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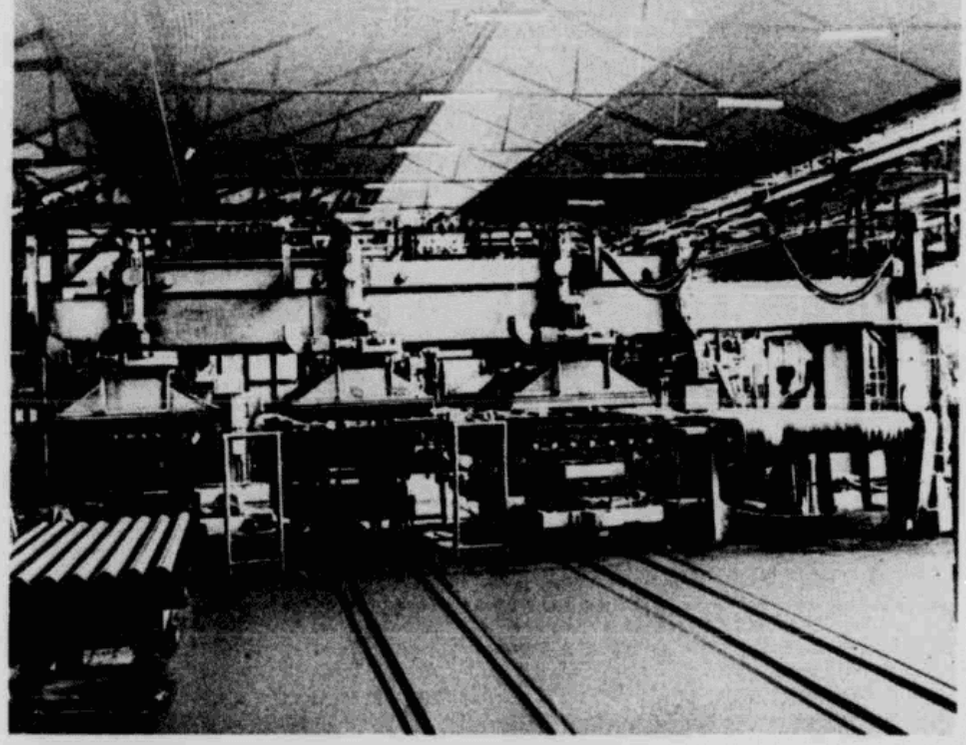
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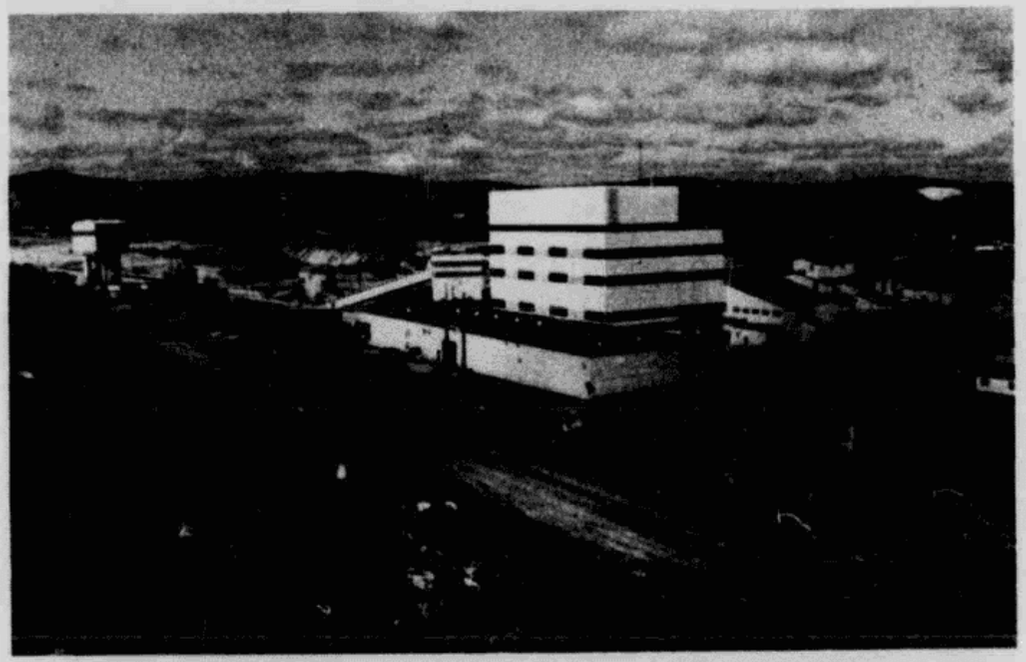
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ASBESTOS

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ANNUAL INTERNATIONAL REVIEW—1978

PART I: THE ECONOMY & OTHER MATTERS

GENERAL BUSINESS

In the early months of 1978 extremely severe winter weather and a prolonged coal strike combined to put a damper on business activity in the United States. Prices were moving steadily upward and, in his State of the Union address, President Carter proposed a program of voluntary wage and price restraints to dampen the ongoing inflation. In the same speech he suggested certain tax reforms which would result in a net overall tax cut for many businesses and individuals. Short-term interest rates started an upward move which was to continue throughout the year. The stock market continued its long slide which began in early 1977. At the same time, the U.S. dollar came under pressure on foreign exchange markets, starting a trend which was not to be halted until late in the year.

While various sectors of the economy exhibited diverse and rapid fluctuations, Gross National Product showed growth of 3.4%, annualized, in the first half and held up reasonably well for the balance of the year. Unemployment edged downward and dropped below 6% shortly after mid-year and has hovered at slightly above that figure since then.

The Federal Reserve Board, recognizing the dangers of inflation, attempted to cut the growth of the money supply by raising the discount rate. This was done in small steps until late in the year when a single large jump resulted in a rate of 9½%. While we have yet to see any appreciable effect on the general price level, these actions have resulted in strong upward pressures on interest rates. As this is written the prime rate at most banks is 11½% and some two-year U.S. Treasury Notes have been marketed to yield 9¼%, an historic high for such securities. These high rates have begun to adversely affect the housing industry which enjoyed a banner year in 1978.

The U.S. dollar continued to fall sharply vis-a-vis foreign currencies and, in October, the President announced the United States would intervene in foreign exchange markets to support the U.S. currency. The dollar showed immediate strength and has remained reasonably stable since that announcement.

In mid-April the stock market reversed its long downtrend and a strong rally on heavy volume carried prices to the 900 level of the Dow Jones Averages in September. In early October a sharp reaction started which carried the Dow below the 800 level in mid-November. Secondary stocks which had led the market higher over an extended period were hardest hit in the reaction, losing about 20% on average. Worsening inflation, weakness in the U.S. dollar and high interest rates are all serving to restrain the market at this point.

