ASBESTOS

INTERNATIONAL INDUSTRY REVIEW—1979

PART I: THE EFFECTS OF THE ECONOMY

PART II: THE ASBESTOS MINING INDUSTRY

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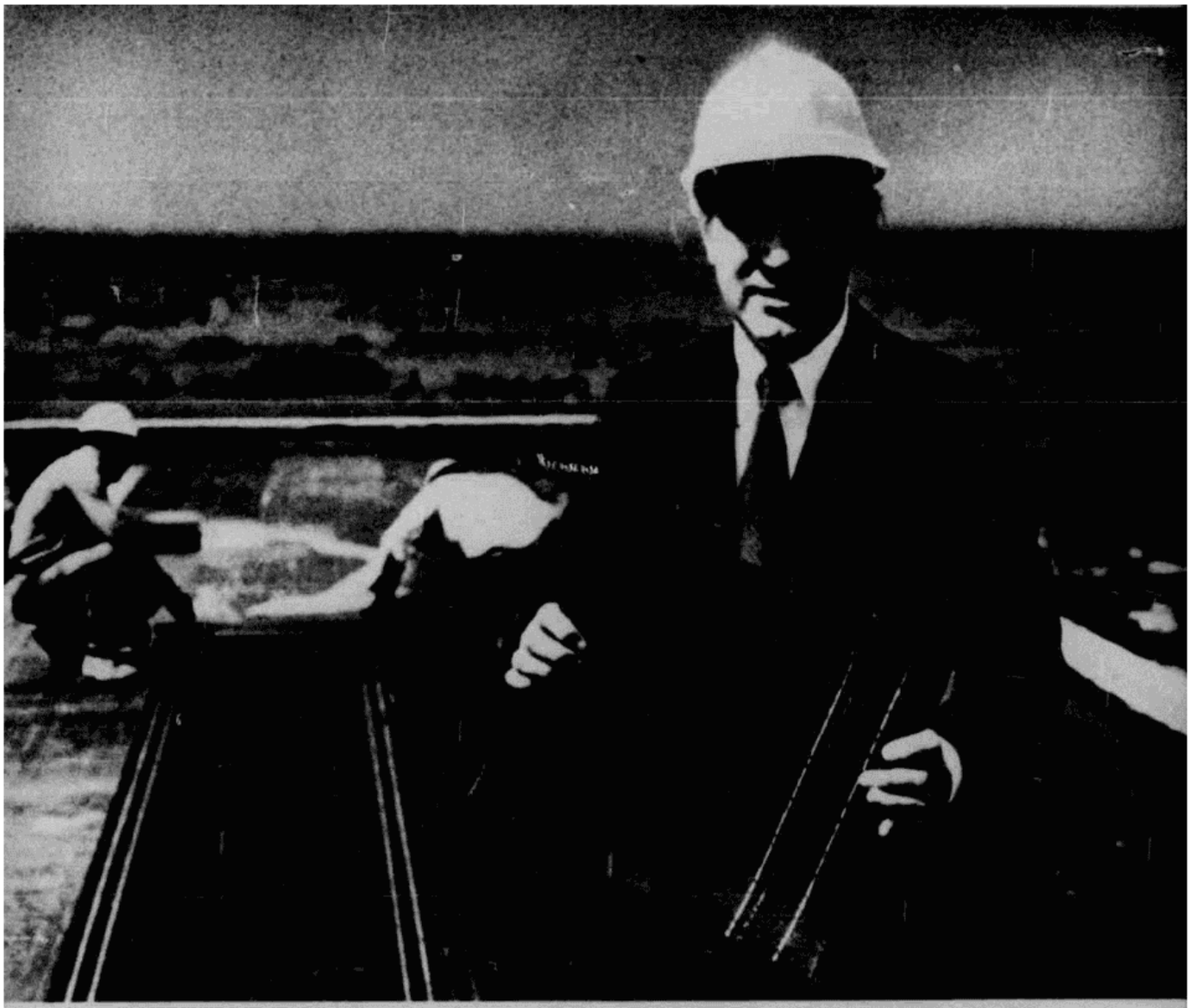
We're helping industry appreciate the "locked in" benefits of asbestos with ads like this one.

We want our customers to continue taking advantage of the unique properties of asbestos. Too often, their ability to do so is hindered by decisions based on emotion rather than factual information. So we're calmly and repeatedly explaining the facts about asbestos-containing products in a series of full page, four-color ads, appearing regularly in the industrial edition of *Business Week*.

The advertising program is designed to let industry management know that in an extensive range of finished products, such as asbestos/cement sheets and pipe, gasketing materials, asphalt-based coatings, latex and resin-bound papers, and friction materials, the asbestos is "locked in" by various binders to form environmentally safe materials. And once "locked in," the release of asbestos into the environment will not be significant during normal product use.

Our investment in advertising is not nearly as large as that directed toward developing safer ways to ship, handle, and use asbestos. But in many ways, it's equally important. We think it's part of our job as the world's leading producer of asbestos. And part of our continuing commitment to the future of asbestos.

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When our asbestos is used in the manufacture of built-up roofing felts, it becomes "locked in." So our customers can keep on using it.

Asbestos used in the felts of this built-up roofing system contributes to the dimensional stability of the system under changing atmospheric conditions, resists weathering, lowers maintenance costs, and prolongs roof life. In this application and in an extensive range of other finished products containing asbestos, the asbestos is "locked in" with asphalt, rubber, cement, latex, or other binders, to provide environmentally safe materials. Once "locked in," the release of asbestos into the environment will not be significant during normal product end use.

As a result, our customers can continue taking advantage of the unique properties of asbestos. In thousands of asbestos-containing products, asbestos serves an essential function that has not been duplicated on a cost-performance basis.

While EPA and OSHA have established

airborne asbestos generated during production or fabrication of a product, in factory or on site, there are virtually no hazards associated with the proper end use of finished products where the asbestos is "locked in."

As one of the world's leading suppliers of asbestos, we at Johns-Manville are vitally concerned with helping our customers meet these standards. On any problem anywhere, we're ready to help.

We have years of experience in creating systems that effectively and economically control asbestos dust generated in the handling of asbestos fiber and in the machining and fabricating of products containing asbestos. Our experience can help you to eliminate or substantially reduce employee exposure to asbestos.

For example, we package asbestos in pulpable bags that are added directly to

the asbestos. Other bags can be opened automatically with dust-controlled equipment.

In shipping, we utilize damage-free bulkhead rail cars and shrink-wrapped palletized units to help prevent damage during shipment and storage. We're also developing new methods of shipping such as high-density fiber blocks and other innovations that will help maintain dust-free environments and make it easier to handle asbestos safely.

We'd like to help. For more information on safe handling of asbestos, write on your company letterhead to Denis Kelleher, Asbestos Fiber Division, Johns-Manville, Ken-Caryl Ranch, Denver, CO 80217.

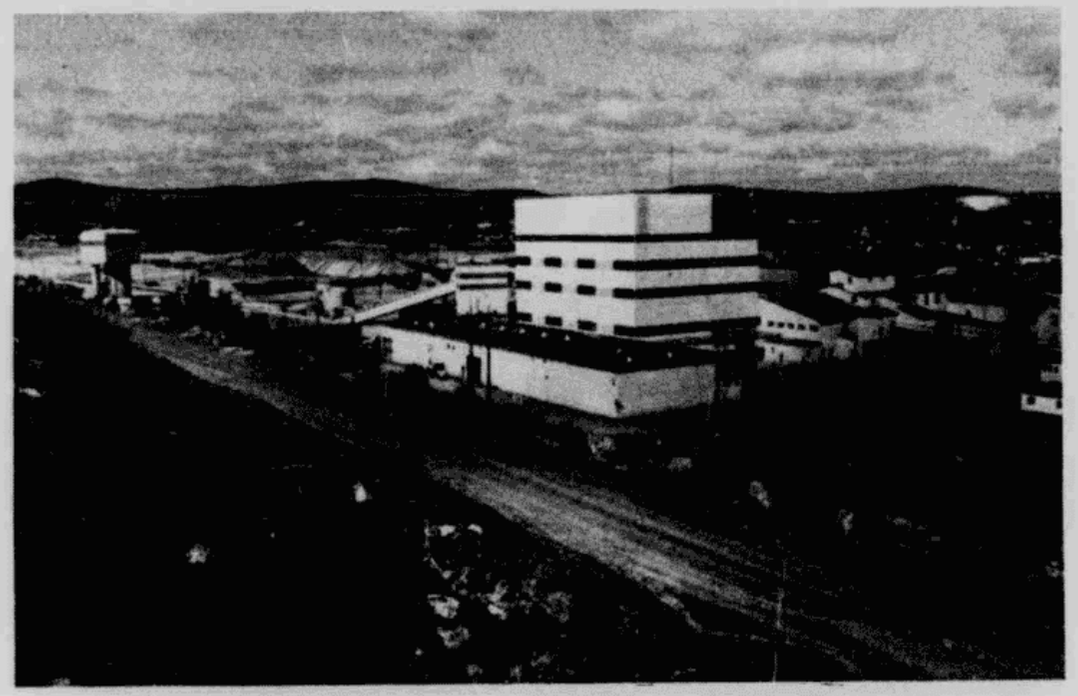
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Johns-Manville

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INT. TX. NO. 05-834512 - CABLE: BELLASBEST

ASBESTOS

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INTERNATIONAL INDUSTRY REVIEW—1979

PART I: THE EFFECTS OF THE ECONOMY

GENERAL BUSINESS

At the beginning of 1979, economists were almost unanimous in predicting a business recession of some sort would begin sometime during the year. As the year progressed, the most widely accepted indicators gave off such a disparate assortment of signals that it was October before one could say, with reasonable certainty, that the pessimistic predictions were finally materializing. Even then, readings of leading indicators were not completely consistent and it was only through certain outward manifestations that pronounced recessionary trends could be recognized.

The first quarter was marked by a high level of business activity, a substantial increase in OPEC's price for oil, an inflation rate at the double digit level and the beginning of turmoil in Iran which eventually resulted in dethronement of the Shah and assumption of political control by a faction headed by the Ayatollah Khomeini. This resulted in curtailment of Iranian oil output and led to spot shortages and to world oil prices considerably higher than the official OPEC minimum.

In the second quarter, business continued at a healthy pace and many manufacturers were operating at near-peak capacity, resulting in shortages and extended deliveries in many mechanical lines. The President adopted a program to decontrol the price of crude oil in phases, starting in June and extending for several years. Announcement of this program was accompanied by a demand for a "windfall profits" tax to limit profits of oil companies which would theoretically result from decontrol. Consumer buying as a hedge against rising prices served to further buoy an already ebullient economy. Unfortunately, inflation continued at a rate in excess of 10% so the apparently strong consumer purchases were just about even with last year's when corrected for inflation.

At mid-year, OPEC raised the basic price of oil about 24%, presaging further increases in consumer prices which had already risen at a rate in excess of 13% during the first half of the year. Sales of larger automobiles started to slip as buyers attempted to counter future shortages and higher prices of fuel by purchasing smaller, more economical cars. In July, Mr. Carter retired to Camp

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ASBESTOS STOCK QUOTATIONS

Comparative Closing Prices	11/20/79	11/21/78	11/15/77
Abitibi Asbestos	C$.63	C$.72	C$.70
*Advocate Mines	C$2.20*	C$2.70	C$3.75
Armstrong Cork	16⅜	16⅛	17¾
Armstrong Cork (pfd 3.75)	38¾	41⅜	49
Asarco	27¾	14	14¼
Asbestos Corporation	C$37.75	C$45.75	C$37.00
Bendix	40¼	35¾	39¾
Bendix (pfd 3)	79½	68½	78
Carlisle	24¾	23	22⅝
Cassiar Asbestos	C$12.50	C$9.25	C$8.375
CertainTeed	15⅛	18⅝	25⅞
Charter Consolidated ....pence	172	125	134
Colt Industries	45½	33⅝	46
Colt Industries (pfd 1.60)	35	25½	24½
Colt Industries (pfd 4.25)	97	70¼	65½
Conwest Exploration	C$6.375	C$5.00	C$4.55
Flintkote	52⅞	27⅛	19⅞
GAF Corporation	9¾	10¾	9⅞
GAF Corporation (pfd 1.20)	13⅞	15⅛	15⅞
Gulf & Western	17	13⅛	11¾
Gulf & Western (pfd 2.50)	34⅝	31	30⅝
Gulf & Western (pfd 3.87)	80⅛	65	57¾
IC Industries	24⅞	24¾	25⅜
IC Industries (pfd 3.50)	39⅜	41⅛	45
Johns-Manville	24	23⅞	33¾
Kennecott Copper	26	22⅛	21½
Lear Siegler	20⅞	16½	16¾
Lear Siegler (pfd 2.25)	52½	40	42
McAdam Mining	C$.30	C$.26	C$.31
National Gypsum	19	17⅞	16⅛
Pathfinder	C$.34	C$.13	C$.29
Porter, H.K. (pfd 5.50)	75⅞	75⅝	74
Raybestos-Manhattan	21¾	26⅝	31¼
Rio Algom	C$26.75	C$34.00	C$22.75
Supradur (O.T.C.) Bid	5	5	5⅞
Asked	5¾	5¾	6⅜
Union Carbide	39¾	35	42⅝
Walter, Jim	30¼	28½	29⅜
Walter, Jim (pfd 1)	9¾	11	12½
Walter, Jim (pfd 1.60)	32½	29⅞	32
Woodsreef Minerals	C$.39	C$.39	C$.77

*Advocate Mines—Bid C$2.20; Asked C$2.65

Other closing prices at 11/20/79 are: Johns-Manville (pfd 5.40)—58; Rio Algom (pfd 5.80)—C$69.50; United Asbestos—C$4.50.

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David to give his undivided attention to several of the country's most crucial problems. The results were a number of changes in key Cabinet positions and proposals for sweeping changes in the nation's energy policy. Conspicuously missing were any new initiatives for fighting inflation.

The Federal Reserve Board continued its tight money policy and the prime rate at major banks reached a record high of 13¼% in September. However, inflation showed no signs of abating and a falling dollar and rapidly rising precious metals prices indicated the world financial community had little faith in the willingness or ability of the U.S. to control inflation.

In early October, the Federal Reserve Board, headed by a new Chairman, initiated a completely new set of policies designed to wage a really strong battle against inflation. Markets for stocks, bonds and precious metals fell sharply immediately following this action and the dollar strengthened substantially. Interest rates rose rapidly to new record highs and banks' prime rates reached 15¾% in November but showed signs of slacking off in early December. By that time, the effect of high interest rates was becoming obvious as sales of automobiles contracted severely, mortgages became almost impossible to obtain in some areas and pre-Christmas business of retailers fell well short of targets. Whether these developments mark the onset of the long-awaited recession remains to be seen.

On the international political front, in November a group of Iranians, apparently with the sanction of their government, seized the U.S. Embassy in Tehran and held the Embassy personnel captive, demanding that the U.S. return the Shah to Iran in exchange for the hostages. Some of the hostages have been released and the United Nations has officially condemned the Iranian actions but, at mid-December, a final resolution of the problem had not been achieved.

As the New Year unfolds, the world community is faced with many serious problems. However troublesome these may seem, they pale by comparison with others which have been successfully met and solved over the centuries. A renewal of confidence in our ability to surmount difficulties, however great, will assure the continuity and advancement of civilization as we know it.

HOUSING & CONSTRUCTION

Based on activity through September and on projections to the end of the year, the total of all types of costruction in 1979 should approximate $165 billion, a 6% increase over that projected at the

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beginning of the year. Residential construction at $73.7 billion shows an 8% gain and non-residential building at $49.3 billion shows a 10% gain over predicted figures while non-building construction at $42.5 billion is right on target with year-ago estimates.

The unforseen rise in interest rates to record levels had only a modest effect on construction activity during the last quarter of 1979 but the full negative impact is expected to be felt in the first half of 1980 and to continue until some radical change occurs in overall national economic policy.

According to George A. Christie, Vice President and Chief Economist of McGraw-Hill Information Systems Company, so long as present monetary restraints are continued we may anticipate stagnation of the housing market and curtailment of industrial and commercial building. In the absence of specific knowledge regarding the direction and timing of future changes in monetary policy, it is impossible to make any firm predictions of construction activity in the coming year. However, according to Mr. Christie, a reasonably likely scenario would have dollar value of residential construction increasing by about 3%, nonresidential building decreasing by about 2% and nonbuilding construction increasing about 7% as compared to 1979 levels. (The U.S. Department of Commerce projects actual total volume of all construction will fall about 9% from the 1979 figure.)

Mr. Christie goes on to predict that "If runaway inflation can be reversed in the next six months, most building markets will be making their recovery during 1980's second half, responding to the strongest demand the construction market has ever experienced."

MOTOR VEHICLE FACTORY SALES

Sales of automobiles from U.S. plants started 1979 at a satisfactory rate but higher prices, tightening credit and fears of future fuel shortages combined to reduce demand, particularly for the larger passenger vehicles and, by year-end, the entire domestic industry was suffering from a pronounced sales slump. Market share of small foreign cars rose sharply toward the end of the year, General Motors found itself unable to satisfy demand for its newest line of economy cars and small, diesel-powered vehicles were commanding premium prices in most markets. Extensive plant closings were the order of the day and manufacturers were offering cash rebates on most models to help dealers clear their stocks of unsold 1979 models. The industry was obviously pre-

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paring for an extended period of poor business as the year drew to a close.

