filter, can be examined, it must be prepared in a form suitable for the electron microscope. This is where there has been in the past a great divergence of opinion, although there is now some level of agreement, particularly with the publication of the EPA interim method for water[3] and the formation of an American Society for Testing and Materials (ASTM) committee[6] to study the matter.

For TEM analysis, the requirement is to deposit a representative and known proportion of the fibers from the original sample on to a very thin carbon film supported by a 3 mn diameter specimen grid. A thin carbon substrate is chosen since it must be relatively transparent to the electron beam. A typical specimen grid would be approximately 200 mesh, and made of copper. The fibers present on the carbon film in the open regions of the mesh are then examined. For the 200 mesh grids, these open areas are squares of about 80 μm size. There are currently several preparation methods in use for TEM samples, and these are outlined below. In each case the starting point of the preparation is some type of membrane filter, which has been used to filter either air or a liquid suspension.

a) A portion of the filter is placed in fiber-free water and exposed to ultrasonic treatment to detach the particulate. A few microliters of the resulting suspension is placed on a carbon-coated grid using a pipette, and the liquid drop evaporated. A variation of this technique is to ash the

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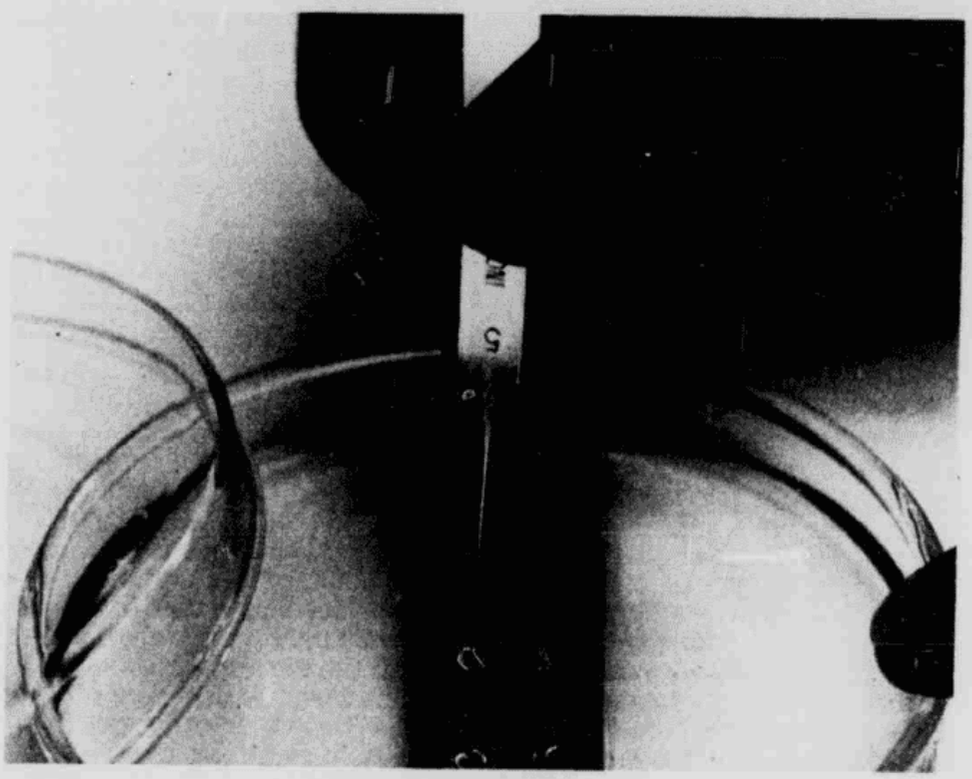
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original filter in a low temperature plasma asher, and to redisperse the ash in fiber-free water. The principal objection to all of these so-called "drop" methods is that the uniformity of particulate deposit on the grid is questionable. It should be appreciated that only a few grid openings are going to be examined for the actual fiber counts, and that these will be assumed to be representative of the whole grid. Evaporation of small droplets does not in general give rise to an absolutely uniform deposit, and there is also some difficulty in accurately measuring the total area of the deposit. For these reasons, the "drop" methods have largely been abandoned.

b) A small portion of a Millipore filter is placed, deposit side down, onto a carbon-coated grid. This assembly is then solvent-extracted to remove the filter material, leaving the particles on the carbon film support. Two methods of solvent extraction are in use, the Jaffe washer and the condensation washer. One design of the Jaffe washer, as shown in *Figure 4*, consists of a stainless-steel mesh bridge with a strip of filter paper supported on it. The ends of the paper are immersed in the solvent, and after 24 hours or so the filter material is completely dissolved, and the grids can

Figure 4

JAFFE WASHER SOLVENT EXTRACTION; GRIDS WITH PORTIONS OF FILTER ARE EXPOSED TO SOLVENT FOR ABOUT 24 HOURS

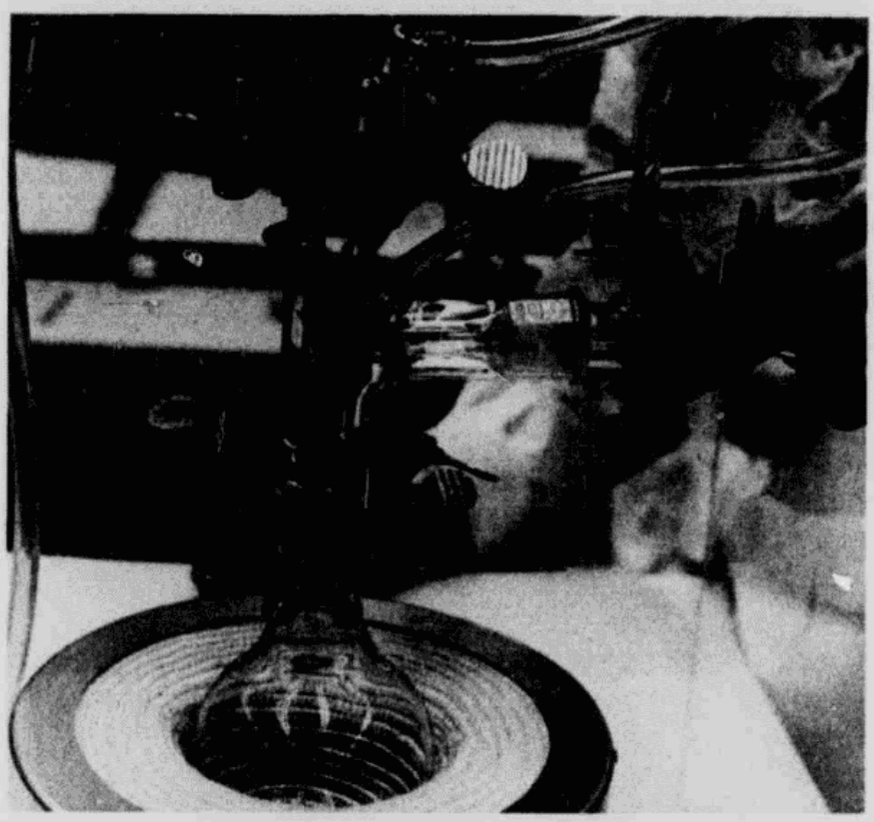


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be removed for examination. The alternative means of solvent extraction, the condensation washer, is shown in *Figure 5*. The grids and filter portions are placed on a cold finger and exposed to solvent vapor from the heated flask below. Vapor condenses on the cold finger assembly and the filter material is slowly dissolved.

Figure 5

CONDENSATION WASHER SOLVENT EXTRACTION; SAMPLES ARE EXPOSED TO CONDENSING SOLVENT VAPOR ON THE COLD FINGER



The above solvent extraction methods can be criticized on the grounds of particle loss. It is optimistic to expect large amounts of filter material to be dissolved away without some movement and loss of particles. The techniques have, however, been used by a number of laboratories with varying degrees of success. At best it appears that the results are strongly dependent on the skill of the operator, and at worst they are totally unreproducible. Controversy surrounding these techniques has been maintained in the past few years by the absence of suitable absolute standards by which quantitative comparisons could be made. Recent work by the author indicates that solvent extraction of unfixed particles on Millipore filters by either the Jaffe or the condensation washer does not yield reproducible results. On the other hand, similar Jaffe extraction of unfixed par-

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ticles on Nuclepore membranes gives results which are comparable with those from known low-loss preparations. The degree of particle movement and loss is evidently a function of filter type.

c) The final preparation technique described below is now largely accepted as the most satisfactory. A Nuclepore filter is vacuum-coated with a carbon film, which also envelops and traps all of the particles on its surface. A portion of the coated filter is then placed on a support mesh (no carbon coating), and extracted in a Jaffe washer using chloroform as the solvent. The sample obtained is a copy, or replica, of the filter surface, with all of the original particles retained in position. The solvent extraction does not apparently cause loss of particles, since asbence of a particle would usually be indicated by a replicated region with no particle inside it. This is the preparation method used for the samples shown in *Figures 2B and 3B* (See February 1978 "ASBESTOS", pages 6 and 12), and it can be seen that particles visible in the TEM image can usually be located in the corresponding SEM image. Losses would be indicated by particles present in the SEM image but absent after preparation.

The Nuclepore is selected for this technique, since its surface is relatively featureless apart from the cylindrical pores. The Millipore filter is a depth-type filter; it is unsuitable for this application because of the large amount of surface detail which would be present in the final sample and the fact that all fibers are not available at the surface for replication.

A variation of the technique is known as the "collapsing Millipore" method. A Millipore filter is used for initial filtration, and its open structure collapsed by exposure to solvent vapor. The resulting smooth surface is then processed by the carbon replication method. The technique can be criticized since not all of the fibers are on the surface after the filter is collapsed, and there will consequently be losses during solvent extraction.

Sample preparation for the SEM is simple; the Nuclepore filter with the deposit on its surface is merely carbon-coated, and it is then ready for examination in the microscope.

CORRECT FILTER LOADING

So far the discussion has concerned the ideal sample from which a filter can be prepared directly. Most environmental water samples, and many air samples, contain much organic debris; and, for example, beer and wine are almost unfilterable through a 0.1 μm pore-size membrane. Alternatively, a filter may be so overloaded that direct preparation for the microscope is impossible. In the case of air samples it may not be possible to obtain an ideally-loaded filter. Such filters may be oxidized in a low temperature plasma asher, and a suspension prepared by dispersing the resulting ash in fiber-free water. Correctly-loaded filters can then be prepared from this suspension. If ultrasonic treatment is used to disperse the ash, care should be taken to demonstrate that fiber breakdown is insignificant at the powers used, and for the size dis-

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tribution observed. For beer, wine and beverage samples, the author has had some success using wet oxidation techniques; however, the use of acids has to be carefully controlled since Chrysotile can be attacked by even very weak acids.

The recently published procedure for air samples[7] includes preparation by method (c), with ashing as an additional step if the original filter is unsatisfactory. This is more or less identical to the interim procedure for water. However, Nuclepore filters should be used with caution in the collection of field air samples, since the deposits are prone to detachment or movement during subsequent transport. If this occurs, representative sampling from the filter becomes impossible. Such disturbance of the sample during transportation is less likely to occur if cellulose ester-type filters are used for field sampling.

FIBER DETECTION & COUNTING

Having obtained a suitably loaded sample, a known area is examined for the presence of fibers. Those identified as asbestos are measured in length and width, and if desired an estimate of the mass concentration can also be calculated by assuming a density.

The accuracy of asbestos analysis results should always be stated to avoid misinterpretation of data. There is a fundamental limit to the precision which is possible. This limit is controlled by the statistics of fiber counting and is totally independent of the instrumental method in use. A complete fiber count of an area of a filter in the TEM, resulting in detection of a given number of fibers, has the same accuracy as the result of an SEM count in which the same fibers were reported. In the absence of any systematic effect, the distribution of fibers on the filter surface is Poissonian, i.e., they are randomly and uniformly dispersed. Using production membrane filters, this random distribution is not easy to achieve, and extreme variability in the deposits has been observed. The author's laboratory has investigated the reasons for non-uniform deposits on filter surfaces, since the accuracy of the final result is critically dependent on representative sampling. In these microscopy techniques only a very small portion of the filter is eventually examined, and consequently every effort has to be made to ensure that this is representative of the whole filter. Assuming that both the sampling and preparation were satisfactory, and that there were no identification errors, a realistic precision for this type of measurement is a factor of three, or in equivalent terms ±50%. However, this precision is sample-dependent and it is recommended that a confidence interval be calculated and reported for each actual sample distribution. Many results can be

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reported to a closer precision than this but when samples yield poorly distributed filters for successive preparations, little can be done to improve the accuracy.

The limit of detection has to be carefully considered for each sample. The detection limit is usually taken to be that concentration corresponding to one fiber counted in the examined portion of the sample, assuming a zero background measurement. This is, in turn, controlled by the degree of concentration possible, e.g. the amount of sample filtered, and is usually limited by the presence of extraneous debris. Thus widely differing fiber detection levels exist for different samples, and these should be reported along with the fiber concentrations.

Figure 6

POSITIVE PRESSURE CLEAN ROOM FACILITIES ARE REQUIRED FOR LOW BACKGROUND ASBESTOS SAMPLE PREPARATION



CONTAMINATION

Allied to the topic of detection limits is that of contamination. Chrysotile asbestos is present in many products, and it is difficult to prevent accidental additions during analysis. Contamination from various sources can occur, and it is necessary to perform all

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preparation in positive pressure clean-room facilities such as those shown in *Figure 6*, from which all known sources of asbestos have been removed. Even then, one cannot assume anything in use in the analysis to be asbestos-free. All reagents must be filtered, and even membrane filters must be checked periodically for the presence of fibers.

EPILOGUE

The preceding article is intended to introduce and clarify a somewhat complex topic to the user of environmental asbestos measurements. Asbestos is unfortunately characterized only by its crystallography and some aspects of its composition. There appears to be no easy chemical or physical measurement that can be made: it would seem that we are restricted to fiber counting and identification for some time. Fiber definitions may, and probably will, change but the basic measurement technique will remain the same so long as numerical concentrations and fiber identification are required.

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2. Rudd, C.O., Barrett, C.S., Russell, P.A. and Clark, R.L.; Micron, 1976, Volume 7; pages 115-132.

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7. Samudra, A.V., Harwood, C.F. and Stockham, J.D.; EPA Report 600/2-77-178, August 1977, U.S. Environmental Protection Agency.