The year 1978 marked the start of a peaceful but determined citizens' revolt against high taxes. The first and most drastic move occurred in California where a referendum resulted in placing a lid on property taxes. Dur-

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ASBESTOS STOCK QUOTATIONS

Comparative Closing Prices	11/21/78	11/15/77	11/16/76
Abitibi Asbestos	C$.72	C$.70	C$.79
Advocate Mines	C$2.70	C$3.75	C$2.90
Armstrong Cork	16⅛	17¾	29⅝
Armstrong Cork (pfd 3.75)	41⅜	49	na
Asarco	14	14¼	15⅝
Asbestos Corporation	C$45.75	C$37.00	C$25.00
Bendix	35¾	39¾	39⅝
Bendix (pfd 3)	68½	78	80½
Carlisle	23	22⅝	13⅞
Cassiar Asbestos	C$9.25	C$8.375	C$5.00
CertainTeed	18⅝	25⅞	18⅝
Charter Consolidated (pence)	125	134	132
Colt Industries	33⅝	46	47⅜
Colt Industries (pfd 1.60)	25½	24½	25¾
Colt Industries (pfd 4.25)	70¼	65½	66¼
Conwest Exploration	C$5.00	C$4.55	C$3.00
Flintkote	27⅛	19⅞	21¾
Flintkote (pfd-B 2.25)	33½	31	30¼
GAF Corporation	10¾	9⅞	11½
GAF Corporation (pfd 1.20)	15⅛	15⅞	17⅜
Gulf & Western	13⅛	11¾	16⅛
Gulf & Western (pfd 2.50)	31	30⅝	na
Gulf & Western (pfd 3.87)	65	57¾	na
Gulf & Western (pfd 5.75)	70	72	72¼
IC Industries	24¾	25⅜	18¾
IC Industries (pfd 3.50)	41⅛	45	40⅜
Jim Walter Corporation	28½	29⅜	38⅝
Jim Walter (pfd 1)	11	12½	na
Jim Walter (pfd 1.60)	29⅞	32	42
Johns-Manville	23⅞	33¾	33
Kennecott Copper	22⅛	21½	26½
Lear Siegler	16½	16¾	11¼
Lear Siegler (pfd 2.25)	40	42	32½
Maremont	19¼	21¼	16¼
McAdam Mining	C$.26	C$.31	C$.40
National Gypsum	17⅞	16⅛	17⅜
Pathfinder Resources	C$.13	C$.29	C$.32
H. K. Porter (pfd 5.50)	75⅝	74	na
Raybestos-Manhattan	26⅝	31¼	27½
Rio Algom	C$34.00	C$22.75	C$27.00
Supradur (O.T.C.) Bid	5	5⅞	4⅛
Supradur (O.T.C.) Asked	5¾	6⅜	4⅝
Union Carbide	35	42⅝	56⅜
Woodsreef Minerals	C$.39	C$.77	C$.75

na—not available

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ing the off-year elections in November, many other States voted for similar tax cuts and many candidates were elected on platforms promising to limit or reduce taxing and spending. On the national level a new tax bill was enacted. While it bore little relationship to the President's original proposals, it will result in lower taxes for many businesses and individuals and will also increase incentives for capital investments.

Late in the year Mr. Carter presented a new plan to control inflation, involving government prescribed guidelines for voluntary wage and price limitations and suggesting some curtailment of government hiring, spending and regulation. At year-end those in charge of the program were busily engaged in trying to establish the guidelines and in explaining to business, labor and other involved parties just what each is supposed to do to comply with the program.

On the international front, biggest news of the year was the President's success in getting Egypt and Israel to arrive, in principle, at agreements which would settle most of their differences and assure peace in the Middle East for many years to come. While the agreements have been subject to further negotiations and have not yet been finalized, it is generally agreed that Mr. Carter achieved a diplomatic coup of no small magnitude in bringing the parties together and fostering the meeting of minds which has taken place.

Looking back over these comments for the past year it occurs to us that we may have seemed to go overboard in so often citing inflation as our number one economic problem. However, in view of the President's recent public statements and the feelings foreign governments and bankers have expressed on the subject, we are convinced we have not over-rated its importance. As we enter the new year, along with the usual hope for world peace we offer a prayer that our leaders will have the fortitude to attack and destroy this monster before it destroys us.

HOUSING & CONSTRUCTION

Residential building in 1978 exceeded predictions by almost 13% and non-residential building was 11% higher than had been predicted. These gains were more than sufficient to offset the rather disappointing performance of nonbuilding contracts which fell short of estimates by about 15%. Construction in all categories in 1978 totaled approximately $152-billion, exceeding the estimated $147-billion by 3.4%. Biggest surprise was the strength in residential construction which was believed to have peaked in 1977 but which moved strongly upward.

George A. Christie, Vice President and Chief Economist of McGraw-Hill Information Systems Company, presented his annual forecast of the coming year's construction market to nearly 600 executives at the annual Building Products Executives Conference in Washington, D. C., on October 26. He projects the total of construction contracts in 1979 at $155.8-billion, a 2% gain over the projected figure of $152-billion for 1978.

In view of worsening inflation and a combination of other unfavorable factors, Mr. Christie believes 1978 marked a change from expansion to stability in the construction field. He expects an approximate 5% decline

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in the total physical volume of new construction in 1979 with inflation boosting prices to a value about 2% higher than that of 1978.

Residential construction is projected at $68.3-billion, a 2% decline from 1978 volume, nonresidential building is estimated to gain 5% to $44.8-billion and nonbuilding construction is expected to increase 7% to about $42.7-billion.

Mr. Christie stressed his belief that the construction industry "is not headed for anything like the 1974/75 collapse" and a small decline in 1979 should not be categorized as a recession but rather as part of "a transition period in the evolution of the construction cycle."

MOTOR VEHICLE FACTORY SALES

Sales of automobiles from U.S. plants continued at a healthy level in 1978, slightly higher than those of 1977.

The fall in value of the U.S. dollar led to substantial increases in prices of foreign cars and their sales, as a percentage of the total market, dropped appreciably during the past year. American manufacturers have been able to take advantage of this price "umbrella" and have instituted price rises, particularly on their compact and intermediate lines. The sizes and weights of even the largest U.S. cars are being reduced in efforts to meet coming Federal standards for fuel economy. The constantly rising cost of new cars has necessitated more liberal financing terms for installment sales and the 60-month car loan has now become a reality in the United States.

Figures compiled by the Motor Vehicle Manufacturers Association of the United States, Inc., show sales of cars and trucks for the last five twelve-month periods to September as follows:

MOTOR VEHICLE FACTORY SALES FROM U.S. PLANTS

Annual Period	Passenger Cars	Trucks & Buses	Total Sales
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

METRICATION

The Metric Conversion Act of 1975 authorized establishment of a 17-member United States Metric Board, an independent government agency responsible for coordinating voluntary conversion to the metric system of measurement. In late 1977 President Carter nominated 15 persons for membership on the Board and named Dr. Louis F. Polk as Chairman of the Board. In March of 1978 the U.S. Senate confirmed Dr. Polk as Chairman and also confirmed the appointments of 12 other members of the group originally named to the Board.

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In April the Board held its first meeting in Atlanta, Georgia, in conjunction with a conference on metric conversion sponsored by the American National Metric Council. Despite some disparaging comments by an invited speaker, the consensus of those in attendance was that voluntary conversion to metric in the United States is progressing rapidly and it is just a question of time until the changeover will be complete. For example, the automobile industry, our largest producer of highly complicated mechanical products, is 100% behind the move toward conversion and has already made great strides in that direction.

Early in June Dr. Polk named Dr. Malcolm E. O'Hagan as Executive Director of the Metric Board. Dr. O'Hagan has been serving as President of the American National Metric Council and is an internationally recognized authority on metrication. Later in June the Senate confirmed the appointments of four new members to the Metric Board, thus completing the roster of the 17-member body.

During the year several Congressmen tried to scuttle the Board by sponsoring bills to abolish it, in some cases by moving to cut off its funding. Thus far there seems no chance they will succeed in such efforts.

The U.S. Department of Health, Education & Welfare, through its Office of Education, has awarded grants totaling $2-million to continue teaching school children and adults to use the metric system of measurement.

While the program is still a strictly voluntary one, the move toward metrication is gaining momentum and, as its benefits become more apparent, it seems quite possible the United States may eventually follow the lead of Britain and many other countries and make conversion mandatory with an established deadline for completion.