Sales of cars and trucks for the last six twelve-month periods as compiled by the Motor Vehicle Manufacturers Association were as follows:

MOTOR VEHICLE FACTORY SALES FROM U.S. PLANTS

Annual Period	Passenger Cars	Trucks & Buses	Total Sales
Year to 9/79	8,894,056	3,409,122	12,303,178
Year to 9/78	9,096,491	3,573,519	12,670,010
Year to 9/77	9,061,107	3,281,770	12,342,877
Year to 9/76	8,238,922	2,910,471	11,149,393
Year to 9/75	6,609,309	2,296,347	8,905,716
Year to 9/74	7,887,123	2,804,057	10,691,180

ENERGY

During the first half of 1979, the OPEC cartel twice raised its prices on crude oil, the second time by a staggering 24%. To make matters worse, following a complete shutdown, Iranian production was resumed at considerably reduced levels and much of the product was being sold on the spot market at prices much higher than those established by OPEC.

Meanwhile, Congress was making practically no progress on development of a comprehensive national energy policy and the President finally took the bit in his teeth and instituted a program to decontrol the price of domestic crude oil in phases, beginning June 1 and ending in late 1981. At the same time, he requested that Congress enact a tax to recover from the oil companies a substantial part of the so-called "windfall profits" they would realize from the increased prices of "old" domestic oil.

In July, the President presented revised proposals for a comprehensive national energy policy. In addition to the previously proposed "windfall profits" tax, he now proposed the development and construction of multi-billion dollar facilities for production of synthetic fuels as substitutes for petroleum based products. As might be expected, this proposal has met with strong opposition from environmentalists as well as from scientists who recognize the hazards of placing so much dependence on an, as yet, undeveloped and unproven technology.

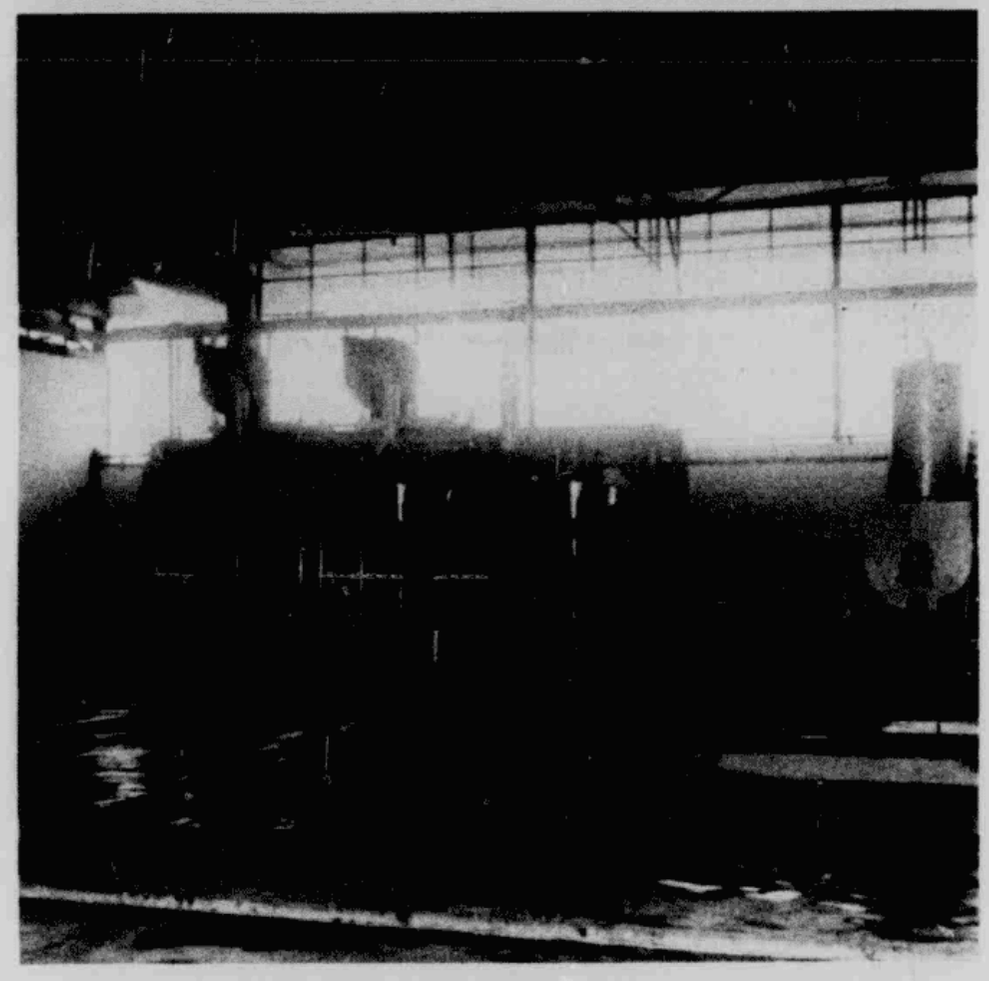
At year end, Congress had not yet enacted a "windfall profits" tax nor had it given truly serious consideration to the proposed synthetic fuels program or other means of achieving increased U.S. production of its essential fuel supplies. It is perhaps typical

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of the present Congress that much more thought seems to have been expended on how to spend the proceeds of the "windfall profits" tax than on enactment of the tax itself.

A potentially serious accident at a nuclear power plant in Pennsylvania made headline news for several weeks and became the subject of extensive Congressional investigation. The unfavorable publicity resulting from the incident has increased public opposition to nuclear power plants and has supplied much ammunition to the pressure groups opposed to nuclear power in general. This is unfortunate in that it throws additional roadblocks in the way of development and expansion of one of our most promising sources of unlimited, non-polluting power. Fortunately, the investigatory bodies have not taken any precipitate action to completely bar further development of such plants and it appears no such action will be taken without much more detailed studies of all the problems involved.

PART II: THE ASBESTOS MINING INDUSTRY

ASBESTOS PRICE RANGE

Until the beginning of 1974, the price range for the various types and grades of asbestos had been rather static. However, since then Quebec prices have escalated to the point that they have more than doubled between January 1, 1974, and January 1, 1980.

Quebec—Asbestos producers in the Province of Quebec increased the prices for their products an average 37% in 1974, 23% in 1975, 11% in 1977, 5.6% in 1978 and 7.1% in 1979. Asbestos Corporation Ltd. announced that effective the first of 1980, its prices will be raised an average 8%.

Cassiar—Price increases for the mineral mined by Cassiar Asbestos Corporation Ltd. rose 53% in 1974, 8% in 1975, 15% in 1976, 13% in 1977, 4% in 1978 and 6.5% in 1979. A new price list as of January 1, 1980, raises Cassiar's prices an average 15.2% for grades AA through AZ, with Grades AAA and AA remaining the same.

United States—Based on our calculations, the value of asbestos produced in the United States averaged $283.20 per short ton in 1979 compared with $262.22 in 1978 and $248.44 in 1977. Prices in 1979 for Calidria asbestos ranged from $100.00 per short ton for SG-104 pellets to $500.00 per ton for RG-144 open fiber. The cost for RG-244 open fiber was $2200.00 per ton. Vermont prices in 1979 ranged from $100.00 per short ton for Grade 7R shorts to $591.00 per ton for Grade 4T fiber. In addition, Hooker No. 1 was listed at $1250.00 per ton and Hooker No. 2 at $700.00. Effective January 2, 1980, Union Carbide Corporation increased the prices for Calidria asbestos an average 11.7%. Prices for Vermont asbestos were raised 16% in 1974, 45% in 1975, 13% in 1976, 14% in 1977, 5% in 1978 and an average of 16% in 1979. Arizona prices are adjusted period-

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ically to keep pace with those of the Quebec producers. In 1979, Arizona ranged from $100.00 to $840.00 per short ton for Groups 7, 4 and 3; Crude No. 2 sold for $1800.00 per ton and Crude No. 1 for $3000.00 per ton.

Republic of South Africa—Based on United States imports of asbestos from South Africa during the first eight months of 1979, the U.S. paid $506.45 per short ton for Amosite vs. $529.78 for the same period of 1978; $622.94 per ton for Crocidolite compared with $611.00 a year earlier; and $631.11 per ton for Chrysotile Crudes against $634.67 in 1978.

CURRENT ASBESTOS PRICES

QUOTED FROM COMPANY PRICE LISTS

ASBESTOS CORPORATION

PER TON OF 2000 LBS., F.O.B. MINE

AS OF JANUARY 1, 1980

CANADIAN DOLLARS

Grades 3Z to 3F spinning fiber	$1125 to $1750
Grades 4T to 4A asbestos cement fiber	846 to 1102
Grades 5R to 5D paper fiber	530 to 626
Grade 6D paper and shingle fiber	380
Grades 7TS to 7D shorts	122 to 233

CASSIAR ASBESTOS

PER TON OF 2000 LBS., F.O.B. NORTH VANCOUVER, B.C.

AS OF JANUARY 1, 1980

CANADIAN DOLLARS

AAA	nonferrous spinning fiber; Canadian Group 3	$2000
AA	nonferrous spinning fiber; Canadian Group 3	1600
A	nonferrous spinning fiber; Canadian Group 3	1150
AC	nonferrous spinning fiber; Canadian Group 3	1050
AK	asbestos cement fiber; Canadian Group 4	975
AS	asbestos cement fiber; Canadian Group 4	900
AX	asbestos cement fiber; Canadian Group 4	825
AY	asbestos cement fiber; Canadian Group 5	575
AZ	asbestos cement fiber; Canadian Group 6	375

Specialty grades AK100, AS100, AX100 and AY120 are increased an additional $25.00 per ton above list price of base grade.

CALIDRIA ASBESTOS

PER TON OF 2000 lbs., F.O.B. KING CITY, CALIFORNIA

AS OF JANUARY 2, 1980

U.S. DOLLARS

SG-103	pellets in bags	vinyl-asbestos floor tile	$ 122
SG-104	pellets in bulk	vinyl-asbestos floor tile	106
SG-130	open fiber in bags	general	170
SG-200	pellets in bags	rubber tile	160
SG-210	open fiber in bags	general	220
HPP	pellets in bags	rubber reinforcement	204
HPO	open fiber in bags	asphalt	220
RG-110	open fiber in bags	roofing	240
RG-144	open fiber in bags	resin viscosity control	560
RG-244	open fiber in bags	resin viscosity control	2500

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CALAVERAS ASBESTOS

AS OF JANUARY 1, 1980

PER TON OF 2000 LBS., F.O.B. COPPEROPOLIS, CALIFORNIA

	U.S. DOLLARS
Grade 4T surface area 6000	$ 661
Grade 5R surface area 8000	434
Grade 6D surface area 8000	318
Grade 7R surface area 10000	115

VERMONT

AS OF JANUARY 1, 1979

PER TON OF 2000 LBS., F.O.B. MORRISVILLE, VERMONT

	U.S. DOLLARS
Grade 4T Fiber	$ 591
Grade 5K Fiber	457
Grade 5R Fiber	388
Grade 6D Waste	284
Grade 7D Shorts	188
Grade 7M Shorts	108
Grade 7R Shorts	100
Hooker No. 1	1250
Hooker No. 2	700

ARIZONA

AS OF JULY 1, 1976

PER TON OF 2000 LBS., F.O.B. GLOBE, ARIZONA

	U.S. DOLLARS
No. 1 Crude (Soft)	$3000
No. 2 Crude (Soft)	1800
AAA	1300
Group No. 3 nonferrous filtering—plastic	$ 750— 840
Group No. 4 nonferrous filtering—plastic	750— 840
Group No. 7 white shorts	100— 200

BRAZIL

AS OF SEPTEMBER 1979

PER TON OF 2000 LBS., F.O.B. MINE

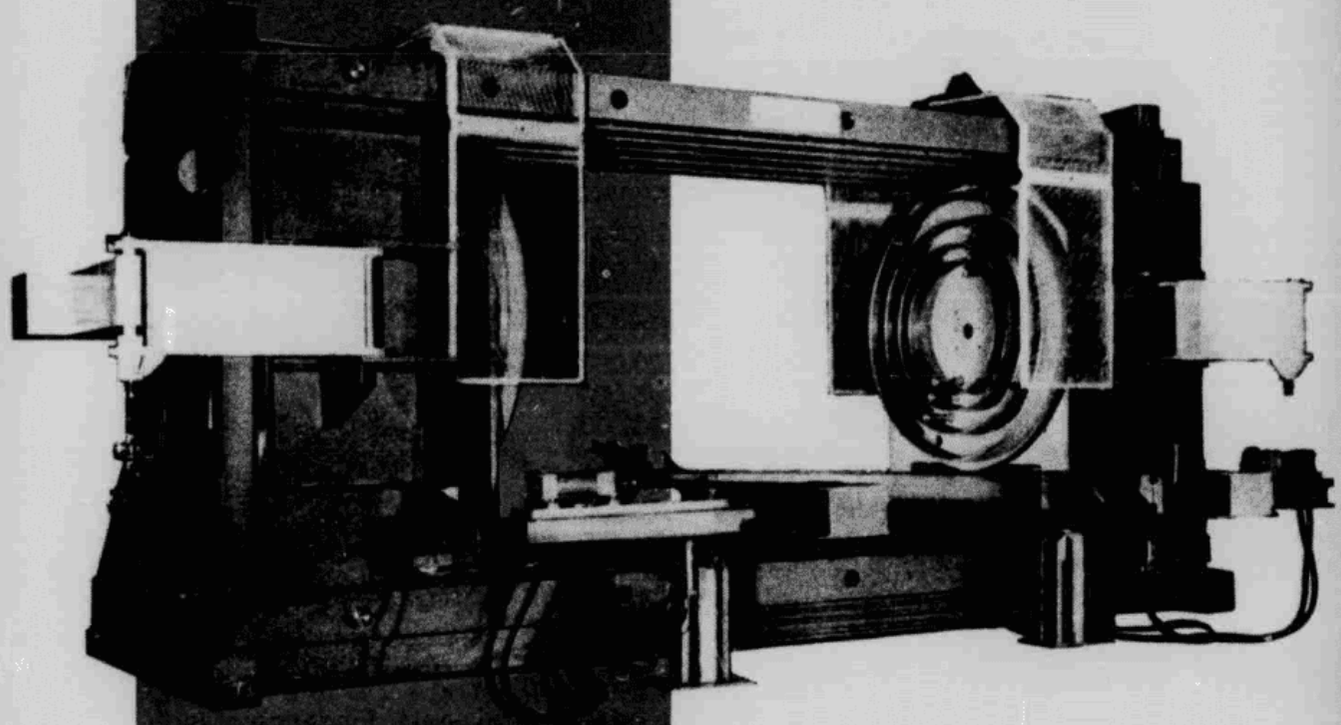
	BRAZILIAN CRUZEIRO $
JM-4T-50 asbestos cement fiber	$16711
A-25/60 asbestos cement fiber	16711
4T 0-2-10-4 asbestos cement fiber	14606
4K 0-4-9-3 asbestos cement fiber	16438
4Z 0-1,5-9,5-5 asbestos cement fiber	13015
5K 0-0-12-4 asbestos cement fiber	10957
5R 0-0-10-6 asbestos cement fiber	8005
6D 0-0-7-9 asbestos cement fiber	5850
7TF asbestos cement shorts	2311
8S shorts	1093

THE WORLD PICTURE

In our last Review we noted that toward the end of 1978 the depressed economic situation was beginning to show improvement. A rise in demand appears evident since, according to our calculations, U.S. imports of

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asbestos have risen 6.5% over last year and Canadian asbestos exports are up 10%. Also noted is a 6.5% drop in Canadian asbestos producer shipments. However, shipments should improve as efforts materialize on the part of the Quebec Asbestos Mining Associaion (QAMA) and the Government of the Province of Quebec to increase the amount of Quebec-produced asbestos used within the province. As the economies in various nations around the world improve, so should demand by the developing countries for asbestos cement fiber grades for use in construction. Not to be discounted, however, are materials alternative to asbestos-cement products; for instance, ceramic and plastic materials and in paints and caulking compounds.

QAMA reports a world asbestos production figure of 5,352,310 short tons in the year 1978 vs. 5,779,000 tons in 1977. The U.S. Bureau of Mines (USBM) estimates a somewhat higher output of 5,598,000 tons in 1978 (5,317,000 tons of Chrysotile, 210,000 tons of Crocidolite and 71,000 tons of Amosite).

WORLD ASBESTOS PRODUCTION
(SHORT TONS)

COUNTRY	1977 (QAMA)	1978 (QAMA)	1978 (USBM)
USSR	2,596,000	2,350,000	2,846,164
*CANADA	1,578,000	1,482,000	1,785,742
SOUTH AFRICA/RHODESIA	750,000	650,000	415,571
EUROPE	330,000	350,000	212,745
CHINA	220,000	220,000	231,485
UNITED STATES	105,000	100,310	102,515
SOUTH AMERICA	80,000	100,000	111,333
AUSTRALIA	75,000	75,000	63,933
OTHER COUNTRIES	45,000	25,000	91,492
	5,779,000	5,352,310	5,860,980

*QAMA gives Quebec asbestos production as 1,277,674 tons in 1977 and 1,312,183 tons in 1978.

Various industry authorities have been predicting a 1% to 2% annual growth in demand for asbestos in the next several years. Evidence of faith in this usage increase is given by the expansions of existing mines and the construction of new operations around the world, notably in the Soviet Union and in Australia, Colombia, Greece, Mexico and Brazil. If mine inventories are kept at a minimum and output is increased to meet the projected growth in demand, world production of asbestos could conceivably reach between 6.1-million tons and 6.7-million tons per year by 1985. USBM predicts a world asbestos production capacity of 7.2-million tons by 1980 and has identified world reserves at 140-million tons and other resources at 116-million tons, or a total of 256-million tons of identified world asbestos resources. The Mines Bureau questions, however, if the economy and the demand for asbestos would raise prices to a level where some of the large resources would become economically attractive.