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THE ASBESTOS FACTBOOK, 3RD EDITION—Compiled by the staff of ASBESTOS Magazine; written in layman's terms; offers useful information on the origin, locations and uses of asbestos; gives the chemical compositions of the various types of the mineral; contains data concerning testing methods and grades. [28 pages; $1.00 per paper-bound copy; order from ASBESTOS Magazine]

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QAMA MANUFACTURING STUDY COMPLETED

The Quebec Asbestos Mining Association (QAMA), representing the five major asbestos mining companies in Quebec, retained Sores Inc., Montreal, to study the economic feasibility of further processing asbestos fiber in the Province. Sores, in turn, retained Arthur D. Little, Inc., Cambridge, Massachusetts, to collaborate in the study. (See ASBESTOS—March 1977, page 8; October 1977, page 16; January 1978, page 24). This is the first study of its kind to cover a global evaluation of all possibilities and conditions required for maximum development of an asbestos manufacturing industry in Quebec.

Phase I

Phase I of the study consisted of a market and economic evaluation of fourteen pre-selected asbestos products in six selected world regions and dealt with shipping of fiber by groups, products, destinations and end-use, thus ensuring a worldwide synthesis of the asbestos industry. The various market trends had been analyzed allowing a projection to be made relative to their evolution until 1985. An important element in the work consisted of a comparative study of production costs and a detailed analysis of distribution costs. The offer-demand profile, uses, substitutes, environmental and technological questions were subject to detailed review. Personal interviews were conducted with producers, manufacturers, users, research centers and associations, transportation experts and agencies responsible for the environment. The ultimate purpose of the initial phase of the study was to select, among the fourteen products, the five deemed most likely to present economic opportunities for further processing in Quebec and to conduct pre-feasibility studies to determine their economic viability. The first phase of the project resulted in the selection of the following products for further study via Phase II: asbestos-cement finished sheets, molded friction materials, flooring felts and gasket papers, roofing felts and pipe-wrapping papers and asbestos-cement pipes.

Phase II

The second and final part of the study consisted of an in-depth analysis of these five products and the elaboration and study of development projects for each of them. Sores/Little's perspective in the study was that of a prudent investor making business decisions. The models developed represent real-life situations which promoters or investors can use, with their own hypotheses and costs, for more specific analysis within the perspective of definite projects.

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Following is a summary of the voluminous 200-page report by Sores/Little which constitutes the results of Phase II of the study:

Asbestos-Cement Finished Sheets—The total market appropriate for these products is in the range of 100-million square feet in Canada and 600-million square feet in the United States, out of which 10- to 15-million square feet is sufficient to develop a product line. This is a very competitive market, supplied by a large variety of firms and products. Most of the individual products have a very small share of the potential market; consequently there is room for a new product if its characteristics are properly suited to the real needs of users and if an intensive and long-term marketing program is implemented. An association between a local company and a foreign company with the necessary technology would constitute the best type of organization to ensure success. The local company should already be operating in the building material sector, supported by an adequate distribution network. Such a venture could, in the long term, become the core of an eventual integrated building material business.

Molded Friction Materials—Considering the rapid growth in the replacement market for these products, production capacity should be increased starting in 1980. An important U.S. producer could be approached to locate in Quebec and spread production throughout the continent or set up a small firm to channel efforts toward the replacement market. The possibility of assisting in the development of a Quebec firm already involved in this sector should be studied in detail.

Flooring Felts & Gasket Papers—On the basis of the rate of growth in vinyl sheet production, of the use of asbestos in backing for vinyl sheet and of the market mix between producers of felt who sell to producers of vinyl-yard-goods and those integrated in both felt and vinyl-yard-goods production, the researchers estimate that in North America and Europe the demand for asbestos flooring felts will increase 70,000 tons from 1976 to 1985. This growth implies the need for additional asbestos flooring felt production capacity. Should a decision be made quickly, this type of production offers an interesting possibility for a new plant in Quebec.

Asbestos Roofing Felts & Pipe Wrapping Papers—Moderate growth is projected from 1976 to 1985. A new plant in this sector would represent a high risk. This is not an interesting possibility for Quebec except perhaps in the case of relocation of existing plants or expansion of annual production capacity requiring significant product promotion and development efforts.

Asbestos-Cement Pipes—The annual Canadian and U.S. production capacity is sufficient to meet projected demand to 1985 and market projections are not heading toward an increase in the demand for asbestos-cement pipes. An additional plant in Quebec would not be viable.

The Economics

Concerning economic data, Sores/Little estimates that an investment required for an asbestos-cement finished sheet plant would fluctutate between $5- and $10-million, generating about

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100 jobs and consuming 2,000 tons of fiber per year. A new molded friction materials plant would need an initial investment of $25-million, a staff of 225 and would annually use 2,500 tons of fiber. A flooring felt plant would represent an initial outlay of around $28-million, creating 60 jobs and using 34,000 tons of fiber. Thus, in terms of investment, implementation of these three projects could total about $60-million, could produce some 400 new jobs and could conceivably result in asbestos fiber consumption of about 40,000 tons annually.

QAMA Comments

At a press conference held January 17 to announce the final report, M. J. Messel, President of QAMA, stated the Association did not intervene in any way with the work of the researchers and, except for financing (C$225,000), its role was limited to the supply of information as requested by the study group. As a result, said Mr. Messel, QAMA now has an expert and fully-objective assessment of the opportunities for manufacturing asbestos products in the Province of Quebec. In summation, he stressed that the following "key ideas" contained in the report should be highlighted: (1) It is clear that a substantial enlargement of the asbestos manufacturing sector requires that a considerable increase in the use of asbestos products must take place within Quebec; (2) The development of manufacture and the future of asbestos products are closely tied to the evolution of legislation and regulations governing the use of asbestos; and (3) One must realistically recognize that an optimal expansion of the asbestos manufacturing sector in Quebec will necessitate the injection of important risk-capital, with a relatively minor impact on the job market in the Province.

FERODO CLARIFIED

We refer you to the "Ferodo Five-Year Plan" mentioned in ASBESTOS (November 1977, page 8; January 1978, page 26). Turner & Newall Ltd. has asked us to clarify that the company concerned is not Ferodo Ltd., a subsidiary of T&N, but the French firm Societe Anonyme du Ferodo Francaise.

Next Issue—The Alpine Press Roll Modification

Asbestos Magazine, 1978, March 1978
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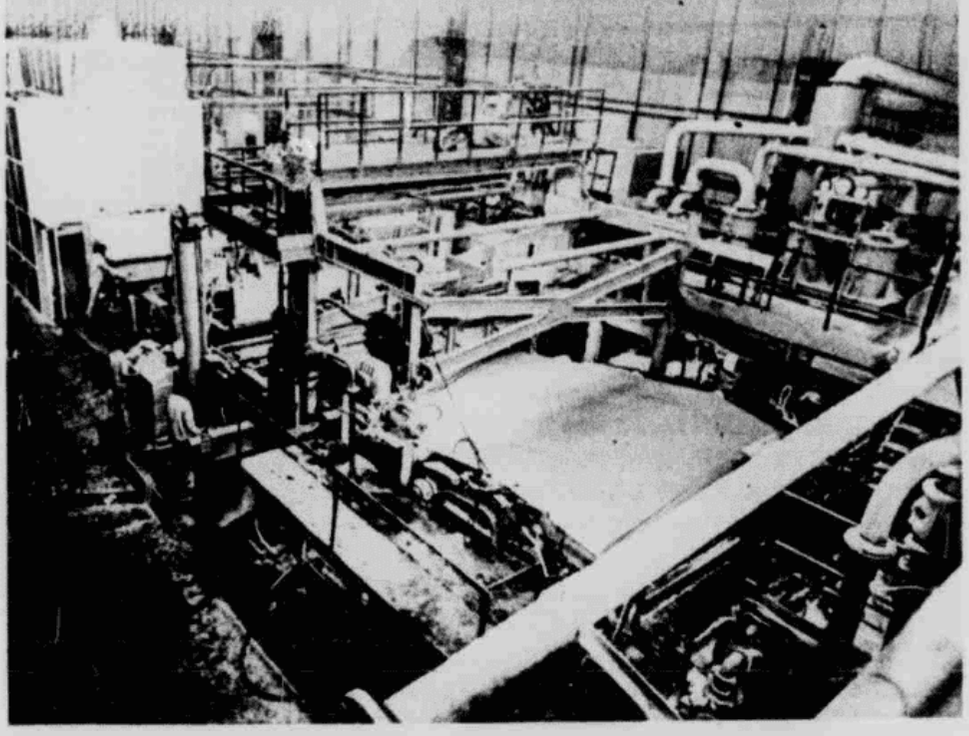
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Pressure Pipe Plant

MARKET CONDITIONS

GENERAL BUSINESS

Extremely severe winter weather combined with the prolonged coal strike to cause a perceptible slowing of general business in the first two months of 1978. While it is felt a quick recovery, similar to that of 1977, should ensue once these two impediments are out of the way, statistical news on the economy has taken a turn for the worse recently, adding to the feelings of uncertainty which have prevailed for some time.

After a sharp December rise, orders for durable goods slumped 4.4% in January, the worst drop in over three years. While unemployment decreased slightly, prices on both wholesale and retail levels moved substantially higher, renewing fears of double-digit inflation. The dollar continued to lose ground against other important currencies, reflecting foreign mistrust of present U.S. economic policies. While the U.S. announced it would intervene to ensure an orderly market for the dollar, its ability to support the currency at some predetermined level remained in doubt and dollars hit a new low at the end of February vis-a-vis German marks and Japanese yen. Concurrently, the stock market decline continued and a new low was registered by the Dow Jones Industrial Average at the beginning of March.

The Index of Leading Economic Indicators dropped 1.9% in January but much of the slump could be directly attributed to the bad weather. However, more disturbing, the gain in productivity for the fourth quarter of 1977 was revised from a 1.4% to a 0.5% annual rate. This continuing failure to achieve increased productivity is of great concern since it bears a direct relationship to price levels and hence to inflation. The greatest increases in productivity result from the utilization of equipment which enables men to accomplish more than they can with their muscle alone. Such equipment is costly and much of it requires completely new plants in order to be most effective. The extended drought of capital spending therefore promises to prolong the period of sub-normal improvement in productivity. Of course, it may also be argued that growth of employment in the service industries and in government, much of which is relatively non-productive, lowers the overall productivity of the economy, although this effect is not easily measured and is not reflected in the official figures. There can be no doubt that growth of such employment contributes powerfully to inflationary pressures.

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The President's suggested energy program remains at a standstill as the Senate Energy Committee continues deadlocked on the question of natural gas pricing. A compromise among the Senators now appears possible in the fairly near future but any such agreement would still be subject to acceptance by the House where gas prices higher than those already approved by that body would meet strong opposition. Part of the dollar's troubles stem from failure of the U.S. to come to grips with its energy problems.

MOTOR VEHICLE FACTORY SALES

YEAR 1977—Motor vehicle factory sales from plants in the *United States* totaled 12,639,291 for the Year 1977 compared with 11,476,652 a year earlier. The breakdown for the latest year is 9,198,956 passenger cars (up 701,353) and 3,440,335 trucks and buses (up 461,286). . . . Factory sales from plants in *Canada* reached 1,761,185 motor vehicles in 1977 against 1,632,558 in 1976. [Motor Vehicle Manufacturers Association of the United States, Inc.]

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PRODUCTION—IMPORTS—EXPORTS

CANADIAN ASBESTOS FIBER SHIPMENTS

According to Statistics Canada, shipments of asbestos by primary Canadian producers (including tonnage for own use) amounted to 140,856 short tons in *November 1977* and 141,826 tons in *December 1977*. Shipments for the *Year 1977* totaled 1,681,719 tons valued at an estimated C$564,130,000, compared with 1,693,250 tons valued at $452,208,338 in 1976, 1.2-million tons valued at $267-million in 1975 and 1.8-million tons valued at $302-million in 1974. A breakdown by grade and origin for the past four years is as follows:

PRIMARY CANADIAN ASBESTOS PRODUCERS' SHIPMENTS

	Year 1977	Year 1976	Year 1975	Year 1974
Quebec Plants—				
Crudes 1 & 2 and Group 3—Spinning	14,956	22,006	10,039	32,432
Group 4—Shingle Fiber	406,618	321,337	208,929	351,804
Group 5—Paper Fiber	158,748	146,505	74,133	202,320
Group 6—Stucco Fiber	235,030	250,137	162,464	274,387
Group 7—Refuse	566,049	633,814	428,342	675,313
Group 8—Sand	2	25	116	315
	1,381,403	1,373,824	884,023	1,536,571
Plants in Newfoundland, Ontario, British Columbia and the Yukon	300,316	319,426	279,651	274,093
Total Short Tons	1,681,719	1,693,250	1,163,674	1,810,644
Total Metric Tons	1,525,629	1,536,091	1,055,667	1,642,589

FELT SHIPMENTS FROM CANADA

Canadian shipments of asbestos, cotton and synthetic dryer felts and fabrics for the *Year 1977* totaled 4,955,439 square feet (460,375 square meters) valued at C$15,445,652. Shipments of woven and/or needled wet felts and jackets (including felts used in asbestos-cement pipe or sheet-forming operations) reached 2,178,430 pounds (988,115 kilograms) valued at $33,405,071. Shipments of forming fabric amounted to 2,572,759 square feet (239,015 square meters) valued at $18,047,312. Among the eleven reporting firms are Albany Felt of Canada, Asten-Hill, Ayers, Drytex, Huyck Canada, Johnson Wires, Lockport Felts, Niagara Quebec Wires, Porritts & Spencer (Canada), Scapa Dryers (Canada) and SNA International. [Statistics Canada]

CANADA'S FLOOR TILE OUTPUT

Production of vinyl-asbestos floor tile by Canadian manufacturers for the *Year 1977* reached 40,521 metric tons (8.4-million square meters) compared with 48,133 tons (10.5-million square meters) in 1976. *Shipments* totaled 40,934 tons (8.4-million square meters) in the latest year against

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44,636 tons (9.7-million square meters) a year earlier. The four reporting firms, all located in the Province of Quebec, are American Biltrite Rubber Company (Canada) Ltd., Sherbrooke; Armstrong Cork Canada Ltd., Montreal; Domco Industries Ltd., Farnham; and The Flintkote Company of Canada Ltd., Toronto. [Statistics Canada]