ENERGY

Some nineteen months after the President proposed a comprehensive national energy policy, the U.S. Congress passed a bill which represents the first positive action to implement the Carter proposals. Under this bill the price of natural gas will be completely deregulated in 1985. Meanwhile, an extremely complicated system will be established for pricing this fuel until that time and the price of intrastate gas, hitherto unregulated, will be placed under control. Incentives in the form of tax reductions are provided for homeowners who take certain fuel conservation measures such as insulating, installing solar heating devices, etc. No mention is made of the tax program proposed originally as a means to conserve petroleum fuels and, at the time, considered to be the "centerpiece" of the President's program.

Regardless of one's feelings as to the merits of the April 1977 proposals, it is obvious that Congress has failed to come to grips with the basic problems and there is little hope for positive action until we are faced with a much more serious emergency than is now apparent.

The effectiveness of government planning and control of pricing and allocation of energy sources has been brought into serious question by some recent developments in connection with natural gas. After a multi-year ban on new home heating installations using natural gas as the fuel,

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some utility companies are now encouraging such installations, at least for a "limited" number of customers. At the same time the U.S. Department of Energy has taken the official position that present oil users should switch to gas instead of to coal as the first step toward reducing petroleum usage. This represents an almost complete about-face from the fairly recent predictions of imminent natural gas shortages. While the present surplus may be short-lived, it has created a doubt on the part of industrial users as to which way they should go in planning for future energy supplies.

Present prospects are for the OPEC nations to increase the price of petroleum during the coming year. The amount and timing of the increases are subject to conjecture but oil importing nations can look forward to another upward push on their general price levels in the reasonably near future.

PART II: ASBESTOS MINING INDUSTRY

ASBESTOS PRICES CONTINUE UPWARD

After many years of little change in the prices for various grades of asbestos, steady increases have been announced yearly beginning in 1974.

Quebec—Producers of asbestos in the Province of Quebec raised the prices for their products an average 37% in 1974, 23% in 1975, 11% in 1977 and 5.6% in 1978. As of January 1, 1979, the Quebec asbestos price range has been increased an average of 7.1% (See Page 11).

British Columbia—Cassiar Asbestos Corporation Ltd. raised its prices an average 53% in 1974, 8% in 1975, 15% in 1976, 13% in 1977 and 4% in 1978. Effective the first of 1979, an average increase of 6.5% was announced (See Page 11). As a result of the Clinton Mine closure, the supply of Clinton fiber is limited. Also increased an additional $25.00 per ton above list price of base grade are the specialty grades AK100, AS100, AX100 and AY120.

United States—Based on data received from Robert A. Clifton, of the Bureau of Mines, U.S. Department of the Interior, the value of asbestos produced in the United States averaged $262.22 per short ton in 1978 vs. $248.44 per ton in 1977. . . . The price per ton for asbestos from *California* averaged $252.23 in 1978 compared with $246.75 in 1977. Union Carbide Corporation, Metals Division, announced increases for "Calidria" asbestos of approximately 7% in January 1978 and about 5% in June 1978. . . . *Arizona* asbestos prices were raised 9% in 1974, 16% in January 1975, 15% in April 1975 and 10% the first of 1978, adjusting to prices for Quebec asbestos. . . . *Vermont* increased the prices for its asbestos 16% in 1974, 45% in 1975, 13% in 1976, 14% in 1977 and 5% in 1978. Vermont prices were again increased, as of January 1, 1979, at varying rates. Grade 4T was raised 18%, 6D is up 19%, Hooker No. 1 will be 7.2% higher and Hooker No. 2, 20% higher (See Page 11).

Republic of South Africa—During the first eight months of 1978, the United States paid the following prices for asbestos imported from South

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CURRENT ASBESTOS PRICES

QUEBEC

As of January 1, 1979

Per Ton of 2000 Lbs., F.O.B. Mine
Canadian Dollars

No. 2 Crude	$2295
No. 3 Spinning Fiber	$1032—$1606
No. 4 Asbestos Cement Fiber	687— 1011
No. 5 Paper Fiber	388— 537
No. 6 Paper and Shingle Fiber	330— 332
No. 7 Shorts	113— 218

CASSIAR

As of January 1, 1979

Per Ton of 2000 Lbs., F.O.B. North Vancouver, B.C.
Canadian Dollars

Cassiar Mine

C-1	—No. 1 Crude	$3621
AAA	—Nonferrous Spinning Fiber; Canadian Group 3	2000
AA	—Nonferrous Spinning Fiber; Canadian Group 3	1600
A	—Nonferrous Spinning Fiber; Canadian Group 3	1050
AC	—Nonferrous Spinning Fiber; Canadian Group 3	960
AK	—Asbestos Cement Fiber; Canadian Group 4	850
AS	—Asbestos Cement Fiber; Canadian Group 4	740
AX	—Asbestos Cement Fiber; Canadian Group 4	670
AY	—Asbestos Cement Fiber; Canadian Group 5	470
AZ	—Asbestos Cement Fiber; Canadian Group 6	340

Clinton Mine

CT	—Asbestos Cement Fiber; Canadian Group 4	$ 680
CY	—Asbestos Cement Fiber; Canadian Group 5	470
CZ	—Asbestos Cement Fiber; Canadian Group 6	340

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

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Africa (with percentage change from prior year in parentheses): Amosite—$529.78 per short ton (up 6.3%); Crocidolite—$611.00 per ton (up 40.6%); Chrysotile Crudes—$634.67 per ton (up 9%); Chrysotile Spinning Fiber—$739.31 per ton (up 6.4%).

Union of Soviet Socialist Republics—In the same eight months the United States paid $291.51 per short ton for various asbestos crudes and fibers imported from the Soviet Union, 49.7% more than in the like period a year earlier.

THE GLOBAL SCENE

One result of the worldwide economic slump which continued through most of 1978 was a noticeable lack of construction activity. This greatly affected the Asbestos Industry due to the resultant lessening in demand for asbestos-cement building materials. Following the precedent set in past "Reviews," most of the statistical data appearing on the ensuing pages are for twelve-month periods ending between mid-year and August 1978. It will be noted that the depressed economic situation is reflected in the data. Toward the end of 1978, however, a brighter picture is beginning to emerge. Shipments of textile fibers are on the increase and an acceleration in demand for the shorter grades is taking place. While we do not discount the impact on the Industry caused by the "health issue," we believe the general recession is the real culprit and the condition of the Asbestos Industry will improve as the economy improves and as the U.S. dollar and other international currencies begin to stabilize. Asbestos fiber producers and product manufacturers are indicating their faith in the future of the Industry as they continue to spend and allocate large sums of money for plant expansions and improvements and for research into better products and new uses for their products. The U.S. Bureau of Mines also supports an optimistic view by estimating that *world asbestos production* will reach 5.5-million metric tonnes (6.2-million short tons) in 1978 which, according to our calculations, is an increase of 5% over 1977 and 10% over 1976. A geographical breakdown of the Mines Bureau figures for estimated world asbestos production in 1978 is:

Central Economy Countries	3,196,670 tons
Canada	1,696,440 tons
Republic of South Africa	418,874 tons
Other Market Economy Countries	760,587 tons
United States	100,309 tons
	6,172,880 tons

Of a total world output in 1977 of 5,878,829 tons, the Mines Bureau allots 2.7-million tons to the USSR (46%), 1.7-million tons to Canada (29%), 419,059 tons to South Africa (7%) and 220,000 tons each to Rhodesia (4%) and the People's Republic of China (4%). By comparison the Quebec Asbestos Mining Association (QAMA) gives a slightly lower world production figure of 5,779,000 tons in 1977, crediting 45% to the USSR, 27% to Canada and 13% combined to South Africa and Rhodesia.