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Calaveras Asbestos Ltd.

PRODUCERS OF . . .

CHRYSOTILE

GRADES 4, 5, 6, and 7

SPECIAL MATERIALS, INC. ILLINOIS
SALES OFFICE FOR NORTH AND SOUTH AMERICA
3628 W. PIERCE ST., MILWAUKEE, WI 53215
TELEPHONE: 800-558-0604 / 414-383-2020

UNITED STATES

Under the signature of its President, J. Allen Overton, Jr., the American Mining Congress (AMC) issued a letter to the press in October expressing concern that the United States, despite its vast endowments of natural resources, is increasingly dependent on foreign sources, many of them unstable, for key minerals. The nation now imports over 20% of copper, over 25% of iron ore, over 50% of mercury, over 60% of zinc, over 75% of nickel and virtually all cobalt, chromium and manganese. In stark contrast, the Soviet Union is self-sufficient in all these strategic materials. AMC puts the blame squarely on the Federal government which has been withdrawing public lands from mineral exploration and development, until today areas equal in size to nearly all the states east of the Mississippi have been marked *off limits.* In addition, says AMC, Congress is now considering legislation which would withdraw another 100-million acres or more in Alaska. Minerals are the bedrock of civilization, underlying the food we grow, the goods we manufacture, the structures we build and ultimately every job we create. Mining does not have to be incompatible with a decent respect for the environment. In its closing paragraph, AMC writes: ". . . . It is perilous folly to let elite groups of environmentalist zealots and the self-serving bureaucracy of the Federal government put this nation on a collision course with calamity by denying it access to its own patrimony of critically needed minerals."

Focusing the above situation specifically on the Asbestos Industry, USBM reports that the United States relies on imports for 84% of its apparent consumption of asbestos, mainly from Canada and South Africa. Relatedly, the Government Stockpile continues to retain just small amounts of asbestos. As of September 1979 it is holding 10,957 short tons of Chrysotile, 2,490 tons of Crocidolite and 42,534 tons of Amosite.

The U.S. has lost its lead to the USSR as the world's largest consumer of asbestos. It imports some 98% of its demand for Chrysotile from Canada and virtually all of its Amosite and Crocidolite from the Republic of South Africa. The construction industry is the major consumer of asbestos in the U.S. Percentages of distribution, by end use, are: 25% in asbestos-cement pipe; 21% in flooring; 14% in friction products; 10% in roofing; 5% each in asbestos-cement sheets, coatings and compounds, and paper; 4% in packings and gaskets; 2.5% in thermal insulation; 1% each in plastics and textiles; 0.5% in electrical insulation; and 6% in other materials. Of the 642,647 tons of asbestos consumed by the U.S. in 1978, 4% was the Crocidolite variety, 0.6% was Amosite and 0.5% was Anthophyllite, leaving Chrysotile with nearly 95%. According to the U.S. Bureau of Mines, domestic demand for asbestos is expected to remain static and stay between 393,000 tons and 1-million short tons in the year 2000. The forecast was derived by contingency forecasting of the major end use demands, considering possible shifts caused by changing technology, dwindling resources or environmental problems during the forecast period. Forecasting U.S. asbestos demand in the year 2000, USBM projects 34% in asbestos-cement pipe, 28% in flooring, 19% in roofing, 9% in friction materials, 6% in paper and 4% in packings and gaskets. Zero demand is seen for asbestos-cement sheets and for asbestos in insulation and textiles.

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U.S. Imports—For the twelve-month period ended August 1979, the United States imported 632,717 short tons of asbestos, 6.5% above the prior year. Value of the imports was up just 0.2%, to $147,776,880. Chrysotile accounted for 94% of the total, 98.8% of which was Canadian. A further breakdown shows that 90% of the Chrysotile Crudes imported into the U.S. was from the Republic of South Africa, with the remainder from Italy and Canada. All of the Chrysotile Spinning Fiber came from Canada, as did 99.6% of the Chrysotile classified as Other. Imports of Amosite were 89% directly from South Africa and 11% through Canada, although the latter was undoubtedly of South African origin. South Africa directly supplied 97% of the Crocidolite imported into the U.S., with the rest arriving by way of Namibia, Switzerland and Canada. Canada was the supplier of 94% of the Other Crudes & Fibers category. On an average, the U.S. paid the following amounts per short ton for all varieties and grades of asbestos imported in the last six years: 1979—$233.56; 1978—$248.30; 1977—$236.44; 1976—$208.15; 1975—$198.67; 1974—$143.84.

U.S. IMPORTS OF UNMANUFACTURED ASBESTOS
(SHORT TONS)

YEAR TO	CHRYSOTILE	CROCIDOLITE	AMOSITE	OTHER	TOTAL QUANTITY	TOTAL VALUE
Aug 79	594,437	20,531	737	17,012	632,717	$147,776,880
Aug 78	557,638	14,594	1,091	20,783	594,106	$147,517,562
Aug 77	587,087	13,049	824	26,822	627,782	$148,431,168
Aug 76	591,667	9,174	1,809	33,308	635,958	$132,375,509
Aug 75	558,630	11,483	5,616	14,472	590,201	$117,254,264
Aug 74	739,231	12,436	7,644	28,362	787,673	$113,294,848

U.S. Exports—The total amount of asbestos fibers, waste and refuse exported from the United States for the year to August 1979 was 39,551 short tons, valued at $13,971,336; down 10% in quantity and up 13.3% in value over the prior like period. Although exports of waste and refuse were down 30.8%, those of asbestos fibers rose 7.1%. The value per short ton of all exports was $353.25 in 1979, $280.77 in 1978, $305.48 in 1977, $277.85 in 1976, $275.53 in 1975 and $135.86 in 1974.

U.S. EXPORTS OF UNMANUFACTURED ASBESTOS
(SHORT TONS)

YEAR TO	FIBERS	WASTE & REFUSE	TOTAL QUANTITY	TOTAL VALUE
Aug 79	25,857	13,694	39,551	$13,971,336
Aug 78	24,135	19,801	43,936	$12,335,894
Aug 77	17,370	19,719	37,089	$11,329,884
Aug 76	21,736	24,160	45,896	$12,752,021
Aug 75	14,953	18,832	33,785	$ 9,308,660
Aug 74	36,503	35,281	71,784	$ 9,752,917

U.S. Asbestos Mines

U.S. mines produced an estimated 102,515 short tons of asbestos in 1978, valued at about $26.9-million, some 2% of the Chrysotile mined

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throughout the world. Statistics for prior years are: 101,704 tons in 1977, valued at $25.3-million; 114,842 tons in 1976, valued at $23.7-million, 98,654 tons in 1975, valued at $14.2-million and 109,091 tons in 1974, valued at $13.8-million. Approximately 70% of U.S. asbestos output is produced in California, followed by Vermont, Arizona and North Carolina, the latter producing a minimal amount of Anthophyllite.

The major sources for *California* Chrysotile are in the Copperopolis area of Calaveras County and the Coalinga region of Western Fresno and Southern San Benito Counties. *Calaveras Asbestos Ltd.*, Copperopolis, produces Grades 4-7, mainly used in the manufacture of asbestos-cement pipes and sheets. *Union Carbide Corporation*, Metals Division, produces "Calidria" asbestos products from short fibers mined in San Benito County and processed at King City. The primary product of *Atlas Asbestos Company*, near Coalinga, is Grade 7 Shorts, for use in vinyl-asbestos floor tile.

Vermont Asbestos Group, Inc., now owns and is operating the 2300-acre asbestos quarry and mill at Belvidere Mountain, Lowell, acquired from GAF Corporation in 1975. Annual production is some 30,000 tons, mostly short-fibered Chrysotile. A major expansion program at the mine and mill is planned during the next 15 years. The project will include moving large quantities of barren rock to gain access to a 17 -year supply of high-quality asbestos deposits.

Jaquays Asbestos Corporation operates an underground, low-iron Chrysotile mine in the Tonto National Forest and a mill some 30 miles away, near Globe, *Arizona*. It is possible the facility will be closed, mainly due to the high cost of meeting mandatory environmental controls and labor problems.

Powhatan Mining Corporation, Baltimore, Maryland, runs an Anthophyllite mill at the Hippy Mine, Newdale, Yancey County, *North Carolina*. Production is minimal.

Investigation continues at the potentially-large Chrysotile deposit near Eagle, *Alaska*, some 60 miles west of the now-closed Clinton Mine, Yukon Territory, of Cassiar Asbestos Corporation Ltd. The project is a joint venture between *General Crude Oil Company, McIntyre Mines (Nevada) Ltd., Tanana Asbestos Corporation and WGM Inc.*

CANADA

Canada remains the third largest mining nation in the world, second only to the United States and the USSR. The country is the second leading asbestos producer, following Russia, and is the frontrunner as an international supplier of the mineral, exporting some 95% of output. About 28% of the world's asbestos is produced annually in Canada. Quebec is by far the leading Provincial producer of asbestos, with some 88.5% of total Canadian production and 24.5% of world production. In order of importance, the other asbestos-producing Provinces are British Columbia, Newfoundland, the Yukon and Ontario. Based on exports of asbestos from Canada, the average price per short ton was: $377.49 in 1979; $373.90 in 1978, $329.91 in 1977, $280.19 in 1976, $223.03 in 1975 and $170.67 in 1974. Spokesmen in the Industry report that demand for spinning fiber has improved, orders remain strong for asbestos-cement fiber Grades 4, 5 and

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6 and a surplus of Group 7 fibers continues. The international market remains steady as customers replenish low inventories and as demand for building materials in developing economies maintains its level of activity.

Primary producers' shipments of asbestos (including tonnage for own use) totaled 1,488,391 metric tonnes for the year ended August 1979, 3.1% over the year earlier. These figures include concentrate shipped from Asbestos Hill to West Germany for processing. Following is a breakdown of shipments of Quebec grades for the latest annual period, with percentage differences from the prior year: Group 3 Spinning Fibers—16,717 tonnes, up 31.5%; Group 4 Shingle Fibers—373,811 tonnes, down 1.9%; Group 5 Paper Fibers—166,683 tonnes, up 17.6%; Group 6 Stucco Fibers—221,261 tonnes, up 14.1%; Group 7 Refuse—570,325 tonnes, up 16.1%. Just one tonne of Group 8 Sand was shipped in 1979 vs. 19 tonnes in 1978. Total Quebec shipments were ahead 10.5% over the year earlier. Shipments from the other four asbestos-producing Provinces reached 139,593 tonnes to August 1979, down 40.2% from 1978.

CANADIAN ASBESTOS PRODUCERS' SHIPMENTS
(SHORT TONS)

YEAR TO	QUEBEC	OTHER*	TOTAL QUANTITY
Aug 79	1,348,798	139,593	1,488,391
Aug 78	1,220,788	233,488	1,444,276
Aug 77	1,240,051	302,364	1,542,415
Aug 76	1,143,284	267,569	1,410,852
Aug 75	1,401,374	327,027	1,728,401
Aug 74	1,423,139	269,933	1,693,972

*British Columbia, Newfoundland, the Yukon and Ontario.

Canadian exports of asbestos amounted to 1,511,834 metric tonnes for the twelve months ended August 1979, valued at C$629,082,000, 18.2% higher in quantity and 19.3% higher in value over the year to August 1978. By categories, exports of Milled 3 fibers were up 21.9%, Milled 4 and 5 fibers rose 18.7% and Shorts 6-9 increased 17.6%. Crude exports totaled 21 tonnes in 1979 compared with just one tonne in 1978. A geographical breakdown of destinations for the latest annual period shows 36.4% of the exports to the United States; 31.2% to Western Europe; 16.1% to Asia; 9.8% to South America, Central America and the Antilles; 2.9% to Eastern Europe; 1.6% to Oceania; 1.1% to the Middle East and 0.9% to Africa.

CANADIAN ASBESTOS EXPORTS
(METRIC TONNES)

YEAR TO	CRUDE	MILLED 3	MILLED 4 & 5	SHORTS 6-9
Aug 79	21	26,215	708,972	776,626
Aug 78	1	21,496	597,439	660,226
Aug 77	19	25,495	731,911	752,025
Aug 76	176	20,265	633,770	689,647
Aug 75	275	24,002	641,267	591,852
Aug 74	15	29,672	775,181	810,023

Total quantities and values of Canadian exports for the above six years were: 1979—1,511,834 metric tonnes, valued at C$629,082,000;

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1978—1,279,162 tonnes, C$527,216,000; 1977—1,509,450 tonnes, C$548,925,000; 1976—1,343,858 tonnes, C$415,064,000; 1975—1,257,396 tonnes, C$309,125,000; 1974—1,614,891 tonnes, C$303,806,000.

Ore Reserves—The Quebec Asbestos Mining Association advised that whatever the growth rate in the demand for fiber, there is no doubt that the present reserves in the Canadian deposits, estimated at over one-billion tons of ore from which about 40-million tons of fiber can be extracted, ensure that Canada—and in particular Quebec—will be able to supply the market for several decades to come.

Capital Expenditures—According to the Canadian Mining Journal, estimates of spending for asbestos mining in Quebec and Newfoundland rose from $30-million in 1978 to $53-million in 1979. Total expenditures will reach $219-million over the next few years, with 17% or $38-million earmarked for environmental controls at both the mines and the mills. The actual capital expense figures projected are: $52,797,000 in 1979, $67,383,000 in 1980, $46,210,000 in 1981 and $52,400,000 beyond 1981.

Province of Quebec

Asbestos is used internationally because of its many inherent characteristics. It is noncombustible; it insulates against heat, cold and noise; it has good dielectric properties and great tensile strength; and it resists corrosion and attack by alkalis and most acids.

Commercial extraction of asbestos ore began in the Province of Quebec in 1876 at Thetford Mines, in the Eastern Townships, followed shortly thereafter by commercial production at the town of Asbestos. Today, Quebec's asbestos mines produce some 150 types of Chrysotile fiber to meet the vast range of applications for asbestos-containing products. Five asbestos mining companies are operating in the Eastern Townships, employing 6800 workers and exporting fiber to over 80 countries around the world. Via the world-recognized Quebec Standard, the mineral is rigorously and uniformly classified into eight basic groups, on the basis of fiber length. Each group is subdivided into grades according to color, absorptivity, density, strength, etc.

A strengthening in demand for Quebec Chrysotile is being noted, reportedly due to the expansion of new asbestos-cement markets in developing nations. "Nevertheless," says the Quebec Asbestos Mining Association, "these prospects should be weighed, taking into account world economic conditions, and particularly the low rate of growth expected in industrialized countries and the scarcity of hard currency in the less developed nations." This Magazine projects that total Quebec asbestos production for the year 1979 will reach 1.5-milion metric tonnes, valued at C$550-million.

Quebec Exploration Program—The year 1979 marks the completion of two years of the Quebec Government's five-year exploration program for Northwestern Quebec. The plan includes geoscientific projects, exploration agreements and the building of access roads in exploration-mining areas. The objective is to inject new mining life into a region where the mining industry is the main economic base. One of the main vehicles for carrying out the project is the Provincially-owned Soquem. A major

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ASBESTOS

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development in the program was the signing of a Quebec-France agreement covering the five-year period and calling for joint overall exploration expenditures of $10-million. Joint government-industry agreements have been concluded which involve several firms, including McAdam Mining Corporation [The Northern Miner]

Bill 70/SNA—In late November 1977, Bill 70 was introduced in the Quebec National Assembly. In essence it created the National Asbestos Corporation (SNA; Societe Nationale de l'Amiante), a Quebec Crown corporation whose purpose is the research and development of asbestos deposits and the marketing of their products and all activity of an industrial, manufacturing or commercial nature relating directly or indirectly to the transformation of asbestos fiber. The head office of SNA has now been established at Thetford Mines.

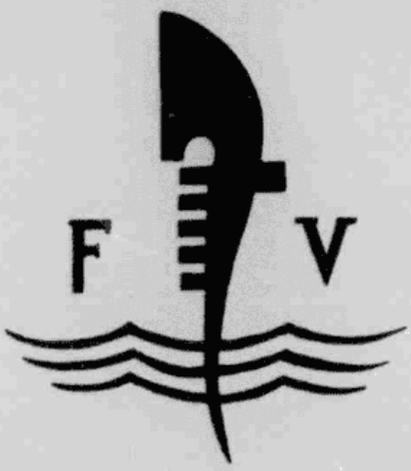
Parti Quebecois Independence Platform—The result of a by-election held November 14, 1979, was that a large number of former supporters of Premier Rene Levesque's separatist party have flatly turned down the candidate of the Premier's ruling Parti Quebecois (PQ). Although the results of the ballot do not change the balance of power in the Provincial Legislature, the vote is being interpreted as a broad rejection of PQ, including its call for separation from Canada. Mr. Levesque rejected, before the press, all suggestions that the defeat of PQ candidates was tied to the party's independence platform. . . . Mid-November 1979, the Quebec Government unveiled a 120-page official policy paper entitled "Quebec-Canada: A New Deal" which establishes the platform on which it will argue for creation of a sovereign nation. The importance of the paper lies in its intended use as a key campaign document in a coming referendum on Quebec's future. Currently slated for the Spring of 1980, the referendum is expected to seek a public mandate to negotiate new terms of association between a new State of Quebec and the rest of Canada. If Premier Levesque's government wins the referendum, the paper commits it to seek the creation of a common market and monetary union which, like the European Community, would allow for the free flow of people, goods and capital between Quebec and Canada. Mr. Levesque's government has promised that Quebec alone would have the power to tax and to make laws affecting its citizens. Quebec courts would have sole jurisdiction.