AUSTRALIAN IMPORTS & EXPORTS

For the *Quarter Ended September 1977,* Australia *imported* 16,039 metric tons of asbestos valued at A$7,166,696, ahead 1% in tonnage and 22% in value over the three months ended September 1976 and up 29.3% in quantity and 72.5% in value over the like 1975 quarter. The breakdown by variety of asbestos for the latest three-month period is (comparative year-earlier figures are enclosed in parentheses): Chrysotile, 6187 tons, $2,841,927 (6,306 tons, $2,302,311); Amosite, 5,333 tons, $2,450,278 (5,536 tons, $2,205,563); Other 4,519 tons $1,874,491 (4,033 tons, $1,373,842). . . . *Exports* of all types of asbestos for the Quarter to September 1977 totaled 6,978 metric tons valued at $6,160,510, a decrease of 22.8% in tonnage and an increase of 105% in value compared with the like 1976 quarter and up 0.9% in quantity and 109% in value over the same three months of 1975. [Commonwealth Bureau of Census and Statistics, Canberra]

AUSTRALIAN A/C SHEET PRODUCTION

Production in Australia of non-acoustic, asbestos-cement sheets for the *Year Ended June 1977* totaled 43,640,000 square meters, 4.5% higher than the prior year and 4% more than the twelve months ended June 1975. [Australian Bureau of Statistics]

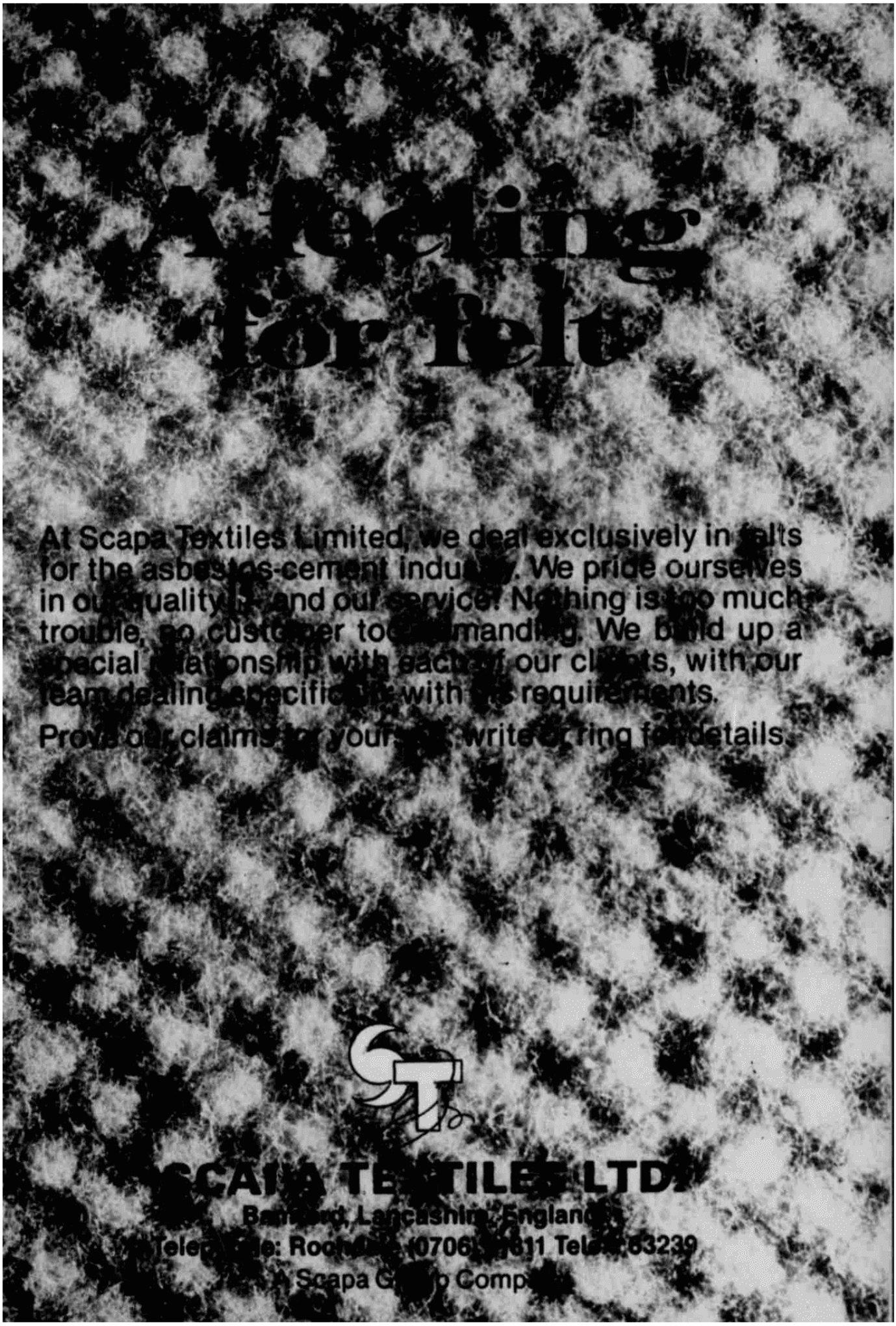
FRENCH ASBESTOS IMPORTS

France imported 143,625 metric tons of asbestos in the *Year 1976* against 138,637 tons in 1975. The principal countries of origin were Canada, the USSR, the Republic of South Africa and Italy. [Industrial Minerals]

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IMPORTS INTO THE UNITED STATES

From: U.S. Bureau of the Census

UNMANUFACTURED ASBESTOS: **NOVEMBER 1977**

Amosite	s.tons	..	$ ..
Crocidolite (Blue), Canada	s.tons	15	14,642
Republic of South Africa	s.tons	748	444,136
Chrysotile Crudes, South Africa	s.tons	499	277,634
Chrysotile Spinning Fibers, Canada	s.tons	292	281,635
South Africa	s.tons	3,480	110,664
Chrysotile, Other, Canada	s.tons	49,541	10,700,975
Mexico	s.tons	3,373	935
South Africa	s.tons	139	90,390
Other Crudes & Fibers, Canada	s.tons	719	134,385
South Africa	s.tons	441	266,000
		59,247	$ 12,321,396

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos yarn, cloth, tape, etc.	Lb	903,615	$ 1,322,811
A-C pipes, tubes & fittings	Lb	1,396,207	159,962
Other asbestos-cement articles	Lb	1,418,762	260,322
Other asbestos articles	Lb	..	279,658
			$ 2,022,753

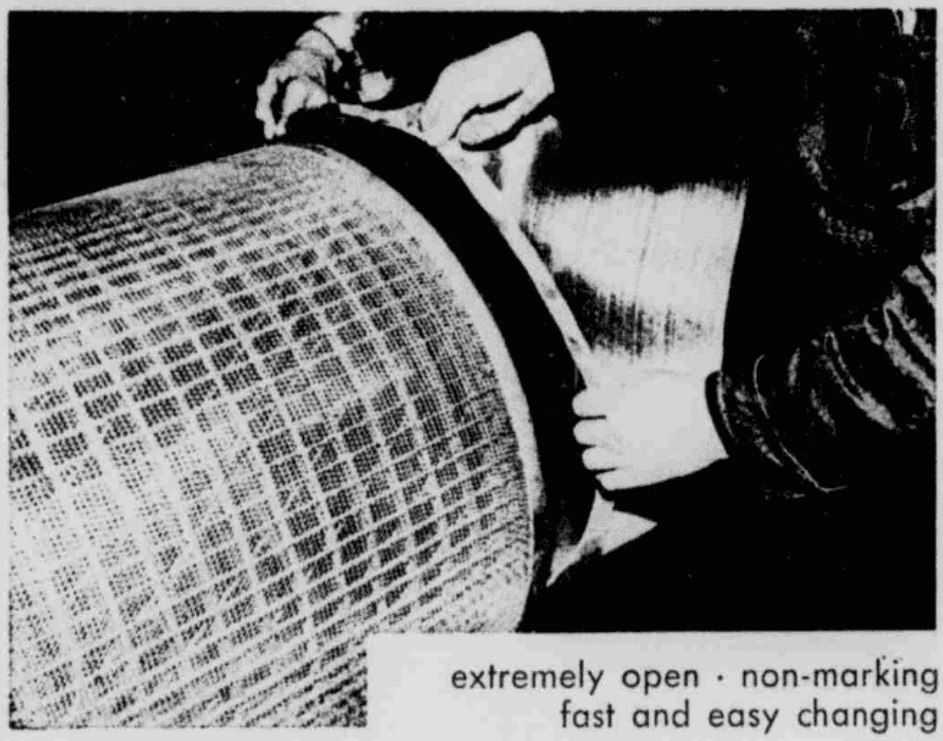
UNMANUFACTURED ASBESTOS: **JANUARY-NOVEMBER 1977**

Amosite, Canada	s.tons	1	$ 570
South Africa	s.tons	486	237,010
Crocidolite (Blue), Canada	s.tons	15	14,642
South Africa	s.tons	11,335	5,110,984
Chrysotile Crudes, Canada	s.tons	134	65,576
Rhodesia	s.tons	2,451	2,368,050
South Africa	s.tons	3,597	2,091,972
Chrysotile Spinning Fibers, Canada	s.tons	5,893	5,553,105
South Africa	s.tons	3,764	308,450
USSR	s.tons	2,190	443,348
Chrysotile, Other, Canada	s.tons	509,946	113,936,925
Mexico	s.tons	3,395	5,637
South Africa	s.tons	182	126,535
USSR	s.tons	166	49,454
Other Crudes & Fibers, Canada	s.tons	9,834	1,575,849
Mexico	s.tons	220	133,000
Rhodesia	s.tons	345	199,195
South Africa	s.tons	2,106	1,099,444
Sweden	s.tons	1	495
Taiwan	s.tons	312	6,976
USSR	s.tons	5,494	1,069,696
		561,867	$134,396,913

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos yarn, cloth, tape, etc.	Lb	10,587,150	$ 15,181,020
A-C pipes, tubes & fittings	Lb	17,115,903	1,912,318
Other asbestos-cement articles	Lb	43,042,685	6,979,596
Other asbestos articles	Lb	..	5,324,499
			$ 29,397,433

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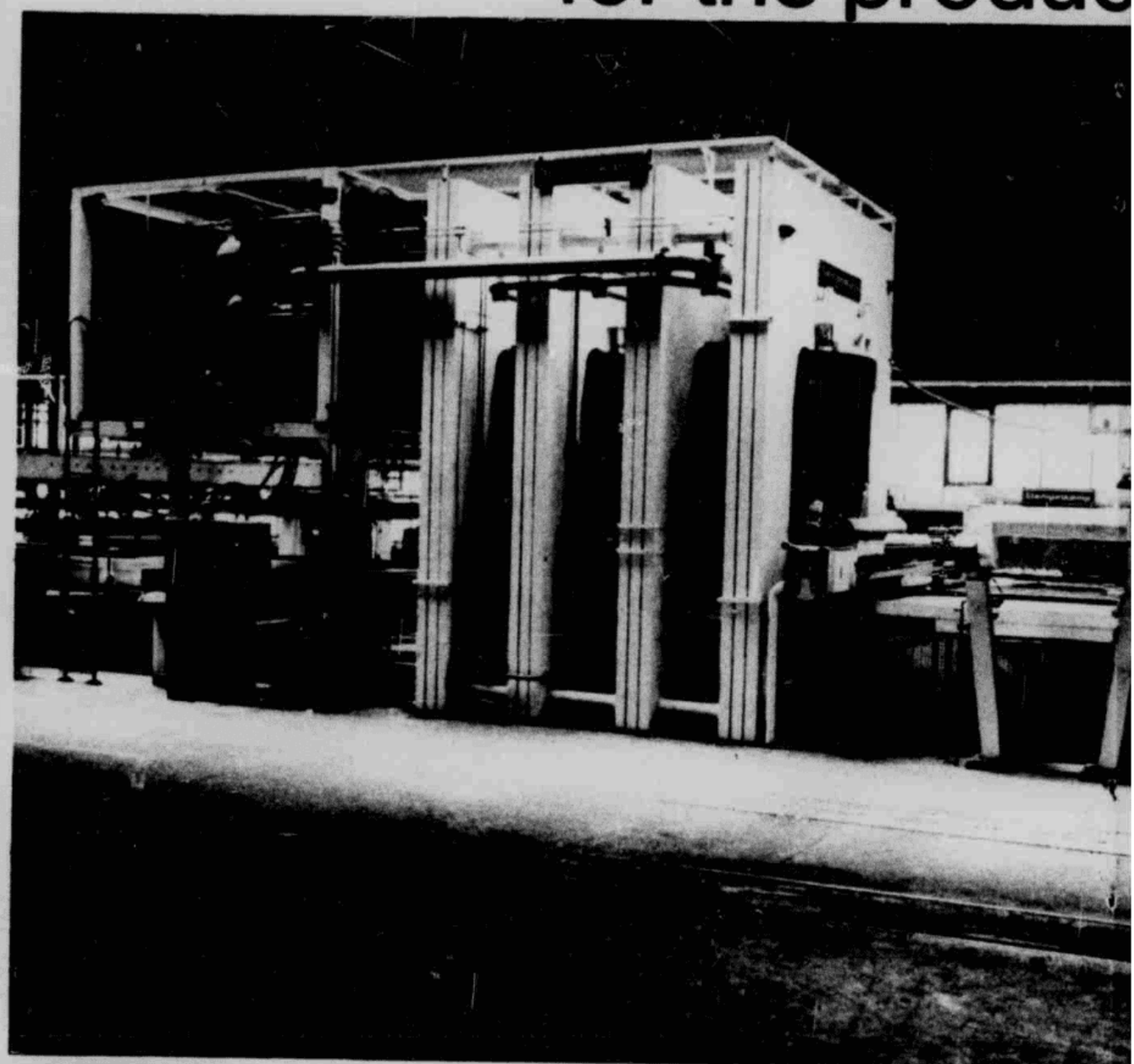
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EXPORTS FROM THE UNITED STATES

From: U.S. Bureau of the Census

NOVEMBER 1977

UNMANUFACTURED ASBESTOS:

Fibers not further processed than beaten, washed or graded to length	s.tons	1,573	$ 590,465
Waste and refuse	s.tons	1,747	312,072
		3,320	$ 902,537

MANUFACTURED ASBESTOS PRODUCTS:

A-C shingles & clapboard	Lb	1,429,116	$ 225,558
Other a-c fiber-cement articles	Lb	4,648,542	1,679,991
Gaskets	Lb	36,881	110,253
Packing	Lb	248,047	751,119
Heat or sound insulation		..	488,978
Textiles & yarns	Lb	853,771	784,437
Protective clothing		..	151,694
Mfrs. other than friction materials		..	630,359
Clutch facings & linings for auto. use	No	61,350	147,142
Other clutch facings & linings	No	99,654	94,223
Brake linings for automotive use	Lb	969,078	891,663
Other brake linings	Lb	197,748	280,690
			$ 6,236,107

JANUARY-NOVEMBER 1977

UNMANUFACTURED ASBESTOS:

Fibers not further processed than beaten, washed or graded to length	s.tons	16,197	$ 6,757,084
Waste and refuse	s.tons	18,468	4,022,070
		34,665	$10,779,154

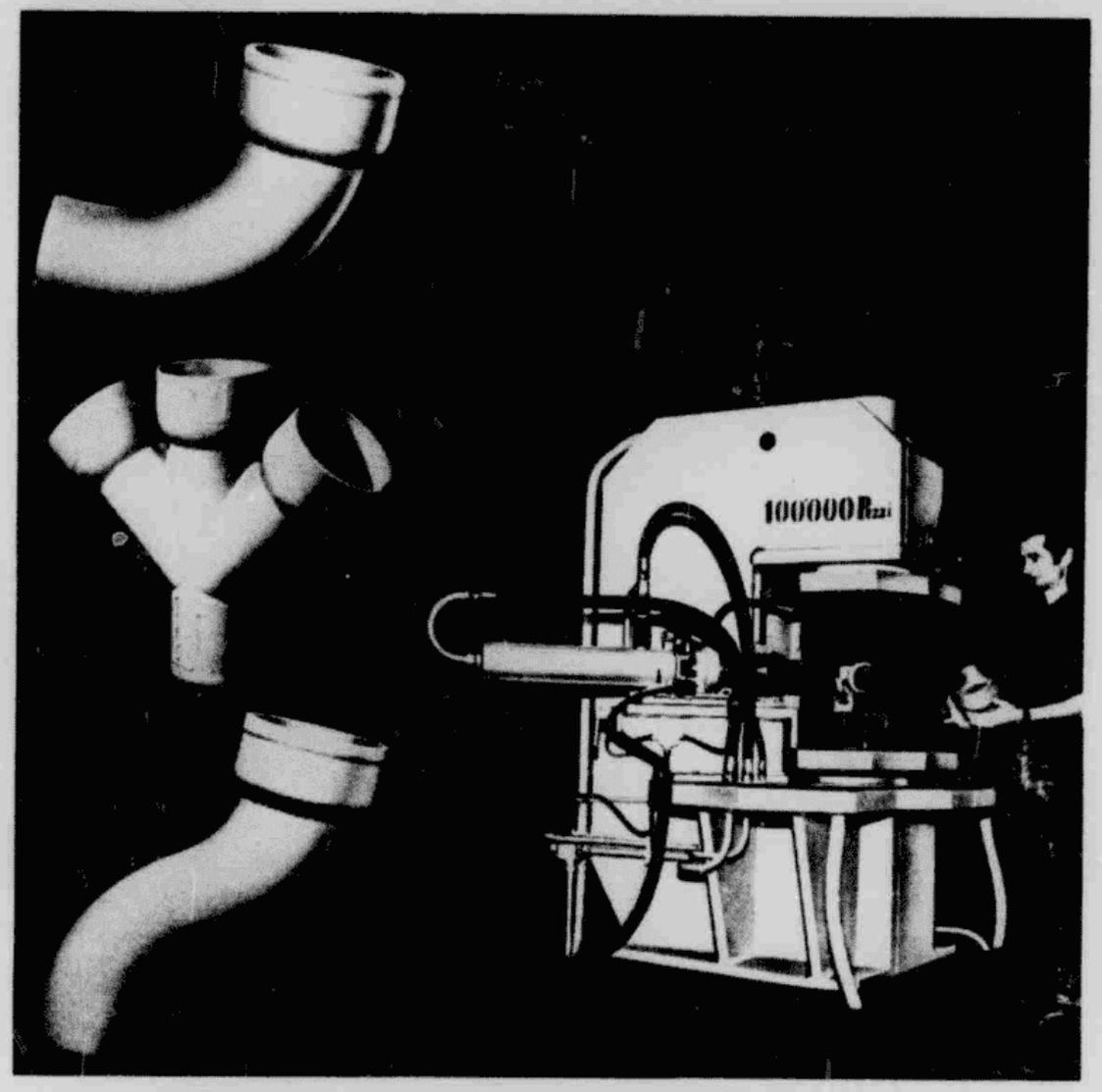
MANUFACTURED ASBESTOS PRODUCTS:

A-C shingles & clapboard	Lb	10,454,814	$ 1,775,188
Other a-c fiber-cement articles	Lb	45,876,151	12,716,484
Gaskets	Lb	2,282,326	2,546,443
Packing	Lb	4,593,322	10,878,336
Heat or sound insulation		..	4,398,842
Textiles & yarns	Lb	16,123,502	10,119,130
Protective clothing		..	1,245,329
Mfrs. other than friction materials		..	13,797,700
Clutch facings & linings for auto. use	No	645,325	1,530,748
Other clutch facings & linings	No	338,924	385,499
Brake linings for automotive use	Lb	9,609,599	8,875,585
Other brake linings	Lb	2,357,998	3,091,803
			$71,361,087

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"P 8" Plant for the production of asbestos-cement fittings for pipes, gutters and similar articles

---

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Automatic INJECTION Plants

EXPORTS FROM CANADA

From: Statistics Canada

NOVEMBER 1977
Short Tons

UNMANUFACTURED ASBESTOS:	Crude	Milled Gp 3	Milled Gp 4&5	Shorts Gp 6-9
Western Europe	..	471	13,830	8,757
Eastern Europe	..	..	386	..
Middle East	..	..	1,881	216
Africa	..	..	2,231	881
Asia	..	192	3,691	6,172
Oceania	..	2	4,931	227
So. & Cen. America & Antilles	..	158	5,587	2,275
United States	..	229	7,322	34,871
	..	1,052	39,859	53,399

The total amount of unmanufactured asbestos exported in *November 1977* was 94,310 short tons, valued at $31,546,000.

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos cloth, dryer felts & sheets	$ 105,000
Asbestos brake linings & facings	229,000
Asbestos-Cement building materials	1,188,000
Other basic asbestos products	572,000
	$ 2,094,000

JANUARY-NOVEMBER 1977

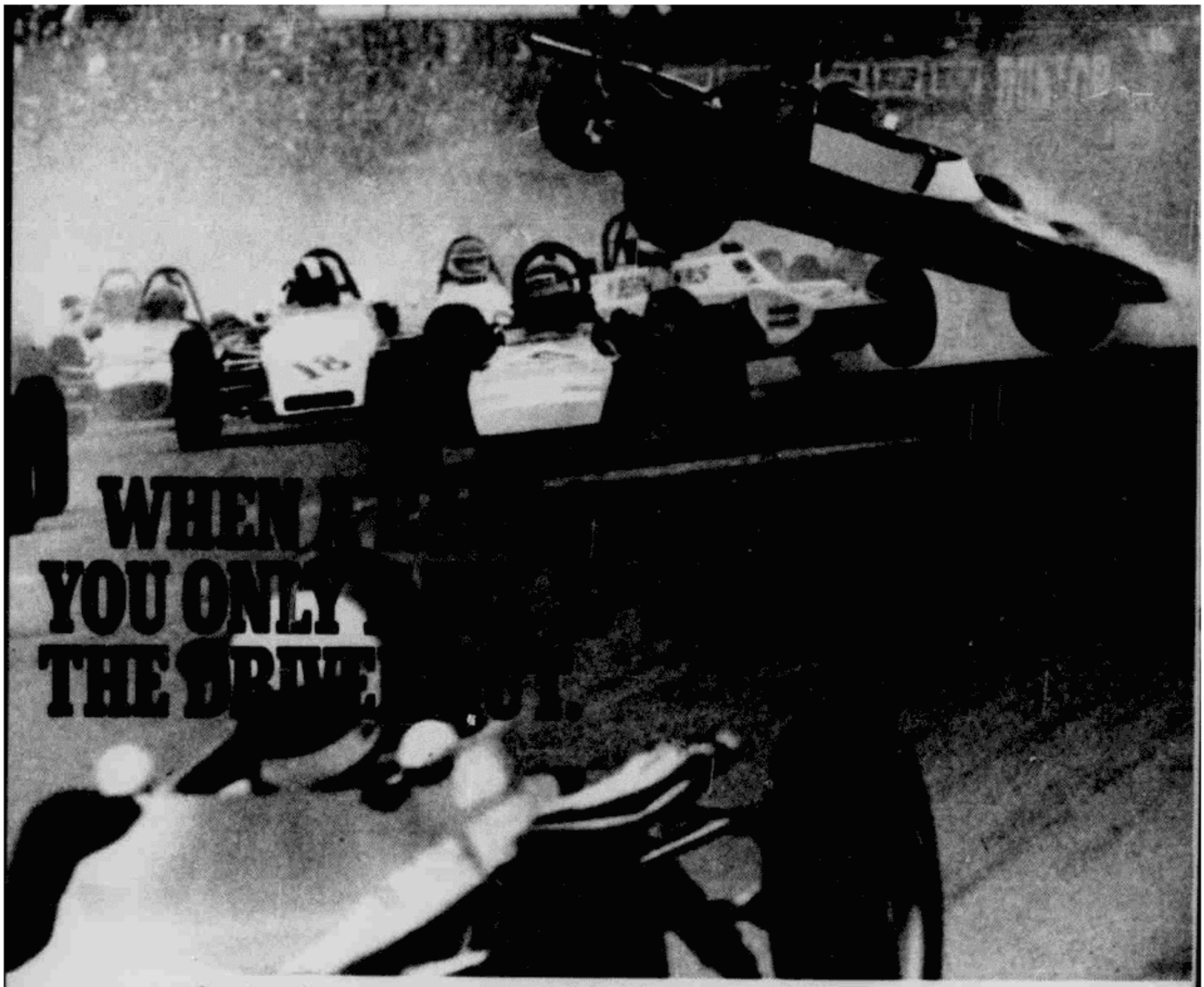
UNMANUFACTURED ASBESTOS:	Crude	Milled Gp 3	Milled Gp 4&5	Shorts Gp-6-9
Western Europe	..	9,267	230,871	148,933
Eastern Europe	..	2,091	25,888	4,522
Middle East	..	198	22,388	3,917
Africa	..	..	19,609	7,135
Asia	..	2,546	87,857	116,811
Oceania	..	7	59,259	8,544
So. & Cen. America & Antilles	..	1,819	82,283	33,603
United States	1	7,008	119,097	396,979
	1	22,936	647,252	720,444

The total amount of unmanufactured asbestos exported in *January-November 1977* was 1,390,633 short tons, valued at $479,468,000.

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos cloth, dryer felts & sheets	$ 971,000
Asbestos brake linings & facings	2,997,000
Asbestos-Cement building materials	13,104,000
Other basic asbestos products	5,071,000
	$22,143,000

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Other representatives world-wide

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ARIZONA *Per Ton of 2000 Lbs., F.O.B. Globe, Arizona*
As of July 1, 1976 *U.S. Dollars*

No. 1 Crude (Soft)	$ ..	$3000.00
No. 2 Crude (Soft)	..	1800.00
AAA	..	1300.00
Group No. 3—Nonferrous Filtering—Plastic	750.00—	840.00
Group No. 4—Nonferrous Filtering—Plastic	750.00—	840.00
Group No. 7—White Shorts	100.00—	200.00

QUEBEC *Per Ton of 2000 Lbs., F.O.B. Mine*
As of January 1, 1978 *Canadian Dollars*

No. 2—Crude		2165.00
No. 3—Spinning Fiber	965.00—	1501.00
No. 4—Asbestos Cement Fiber	642.00—	945.00
No. 5—Paper Fiber	323.00—	501.00
No. 6—Paper and Shingle Fiber	307.00—	311.00
No. 7—Shorts	107.00—	213.00

CASSIAR *Per ton of 2000 Lbs., F.O.B. North Vancouver, B.C.*
As of January 1, 1978 *Canadian Dollars*

	Cassiar Mine	
C-1	—No. 1 Crude	$3621.00
AAA	—Nonferrous Spinning Fiber/Canadian Group 3	2000.00
AA	—Nonferrous Spinning Fiber/Canadian Group 3	1600.00
A	—Nonferrous Spinning Fiber/Canadian Group 3	1050.00
AC	—Nonferrous Spinning Fiber/Canadian Group 3	960.00
AK	—Asbestos Cement Fiber/Canadian Group 4	810.00
AS	—Asbestos Cement Fiber/Canadian Group 4	705.00
AX	—Asbestos Cement Fiber/Canadian Group 4	610.00
AY	—Asbestos Cement Fiber/Canadian Group 5	430.00
AZ	—Asbestos Cement Fiber/Canadian Group 6	330.00
	Clinton Mine	
CP	—Asbestos Cement Fiber/Canadian Group 4	760.00
CT	—Asbestos Cement Fiber/Canadian Group 4	680.00
CY	—Asbestos Cement Fiber/Canadian Group 5	430.00
CZ	—Asbestos Cement Fiber/Canadian Group 6	330.00

VERMONT *Per Ton of 2000 Lbs., F.O.B. Morrisville, Vermont*
As of January 1, 1978 *U.S. Dollars*

Grade 4T—Fiber	$ —$	501.00
Grades 5D thru 5R—Fiber	330.00—	387.00
Grade 6D—Waste	——	239.00
Grades 7D thru 7T—Shorts	95.00—	182.00
Grade 7TF—Floats (Shorts)	——	82.00
Grade 8S—Shorts	——	62.00
Hooker No. 1—in 50-lb. woven polypropylene bags		1166.00
Hooker No. 2—in 100-lb. woven polypropylene bags		583.00

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THE MINING SCENE

ALASKAN ASBESTOS PROSPECTS

General Crude Oil Company, McIntyre Mines (Nevada) Ltd., Tanana Asbestos Corporation and WGM Inc. have completed their first year of investigating Chrysotile asbestos prospects in Alaska, located some 60 miles west of the asbestos mine of *Cassiar Asbestos Corporation Ltd.* at Clinton Creek in the Yukon Territory of Canada. Several occurrences of Chrysotile have been found to date and magnetic anomalies suggest the presence of additional ultrabasic bodies. About 5,000 feet of diamond drilling in 27 holes has confirmed the presence of fiber-bearing ultrabasic rocks along a strike length of 1,200 feet and downdip to 1,000 feet. Surface mapping, sampling and a few drill holes at other prospects have confirmed the presence of other potentially large mineralized zones. Initial test results on drill core samples have established the fiber recovered is suitable for most normal asbestos uses. The 1978 program planned for the joint venture will consist of expanded drilling, extensive fiber testing and preliminary engineering investigations to determine if the prospects have economic significance. General Crude Oil is a wholly-owned subsidiary of International Paper Company; McIntyre Mines (Nevada) is a wholly-owned subsidiary of McIntyre Mines Ltd.; Tanana Asbestos is a wholly-owned subsidiary of Doyon Ltd.; and WGM is a geological and mining consulting firm based in Anchorage, Alaska.