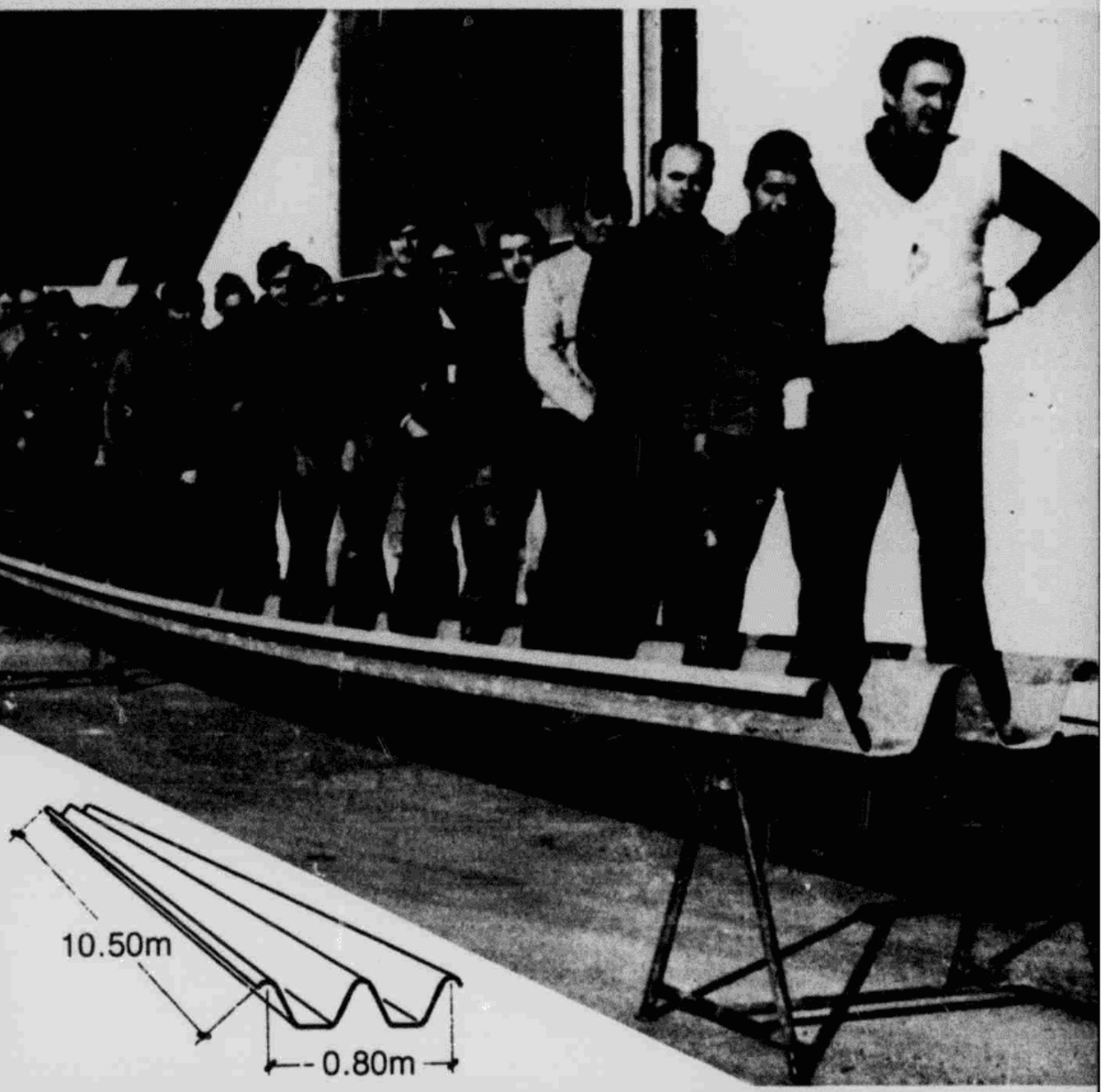
For the fourth consecutive year, the USSR has surpassed Canada as the world's leading asbestos producer although Canada remains No. 1 as

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a world supplier. Interestingly, the United States has lost the world lead to the Soviet Union as a consumer of asbestos.

QAMA predicts that from 1978 to 1981 *world demand for asbestos* should rise at an annual rate of between 1% and 2%. Factors influencing this prediction are an expected rapid increase in the developing countries, particularly in the Near East and Africa where production capacity for asbestos-cement pipes and sheets is growing considerably. This will be compensated somewhat by an anticipated marked decrease in traditional European and North American markets. QAMA further predicts that supply of the mineral will likely stabilize in the West and increase in Eastern Europe and that a slight deficit in world supply will occur, especially of short fibers.

Canada's Department of Energy, Mines and Resources (EMR), Ottawa, projects that world demand for asbestos will *annually* increase 4.5% in 1979 and 1980, 2.9% through 1985, 2.7% through 1990 and 2.9% through the year 2000. If this demand materializes as predicted, it will have risen a phenomenal 90% between 1977 and the year 2000. EMR's world demand predictions, statistically, are as follows: 1977—4,545,000 tons; 1978—4,741,000 tons, up 4.5%; 1979—4,948,000 tons, up 4.5%; 1980—5,168,000 tons, up 4.5%; 1985—5,915,000 tons, up 14.5%; 1990—6,704,000 tons, up 13.5%; and the year 2000—8,626,000 tons, up 28.5%.

UNITED STATES

A series of technical forums was held late this year to obtain public information and comments in connection with a U.S. Cabinet-level *review of nonfuel minerals policy.* The Policy Coordinating Committee making the review is chaired by Cecil D. Andrus, Secretary of the U.S. Department of the Interior. The forums focused on the following topics: outlook for minerals supplies and the U.S. minerals industries; relationship of environmental quality, health and safety and the price and availability of minerals; mineral potential of Federal lands; conservation, substitution and recycling; and adequacy of minerals-related research and development. The review was ordered by President Carter because of serious concerns about the outlook for the U.S. nonfuel minerals industry, adequacy of domestic reserves, production capacities and inventories and the security of future minerals imports. Asbestos is one of twelve minerals selected for in-depth analysis. An analysis will also be provided for all mineral commodities so that problems typical of the twelve can be related to other minerals important to the U.S. economy.

Under an agreement with the Canadian Government, 51 major libraries in the United States (one in each State plus Puerto Rico) will annually receive *official mineral supply-demand statistics on Canada's mining and mineral industries,* starting with the year 1978. In making the announcement, the U.S. Bureau of Mines said its own annual Minerals Yearbook section on Canada, which has typically been a 26-page chapter, will be a condensed summary. A footnote will refer readers to the Canadian Minerals Yearbook, which is the annual statistical reference being supplied to the libraries.

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U.S. Asbestos Industry

Asbestos ranks 10th in the list of minerals and metals for which the United States relies heavily on imports. The nation produces 15% of its asbestos needs and of the 85% imported, 98% of the Chrysotile is from Canada. All of the Crodicolite and Amosite originates from South Africa.

Apparent U.S. consumption of asbestos was 642,641 short tons in 1978, 4.3% less than the 671,543 tons reported for 1977 and 11.5% down from 726,322 tons in 1976. Mr. Clifton projects that domestic demand for asbestos will decrease at an average annual rate of 1% through 1985.