English An Official Language—On December 14, 1979, the Quebec Government adopted an emergency bill restoring English as an official language in the Provincial courts and legislature. Passing of the emergency bill was prompted by the Canadian Supreme Court's ruling that certain sections of the Province's language law violate the British North America Act, Canada's constitution. The bill adopted in December legalizes the "unofficial" English-language versions of all laws passed since August 26, 1977, when the language law took effect. Mr. Levesque said: "The decision of the Supreme Court effectively reflects, with a brutal eloquence, the spirit and the letter of a constitution which has held us down for more than a century." It was Mr. Levesque's Separatist Parti Quebecois government which originally introduced the bill in 1977.

Quebec Barred From Expropriation—In another legal move linked to the Province's French-English language controversy, the Quebec appeals court issued an injunction barring the Quebec Government from ex-

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propriating Asbestos Corporation Ltd. until a final decision is made on the company's legal challenge to the Province's expropriation law. The case is to be heard beginning January 14, 1980. The company feels the expropriation act is unconstitutional because it was adopted in French only and that the Quebec Government does not have the authority to intervene in Asbestos Corporation's business because it operates under a Federal Canadian charter.

Canadian Asbestos Mines

Exploration is continuing at the asbestos project of *Abitibi Asbestos Mining Co. Ltd.* near Amos, in Northwestern Quebec, and exploration discussions are still going on between *Brinco Ltd.* and others, including *Asarco Inc.*, an original prospective partner in developing the site. Cost estimates for mine development and a milling plant are well over C$400-million. Proven and probable ore reserves in three orebodies have been determined sufficient for 40 years of production at a peak annual rate of 250,000 short tons of fiber. Abitibi Asbestos is 60.4% owned by Brinco.

Advocate Mines Ltd. employs about 575 workers and operates an asbestos mine and mill complex in the Baie Verte area, on Newfoundland's Burlington Peninsula (northeast coast of the Province). The company is Canada's sixth largest asbestos producer by volume, with over 80,000 short tons of asbestos-cement grade fiber annually. About three-quarters of the Chrysotile produced is equivalent to QAMA Group 4; the remainder is Group 6. All of Advocate's fiber is captive and destined to the markets of its majority shareholders, principally to Europe, the United States and South America. Some 77.4% of the shares of Advocate Mines are owned by a group of asbestos companies, two of which directly offer management expertise to Advocate. The percentage of outstanding Advocate shares held by this group is as follows: Johns-Manville Canada (Mine Manager; 30.60%); Compagnie Financiere Eternit (Holding Company; 16.62%); Amet Corporation Inc. (Holding Company; 16.31%); Interasbestos Inc. (7%); and Panac Inc. (6.89%). For the nine months ended September 30, 1979, Advocate Mines produced 43,944 metric tonnes of fiber, valued at $23,500,000. Comparable year-earlier output was 24,662 tonnes, valued at $13,168,000. Waste-to-ore ratio was 5.1:1 vs. 4.57:1. Comparable net losses were $6,633,000 to September 30, 1979, against $2,758,000 last year. The high waste-to-ore ratio, which is the major reason for the loss position, will continue until such time as the substantial waste removal program commenced late in 1978 makes additional ore faces containing higher grade ore available for mining. [Portions gleaned from "The Outlook for the Asbestos Industry: Cassiar Asbestos and Advocate Mines," prepared by Jones Heward & Co. Ltd., Montreal]

Asbestos Corporation Ltd.—Net earnings of Asbestos Corporation Ltd. (ACL) for the six months ended June 30, 1979, were $8.3-million, or $2.93 per share. The increase of 15% in profits was realized on a 37% rise in sales, to $86.3-million. During the past three years, ACL has spent or committed some $29-million to improve conditions at and around work areas via advanced dust control methods and equipment. With few exceptions, dust levels are well within government standards. Proven ore

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reserves at year-end 1978 were 226.5-million tons. . . . *Thetford Operations*—Over 200,000 tons of asbestos fiber are produced annually at Asbestos Corporation's mining/milling operations at Thetford Mines, Quebec. The facilities consist of three complete primary and secondary finishing mills, together with four integrated ore preparation and storage plants. The mills are fed from three separate mines—the King underground and the Beaver and British Canadian open pits; producing 4500, 31,000 and 60,000 tons of ore per day, respectively. The bulk of the underground ore is transported to the two mills at British Canadian, with a small tonnage going to the Normandie mill. The Beaver pit ore is beneficiated, dried and transported to the Normandie mill which has the capacity to mill in excess of 8000 tons of rock per day. Each of the two British Canadian mills has the capacity to process over 7000 tons daily. . . . *Asbestos Hill*—The Asbestos Hill mine and plant are located in the Ungava Peninsula, 1130 miles due north of Montreal. The operation consists of an open-pit mine, an ore preparation and storage plant and a primary mill which produces ungraded fiber. The mine produces 1.5-million tons of ore per year, at a waste-to-ore ratio of 3.5:1. The orebody is comprised basically of Group 4 fiber. The mill is designed to produce a high-quality ungraded fiber which yields 35% asbestos when processed at the mill at Nordenham, West Germany, a modern plant which automatically reclaims the ungraded fiber and produces high-quality, high-strength, asbestos-cement grades for customers throughout Eastern and Western Europe, North Africa and the Middle East. The life of the Asbestos Hill Mine and its companion finishing mill at Nordenham has been extended for many years through the continued confirmation of feasible underground mining in the Northern Quebec permafrost.

Court Decision Awaited—In June 1979, by a vote of 59 to 35, the Quebec Assembly gave its final approval to Bill 121, authorizing, but not requiring, the Province of Quebec to expropriate all the assets, in Quebec, of ACL. The ruling provides for expropriation by the Quebec-owned corporation, Societe Nationale de l'Amiante, of any property useful to the pursuit of the objectives of SNA. ACL and General Dynamics (Canada) Ltd. brought suit against the Quebec Government, disputing the constitutionality of the expropriation law and legislation creating SNA. GD (Canada) is the Canadian subsidiary of General Dynamics Corporation (GD), St. Louis, Missouri, 54.6% owner of ACL. The first round in the legal battle was won by the companies when a Quebec Superior Court Justice issued a temporary injunction preventing the Quebec Government from taking any action against ACL pending a hearing. However, one month later a Quebec court refused to issue a temporary injunction to bar the Government from expropriating ACL's assets. The ruling was based on the fact that the company's request was "premature," since the Government had taken no definite steps toward expropriation. In September 1979, the Quebec Provincial Government officially offered C$42.00 per share, or about $65-million, to General Dynamics for its 54.6% holding in ACL. Calling the proposal "unrealistic and unfair," GD directors, as expected, resoundingly rejected the offer. GD had repeatedly said that a more realistic price was a minimum of $99.75 a share. Meanwhile, ACL had appealed the Superior Court ruling that turned down its application for a permanent injunction against the Government's threatened expropriation. As stated

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previously in this Review, in December the Quebec appeals court issued an injunction barring the takeover until a final decision is made on ACL's legal challenge to the expropriation law. The case is to be heard beginning January 14, 1980.

Bell Asbestos Mines Ltd., a subsidiary of Turner & Newall Ltd., Manchester, England, has been producing Chrysotile at Thetford Mines, Quebec, since 1877—mostly Grades 3-6. Annual asbestos fiber production capacity has been increased 28% to 72,000 tons. The company's capital expenditures have reached over $28-million since 1966 and an additional $15.9-million is planned between 1979 and 1981. A considerable portion of the expense has been to improve health conditions at the work site. The major program to modernize Bell's surface installations is due for completion by the end of 1980 and a mechanization program for its underground operation should be finished in 1981.

Carey Canada Inc., a wholly-owned subsidiary of Jim Walter Corporation, Tampa, Florida, produces Chrysotile slip fiber at its open pit mine and mill at East Broughton, Quebec. Annual production capacity is 230,000 tons of Group 4 through Floats, although the average fiber length falls in Groups 6 and 7. Changes at the mill have significantly increased production capacity of medium length fibers. The company expects the short fiber market to decrease and the medium and long fiber markets to increase in the next couple of years. Ore reserves are 45-million tons of proven ore plus 75-million tons of probable and possible ore. Carey Canada is spending some $11-million in 1979 and 1980 to upgrade environmental controls at the mine.

Cassiar Asbestos Corporation Ltd., Vancouver, British Columbia, began asbestos ore production in 1952. Its Cassiar Mine, capable of producing 110,000 tons of Chrysotile fiber per year, is located on McDame Mountain in British Columbia, 200 miles southeast of Whitehorse, near the Yukon border. Cassiar Asbestos receives an average price of $720.00 per ton of fiber, the highest in Canada, mainly due to the outstanding quality of the fiber and its favorable product mix. The company accounts for about 7% of Canadian asbestos production, is Canada's fourth largest producer of asbestos-cement fibers, producing some 9% of Canada's output of the latter grades. On a global scale, Cassiar's fiber sales are 2% of world supplies. For asbestos-cement fibers, the company is the Free World's fourth largest diversified supplier. Cassiar Asbestos is Canada's largest producer of Group 3 spinning grade fibers, up to 14,000 tons per annum. *A long-range construction program* is nearing completion at the Cassiar operation and the company is beginning to realize the increased production and economies of operation expected from its commitment of capital funds to the projects involved. Over $77-million has been spent with more than half going to environmental improvements and additional waste mining in the pit. Cassiar is currently mining phase seven ore and phase eight peak waste. By October 1980 it is expected the first shovel will move into phase nine waste and by January 1981 the second shovel should also be working there. Currently, just 20% of the rock is rejected in the concentrator and 80% goes on to be dried, stored and eventually milled into fiber. *The milling complex* can treat over 3300 tons per day and is capable of producing some 135,000 tons of fiber annually. About 90% of the mill feed as well as 30% of the concentrates are discarded as waste. Fiber yield in

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recent years has averaged about 10.7% with recoveries of some 80%. Of the total annual mill output, approximately 85% is asbestos-cement grade fibers, with Group 4 dominating up to two-thirds of Cassiar's annual fiber production. A new mill air system plus ongoing modernization of the mill circuits has resulted in impoved environmental conditions and better control of fiber quality. Also, a shrink-wrap system for packing pallets is coming on stream. At December 31, 1978, ore reserves mineable by open pit methods were calculated at 15.3-million tons. Diamond drilling at the *asbestos prospect at Kutcho Creek,* in Northern British Columbia, confirmed a substantial tonnage of asbestos fiber mineralization, but present-day economic conditions do not warrant further development. The mining claims, however, are being held in good standing. A re-examination of Chrysotile occurrences in the Clinton/Dawson City area found nothing of economic consequence. *Principal shareholders* in Cassiar Asbestos are Bell Asbestos Mines Ltd. (23.4%), Newmont Mining Corporation (12.9%), Raybestos-Manhattan, Inc. (10%) and James Hardie Industries Ltd. (10%). [Taken in part from the Jones Heward & Co. Ltd. report titled "The Outlook for the Asbestos Industry: Cassiar Asbestos and Advocate Mines]

Golden Gate Explorations Ltd.—Under an agreement reached in April 1979, *Asarco Inc.* will spend a minimum of $50,000 for additional drilling on the Rex asbestos property at Haines Junction, in the Yukon, held by Golden Gate and its President, W. J. Abraham. To be confirmed are results obtained from rotary drilling in 1978 which opened an entirely new area with large potential. Additional terms of the pact call for a further $200,000 worth of work in 1980, $250,000 in 1981, plus at least $75,000 per year thereafter and annual cash payments to Golden Gate, entitling Asarco to 75% property interest.

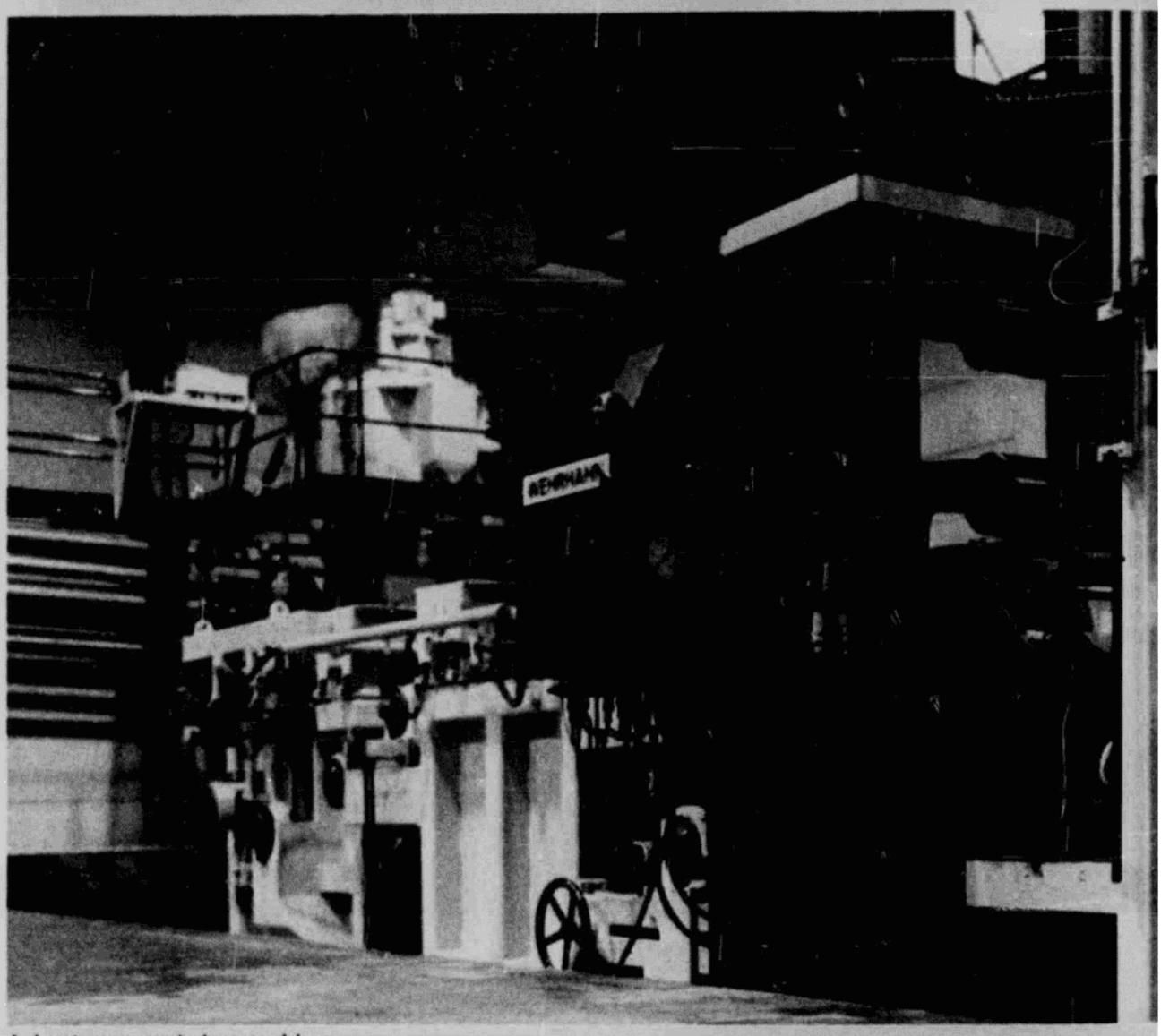
Johns-Manville Canada Inc. is the leading asbestos mining company in Quebec and produces about 37% of all the asbestos produced in Canada. Its Jeffrey Mine at Asbestos is the largest open pit asbestos deposit in the Western World, producing Chrysotile grades 4, 6 and 7. The five-year, $77-million capital expenditure program is continuing on schedule and is expected to be completed in 1981. It is designed to ensure continuing profitable and safe mining operations for the next 15 years and, when completed, production capacity is anticipated at 700,000 tons per year. Proven ore reserves are estimated to exceed 441-million tons. This asbestos mining segment of J-M Canada's business contributes some 7% of net sales and 19% of income from operations of the parent company—Johns-Manville Corporation, Denver, Colorado.

Lac d'Amiante du Quebec Ltee began its mining operation as Lake Asbestos of Quebec Ltd. on May 7, 1954. Between May 7, 1979, and the end of this year, some 35 employees will have completed 25 years of service with this wholly-owned subsidiary of Asarco Inc. Production of Chrysotile Grades 4-6 reached a record 280,000 tons of fiber in 1978 from the combined facilities of Lake Asbestos at Black Lake, Quebec, and National Mines at Thetford Mines, Quebec. Between 1976 and the next 4-5 years, approximately $10-million will have been spent for improvements in the workplace environment at Black Lake and to mdernize and initiate an air purification program at National.