QAMA SURVEYS QUEBECERS' OPINION

The Quebec Asbestos Mining Association commissioned the *Centre de Recherche sur l'Opinion Publique (CROP)* to execute a large-scale survey throughout Quebec and in the greater asbestos region in the Province to ascertain opinions and attitudes toward the Quebec Government's new asbestos policy. The results of the CROP survey reveal that the majority of the people interviewed oppose the Government takeover of the asbestos industry. Well over half the respondents felt the Government should leave the initiative for developing the industry to private companies or grant them subventions to develop the manufacturing sector. Asbestos companies are perceived by a large majority of the mining community population as being "quite good to very good employers" and contributing greatly to the economic growth of Quebec. To quote QAMA, "It is not surprising, therefore, that the Government's new asbestos policy, whose advantages and benefits for Quebecers, as a whole, are at the very best, hypothetical, has been received coldly by the population which is concerned in seeing one of the rare sectors of Quebec's economy that performs well, being singled out in this fashion."

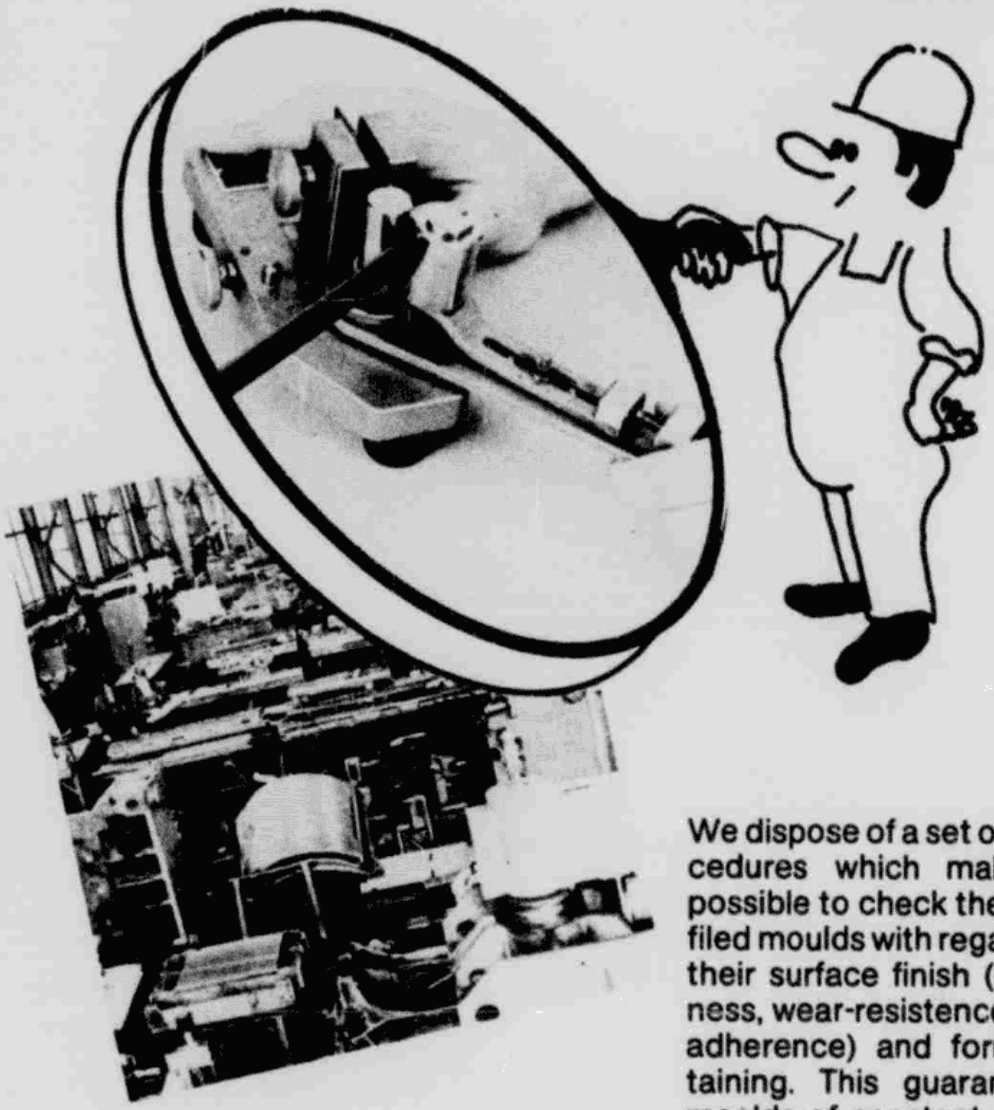
UNITED ASBESTOS BACK IN THE RUNNING

A program of 10,800 feet of diamond drilling was authorized for the Midlothian asbestos mine and property of *United Asbestos Inc.* by *The*

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Clarkson Company, United's trustee, according to *The Northern Miner*. Clarkson said drilling was completed in the fall of 1977 to audit or confirm the results of drilling carried out by United over a long period. Currently the drill core from the program is being milled. Preliminary results are available but no disclosure will be made until all results are in. Clarkson is endeavoring to determine if it has something credible by way of confirmed drill results to show other companies interested in the property, although the possibility of a reorganization of United Asbestos within its current corporate framework has not been discounted.

REPORT FROM CITLEC

Citlec Minerals Ltd., Vancouver, is still negotiating with major firms to participate in the asbestos prospect at St. Cyr in Richmond, Quebec, although to date nothing has been finalized. It is estimated the property contains about 50-million tons of ore grade material and plans are in the offing for a small drilling program to test the chromite content of the property and to explore the "A" zone for asbestos. No development work has been carried out other than exploration and there are, as yet, no formalized plans for production.

CAPE ASBESTOS FIBRES REORGANIZED

Cape Asbestos Fibres Ltd., a subsidiary of *Cape Industries Ltd.*, is responsible for the international marketing of asbestos mined by Group associates. New area offices have been established in London, Rio de Janeiro and Singapore. As part of the reorganization, *North American Asbestos Corporation* ceased operating on January 31, 1978. Amosite and Crocidolite will continue to be supplied to customers in the United States, Canada and Mexico through *Continental Products Corporation*. One particular objective of the reorganization is to augment the service to customers by establishing a readily-available channel of communication with the supplier and ensuring that all users are able to make use of the technical service which has always been a feature of Cape's activity.

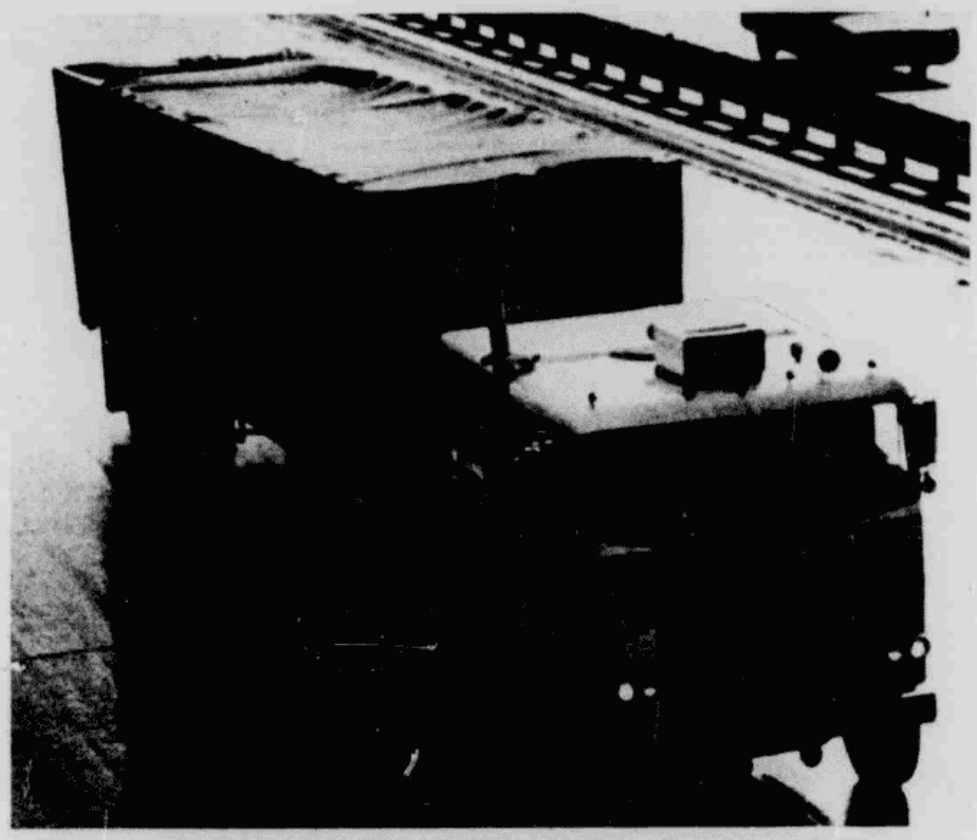
CUTBACKS IN SOUTH AFRICA

Cape Asbestos South Africa (Pty) Ltd., Johannesburg, announced major cutbacks at its asbestos mining operations in the Republic of South Africa, mainly attributed to poor demand for the product. Milling time at the Penge Asbestos Mine in the Transvaal and at the Koegas Asbestos Mine in Cape Province has been reduced from two to one shift per day, idling a substantial number of mineworkers.

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JIM WALTER ANNUAL REPORT 1977

Strong economic activity, particularly in new construction markets in the second half of the fiscal year, enabled Jim Walter Corporation to set records in net income and earnings per share for the 7th consecutive year. Net income for the year ended August 31, 1977, totaled $79.4-million, 12% higher than the previous year. Sales and revenues increased to a record $1.4-billion, up 12% from a year earlier, due principally to strong demand and firm pricing for building materials and continuing record sales of partially-finished homes. . . . Sales and revenues from the Mineral and Fiber Products Group, which includes Celotex, Carey-Canadian Mines and Majestic Carpet Mills, amounted to $511-million in 1977 compared with $448-million in 1976. Income contribution was $41-million in 1977 against $29-million a year earlier. Carey-Canadian Mines benefited from strong world demand for asbestos fibers, an improved mix of long to short fiber grades and a year of uninterrupted production. World requirements for asbestos fibers were at high levels throughout the year and shipments to markets outside the North American continent rose to 59% of total sales. Carey-Canadian continued its program initiated in fiscal year 1976 of developing existing reserves of medium fiber grades used principally in friction materials. Sales of these grades in 1977 amounted to 54% of total sales compared with 44% three years ago. Some $2.5-million has been spent by Carey-Canadian for the purchase and installation of pollution control equipment. Additional investment of about $6.3-million will be necessary during the 1978-81 period to meet Canadian environmental control requirements.

ASBESTOS STOCK QUOTATIONS

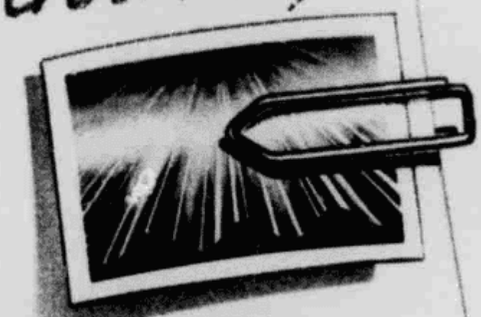
CLOSE—FEBRUARY 21, 1978

Abitibi Asbestos	C$.65
Advocate Mines	C$3.00
Armstrong Cork	14⅞
Armst. Cork (pfd 3.75)	49
Asarco	16⅛
Asbestos Corporation	C$38.00
Bendix	33⅝
Bendix (pfd 3)	68½
Carlisle	20
Cassiar Asbestos	C$9.00
CertainTeed	20⅞
Charter Conso.	pence 125
Colt Industries	43
Colt Ind. (pfd 1.60)	23¾
Colt Ind. (pfd 4.25)	62½
Conwest	C$4.20
Flintkote	20⅛
GAF Corporation	10⅞
GAF (pfd 1.20)	16⅛
Gulf & Western	11¼
G&W (pfd 2.50)	30¼
G&W (pfd 5.75)	72
IC Industries	24
IC Ind (pfd 3.50)	41⅞
Jim Walter Corporation	27½
Jim Walter (pfd 1)	11¾
Jim Walter (pfd 1.60)	29½
Johns-Manville	30
Kennecott Copper	21½
Lear Siegler	13⅛
Lear Siegler (pfd 2.25)	36⅝
Maremont	18½
McAdam Mining	C$.27
National Gypsum	15⅝
Pathfinder	C$.26
Porter (pfd 5.50)	74
Raybestos-Manhattan	30⅜
Rio Algom	C$26.00
Supradur	Bid 5⅞; Asked 6⅜
Union Carbide	37⅝
Woodsreef Minerals	C$.62

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MEN ON THE MOVE

ASBESTOS CORPORATION LTD.

Jean Gaudry has been appointed Sales Director-North and South America and the Caribbean and Director of Marketing for Asbestos Corporation Ltd., Montreal. He is a graduate of the University of Montreal and has broad international experience in sales and marketing in the mining field.