The construction industry used about 63% of the asbestos consumed in the United States in 1977 in the manufacture of asbestos-cement pipes, flooring and roofing products and asbestos-cement sheets. Major end uses for asbestos in the U.S. in 1977, according to the Mines Bureau, were:

Asbestos-Cement Pipes	24.0%	Paper	3.5%
Flooring Products	23.0%	Insulation, Thermal & Electrical	3.0%
Friction Materials	13.5%	Textiles	1.5%
Roofing Products	9.5%	Plastics	1.0%
Asbestos-Cement Sheets	6.5%	Other	5.0%
Coatings & Compounds	5.5%		100.0%
Packings & Gaskets	4.0%		

Of the 671,500 short tons of asbestos consumed by the U.S. in 1977, 637,600 tons of Chrysotile were used in the manufacture of all the above product categories. The remaining 33,900 tons were of the Crocidolite, Amosite and Anthophyllite varieties, used as follows:

Crocidolite—25,400 tons in asbestos-cement pipes, 900 tons in plastics, 500 tons in paper, 100 tons in roofing products and 100 tons in packings and gaskets;

Amosite—3,000 tons in asbestos-cement pipes and 1,200 tons in asbestos-cement sheets;

Anthophyllite—700 tons in friction materials and 2,000 tons in "other" products.

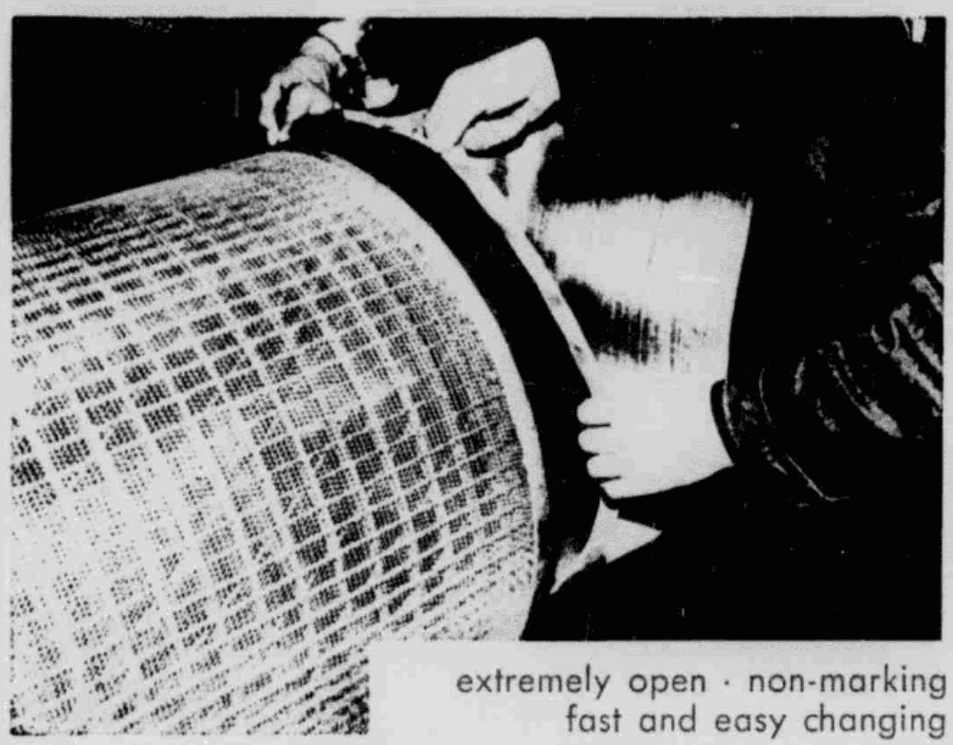
Although we have no figures as yet for 1978, 207 short tons of unmanufactured asbestos were released from the U.S. Stockpile in 1977 compared with 552 tons in 1976, 6,877 tons in 1975, 28,851 tons in 1974 and 6,761 tons in 1973.

The total amount of *asbestos produced in the United States* in 1978 was 100,309 short tons, valued at $26,303,000, down 1.4% in quantity from 1977 but up 4% in value. Compared with the year 1976, output showed a decrease of 12.7% but value was up 11%. U.S. asbestos production for the past five years was: 1978—100,309 tons, valued at $26,303,000; 1977—101,704 tons, valued at $25,267,000; 1976—114,842 tons, valued at $23,693,000; 1975—98,654 tons, valued at $14,220,000; 1974—109,091 tons, valued at $13,759,000.

California is the largest asbestos-producing State (approximately 70% of total U.S. output), followed by Vermont, Arizona and North Carolina (the latter producing a minimal amount of Anthophyllite). California produced 68,992 tons, valued at $17,402,000, in 1978; 77,000 tons, valued at $19,000,000 in 1977; and 83,302 tons, valued at $16,951,000, in 1976.

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Based on monthly and cumulative figures published in this Magazine, *U.S. imports of unmanufactured asbestos,* compared with the last annual period, fell 5.5% in quantity although value remained about the same for the year ended August 1978. Imports of Chrysotile were down 5% while Crocidolite rose 12% and Amosite was up 32%. Comparing the latest year with that ended August 1976, imports were down 6.5% in quantity but were higher in value by 11.5%. A five-year history of U.S. imports of unmanufactured asbestos is as follows:

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

YEAR TO	CHRYSOTILE	CROCIDOLITE	AMOSITE	OTHER	TOTAL QUANTITY	TOTAL VALUE
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

For the latest year under review, all of the Crocidolite and Amosite imported into the United States came directly from South Africa except for 171 tons by way of Canada. The sources of Chrysotile Crudes were 2,719 tons from South Africa, 20 tons from Canada and 17 tons from Italy. Canada supplied 7,052 tons of Chrysotile spinning fiber and 3,693 tons were imported from South Africa. The origins of the Chrysotile classified as "Other" were 540,052 tons from Canada, 3,531 tons from Mexico, 506 tons from South Africa and 48 tons via Yemen. In the "Other Crudes & Fibers" category, the United States imported 14,587 tons from Canada, 3,893 tons from the USSR, 1,581 tons from South Africa, 345 tons from Rhodesia, 312 tons from Taiwan, 41 tons from Italy and 24 tons from India.

The United States exported 43,936 short tons of manufactured asbestos fiber, waste and refuse, valued at $12.3-million, during the year ended August 1978, an increase over the prior year of 18.5% in quantity and 9% in value but a decrease over the year ended August 1976 of 4.5% in tonnage and 55.5% in value. A statistical picture of the past five years is as follows:

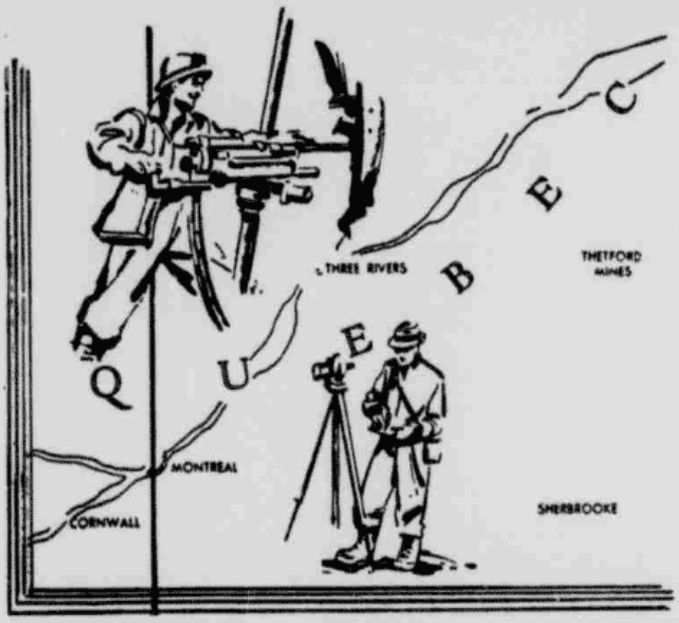
U.S. EXPORTS OF UNMANUFACTURED ASBESTOS (SHORT TONS)

YEAR TO	FIBERS	WASTE & REFUSE	TOTAL QUANTITY	TOTAL VALUE
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. exports of unmanufactured asbestos were valued at $280.77 per short ton in 1978, $305.48 per ton in 1977 and $277.85 per ton in 1976.