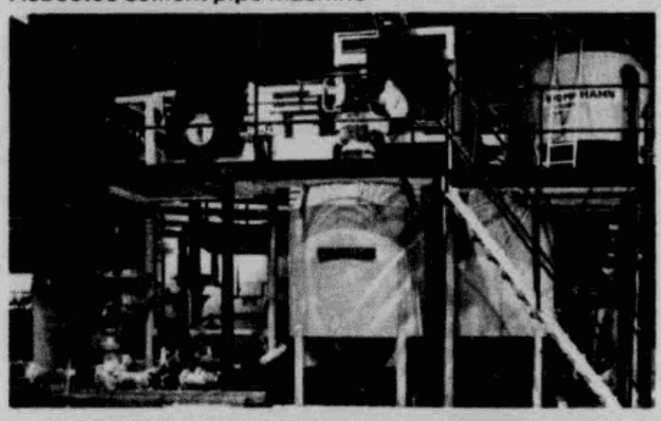
McAdam Mining Corporation Ltd., Toronto, Ontario, under an agreement reached in 1970, granted a working option to Rio Tinto Canadian Ex-

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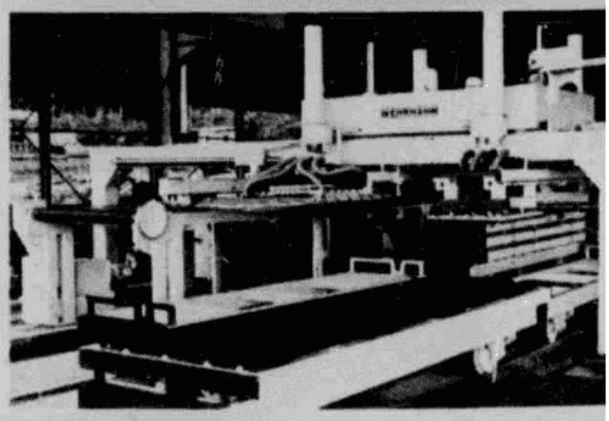
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Asbestos cement pipe machine



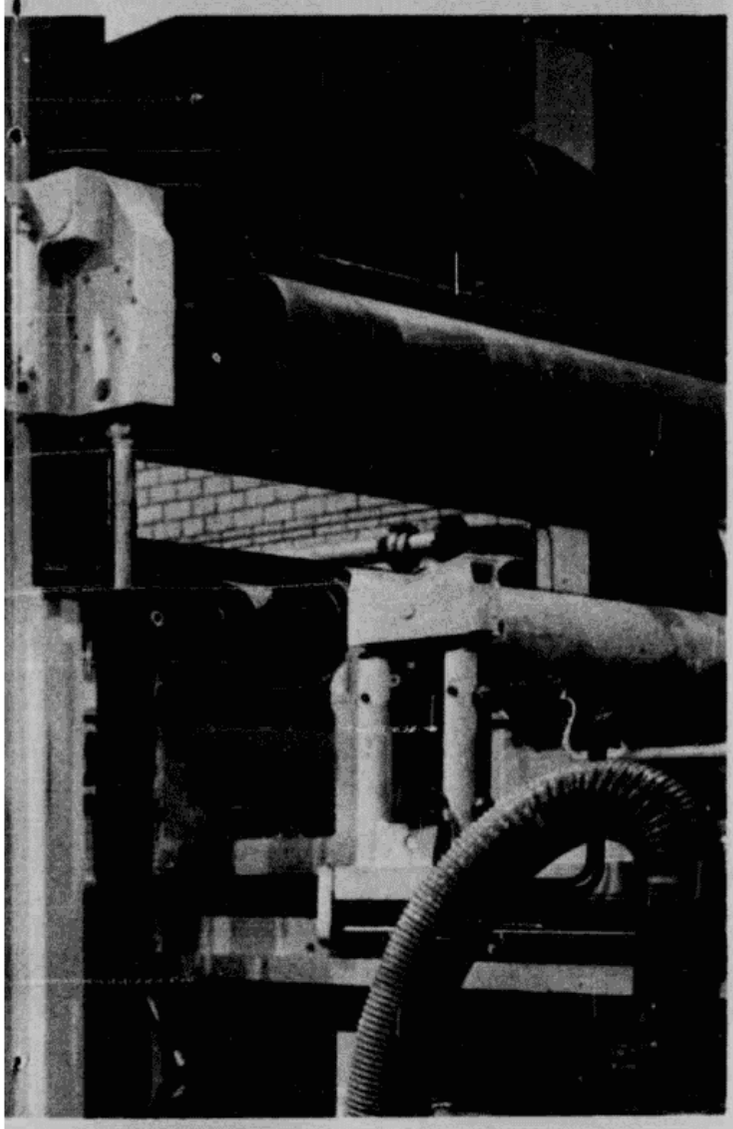
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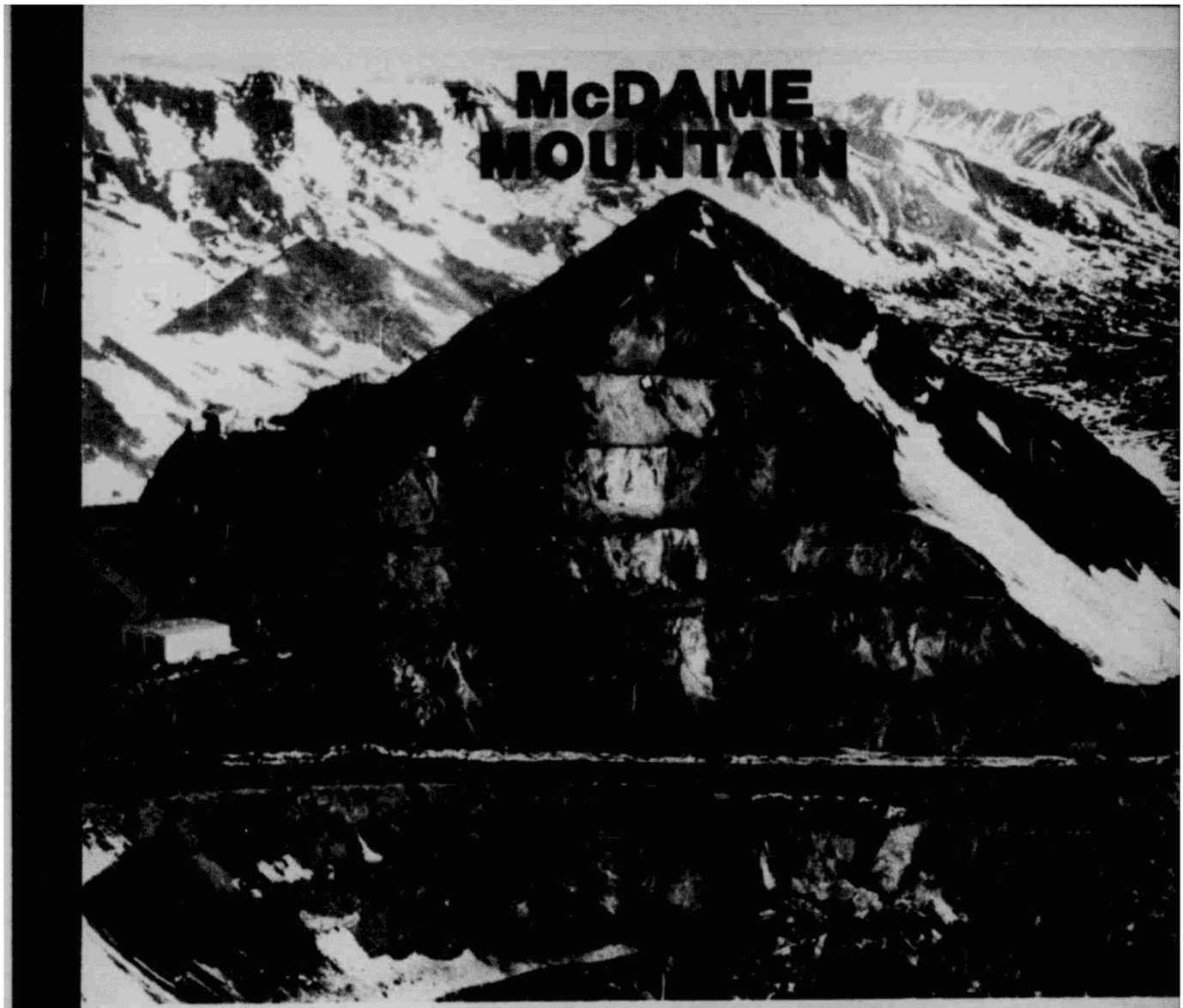
plorations Ltd. (Riocanex) on its 61 mining claims held at Roberge Lake, McCorkill Township, Quebec. At mid-1979, the news media informed that McAdam Mining was planning further discussions with Riocanex. Reportedly, however, Dr. P. Kavanagh, Vice President-Exploration for Rio Algom Ltd., stated that Rio Algom does not consider the property economically attractive to develop. Concerning the asbestos prospect at McKenzie Bay, Roy Township, Quebec, five miles from Roberge Lake, McAdam advised it has dropped its option on this "Q" project with Campbell Chibougamau Mines Ltd. Although results from some of the drilling were encouraging, McAdam directors concluded that the two years of completed work on the project did not confirm the possibility of an asbestos deposit of sufficient size and grade to warrant open pit mining.

Pathfinder Resources Ltd.—Discussions have resumed between Pathfinder and Societe Quebecoise d'Exploration Miniere (Soquem) concerning the asbestos property which lies some five miles southwest of Asbestos in the Eastern Townships of the Province of Quebec. The property is reported to contain an estimated 30-million tons of asbestos-bearing ore averaging 4.37% fiber content. Chrysotile Grades 4-7 are present and a 100,000-ton-per-year operation is envisaged.

Preston Mines Ltd. & Rio Algom Ltd.—The Boards of Directors of Preston Mines and Rio Algom approved the share-conversion ratios and other terms and conditions of the proposed amalgamation of the two mining concerns, both based in Toronto, Ontario. Shareholders of the two firms will be asked to approve the amalgamation at special meetings which, subject to obtaining the necessary regulatory approvals, are proposed to be held mid-December 1979. Assuming acceptance, it is anticipated the transaction will become effective December 31, 1979, with the amalgamated concern to be named Rio Algom Ltd. Preston owns 44% of Rio Algom and is, in turn, an 81%-owned unit of Rio Tinto Zinc Corporation, London.

United Asbestos Inc., Montreal, Quebec, reported revenues for the year ended March 31, 1979, of $20.5-million, resulting entirely from the operations of Lac d'Amiante du Quebec Ltee at Black Lake, a joint venture with Asarco. The substantial earnings enabled United Asbestos to apply $5.4-million to repayment of deferred debt related to its shut-down Midlothian asbestos mine, situated at Midlothian Township, some 40 miles south of Timmins, Northern Ontario. In September 1979, United announced it had arranged a $35-million collateral mortgage term loan with Toronto-Dominion Bank to recover possession and control of its assets and the agent for its principal secured creditor, appointed in March 1977 when the company was placed in default, would be removed. Speaking before shareholders at the annual meeting of the company, Chairman and Chief Executive Officer P. M. Malouf said the Midlothian mine will not be reopened in the near future. He indicated that operations could not begin during the severe winter months and that time would be needed for employee training. It is also presumed that some rather extensive modifications would be necessary to the mine to permit compliance with current environmental regulations. Concerning the $35-million refinancing loan, Mr. Malouf said that capital expenditures of up to $20-million may be permitted for the Midlothian property. For the six months ended September 30, 1979, revenues amounted to $13.3-million, up 12.5% from

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the same 1978 period. Net income reached $5.1-million or 71¢ per share, up 9.2%. United's share of cash proceeds from the joint venture operations with Asarco at Black Lake was $8.8-million.

UNION OF SOVIET SOCIALIST REPUBLICS

For the fifth consecutive year, the USSR has surpassed Canada as the leading world producer of asbestos. Because of several extensive expansion and modernization programs and the opening of new deposits, the Soviet Union is projected to increase output 21.5% by 1981 and another 26.5% by 1986. Russian exports of asbestos were estimated at 400,000 tons in 1970, 550,000 in 1976 and 800,000 in 1977. If this rapid escalation of exports continues it is quite conceivable the USSR will outpace Canada as the leading world supplier of asbestos in the early 1980's.

USSR Asbestos Combines

Uralasbest—Three adjacent open pit asbestos mines are operating at Uralasbest, near Sverdiovsk in the Ural Mountains, producing some 1,870,000 tons per year of Chrysotile Grades 1-6, plus some 350,000 tons of Grade 7. Projected future output is 1,990,000 tons by 1981 and 1,900,000 tons by 1986.

Koustanai—This second largest asbestos operation in the USSR is situated at the Dzhetygara deposit in Kazakhstan, Kustanay Oblast'. Current annual production is said to be 730,000 tons with 760,000 tons projected for 1981 and 1,150,000 tons by 1986.

Tuvaasbest—The third largest complex is the Tuvaasbest Combine at Ak-Dovurak, near Krasnoyarsk in the Tuva Autonomous Republic in South Central Siberia. Output is estimated at 250,000 tons in 1979, 265,000 tons by 1981 and 300,000 tons by 1986.

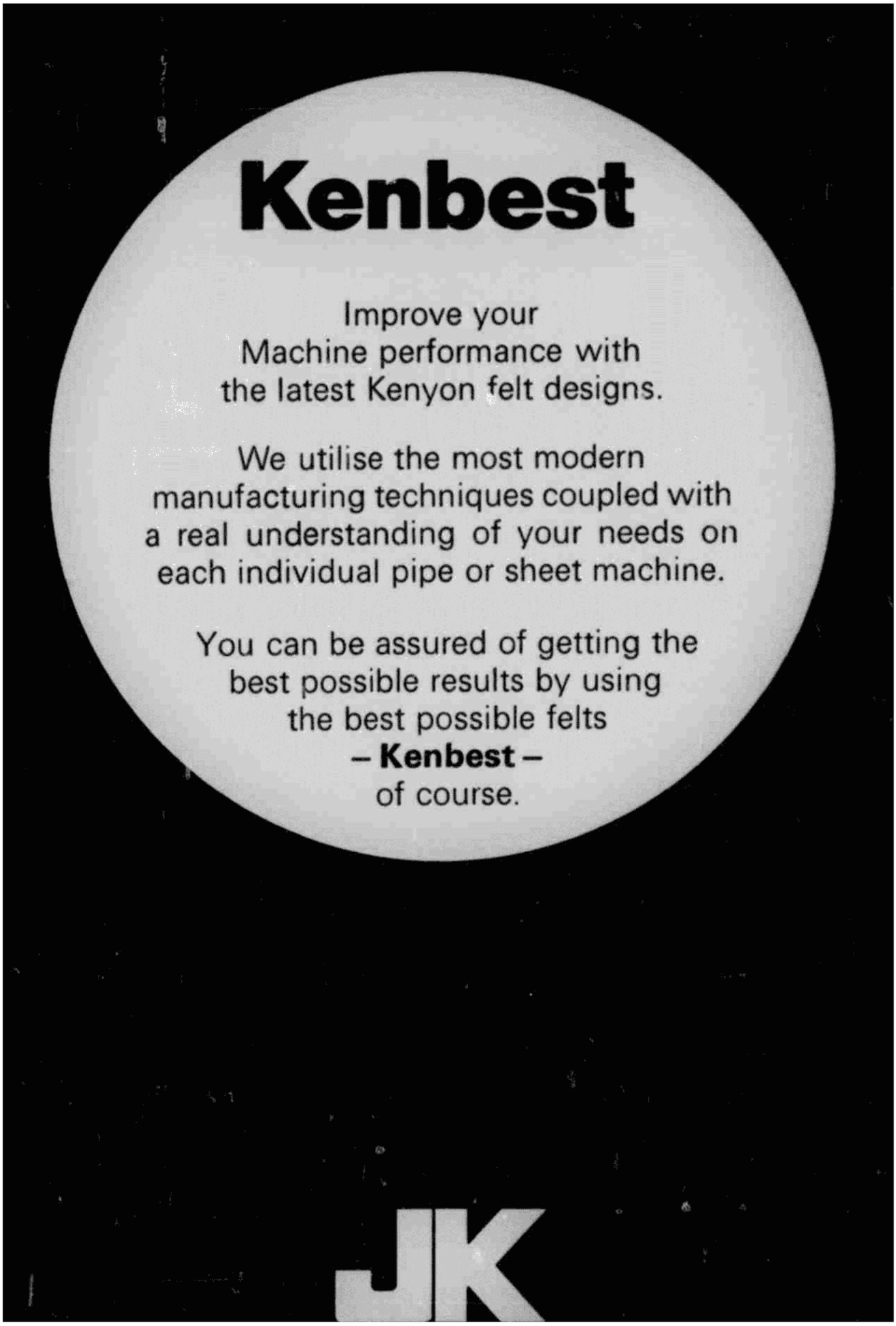
Kiembay—The Kiembay asbestos deposit produced its first small tonnages of asbestos fiber in January 1979 at Orenburg Oblast', on the eastern slopes of the southern Urals. Full production of Grades 3-6 is to be reached by 1982, with the output to be shared among participating Comecon members, i.e., Poland, Bulgaria, East Germany, Romania, Czechoslovakia and Hungary. Estimated output is 250,000 tons by 1981 and 500,000 tons by 1986.

Sayan—The Sayan asbestos deposit is situated at the border of Krasnoyarsk Kray and Tuva ASSR in East Siberia. Reserves are estimated at 7-million tons. An annual capacity of 200,000 tons is anticipated when construction of the combine is completed, by 1986.

Lenin—According to Moscow radio reports, the V. I. Lenin Combine in the Tuva ASSR has begun asbestos production. The mine is expected to be one of the largest in the Soviet Union and should be producing some 120,000 tons of fiber this year.

Buryat—Development is planned at the Molodezhnoye and Il'chirsk deposits at Buryat. The former was designated in 1974 for development when the western section of the Bayrol-Amur Railway is constructed and in operation.

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REPUBLIC OF SOUTH AFRICA

The Republic of South Africa is the third largest asbestos producer in the world and the supplier of nearly all of the Crocidolite and Amosite utilized internationally. South Africa is the one nation which produces and markets the three main varieties of asbestos used commercially, i.e., Crocidolite, Chrysotile and Amosite. All of the South African asbestos mines are located in the Transvaal and Cape Province. Reserves have been estimated at 8.5-million tons, ranking the country second in the Western World (8%) and fourth globally (5%).