ATLAS ASBESTOS COMPANY LTD.

John D. Zacharias will become President of Atlas Asbestos Company Ltd., Montreal, on April 1, upon the retirement on March 31 of *George Barge*. Mr. Zacharias joined the company last year and served as Vice President-Corporate Development and Executive Vice President. Prior to that he had been Marketing Manager-A/C Pipes with Atlas' affiliated company, TAC Construction Materials Ltd.

CENTRAL ASBESTOS COMPANY LTD.

K. Wood was appointed a Director of Commonwealth Mining Investments (Australia) Ltd. He is Managing Director of Central Asbestos Company Ltd., London, England.

COMBUSTION ENGINEERING, INC.

David G. Peterson, affiliated with Combustion Engineering, Inc., for 30 years, was named President of C-E Bauer, Springfield, Ohio, an operating unit of the parent company, effective January 1. He had been Vice President of Manufacturing at C-E Air Preheater. The announcement was made by *D. R. Shouvlin, Jr.*, former President of C-E Bauer, who was promoted last March to Vice President and General Manager of the C-E General Equipment and Controls Unit. C-E Bauer is a part of that Unit.

NICOLET INC.

Richard H. Park is now Southwest Regional Manager for the Pipeline Products Division of Nicolet Inc., Norristown, Pennsylvania, it was announced by *D. F. Cortright*, Vice President of Marketing. Succeeding *L. R. Davis*, who resigned, Mr. Park will also be responsible for sales to Latin American countries. The Division manufactures asbestos protection products, including coal-tar and asphalt-saturated asbestos felt to protect underground pipelines against corrosion.

STANDCO INDUSTRIES, INC.

James E. Fleeger was named Executive Vice President and Chief Operating Officer for Standco Industries, Inc., Houston, Texas. He is an experienced consultant and financial planner.

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CANADA

BIRTHDAY GREETINGS to . . .

H. D. S. Hardie, Personnel & External Relations Director, Turner & Newall Ltd., Manchester, England, April 15.

Denis M. Kelleher, Marketing Manager, Asbestos Fiber Division, Johns-Manville Sales Corporation, Denver, Colorado, April 16.

Jean Marc Leblond, Manager-Marketing, Bell Asbestos Mines, Ltd., Thetford Mines, Quebec, April 16.

Philip A. Meyer, Consultant, Nicolet Inc., Short Hills, New Jersey, April 16.

Adi K. Patell, Sales Administrator, Carey-Canadian Mines Ltd., East Broughton Station, Quebec, April 16.

G. A. Higham, Managing Director & Group Chief Executive, Cape Industries Ltd., London, England, April 17.

S. P. Milburn, a Director, Ferodo Italiana S.p.A., Mondovi, Italy, April 18.

Kerry A. Rickert, General Superintendent of Manufacturing, Cement Asbestos Products Company, Van Buren, Arkansas, April 18.

Robert A. Clifton, Asbestos Specialist, Division of Nonmetallic Minerals, U.S. Bureau of Mines, Washington, D. C., April 20.

Donald L. Davidson, Director of Marketing & Sales for Transportation/Industrial/Aerospace Products, RM Industrial Products Company, Detroit, Michigan, April 21.

Neal B. Norris, Market Manager (Felt), Asbestos Fiber Division, Johns-Manville Sales Corporation, Denver, Colorado, April 21.

Norman W. Kelly, Production Superintendent, Clinton Mine, Cassiar Asbestos Corporation Ltd., Clinton Creek, Yukon Terr., April 23.

William T. Cavanaugh, Managing Director, American Society for Testing and Materials, Philadelphia, Pennsylvania, April 24.

L. R. Blair, Vice President-Technology Transfer, Johns-Manville Corporation, Denver, Colorado, April 26.

G. C. Clark, Joint Managing Director, Engineering Components Ltd., Slough, England, April 26.

P. W. C. Griffith, Chairman, Turner & Newall Ltd., Manchester, England, April 26.

W. A. Burgess, a Director & a General Manager, TAC Construction Materials Ltd., Manchester, England, April 27.

Robert A. DeWitt, Vice President & Group Executive, Jim Walter Corporation, Tampa, Florida, April 27.

W. Jerry Rooney, Vice President of Marketing, Ambler Division, Nicolet Inc., Ambler, Pennsylvania, April 28.

Calvin M. Edwards, Manager of Manufacturing, Southern Asbestos Company, Charlotte, North Carolina, April 29.

Wayne Gallant, Vice President-Finance & Secretary-Treasurer, Atlas Asbestos Company Ltd., Montreal, Quebec, April 30.

Richard H. Jaffer, President, York Insulation Company, Inc., Hillside, New Jersey, May 1.

Edmond P. Bertheaud, a Corporate Vice President, Treasurer & a Director, Nicolet Inc., Ambler, Pennsylvania, May 3.

Reynold Nebel, Vice President, Process & Engineering Development Division, Johns-Manville Corporation, Denver, Colorado, May 3.

G. R. Vincent, Mine Manager, Clinton Mine, Cassiar Asbestos Corporation Ltd., Clinton Creek, Yukon Territory, May 3.

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Guy G. Gabrielson, Jr., Chairman of the Board, Nicolet Inc., Ambler, Pennsylvania, May 4.
E. C. Hildebrandt, Secretary, MacArthur Company, St. Paul, Minnesota, May 4.
Hans Thoeni, Managing Director, Everite Ltd., Braamfontein, Johannesburg, Republic of South Africa, May 4.
James R. Carpenter, Plant Manager, Cement Asbestos Products Company, Ragland, Alabama, May 6.
J. Randall Plummer, Vice President, Pars Manufacturing Company, Ambler, Pennsylvania, May 6.
Dr. James T. Trainor, Director-Research & Development, RM Friction Materials Company, Trumbull, Connecticut, May 7.
John P. Hayes, President & Chief Operating Officer, National Gypsum Company, Dallas, Texas, May 9.
Isabelle M. Dienstbach, Vice President, Executive Department, Johns-Manville Corporation, Denver, Colorado, May 10.
R. J. Lambson, General Manager, Everite Ltd., Braamfontein, Johannesburg, Republic of South Africa, May 10.
C. R. Elliott, a Director, Cassiar Asbestos Corporation Ltd., Vancouver, British Columbia, May 11.
R. B. Todd, Vice President-Manufacturing, Atlas Asbestos Company Ltd., Montreal, Quebec, May 11.
G. J. Leathley, Mine Superintendent, Cassiar Mine, Cassiar Asbestos Corporation Ltd., Cassiar, British Columbia, May 13.
Robert J. Muth, Vice President, Asarco Inc., New York City, May 13.

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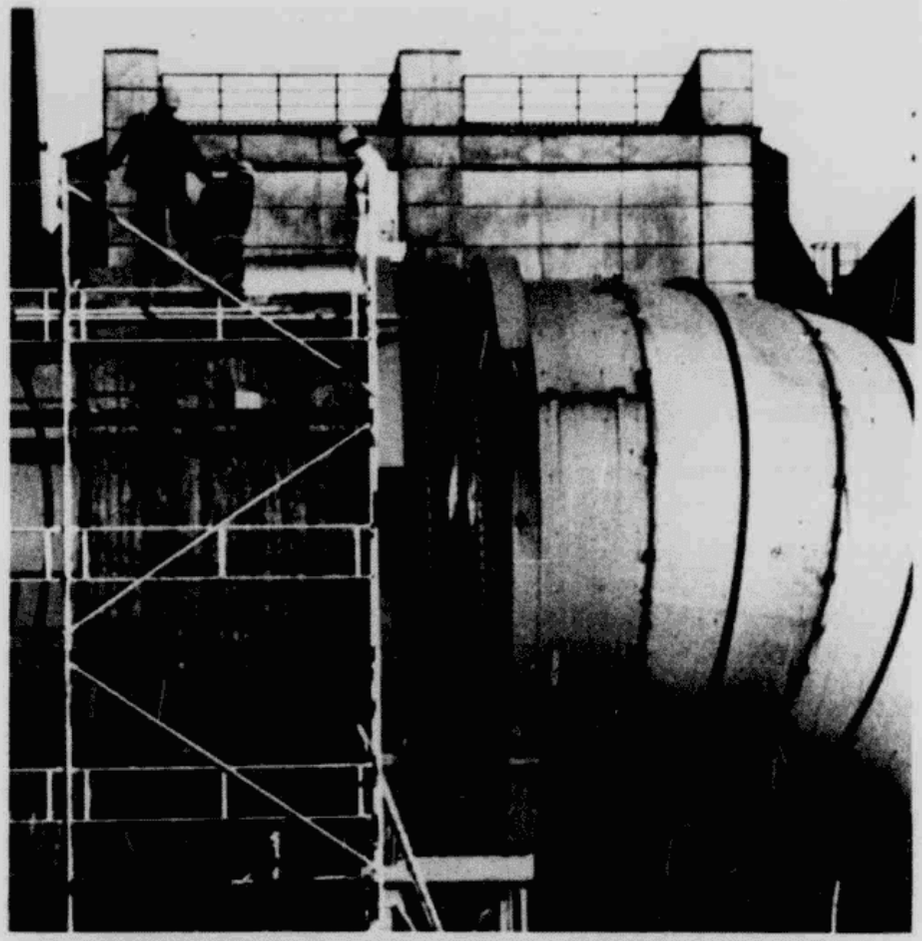
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VALUABLE LITERATURE

ENVIRONMENTAL HEALTH: QUANTITATIVE METHODS—Edited by Alice S. Whittemore, Hunter College and New York University Medical Center; Proceedings of the Conference on the Quantitative Aspects of Environmental Health held by the Society for Industrial and Applied Mathematics (SIAM), Institute for Mathematics and Society, under a grant by the National Science Foundation; brings together the work of outstanding authors of both analytic and empirical approaches to the study of environmental disease; contains examinations of some of the most fruitful mathematical and statistical techniques used in processing and analyzing data and in developing useful conclusions concerning environmental health; analyzes the relationship between environmental factors and diseases such as respiratory disorders and cancer. [259 pages; $19.50; order from SIAM or through ASBESTOS]

LOW TEMPERATURE X-RAY DIFFRACTION (LTXRD): APPARATUS AND TECHNIQUES—By Reuben Rudman, Adelphi University; summarizes and classifies the results of nearly sixty years of research in LTXRD instrumentation; provides the data required to initiate simple, exploratory low-temperature investigations; contains detailed discussions of the basic design principles which have been used to construct modern low-temperature systems which are compatible with sophisticated x-ray diffraction apparatus; the preparation of samples is described at length, as are methods used to grow single crystals from liquids, data collection strategies, data reduction absorption corrections (for sample holders) and treatment of disordered structures. [344 pages; $35.00; order from Plenum Publishing Corporation or through ASBESTOS]

FRICTION MATERIALS 1978: RECENT ADVANCES—Chemical Technology Review No. 100 by Louis B. Newman; discusses hundreds of formulations and design requirements for automotive brake linings which have been developed worldwide and are described in U.S. patent literature, the more demanding and complex requirements of railway and aircraft friction elements and other processes designed to enhance slip resistance between varied materials. [358 pages; $36.00; order from Noyes Data Corporation or through ASBESTOS]

NEW TRADE NAMES 1977—Edited by Ellen T. Crowley; is a guide to new and newly-noted consumer trade names and brand, product, coined, model and design names; includes addresses of manufacturers, importers, marketers and distributors; contains over 128,000 trade name and company entries. [175 pages; $45.00; order from Gale Research Company or through ASBESTOS]

EXPLOSIVES AND BLASTING TECHNIQUE—Written by distinguished professionals in the field of blasting and edited by Dr. Calvin J. Konya; contains papers presented at the First, Second and Third Conferences on Explosives and Blasting Technique sponsored by the Society of Explosives Engineers (SEE). [$25.00 per Conference Proceedings; $50.00 per set of three; order from SEE or through ASBESTOS]

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NEW ASBESTOS PATENTS

U.S. patents may be purchased from The Commissioner of Patents, Washington, D. C. 20231, for 50c each. Photoprints of non-U.S. patents may be purchased from the same source at a cost of 30c per page. Remittances should be in coin, currency or check and the number of the patent, name of the inventor and date of issue should be given.

British 1,484,401—In the manufacture of yarn a stabilized aqueous dispersion of Chrysotile asbestos is extruded through a slit nozzle flowing down an inclined chute so as to chill and gel the dispersion, and the tension in the extruded stream is varied by causing the cold water to change direction in the chute; A. N. Magnall, P. H. Taylor & R. Roberts; assigned to TBA Industrial Products Ltd., September 1, 1977; 6 pages.

British 1,484,402—Strands for use in the manufacture of textile yarns are produced from an aqueous dispersion of hot water, asbestos, a commercial sodium soap of mixed tallow fatty acids containing an excess of free fatty acid, and stearic acid or myristic acid; P. H. Taylor; assigned to TBA Industrial Products Ltd., September 1, 1977; 3 pages.

Canadian 1,010,311—Mats for making asphalt shingles are formed from a mixture of asbestos, insulation-type glass fibers, bundles of textile-type monofilament glass fibers and a dispersing agent, wherein the twisted strands of glass fibers contain randomly-dispersed asbestos fibers; W. L. VanDerbeek, P. B. Shepherd, W. J. Plichta & H. W. Dreikorn; assigned to Johns-Manville Corporation, May 17, 1977; 25 pages.

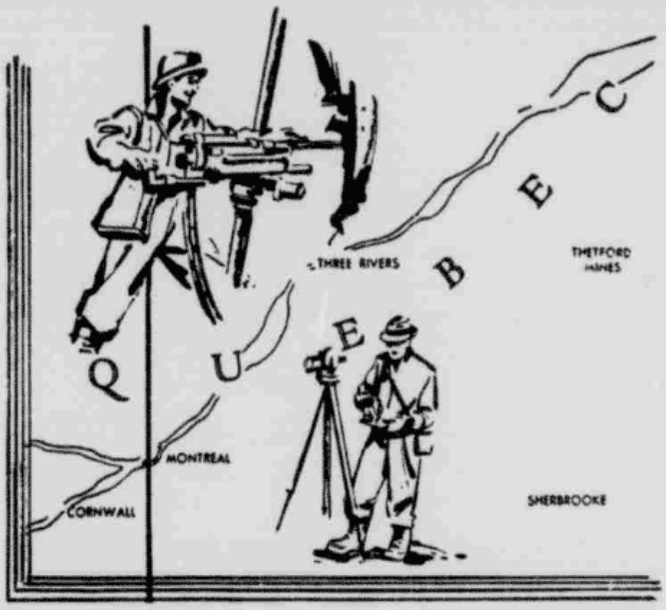
Canadian 1,013,526—Sheets for insulating a thermal reactor device used in the treatment of exhaust emissions from internal combustion engines are made by orienting asbestos fibers generally parallel to one another in a butadiene-styrene copolymer in the sheets, and heating the sheets to reduce the water content and crack the copolymer resin; G. D'Olier; assigned to Raybestos-Manhattan, Inc., July 12, 1977; 18 pages.