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U.S. Asbestos Mines

California—Large quantities of asbestos are produced in California, the main sources being the Copperopolis area of Calaveras County and the Coalinga area of western Fresno and southern San Benito Counties. In both areas Chrysotile asbestos-bearing serpentine is mined in open pits (California Geology). . . . *Calaveras Asbestos Ltd.*, Copperopolis, mines Chrysotile Grades 4-7, mainly used in the manufacture of asbestos-cement pipes and sheets. Mr. Gordon A. Coats, President of Calaveras Asbestos, in commenting on high costs having a tremendous impact on earnings, said the company is paying substantially higher energy costs (over 100% increase in one year) and environmentally-related expenses (400% over budget). He further announced that Wilbur-Ellis/Connell Bros., an organization which had represented Calaveras Asbestos for two years, has now acquired an interest in the company. . . . *Union Carbide Corporation,* Metals Division, produces "Calidria" asbestos products from short-fibered Chrysotile mined in San Benito County. The plant is at King City. . . . Vinyl-asbestos floor tile is the primary market for the Chrysotile Grade 7 produced by *Atlas Asbestos Company* near Coalinga, in Fresno County. . . . The unimproved asbestos-bearing property in *Tuolumne County, Sonora Township,* remains available for purchase. Reportedly it holds 4.5-million to 9-million tons of recoverable asbestos, Grades 4-7. . . . *Adams Mining, Milling & Manufacturing* expects to again be working an asbestos property in Trinity County in the near future.

Vermont—Acquired from GAF Corporation for $400,000 in 1975, the 2300-acre asbestos quarry and mill at Belvidere Mountain, Lowell, is now owned and operated by *Vermont Asbestos Group, Inc.* The projected annual production rate of 40,000 tons has not materialized although output is meaningful and ranks second in the nation. Recent intensive exploration into mineral resources has indicated there is sufficient asbestos for twelve years of surface mining. If VAG goes underground the life of the mine is even more substantial, although undetermined at this time. During a heated annual stockholders meeting in April, Howard A. Manosh won control of VAG when all but one man on his 15-member slate were elected to the Board of Directors, ousting the previous management. Mr. Manosh was then named President and Chairman of the company. Later in the year it was learned that Schoeffer Associates, Inc., had issued a tender offer for VAG. The purchase price set by Schoeffer was $2,200 per share vs. a tender offer by Mr. Manosh for shares at $1,834 each. The stock originally sold at $50.00 a share.

Arizona— An underground mine in the Tonto National Forest and a mill some 30 miles distant, near Globe, are operated by *Jaquays Asbestos Corporation.* In 1974 the company completed a $100,000 mill modification program to comply with air pollution requirements for asbestos processing. It has been rumored that production of the Arizona low-iron Chrysotile is on the decrease and that Jaquays may close the mine.

North Carolina—Baltimore, Maryland, is the site of *Powhatan Mining Corporation's* Anthophyllite (amphibole) asbestos mill. The material is shipped from the company's open-pit Hippy Mine at Newdale, Yancey County, North Carolina. Production is minimal.

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Alaska—Potentially large mineralized zones are indicated and investigations are continuing at the Chrysotile asbestos deposit near Eagle, Alaska, some 60 miles west of the Clinton Mine in the Yukon Territory, recently closed by *Cassiar Asbestos Corporation Ltd.* The Alaskan project is a joint venture between *General Crude Oil Company, a wholly-owned subsidiary of International Paper Company; McIntyre Mines (Nevada) Ltd., a wholly-owned subsidiary of McIntyre Mines Ltd.; Tanana Asbestos Corporation, a wholly-owned subsidiary of Doyon Ltd.; and WGM Inc.*, a geological and mining consulting firm based in Anchorage. If fiber grades and physical properties prove favorable, and a mining-milling operation is begun, the United States could conceivably reduce its currently heavy reliance on asbestos imports to meet its needs for the mineral.

Texas—No further information has been received on the Diablo Asbestos Deposit located near Van Horn, owned by *Lewter Oil Company*. Presumably the Richterite (amphibole) property remains available for strip mining.

CANADA

Canada continues to hold its rank as the third largest mining country in the world, exceeded only by the United States and the USSR and shipping over 60 commodities produced by Canadian mining companies to some 100 countries.

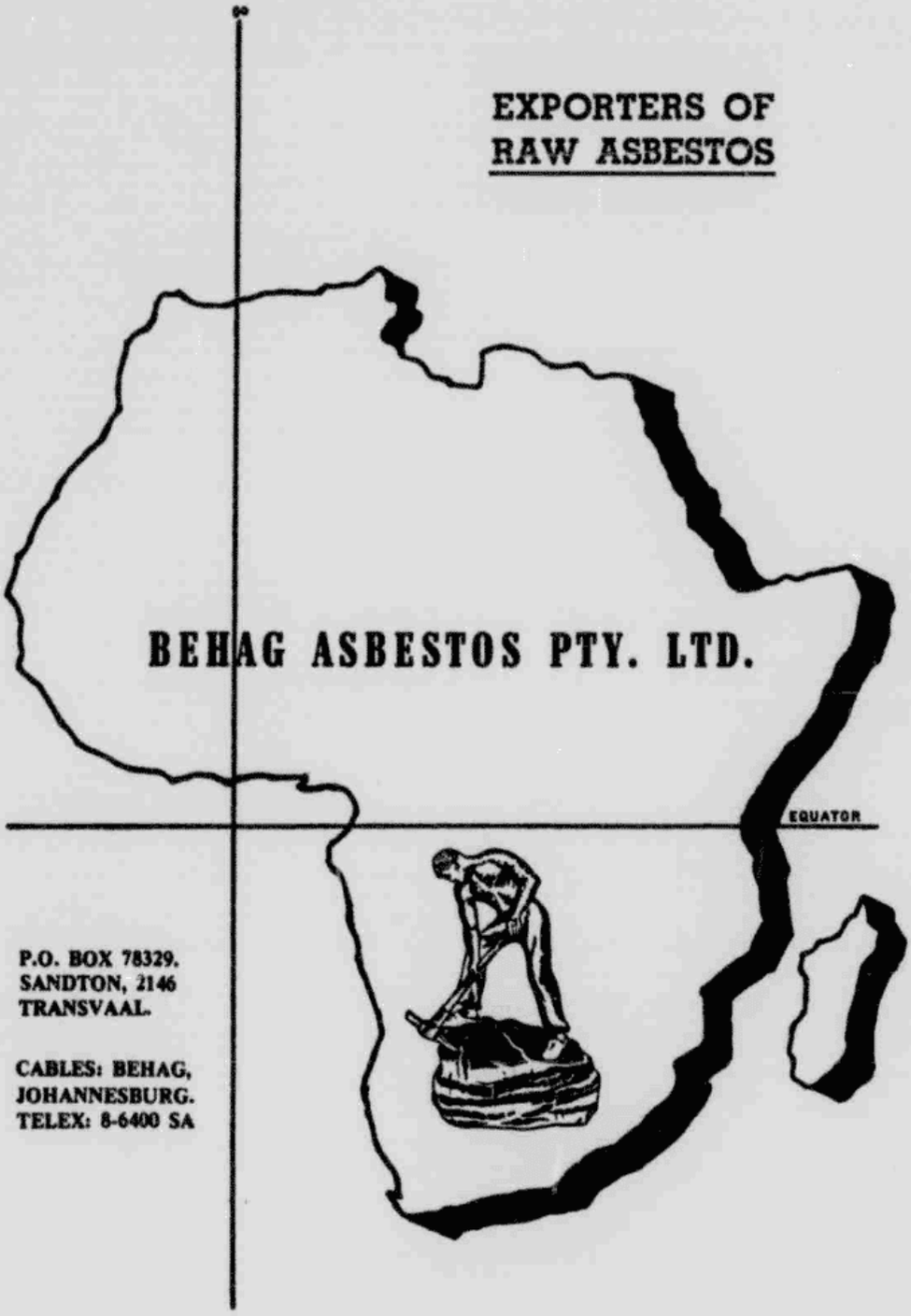
The nation also remains the *world's biggest supplier of asbestos*, exporting about 95% of her output. Among the Provinces, Quebec is the primary producer (about 81% of total Canadian asbestos production), followed by British Columbia, Newfoundland, the Yukon and Ontario. In 1976 Canada accounted for 61% and Quebec 50% of the 2.69-million tons of asbestos fiber produced in the western world. Total Canadian fiber exports were 64% of world exports of the mineral.