Production of all varieties of the mineral are reportedly the lowest they have been in the last several years: down 29.7% from 1978, 35.6% from 1977, 29.3% from 1976, 28.1% from 1975 and 31.9% from 1974. Comparing the year ended March 1979 with the prior like period, by type of asbestos, Crocidolite production decreased 32.8%; Chrysotile, 24%; and Amosite, 30%. It has been suggested that South Africa has the capacity to produce larger tonnages of all varieties of asbestos and will increase output as the economy improves and manufacturers' inventories are reduced. Production for the latest year included 51.5% of Cape Crocidolite, 32% of Chrysotile and 16.5% of Amosite.

SOUTH AFRICAN ASBESTOS PRODUCTION
(METRIC TONNES)

YEAR TO	CAPE BLUE	CHRYSOTILE	AMOSITE	TREMOLITE	TRANSVAAL BLUE
Mar 79	126,682	79,317	40,704	..	87
Mar 78	188,651	104,317	58,193	..	100
Mar 77	189,241	113,834	78,244	1,726	..
Mar 76	161,139	101,241	85,017	1,855	..
Mar 75	160,854	87,697	93,829	769	..
Mar 74	149,521	72,087	102,419	640	1,597

TOTAL TONNAGES OF SOUTH AFRICAN ASBESTOS PRODUCTION FOR THE ABOVE SIX YEARS WERE: 1979—246,790 TONNES, 1978—351,261 TONNES, 1977—383,045 TONNES, 1976—349,252 TONNES, 1975—343,149 TONNES, 1974—362,264 TONNES.

Exports of South African Chrysotile increased 13.1% in value for the year to March 1979, while Cape Crocidolite and Amosite decreased, 22.5% and 0.6%, respectively. Total value of exports for the latest year dropped 14.3% from 1978 and 13.8% from 1977, although the value was ahead 23% over 1975. South Africa exports over 90% of her asbestos output.

VALUE OF SOUTH AFRICAN EXPORTS OF ASBESTOS

VARIETY	YEAR TO 3/79	YEAR TO 3/78	YEAR TO 3/77	YEAR 1975
Cape Blue	R 67,835,146	R 87,572,031	R 82,559,619	R50,168,317
Amosite	21,824,468	21,958,900	24,190,185	25,974,773
Chrysotile	17,144,308	15,154,558	17,013,381	10,454,554
Tremolite	..	..	104,834	208,036
	R106,803,922	R124,685,489	R123,868,019	R86,805,680

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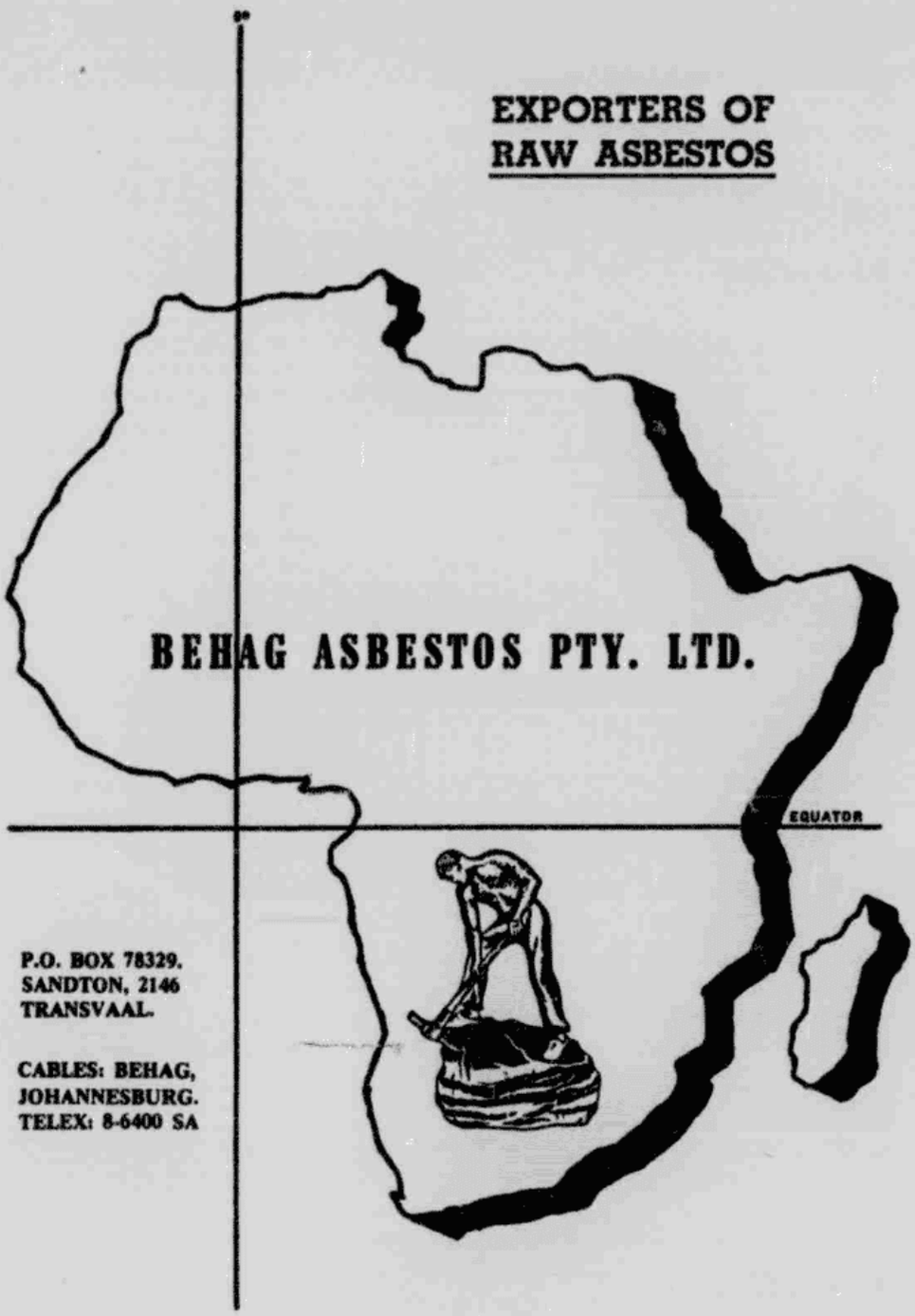
South African Asbestos Mines

General Mining and Finance Corporation Ltd. is South Africa's second largest mining house, following its takeover of Union Corporation, and dominates the nation's asbestos industry via two producers: Griqualand Exploration and Finance Co. Ltd. (Gefco Blue) and Msauli Asbes Ltd. (Chrysotile). . . . *Gefco* produces over 30% and markets almost half the total world output of Crocidolite from the Kuruman area of the North-western Cape Province. The Bretby Mine in the Northern Cape was closed due to an oversupply of low grade asbestos and production is now being concentrated at the more efficient facilities. The closure will initially reduce Crocidolite output some 10%. Gefco buys high grade fiber for blending with its own product from the nearby Wandrag mine of Duiker Exploration, part of the Lonrho Group. In line with Gefco's lower sales, Wandrag cut back production to 10,351 metric tonnes of fiber in 1978. Duiker closed its Emmarentia Mine at the end of 1978 and until markets recover is centralizing production at Wandrag. [Mining Annual Review, 1979]. . . . *Msauli Asbes* owns the entire issued share capital of African Chrysotile Asbestos Ltd., seller of the Chrysotile fiber produced from the Msauli Mine in the Barberton District of the Transvaal. For the year 1978, fiber production was reduced 29% to 70,967 tons and sales were down 7% to 80,707 tons. This decrease is attributed to increased competition and Russian dumping in Far Eastern markets, a situation which appears to have changed somewhat in 1979. Msauli has forecast 1979 as a satisfactory trading year, on the strength of an expected upswing in sales volume and the ability of the company to satisfy a growing demand for longer-than-average and better-priced fiber grades. Current capital projects include shaft-sinking, equipment, plant modification, dust prevention and pressure packing and mechanized handling of unitized cargo.

Cape Asbestos/Transvaal Consolidated—One of the most significant transfers of asbestos mining properties in recent years occurred on June 29, 1979, when the directors of *Cape Industries Ltd.* (CIL) announced the sale of the company's Mining Division to *Transvaal Consolidated Land & Exploration Co. Ltd.* (TCL) for a total consideration of £15.6-million. The principal companies in the Division which, together with their subsidiaries, became wholly owned by TCL are Cape Blue Mines (Pty) Ltd. and Egnep (Pty) Ltd. Cape Blue Mines produces Blue (Crocidolite) asbestos at Pomfret in the Northern Cape Province. Egnep mines Amosite under license at Penge in the Northeastern Transvaal. Annual production capacities have been reported as 90,000 tonnes at Penge and 70,000 tonnes at Pomfret. Certain net assets of Cape Asbestos South Africa (Pty) Ltd., the holding company for the two mining firms and of Cape Asbestos Fibres Ltd. (CIL's U.K.-based asbestos fiber marketing company) were also acquired by TCL as part of the transaction. Proceeds of the sale are being used to further development of CIL's manufacturing, contracting and distribution activities more rapidly than would otherwise have been possible. Since CIL is presently engaged chiefly in the building and automotive industries, it seemed logical to the company that the mining activities could better be carried on by a firm whose primary activities lay within the South African mining industry. TCL is part of the Barlow Rand Group of South Africa.

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Asbestos Investments (Pty) Ltd., a member of the Eternit Group of companies, is the third largest asbestos producer in South Africa. Via two subsidiaries located in the Northern Cape Province, the company has the capacity to annually produce 63,000 tons of Crocidolite. Kuruman Cape Blue Asbestos (Pty) Ltd. operates two milling plants at Whitebank (30,000 tons per year) and a new mining/milling facility at Klipfontein, Postmasburg District (18,000 tons per year). Danielskuil Cape Blue Asbestos (Pty) Ltd. operates mines at the Ouplaas farm in the Danielskuil District (15,000 tons per year).

RHODESIA

It is still extremely difficult to obtain reliable information on the status of the Rhodesian asbestos mining industry. While Rhodesia probably remains the fourth largest asbestos producer in the world, there is a possibility that full operation of the new mill at the *Kudu Asbestos Mine* in Bulawayo could increase Rhodesia's production capacity to an output which would surpass that of South Africa and move Rhodesia into third place among worldwide producers of asbestos fiber. This conjecture is based on the assumption that Rhodesian production amounted to about 250,000 tons in 1978 and the reported increase of some 200,000 tons per year in Kudu capacity would result in a potential capacity of 450,000 tons annually for the entire country, with a major proportion in the form of Chrysotile. While *Rhodesian & General Asbestos Corporation (Pvt) Ltd* continues to operate the Shabani Mine in Gwelo and the nearby Gath, Temeraine and King Mines, no reports of any substantial changes in any of these facilities have been forthcoming for some time, despite the fact that *Turner & Newall Ltd.*, Manchester, England, has substantial interests in that company. . . . Other, smaller asbestos facilities in Rhodesia are operated by *Pangani Asbestos Mines (Pvt) Ltd.* (Pangani, Vanguard and Boss Mines; owned by Asbestos Investments), *A.D. Theron and Sons (Pvt) Ltd., D.S.O. Asbestos (Pvt) Ltd.*, and the *Elenem Syndicate.*

PEOPLES REPUBLIC OF CHINA

So far as we can determine, the Peoples Republic of China continues to be the fifth largest producer of asbestos in the world, primarily of the Chrysotile variety. Principal operation is the Shihmien (meaning asbestos) Mine in Szechuan Province, with reserves estimated at 28-million tonnes and the quality of the fiber a top-grade textile product. The Penghsien Mine is considered the second major asbestos deposit in the Province. Outside Szechuan, the most productive deposits are situated in Laiyuan County, Hopeh. Asbestos has also been located in Yuankiang County, Yunnan Province. The U.S. Bureau of Mines estimates annual production of Chinese asbestos at some 207,000 tonnes.

AUSTRALIA

Exports—Historically a net importer, Australia's exports of asbestos exceeded her imports 15.7% for the year ended June 1979. Total exports

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of all varieties of the mineral for the latest year totaled 34,063 metric tonnes valued at A$13,164,459, 6% higher in quantity but 34.2% lower in value over the same twelve-month period a year earlier. Comparing 1979 with 1977, exports were up 21.6% in tonnage and 26.8% in value (1977: 28,011 tonnes; A$10,384,430). Against 1976, exports decreased 10.7% in quantity but rose 11.6% in value (1976: 38,139 tonnes; A$11,793,186).

Imports—Australia imported 29,442 tonnes of asbestos valued at A$13,037,911 for the year ended June 1979, down from the same period a year earlier 46.7% in tonnage and 49.8% in value. The 1979 breakdown by variety of asbestos is: Chrysotile—19,948 tonnes (down 20%), valued at A$8,934,186; Amosite—8692 tonnes (down 48.4%), valued at A$3,724,252; Other—802 tonnes (down 94%), valued at A$379,473. Comparing 1979 with 1977, imports were down 58.1% in quantity and 55.7% in value (1977: 70,342 tonnes, A$29,414,733). Against 1976, imports decreased 47.7% in tonnage and 27% in value (1976: 56,246 tonnes, A$17,852,927). Comparison with the year 1975 shows quantity down 42.1% but value up 16.5% (1975: 50,879 tonnes, A$11,195,399).

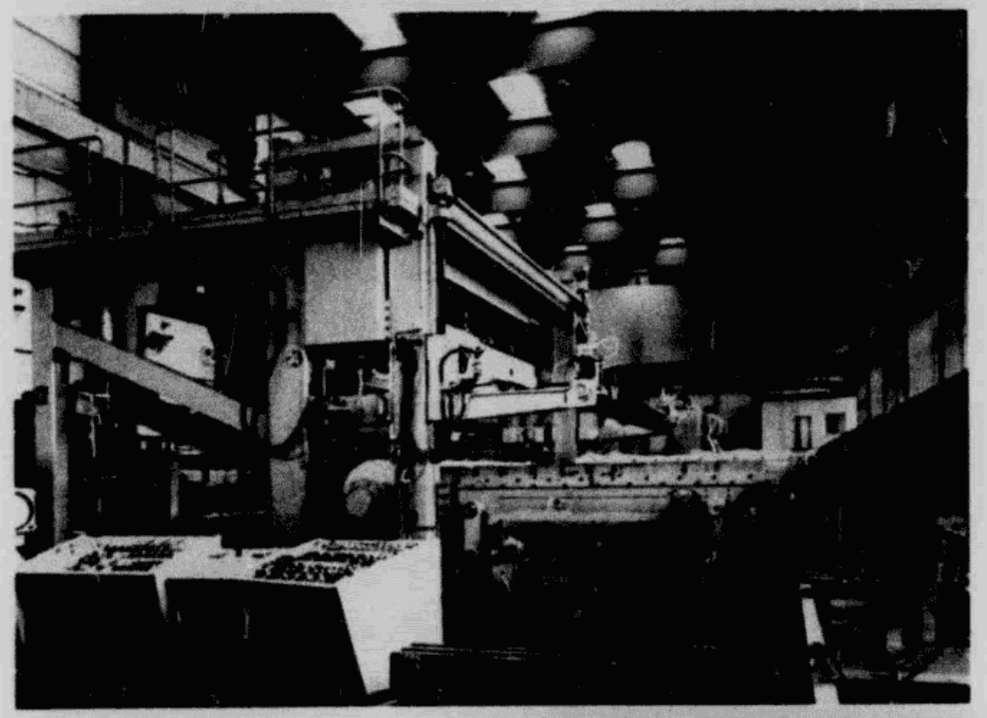
Woodsreef Mines Ltd.

Asbestos *production* at the Woodsreef Mine, Barraba, New South Wales, operated by *Chrysotile Corporation of Australia Pty. Ltd., a subsidiary of Woodsreef Mines Ltd.*, is steadily increasing. Output for the eleven months to September 30, 1979 amounted to 67,893 metric tonnes, 6% above the 63,973 tonnes produced for the same period in 1978. Fiber shipments for the latest period reached 66,570 tonnes, up 45% over the 46,064 tonnes shipped a year earlier and reflecting the significant increase in demand for asbestos, especially in Asia. Revenue from invoiced sales was up 30%; i.e., A$20,207,000 in 1979 compared with A$15,584,000 in 1978. The company reports that firm sales for 1979 now total 87,800 tonnes and because of the strong demand for fiber in Woodsreef's natural market area of South-East Asia, Japan and India, it anticipates sales in 1980 will be in excess of 100,000 tonnes, largely eliminating the inventory of fiber built up in 1977 and 1978. The new tailings recovery circuit at the Barraba Mine is now fully commissioned and operating. Average increase in revenue from the new circuit is 14% over the last four months and this is confirmed by a significant reduction in tailings values. In accordance with a financing agreement between Woodsreef Mines and *Woodsreef Minerals Ltd.*, the parent company in Toronto, Ontario, it has been decided to proceed with the construction of the wet process prototype mill. The mill will be located close to the existing mill at Barraba and is scheduled to begin operating in February 1980, with the capacity to produce 1½ tonnes of wet fiber daily. Production is to be shipped to major asbestos-cement producers for testing. Also, negotiations are underway toward bringing in a major asbestos mining company as a partner in the venture.

SWAZILAND

Swaziland's chief source of revenue from its mining industry is asbestos. For example, in 1978 sales of asbestos constituted 77% of total

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VOITH

Top felt-less asbestos cement pipe production machine

for manufacturing pipes of 80 – 1200 mm inside diameter range and 5 m length, with supporting cores and mandrel circuit, shown during workshop assembly. Shipment in autumn 1979 to Messrs. CIAMIT, Tunesia.

All machines for asbestos cement plants for special sheet profiles and pipes from stock preparation to testing of the finished goods.