Netherlands Application 76/04,592—The Canadian standard freeness of a dispersion of asbestos is controlled by treating it with a small but significant amount of sodium polyacrylate or the like to increase the dry strength of sheets formed from the dispersion; assigned to B. F. Goodrich Company, April 11, 1976; 15 pages.

MINERAL EXPLORATION, MINING AND PROCESSING PATENTS, 1976—13th annual edition by O. S. North; a subject-classified, fully-indexed volume of abstracts of 1976 patent literature concerned with mineral exploration and mining, beneficiation, extraction, primary metal refining, and reagent and equipment supply to the minerals industry; abstracts cover substantially all of the significant U.S., Canadian and British patents issued during the year. [307 pages; $30.00; order from the author or through ASBESTOS]

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CALENDAR OF EVENTS

EMERGING PATTERNS IN AUTOMATIC IMAGERY PATTERN RECOGNITION—Conference sponsored by the National Bureau of Standards and the Electronic Industries Association; NBS Headquarters, Gaithersburg, Maryland, *April 3-4.*

EUCON '78—Energy Utilization and Conservation Exhibition and Conference organized by Brintex Exhibitions Ltd.; Royal Lancaster Hotel, London, England, *April 10-12.*

OPERATION AND MAINTENANCE OF ELECTROSTATIC PRECIPITATORS—A Specialty Meeting and Conference of the Air Pollution Control Association; Hyatt Regency Hotel, Dearborn, Michigan, *April 10-12.*

PRACTICAL GEOSTATISTICAL APPLICATIONS IN MINING—Short Course of the Mackay School of Mines; University of Nevada, Reno, Nevada, *April 10-15.*

CHEMICAL INDUSTRY FEDERAL REGULATION—3rd Annual Briefing designed by Executive Enterprises, Inc., and Chemical Week; Mayflower Hotel, Washington, D. C., April 11-12.

INDUSTRIAL POLLUTION—6th Annual Conference of the Water and Waste-water Equipment Manufacturers Association; Riverfront Convention Center, St. Louis, Missouri, *April 11-13.*

GEOCHEMICAL EXPLORATION—7th International Symposium of The Association of Exploration Geochemists; Holiday Inn, Golden, Colorado, *April 16-29.*

NATIONAL PLANT ENGINEERING AND MAINTENANCE AND DESIGN ENGINEERING—Conferences and Shows; McCormick Place, Chicago, Illinois, *April 17-20.*

REMOTE SENSING OF ENVIRONMENT—12th International Symposium; joint venture of the Environmental Research Institute, The University of Michigan and the Natural Resources Management Center; Plaza Hotel, Manila, Philippines, *April 20-26.*

CANADIAN INSTITUTE OF MINING AND METALLURGY—80th Annual General Meeting; Vancouver, British Columbia, *April 23-27.*

IFSSEC '78—5th International Fire, Security and Safety Exhibition and Conference organized by Victor Green Publications Ltd.; Olympia, London, England, *April 24-28.*

MODELING AND SIMULATION—9th Annual Pittsburgh Conference sponsored by the University of Pittsburgh in cooperation with several other organizations; Pittsburgh, Pennsylvania, *April 27-28.*

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A/C PIPE PRODUCERS ASSOCIATION—6th Annual Meeting and Industry Conference; will accentuate the market opportunities for asbestos-cement pipe; Hotel Del Coronado, San Diego, California, *April 30-May 4.*

AMERICAN TEXTILE MACHINERY—International Exhibition of the American Textile Machinery Association and Textile Hall Corporation; Textile Hall, Greenville, South Carolina, *May 1-5.*

INDUSTRIAL MINERALS—14th Annual Meeting of the Forum on the Geology of Industrial Minerals; Albany, New York, *May 4-6.*

11TH COMMONWEALTH MINING AND METALLURGICAL CONGRESS—Organized by the Institution of Mining and Metallurgy; Excelsior Hotel and Convention Centre, Hong Kong, *May 6-12.*

INTERNATIONAL MINING AND METALLURGICAL EXHIBITION—Organized by Christopher Bradley Ltd.; Hong Kong, *May 8-12.*

INTERNATIONAL RESOURCE MANAGEMENT—Joint Conference of the Australasian Institute of Mining and Metallurgy and the American Institute of Mining, Metallurgical and Petroleum Engineers; Canberra, Australia, *May 15-18.*

SCIENCE WEEK—Conferences, Workshops, Courses and other scientific events held by The New York Academy of Sciences; includes Conferences on the Health Effects of Asbestos Exposure and on Public Health Control of Environmental Hazards; New York City, *June 21-30.*

ALL ASBESTOS-CEMENT MACHINES NEED

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Remember When?

(February 1928 ASBESTOS)

New Advertiser: Eternit, Inc., St. Louis, Missouri.

A short article described the uses of asbestos protective clothing and auxiliary heat protective devices in the forging industry.

It was reported that the extensive work done to develop uses for Amosite asbestos was bearing fruit, in that the entire planned production of the material for 1928 had been contracted for in advance. Substantial expansions of existing mining operations were being undertaken and several new properties were being opened in South Africa for production of Crocidolite as well as Amosite.

The Asbestos Brake Lining Association announced the election of John T. Spicer of Johns-Manville Corporation as President. A. W. Koehler of Asbestos Textile Company and W. H, Dunn of Manhattan Rubber Company were elected Vice-Presidents.

George D. Crabbs, President of the Philip Carey Company, was honored at a dinner given by the Chamber of Commerce of Cincinnati, Ohio, in recognition of his leadership in obtaining for the City its new unified freight and passenger railroad terminals.

(March 1928 ASBESTOS)

New Advertisers: Societe Francaise de L'Everite, Paris, France;
The Rochdale Asbestos Co. Ltd., Rochdale, England:
Societa Cave Amianto Di Valmalenco, Sondrio, Italy.

A lead article in this issue described the various methods for mining asbestos then in use and highlighted the differences in techniques used in Canada, Arizona and South Africa due to the differing characteristics of the deposits.

The Economics branch of the U.S. Bureau of Mines established a Non-Metallic Minerals Section. Oliver Bowles, formerly Supervising Engineer for the Non-Metallic Minerals Experiment Station, New Brunswick, New Jersey, was placed in charge of the new Section. Its work was to include studies of products, markets, extension of uses and other factors bearing on the well-being of any industry involved with non-metallic minerals.

A short article described a mine at Rechnitz, Austria, which was producing a material known as "Micro-Asbestos." Chemically and physically the material corresponded to Asbestine and it was being used as a filler for rubber, paper and various types of paint.

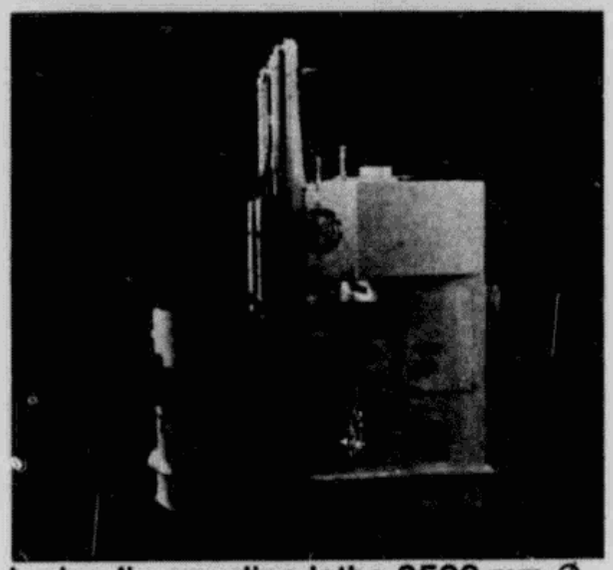
Announcement was made of the formation of an association of British manufacturers of brake lining. Modeled after the existing American association, the group was organized to protect and foster the interests of brake lining manufacturers in general.

Asbestos Magazine, 1978, March 1978
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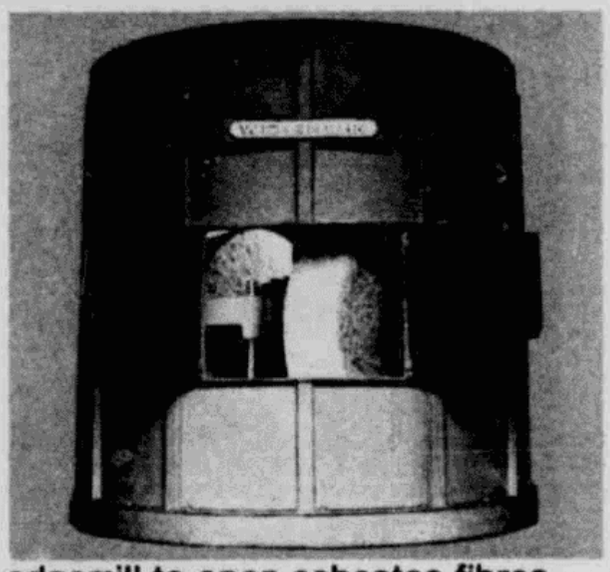
WEHRHAHN



hydraulic coupling cutting machine



hydraulic coupling lathe 2500 mm ∅



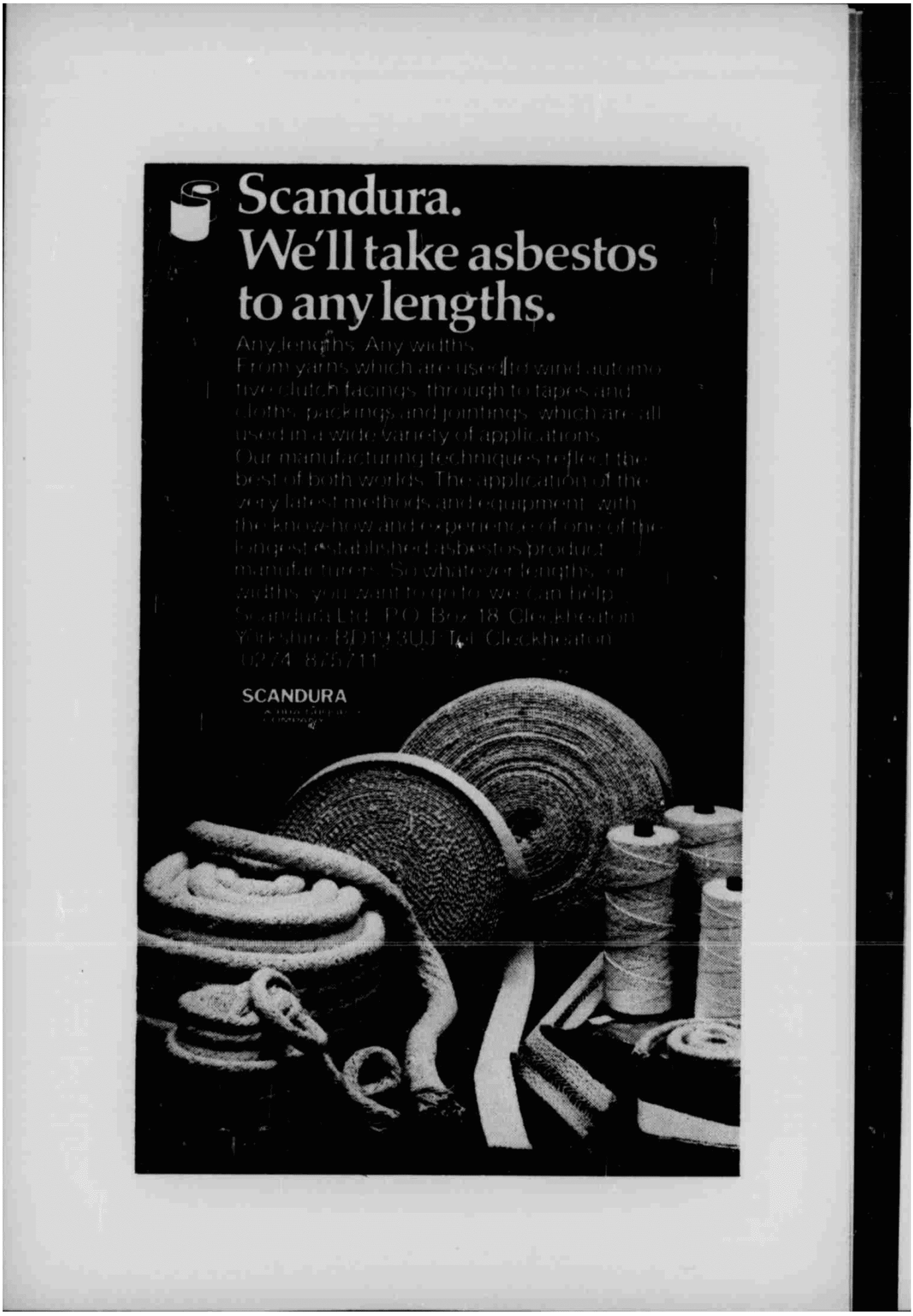
edgemill to open asbestos fibres

...the first results will tell you why you chose WEHRHAHN!