In an article titled "Mineral Waste Resources of Canada" (CIM Bulletin), it is estimated the asbestos industry in Canada produces between 50-million and 60-million tons of mineral and mineral-based waste each year. R. K. Collings, of CANMET, Department of Energy, Mines and Resources, Ottawa, goes on to say that asbestos tailings are produced in large amounts and are of interest for the recovery of additional metals and mineral material. Asbestos tailings contain 5% to 10% short fiber along with significant amounts of magnesium (40% MgO), nickel (0.25%), chromium (0.5%) and iron (6% to 8%). Research has been done on the recovery of the short fibers by wet processing methods and studies by CANMET have demonstrated the technical feasibility of producing mineral wool from these tailings, along with co-product nickel-iron.

Primary producers' shipments of asbestos (including tonnage for own use) for the year ended August 1978 were 1,592,041 short tons, 6.5% less than in the prior twelve-month period but 2.5% ahead of the year ended August 1976. As of January 1, 1978, these figures include concentrate shipped from Asbestos Hill to West Germany for processing. Some 300,000 tons of the ore from Asbestos Hill yields about 93,000 tons of fiber. Based on information received from Paul A. Filteau, Executive Vice

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President of the Quebec Asbestos Mining Association, the value of producers' shipments for the latest year is C$522-million. This is somewhat less than our calculations based on Canadian asbestos export figures issued by Statistics Canada for the same period, the latter showing shipments worth $595-million.

A breakdown of shipments of Quebec grades for the latest annual period, with percentage differences from the prior year, is as follows: Group 3 Spinning Fiber—14,018 short tons, down 29%; Group 4 Shingle Fibers—420,095 tons, up 19%; Group 5 Paper Fibers—156,281 tons, up 3.6%; Group 6 Stucco Fibers—213,823 tons, down 15.5%; Group 7 Refuse—541,452 tons, down 8%; and Group 8 Sand—19 tons vs. 3 tons the prior year. . . . In addition, shipments from British Columbia, the Yukon, Newfoundland and Northern Ontario totaled 246,353 tons during the twelve months ended August 1978, 26% below the prior like period. Mr. Filteau advises there is little demand or use for the asbestos powder designated as Group 8 and that Crudes 1 and 2 are too expensive and no longer available in substantial quantities. Past users of the Crudes, mainly textile manufacturers, are finding the long Group 3 Spinning fibers most suitable for their needs. . . . Canadian producers' shipments of asbestos for the past five years were as follows:

CANADIAN ASBESTOS PRODUCERS' SHIPMENTS (SHORT TONS)

YEAR TO	QUEBEC	OTHER*	TOTAL QUANTITY
Aug 78	1,345,688	246,353	1,592,041
Aug 77	1,366,922	333,299	1,700,221
Aug 76	1,260,254	294,944	1,555,198
Aug 75	1,544,750	360,485	1,905,235
Aug 74	1,568,742	297,550	1,866,292

*British Columbia, the Yukon, Newfoundland and Northern Ontario

During a recent telephone interview, Mr. Filteau predicted that *Quebec asbestos production* in the year 1978 will total 1.3-million short tons, valued at some C$422-million—approximately the same quantity as that reported for the year 1977. In projecting the figure he stated that 1979 could be a good year if the industry can counter the bad publicity now being given the asbestos-health issue in the European Community. Many questions are being asked and QAMA will be part of a team visiting Europe this month to explain the Quebec position and define its technological knowledge and experience.

Exports of asbestos from Canada totaled 1,410,034 short tons, valued at C$527,216,000, for the twelve months to August 1978, down 15.5% in quantity and 4% in value from the prior like period. Compared with the year ended August 1976, the tonnage showed a 5% decrease but the value was up 27%. For the past five years ended in August, the value per ton of asbestos exported from Canada, based on data issued by Statistics Canada, is calculated at $373.91 in 1978, $329.88 in 1977, $280.26 in 1976, $223.03 in 1975 and $170.68 in 1974. For the period January-August 1978, 43% of Canada's exports of asbestos were shipped to the United States, 24% to Western Europe, 15% to Asia, 11% to South and Central America, 3% to Oceania, 2% to Eastern Europe, 1.5% to the Middle East and less than 1% to Africa. Canadian exports by fiber grade for the past five years were as follows:

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CANADIAN ASBESTOS EXPORTS (SHORT TONS)

YEAR TO	CRUDE	MILLED 3	MILLED 4 & 5	SHORTS 6-9
Aug 78	1	23,695	658,564	727,774
Aug 77	21	28,103	806,793	828,965
Aug 76	194	22,338	698,612	760,205
Aug 75	303	26,458	706,876	652,405
Aug 74	16	32,708	854,491	892,897

Total quantities and values of Canadian exports for the above five years were: 1978—1,410,034 short tons, valued at C$527,216,000; 1977—1,663,882 tons, $548,925,000; 1976—1,481,349 tons, $415,064,000; 1975—1,386,043 tons, $309,125,000; 1974—1,780,112 tons, $303,806,000.

Canadian asbestos ore reserves have been calculated at over one-billion tons, containing about 48-million tons of recoverable fiber. It is estimated that these currently-known reserves will be sufficient to meet the demands of the Western World well beyond the year 2000.

Quebec Asbestos Mining Industry

There has been commercial production of asbestos in the Eastern Townships of Quebec Province for over 100 years. It is generally agreed the mineral was discovered in 1875 near Thetford Mines by Andrew Johnson, a timber merchant. The first commercial extraction of the ore, by hand-cobbing method, took place in 1876 in Thetford Mines, followed shortly thereafter by commercial production in the town of Asbestos.