J. M. VOITH AG ● ST. POELTEN ● AUSTRIA

POB 168 ● Telex 015510 ● Cable Voithwerke

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mineral sales, overshadowing iron ore at 15% and coal at 7%. Output of the *Havelock Mine (Havelock Asbestos Mines (Swaziland) Ltd.)* actually decreased slightly to about 36,995 metric tonnes but tonnage sold increased by about 9% due to sales of some stocks already on hand. Higher prices also added to revenues, resulting in an 18% increase over the 1977 sales figure. The highly efficient operation, in which *Turner & Newall Ltd.* and the *Swazi Nation* are partners, continued to return satisfactory profits. While no plans for expansion have been reported to this Magazine, the company is carrying out an extensive program for reducing the incidence of dust in the mill. Annual production estimates are 36,951 tonnes in 1978 vs. 38,046 tonnes in 1977, 41,847 tonnes in 1976 and 41,219 tonnes in 1975.

CYPRUS

Cyprus Asbestos Mines Ltd. is the sole producer of asbestos on the Island of Cyprus. One mill was in operation in 1978 which produced 33,800 long tons of fiber (18,450 tons of the long grades designated 3S and 15,350 tons of the short grades, HSH). Output quantities for prior years were: 36,105 tons in 1977, 33,973 tons in 1976 and 31,103 tons in 1975. Shipments from the Amiandos Mine amounted to 16,222 tons of 3S, valued at C£2,327,536, and 12,825 tons of HSH, valued at C£1,423,464. Total exports for 1978 and three years prior were: 1978—29,074 tons valued at C£3,750,259; 1977—34,785 tons valued at C£4,397,655; 1976—32,318 tons valued at C£3,306,296; 1975—27,930 tons valued at C£2,127,054. Held in stock by the company at the end of 1978 were 2637 tons of long grades and 8400 tons of short grades. . . . The Mines Department of Cyprus, in an effort to contribute as much as possible towards the improvement of safety and health in the mining industry, offers a shield for the best safety record each year. Cyprus Asbestos Mines took second place in 1978.

OTHER ASBESTOS-PRODUCING NATIONS

Brazil—An open-pit Chrysotile mine is in operation by *S.A. Mineracao de Amianto* at Cana Brava, Goias State, 160 miles northwest of Brasilia. SAMA, which accounts for some 95% of total Brazilian asbestos output, is controlled by S.A. Tubos Brasilit which, in turn, is owned by Saint-Gobain-Pont-A-Mousson and the Eternit Group. Reserves are estimated at 3.5-million tons of fiber. Annual production reached 95,000 tonnes valued at US$29,826,000 in 1976. Plans call for yearly output of 115,000 tonnes by this year and 125,000 tonnes by 1980.

Colombia—The Chrysotile mine and mill under construction by *Minera Las Brisas S.A.* at Antioquia, near Campamentos, includes a $43-million asbestos fiber concentrator of 20,000 tonnes-per-year capacity. Production is expected by early 1981, with a start-up rate of 6000 tonnes per year. The project involves investors from Switzerland and South Africa, with participation by Eternit Colombiana, an asbestos-cement products manufacturer.

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Greece—Construction of the new US$68-million, 100,000-tonnes-per-year asbestos fiber plant was begun in 1978 at the Zidani mine near Kozani, in Northern Greece. Some 75% of output will be exported, with annual net earnings estimated at US$30-million. The project is being executed by Asbestos Mines of Northern Greece and Mining S.A., the latter a part of the government-controlled Hellenic Industrial Development Bank.

Italy—Most all of the asbestos produced in Italy is from the Balangero Mine at San Vittore, owned by *Amiantifera Di Balangero S.p.A.*, Milano. Work continues on deepening the main floor level of open pit. Prior improvements include a system for dust-free bagging and new filters to decrease air pollution. Production is estimated at 135,402 metric tonnes in 1978 vs. 149,327 tonnes in 1977.

Mexico—A pilot plant has been erected at its Pegaso, Oaxaca, asbestos deposit by Industrias Penoles, in a joint venture with Johns-Manville Corporation. The initial results have been favorable and preliminary engineering and feasibility studies are underway. [Mining Annual Review—1979]

Mozambique—Reportedly, production of Anthophyllite Grades 3-7 is underway by *Minas Gerais de Mozambique Lta.* at Mavita, 50 kilometers southwest of Vila Pery. Proven ore reserves have been calculated at 250,000 tons, with probable ore listed as one-million tons.

Democratic Republic of Sudan—A three-year, $3.6-million feasibility study continues in the Ingessana Hills region of the Sudan to determine the viability of building a plant to produce 100,000 tonnes of fiber annually for at least 20 years. The project is valued at $115-million, minimum, and is being carried out via an agreement between *Johns-Manville Corporation, the Gulf International Group of Kuwait and the Sudan Government.*

Turkey—Adana Atermit and Amyant Sanayii A.S. operate the two largest of six asbestos mines in Turkey. Reportedly, the latter concern operates an asbestos processing plant capable of producing 10,000 tons of fiber per year.

Yugoslavia—A Din 300-million investment for new facilities is expected for the asbestos mine at Bosansko Petrovo Selo, Bosnia-Hercegovina. Annual output of ore is to be increased from 150,000 to 660,000 tonnes and fiber production is to be raised from 5000 to 26,000 tonnes per annum. Asbestos reserves in Yugoslavia are estimated to be over 21-million tonnes of ore.

NEXT ISSUE: THE ASBESTOS PRODUCTS INDUSTRY

CHRYSOTILE TEST MANUAL REVISED

Revision I of the Chrysotile Asbestos Test Manual, 3rd Edition, is now available, free of charge, from: Quebec Asbestos Mining Association, 580 Grande Allee East, Suite 320, Quebec, P.Q., Canada G1R 2K2. The basic manual provides 34 standard methods for testing the physical and chemical properties of Chrysotile asbestos fiber.

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RETIREMENTS

Dr. Charles Z. Carroll-Porczynski—Managing Director, Guildford Asbestos Co. Ltd., Guildford, Surrey, England.

Ronald Henry Dent—Chairman, Cape Industries Ltd., London, England; continues on the Board as a Non-Executive Director.

T. R. Earnshaw—A Non-Executive Director, TBA Industrial Products Ltd., Rochdale, England; remains Export United Adviser to the British Overseas Trade Board and a Member of its Advisory Council.

James M. Fletcher—Jeffrey Mine Plant Engineer and Advocate Mine Manager, Johns-Manville Canada Inc., Asbestos, Quebec.

William H. Foster—Vice President of Operations, Asbestos Corporation Ltd., Montreal, Quebec.

Richard Gaze—An Executive Director of the Board, Cape Industries Ltd., London, England; remains active as a Consultant to the company on environmental matters.

D. A. Harper—A Non-Executive Director, Turner & Newall Ltd., Manchester, England.

J. H. Haslewood—Controller, Group Accounting, Turner & Newall Ltd., Manchester, England.

T. G. Masterson—Vice President, Lynn, Macleod Capital Equipment Ltd., Thetford Mines, Quebec.

Marion W. Oliver—Vice President of Materials and Environmental Affairs, Raybestos Manhattan Industrial Products Company, North Charleston, South Carolina, a Division of Raybestos-Manhattan, Inc.

Dr. Ernst J. Schmidheiny—Chairman, Everite Group of Companies, Johannesburg, Republic of South Africa.

Dr. Walter J. Smither—Group Medical Adviser, Cape Industries Ltd., London, England; remains as Medical Consultant.

Charles E. Stiefken—Section Head, Asbestos Laboratory, Asarco Inc., South Plainfield, New Jersey, involved with the Asarco subsidiary, Lac d'Amiante du Quebec Ltee.

Russell A. Todd—Vice President—Manufacturing, Atlas Turner Inc., Montreal, Quebec.

Mervyn A. Upham—President, International Minerals & Chemical Corporation (Canada) Ltd.; remains Chairman of the Board and Consultant; recently elected Chairman of the Board of Kilborn Ltd.

DEATHS

Dr. C. G. Addingley—Former Director and Chief Chemist, British Belting & Asbestos Ltd. (now BBA Group Ltd.), Cleckheaton, England; *October 6, 1978.*

William Lawrence Bent—Retired Labour Liaison Officer, African Associated Mines Ltd.; former Vice President for the Chamber of Mines of Rhodesia; one-time Surveyor, Shiftboss and Section Manager, Shabanie Mine, Rhodesian & General Asbestos Ltd.

Norman Farrar—Private Consultant; retired Director of Kilborn Engineering Ltd., Toronto, Ontario; former Mill Design Engineer with Johns-Manville Canada Inc.

Nicholas Gritzuk—Chairman of the Board, Cassiar Asbestos Corporation Ltd., Vancouver, British Columbia: former Senior Mining Engineer for Newmont Mining Corporation; *April 14, 1979.*

Marcel Levecque—President and Chief Executive Officer, CertainTeed Corporation, Valley Forge, Pennsylvania; *February 22, 1979.*

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DEATHS—CONTINUED

Fred B. O'Mara—Executive Vice President and a Director, Union Carbide Corporation, New York City; *December 30, 1978.*
Frank Pearson—Retired Chairman, BBA Group Ltd., Cleckheaton, England; *July 23, 1978.*
Robert J. Plumb—Treasurer, Asarco Inc., New York City; *May 26, 1979.*
S. Stachelski—Managing Director, Valley Asbestos (Pty) Ltd., Johannesburg, Republic of South Africa.

FRONT COVER PHOTOGRAPHS—1979

March—Structure of the Gore-Tex Membrane vs. that of polyester felt, magnified 1000X.

April—"Proto" team on the Copperbelt, Rhodesia; trainees and instructor at the "Proto" Training School at Wankie.

September—Vickers M17 microscope modified to perform automatic counting of asbestos fibers using the Timbrell-Vickers Automatic Fiber Evaluation System.

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Syro Ltd.

Peter Villforth
J. M. Voith A.G.

Gebr. Wehrhahn

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steel
+ asbestos
+ cement

NEW!

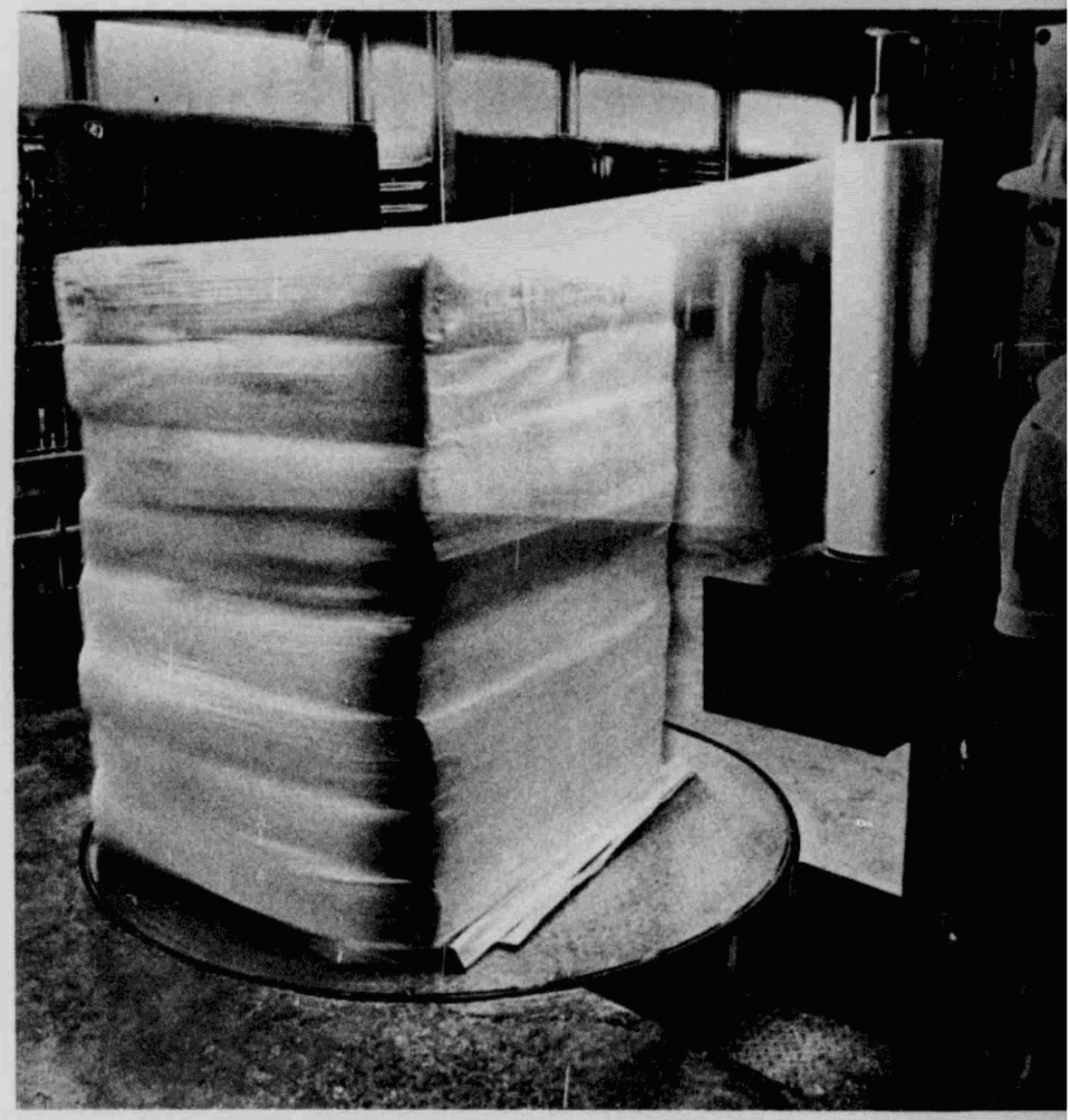
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S.p.A. — Telex 330113

Stretch protects against and related



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wrapping broken bags dust problems.



Lac d'Amiante du Québec, Ltée now supplies two-ton units of asbestos fiber consisting of forty 100-lb. bags completely stretch wrapped in a tough polyethylene film. This protective wrapping virtually eliminates bag damage:

- During car loading and unloading.
- During transit.
- In storage and in-plant handling.

Stretch wrapping is your best assurance that shipments will arrive damage and dust free. It also reduces unloading expense and helps control dust problems in your operation. It's available for a very nominal charge.

Stretch wrapping is evidence of LAQ's concern for its customers and the environment. For details contact Lac d'Amiante du Québec, Ltée, P.O. Box 608, Black Lake, Quebec, Canada. Tel.: 418-423-4221. Or call a representative near you.

LAQ

A subsidiary of **ASARCO**

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IMPORTS INTO THE UNITED STATES

From: U.S. Bureau of the Census

UNMANUFACTURED ASBESTOS:		AUGUST 1979	
Amosite	s.tons	..	$ ..
Crocidolite (Blue), South Africa	s.tons	1,573	978,697
Switzerland	s.tons	173	107,114
Chrysotile Crudes	s.tons	..	..
Chrysotile Spinning Fibers, Canada	s.tons	548	522,879
Chrysotile, Other, Canada	s.tons	36,459	7,149,751
South Africa	s.tons	58	35,705
Other Crudes & Fibers, Canada	s.tons	766	180,269
India	s.tons	49	13,805
Norway	s.tons	26	1,033
		39,652	$ 8,989,253
MANUFACTURED ASBESTOS PRODUCTS:			
Asbestos yarn, cloth, tape, etc.	Lb	769,841	$ 1,294,280
A-C pipes, tubes & fittings	Lb	1,845,582	313,455
Other asbestos-cement articles	Lb	2,053,931	379,914
Other asbestos articles		..	546,853
			$ 2,534,502
UNMANUFACTURED ASBESTOS:		**JANUARY-AUGUST 1979**	
Amosite, Canada	s.tons	81	$ 6,469
South Africa	s.tons	348	176,245
Crocidolite (Blue), Canada	s.tons	99	26,155
Namibia	s.tons	230	142,819
South Africa	s.tons	13,120	8,172,988
Switzerland	s.tons	173	107,114
Chrysotile Crudes, Canada	s.tons	102	22,209
Italy	s.tons	18	4,356
South Africa	s.tons	403	254,336
Chrysotile Spinning Fibers, Canada	s.tons	6,436	5,195,995
Chrysotile, Other, Australia	s.tons	40	4,377
Canada	s.tons	366,264	78,055,864
Germany, Fed. Rep. of	s.tons	12	7,271
Mexico	s.tons	12	2,394
Norway	s.tons	22	6,249
Romania	s.tons	22	3,666
South Africa	s.tons	1,724	1,007,912
United Kingdom	s.tons	22	3,763
Yemen	s.tons	22	8,397
Other Crudes & Fibers, Canada	s.tons	7,809	2,135,691
Germany, Fed. Rep. of	s.tons	11	28,967
India	s.tons	213	52,755
Italy	s.tons	17	3,630
Mexico	s.tons	1	1,000
Norway	s.tons	26	1,033
South Africa	s.tons	108	46,302
		397,335	$95,477,957

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U.S. IMPORTS—CONTINUED

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos yarn, cloth, tape, etc.	Lb	6,429,522	10,128,654
A-C pipes, tubes & fittings	Lb	19,350,544	2,915,033
Other asbestos-cement articles	Lb	20,944,265	4,053,407
Other asbestos articles	..	..	4,041,296
			$21,138,390

January-August 1978: U.S. imports of unmanufactured asbestos totaled 392,947 short tons, valued at $102,066,226; imports of manufactured asbestos products were valued at $21,161,458.