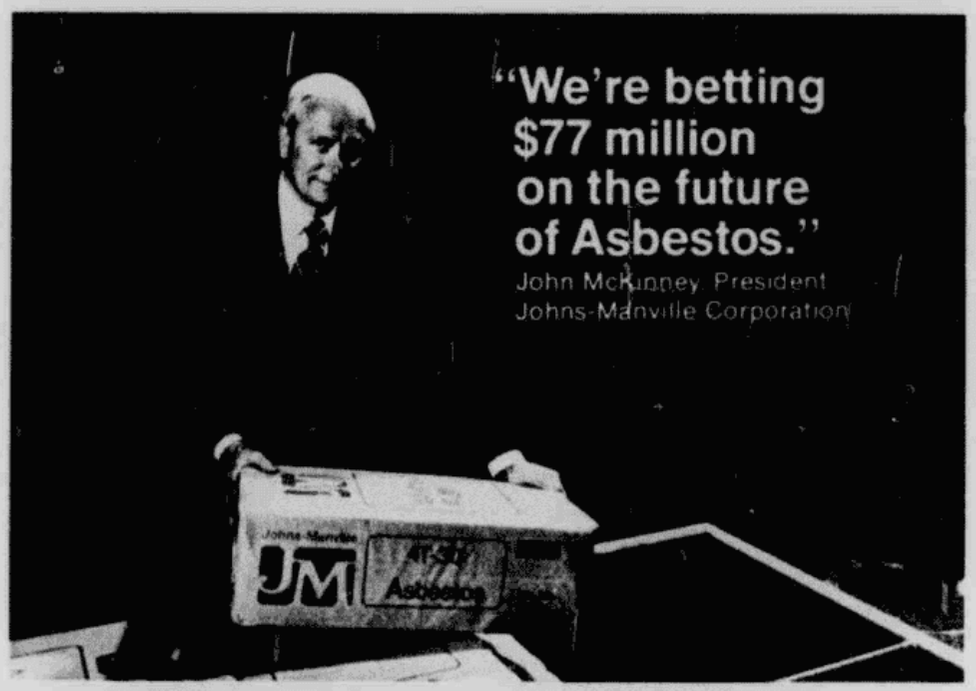
Many fully-automatic WEHRHAHN- ac-plants produce sheets and pipes successfully all over the world. WEHRHAHN has experience for more than a man's age to construct economical ac-machines for the future. WEHRHAHN'S dynamic specialists assist you everywhere. It's their job! Why not contact them? Ask for up-to-date quotations too! Choose:

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DELMENHORST · WILDESHAUSEN UND DINKLAGE



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And that's just a beginning!

A Johns-Manville 3-stage, 5-year plan to develop its facilities at Asbestos, Quebec, will insure an annual output of 700,000 short tons of asbestos over the next 20 years and an additional 20 years at an annual rate of 500,000 to 600,000 tons.

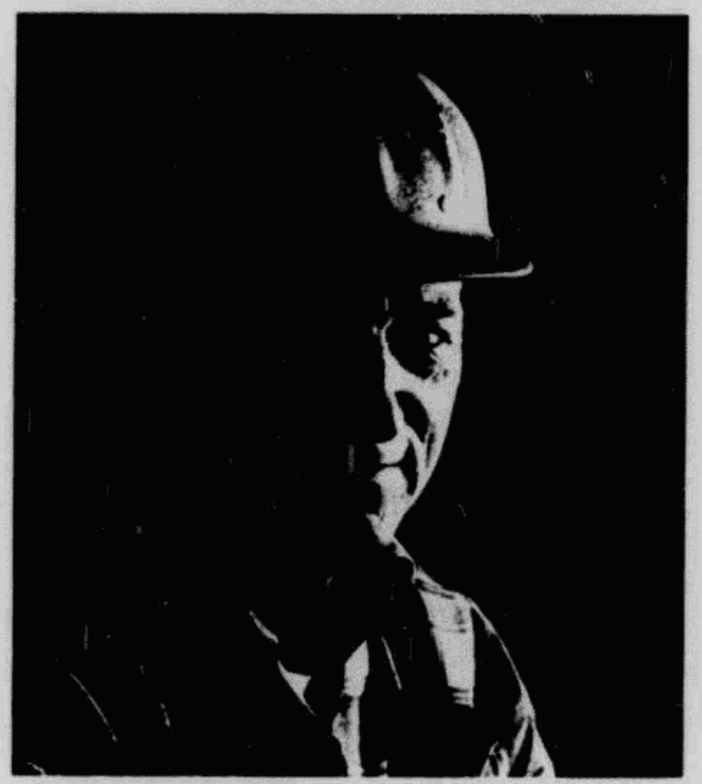
Vital as this commitment is, it is only part of what's needed to insure the future of our industry. The truth about asbestos must be told — factually, widely, and repeatedly.

That's why we're investing heavily in a full-scale program of advertising appearing regularly in *Business Week*. The ads are full pages, in four color. And while the advertising investment is not nearly as large as that committed to our plant, it is in many ways just as important.

Do we believe in the future of asbestos? $77 million says we do.

JM Johns-Manville

"When it comes to service, you gotta be out of your mine."



You can't sell asbestos to industry unless you get out and gain an understanding of the complexities of day to day business. That's what it takes, so that's what we do at Carey-Canadian.

You want the right grade at the right time, at the right price. That's why your Carey-Canadian man stands by you from the drawing board 'til the day your finished product rolls off the line. He will assure that you will get the proper grade of asbestos when you want it. And he will aid you with production problems, scheduling and delivery. That's his job . . . to serve you any way he's needed.

Carey-Canadian . . . one of the largest, most trusted producers of Chrysotile Asbestos.

a Jim Walter company

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Carey-Canadian Mines, Ltd. • P.O. Box 190 • East Broughton Station, P.Q. • Canada G0N 1H0
Phone: (418) 426-3050 • Telex: 05-834 554 CAREYMINE EABR • Cable: CARMINES EASTBROUGHTONPQ

OVERSEAS • ARGENTINA, Buenos Aires: Will L. Smith SACI • AUSTRALIA, Mt. Waverley, Melbourne: K. V. Robinson & Associates Pty. Ltd. • AUSTRIA, Wien: Robert Weisz • BELGIUM, Brussels: Keyser & Mackay • BRASIL, Sao Paulo: ICI-Intercambio Comercial Internacional Ltda. • COLOMBIA, Barranquilla: General Sales Corporation • Bogota: Alba Quimica • COSTA RICA, San Jose: General Agencies Co. • DENMARK, Copenhagen: Andreas Jennow A/S • DOMINICAN REPUBLIC, Santo Domingo: Muniz, Fernandez & Co. • EL SALVADOR, San Jose, C.R.: Alba Quimica • FINLAND, Copenhagen: Andreas Jennow A/S • FRANCE, Paris: G. Devineau S.A. • GERMANY, Duisburg: Deutsche Asbest-Gesellschaft, GmbH. • Lübeck: Possehl Erzkontor GmbH. • GUATEMALA, San Jose, C.R.: Alba Quimica • HONDURAS, San Pedro Sula: Abraham Sikaffy • INDIA, New Delhi: Toyo Menka Kaisha, Ltd. • ISRAEL, Ramat-Gan: P.B.A. (Wiesner) Ltd. • ITALY, Torino: Angelo Baravalle • JAPAN, Tokyo: T. Kakiuchi & Co., Ltd. • MEXICO, Mexico City: Productos Quimicos Mardupol S.A. • NETHERLANDS, Haarlem: Chemische Productenhandel J. J. Van De Vrande • NEW ZEALAND, Mt. Waverley, Melbourne: K. V. Robinson & Associates Pty. Ltd. • NICARAGUA, San Jose, C.R.: Alba Quimica • NORWAY, Copenhagen: Andreas Jennow A/S • PAKISTAN, Karachi: Toyomenka (Pakistan) Ltd. • PANAMA, San Jose, C.R.: Alba Quimica • SINGAPORE: Keenan & Associates • SPAIN, Valencia: Guzman S.A. • SWEDEN, Copenhagen: Andreas Jennow A/S • SWITZERLAND, Zürich: Keyser & Mackay • TAIWAN, Taipei: Hudson Enterprises Ltd. • TURKEY, Istanbul: Chemag Ticaret — Ithalat ve Ihracat • UNITED KINGDOM: London: Central Asbestos Co. Ltd. • VENEZUELA,

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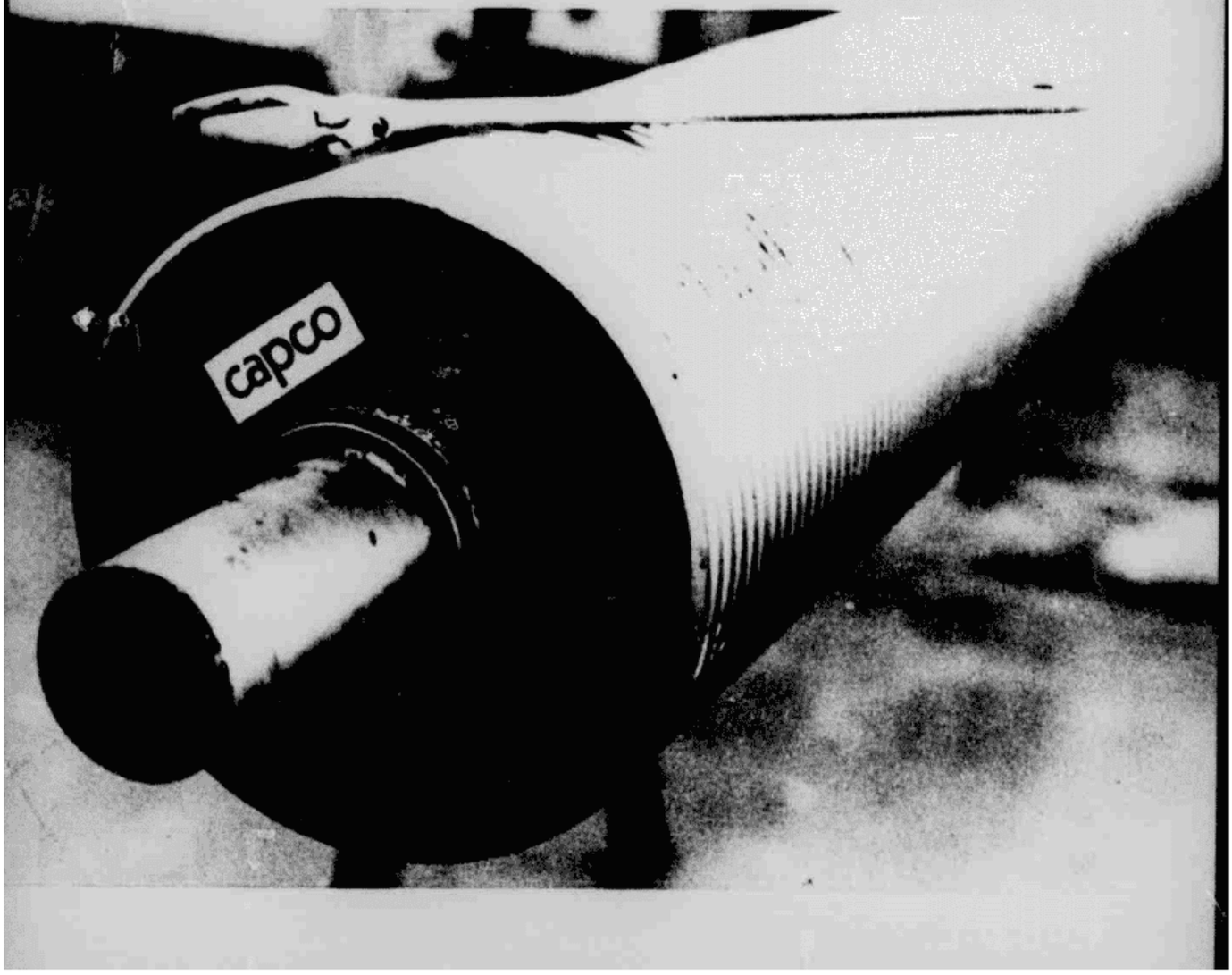
April 1978

ASBESTOS

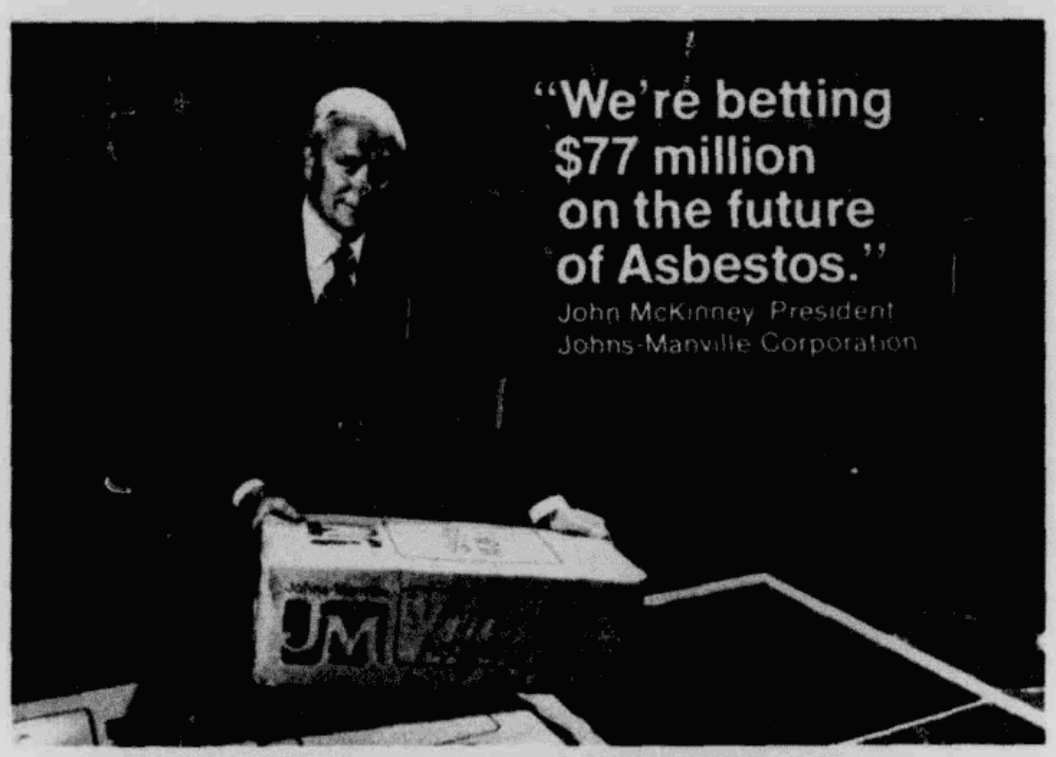
Devoted to the International Asbestos Industry

—FEATURING—

THE ALPINE PRESS ROLL MODIFICATION



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And that's just a beginning!

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Johns-Manville

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