EXPORTS FROM THE UNITED STATES

From: U.S. Bureau of the Census

UNMANUFACTURED ASBESTOS: — ***AUGUST 1979***

Asbestos crudes, fibers & stucco	s.tons	2,879	$ 999,530
Asbestos sand & refuse	s.tons	1,174	348,920
		4,053	$1,348,450

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos yarn, cloth, tape, etc.	Lb	713,207	$ 708,204
Asbestos-Cement shingles & clapboard	Lb	1,150,750	227,727
Other asbestos-cement articles	Lb	578,217	295,565
Asbestos gaskets	Lb	105,302	300,457
Asbestos packings & seals	Lb	287,879	1,042,868
Asbestos insulation	..	..	323,009
Brake linings & disc brake pads	..	..	2,792,194
Clutch facings & linings	..	..	1,000,581
Other asbestos articles	..	..	2,455,463
			$ 9,146,068

UNMANUFACTURED ASBESTOS: — ***JANUARY-AUGUST 1979***

Asbestos crudes, fibers & stucco	s.tons	19,329	$ 7,246,290
Asbestos sand & refuse	s.tons	7,159	2,290,134
		26,488	$ 9,536,424

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos yarn, cloth, tape, etc.	Lb	4,446,026	$ 4,796,434
Asbestos-Cement shingles & clapboard	Lb	13,349,265	3,093,032
Other asbestos-cement articles	Lb	27,835,379	9,706,109
Asbestos gaskets	Lb	8,663,405	3,293,314
Asbestos packings & seals	Lb	3,752,059	8,771,123
Asbestos insulation	..	..	3,219,636
Brake linings & disc brake pads	..	..	39,188,609
Clutch facings & linings	..	..	6,412,453
Other asbestos articles	..	..	15,214,949
			$93,695.659

January-August 1978: U.S. exports of unmanufactured asbestos reached 31,931 short tons, valued at $8,655,038; exports of manufactured asbestos products were valued at $79,318,129.

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EXPORTS FROM CANADA

From: Statistics Canada

AUGUST 1979

Short tons

UNMANUFACTURED ASBESTOS:	Crude	Milled Gp 3	Milled Gp 4&5	Shorts Gp 6-9
Western Europe	..	1,671	24,501	17,041
Eastern Europe	..	158	3,543	321
Middle East	..	..	3,309	131
Africa	..	7	4,182	225
Asia	..	315	10,218	8,771
Oceania	..	..	2,330	482
So. & Cen. America & Antilles	..	166	7,621	4,931
United States	..	665	13,265	33,441
	..	2,982	68,969	65,343

The total amount of unmanufactured asbestos exported in *August 1979* was 137,294 short tons, valued at C$58,060,000.

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos cloth, dryer felts & sheets	C$ 753,000
Asbestos brake linings & facings	205,000
Asbestos-Cement building materials	2,279,000
Other basic asbestos products	554,000
	C$ 3,791,000

JANUARY-AUGUST 1979

UNMANUFACTURED ASBESTOS:	Crude	Milled Gp 3	Milled Gp 4&5	Shorts Gp 6-9
Western Europe	..	7,520	161,617	118,550
Eastern Europe	..	2,473	27,604	1,352
Middle East	..	88	8,293	961
Africa	..	7	7,919	1,981
Asia	..	3,228	86,825	84,672
Oceania	..	5	17,569	1,320
So. & Cen. America & Antilles	..	1,713	60,598	42,759
United States	22	5,341	84,866	310,479
	22	20,375	455,291	562,074

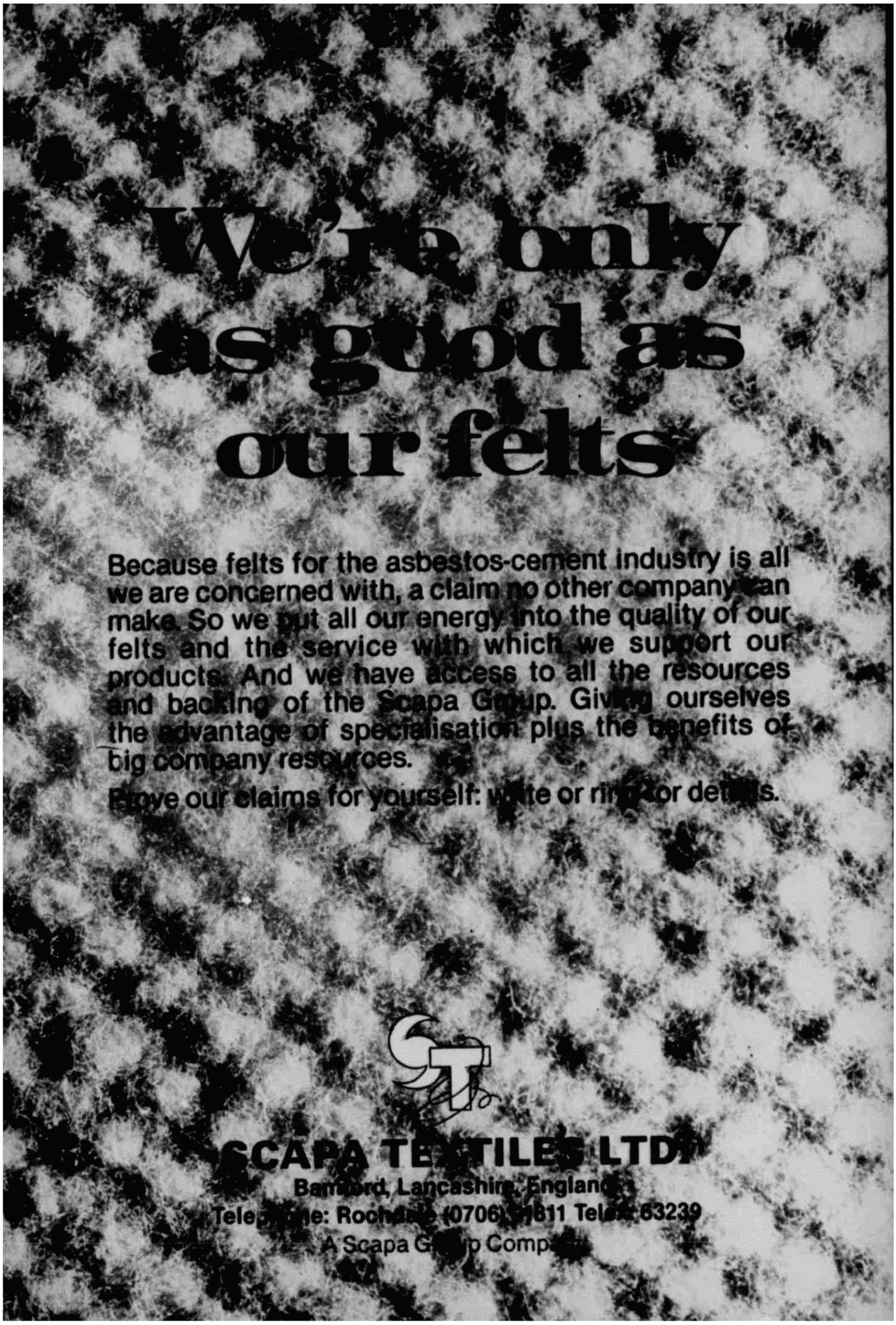
The total amount of unmanufactured asbestos exported in *January-August 1979* was 1,037,762 short tons (941,434 metric tonnes), valued at C$400,672,000.

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos cloth, dryer felts & sheets	C$ 3,939,000
Asbestos brake linings & facings	2,358,000
Asbestos-Cement building materials	10,185,000
Other basic asbestos products	5,422,000
	C$21,904,000

January-August 1978: Canadian exports of unmanufactured asbestos totaled 912,222 short tons (827,568 metric tonnes), valued at C$339,884,000; exports of manufactured asbestos products were valued at C$16,800,000.

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BIRTHDAY GREETINGS to . . .

Claude A. Kennedy, Director of Manufacturing Engineering, Raybestos Manhattan Industrial Products Co., N. Charleston, S. Carolina, January 15.

A. E. Hepper, a Director, Cape Industries Ltd., London England, January 16.

James J. Tracy, Vice President & Treasurer, Johns-Manville Corporation, Denver, Colorado, January 17.

T. M. McKain, Managing Director, Cape Boards & Panels Ltd., Uxbridge, Middlesex, England, January 21.

J. B. Heron, Managing Director, TBA Industrial Products Ltd., Rochdale, Lancashire, England, January 22.

John A. Malone, Asbestos Research Engineer, CertainTeed Corporation, Valley Forge, Pennsylvania, January 22.

R. O Banks, Company Secretary, James Hardie Industries Ltd., Sydney, New South Wales, Australia, January 25.

M. A. Wright, Managing Director, Cape Contracts Ltd., Barking, Essex, England, January 25.

Herbert S. Hirschfeld, Manager, Standard Insulation Company, New York City, January 27.

J. Eugene Connor, National Sales Manager (U.S. & Canada), Asbestos Fibre Division, Johns-Manville Sales Corporation, Denver, Colorado, January 28.

Malcolm E. Schumann, Jr., Plant Manager, Raybestos Friction Materials Co., Manheim, Pennsylvania, January 28.

Fred D. Cousins, Assistant Plant Superintendent, Cassiar Mine, Cassiar Asbestos Corporation Ltd., Cassiar, British Columbia, January 30.

Charles A. Fried, a Corporate Vice President, Raybestos-Manhattan, Inc., Trumbull, Connecticut, January 31.

Gabriel Ferrucci, President, Raybestos Manhattan Industrial Products Co. and a Vice President, Raybestos-Manhattan, Inc., N. Charleston, S. Carolina, February 1.

John W. Oughtred, Manager-Marketing, Cassiar Asbestos Corporation Ltd., Vancouver, British Columbia, February 2.

Gordon S. Dole, Quality Control Manager, Meredith Plant, Amatex Corporation, Meredith, New Hampshire, February 4.

G. R. Albino, President and Chief Operating Officer, Rio Algom Ltd., Toronto, Ontario, February 5.

Alton R. Morrill, Superintendent, Asbestos Plant, Johns-Manville Canada Inc., Asbestos, Quebec, February 5.

A. J. Austen, Chairman, Turners Engineering Products (Nigeria) Ltd., Kaduna, Nigeria, February 8.

R .H. Dent, a Non-Executive Director and former Chairman, Cape Industries Ltd., London, England, February 9.

C. Fred Workman, President, Norristown Division, and Corporate Vice President and a Director, Nicolet Inc., Ambler, Pennsylvania, February 9.

Ronald R. Moalli, President, Raybestos International, and a Corporate Vice President, Raybestos-Manhattan, Inc., Trumbull, Conn., February 10.

Ronald A. Wells, Managing Director, Alternative Materials and Fibres Unit, Turner & Newall Ltd., Manchester England, February 11.

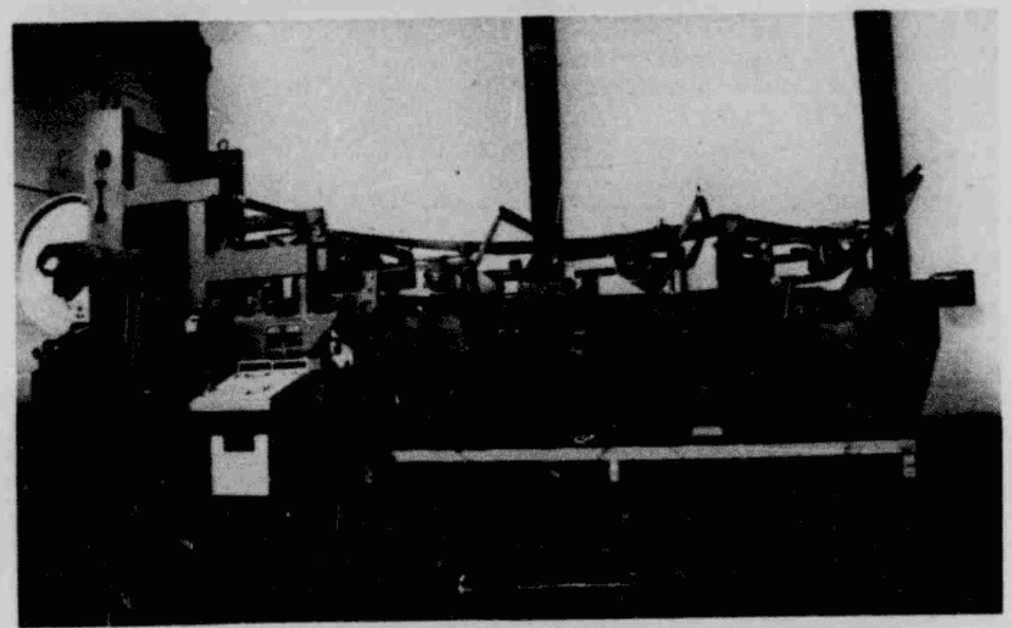
Stephen Gibbs, Chairman, Turner & Newall Ltd., Manchester, England, February 12.

James D. Moran, Chairman and Chief Executive Officer, The Flintkote Company, Stamford, Connecticut, February 12.

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CALENDAR OF EVENTS

UNIVERSITY OF WISCONSIN—Extension courses at the Madison Campus: Legal Aspects of Construction Contracting, *January 14-15;* Construction Safety and Health, *January 24-25;* Air Pollution Control, *January 28-29;* A Systematic Approach to Building Material Evaluation and Selection, *February 4-9;* Industrial Safety, *February 11-12;* Product Audits for Improved Products, *February 13-15.*

NEW YORK LAW JOURNAL—Coming Law Journal Seminars include: Trial and Preparation of Major Antitrust Cases, *January 14-15* at Los Angeles, California, and *January 28-29* at New York City; Structuring Acquisitions, *January 31-February 1* at New Orleans, Louisiana; *February 25-26* at San Francisco, California; *March 17-18* at New York City.

PRACTISING LAW INSTITUTE—Future programs include: Preparation of Annual Disclosure Documents 1980, *January 14-15* at Atlanta, Georgia, *February 11-12* at New York City, and *February 25-26* at San Francisco, California; 19th Annual Advanced Antitrust Seminar, *January 17-18* at San Francisco, California; Foreign Tax and Business Planning, *January 21-22* at New York City, and *February 11-12* at San Francisco, California; Toxic Substances Litigation, *February 8-9* at New York City, and *March 21-22* at San Francisco, California. Occupational Safety and Health Law, *February 11-12* at San Francisco, California, and *March 3-4* at New York City.

FINANCIAL DECISION MAKING AND RISK IN THE MINERAL INDUSTRY—Conference sponsored by the Mackay School of Mines; University of Nevada-Reno, Reno, Nevada, *January 14-16.*

MINERAL INDUSTRY MANAGEMENT—Course sponsored by the Mackay School of Mines; University of Nevada-Reno, Reno, Nevada, *January 14-18.*

PROFESSIONAL DEVELOPMENT—Seminars of McGill University at Montreal, Quebec: Health and Safety Aspects of the Mine Environment, *January 21-25;* Quality of Working Life in the Resource-Based Industries, *January 28-February 1;* Union-Management-Employee Relations in Resource-Based Industries, *February 4-6;* Geostatistical Ore Reserve Estimation, *February 11-15.*

INTEGRATED AND GUIDED WAVE OPTICS—5th Topical Meeting, Optical Society of America; Incline Village, Nevada, *January 28-30.*

OCCUPATIONAL RESPIRATORY PROTECTION—NIOSH Course 593 sponsored by The University of Utah; Salt Lake City, Utah, *February 4-8.*

INTERPIPE 80—8th International Pipeline Technology Conference and Exhibition; Houston, Texas, *February 5-7.*

SOCIETY OF EXPLOSIVES ENGINEERS—6th Annual Conference on Explosive and Blasting Technique; Tampa, Florida, *February 5-8.*

HEARING CONSERVATION NOISE CONTROL, INC.—Industrial Audiometric Technician Training/Certification Programs: *February 6-7* at Atlanta, Georgia; *February 13-14* at Philadelphia, Pennsylvania.

4TH INTERNATIONAL CONFERENCE ON ASBESTOS—Will cover economic geology, geology and mineralogy, chemistry and physics, mining, recovery and refining, industrial uses, quality control and environmental aspects; Torino, Italy, *May 26-30.*

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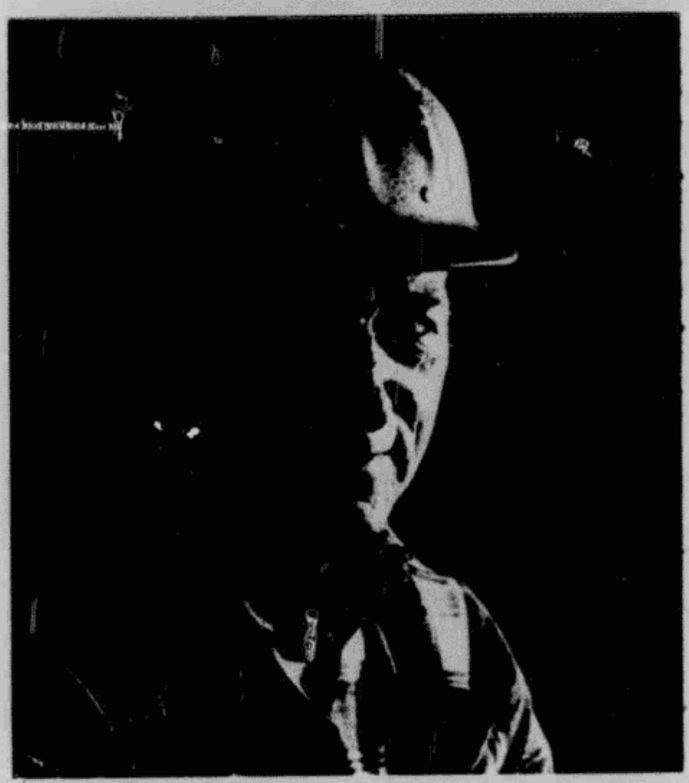
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