Quebec topped the list of Canadian asbestos-producing Provinces with 81% of its deliveries supplied from the mines located in the Eastern Townships. This area employs over 6,800 workers and distributes its Chrysotile to more than 80 countries. The mineral is used widely because of its several vital, inherent characteristics, i.e., 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. Because of the immense range of products which contain asbestos, Quebec's asbestos mines produce close to 150 types of fiber. As some fibers are better suited to certain manufacturing processes, it is essential that users have precise knowledge of the various categories and classes of fiber available in the market. Hence the importance of a rigorous and uniform classification system. The official classification of the *Quebec Asbestos Mining Association,* the Quebec Standard, is recognized and accepted throughout the world. It divides the Chrysotile into eight basic groups, on the basis of fiber length. These groups are, in turn, subdivided into grades according to color, absorptivity, density, strength and other characteristics.

In discussing *economic benefits to the Province,* the following remarks were made by Michael J. Messel, President of QAMA, at the Association's 29th Annual General Meeting in March: ". . . . In 1977 more than $110-million were paid in wages and salaries to the 6,000 workers employed among the five mining companies in the Eastern Townships, to which may be added a further $30-million or so paid by the companies in

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contributions to the various social security plans. Moreover the asbestos industry, which reinvests in Quebec more than 95% of its net income, will yet again have contributed more to the Quebec economy than all the other mining sectors combined, alone providing more than 60% of all sums which the Quebec Treasury draws from the entire mining industry. Thus, if we added all the purchases of material goods and services obtained from 835 Quebec companies, including more than 200 suppliers in the mining areas alone, totaling some $150-million, we now find that the asbestos companies inject nearly $350-million per year into the national economy."

In late November 1977, Bill 70 was introduced in the Quebec National Assembly. In essence the Bill created the *Societe Nationale de l'Amiante (SNA)* with an authorized capital of $250-million. The purpose of the new Quebec Crown corporation is the research and development of asbestos deposits and the marketing of their product and all activity of an industrial, manufacturing or commercial nature relating directly or indirectly to the transformation of asbestos fiber. On October 19, 1978, Mr. Yves Berube, Quebec Minister of Natural Resources, announced that a head office for the SNA would be established in Thetford Mines, thereby rendering the National Asbestos Corporation (English translation) operational. Its first project is the production of asbestos paper and this endeavor will be discussed in greater detail in the January 1979 issue of ASBESTOS, as part of the 1978 Asbestos Products Review. Of interest to the mining side of the business, however, is that if or when *Asbestos Corporation Ltd.* is acquired by the Province of Quebec, it will become a subsidiary of SNA. Quebec's plan is to acquire the 54.6% interest in Asbestos Corporation held by General Dynamics Corporation. Although discussions continue, no decision has been reached. An agreement as to price per share seems to be the biggest obstacle, with the Province offering $68.00 and General Dynamics suggesting $108.00. General Dynamics has said repeatedly it is not desirous of disposing of its interest in Asbestos Corporation. Latest news reports quote Quebec Premier Rene Levesque as saying the Province will "expropriate" the 54.6% held by General Dynamics if GD cannot agree with the government on a price for the holding.

Canadian Asbestos Mines

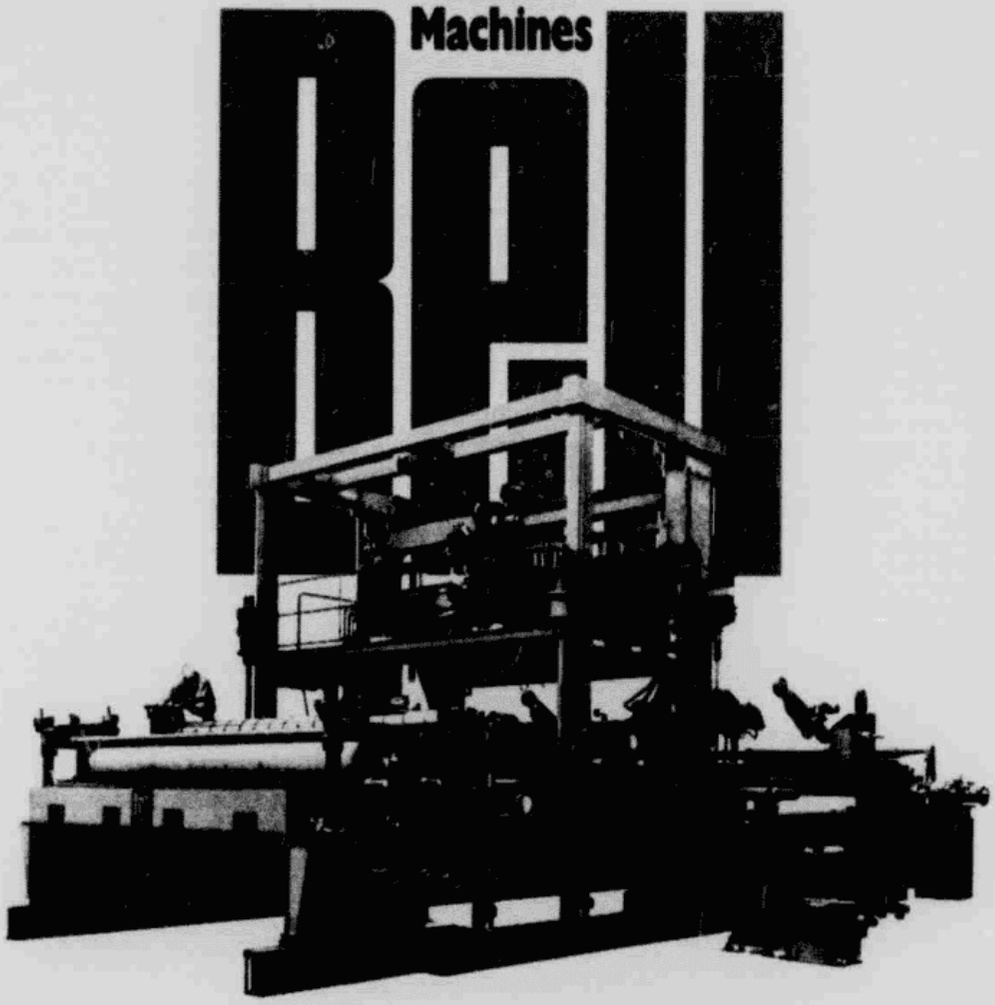
Abitibi Asbestos Mining Co. Ltd.—New exploration is under way at the Abitibi asbestos project near Amos, northwestern Quebec, and talks are continuing between Brinco Ltd. and other firms, including Asarco Inc., an original prospective partner in developing the site. Development will probably be accomplished by a consortium led by Brinco, which holds 60.4% of Abitibi Asbestos. Cost estimates have risen to well over C$400-million for mine development and a milling plant. 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 tons of fiber.

Advocate Mines Ltd.—A loss of $2.5-million or 40.1¢ per share, after providing for income taxes, was incurred by Advocate Mines in the first half of 1978. The loss was attributed to a three-month strike by the firm's hourly paid workers and to the significant wall failure in the North Pit which occurred in late 1977. Advocate shipped 12,512 metric tonnes of asbestos fiber from January to June 1978 compared with 24,798 tonnes during the comparable period a year earlier. Ore reserves at December 31, 1977, stood at 42.3-million tons. Advocate produces mostly Groups 4 and 6 Chrysotile.

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Asbestos Corporation Ltd.—Net earnings in the first nine months of 1978 were $9.6-million on sales of $101.4-million compared with $15.1-million on sales of $109.4-million in the same period in 1977. Fiber tonnage sold was lower than last year and revenue, in spite of higher prices, did not increase sufficiently to offset higher costs due to inflation and the exchange losses recorded from Asbestos Corporation's German operations due to the devaluation of the Canadian dollar. In a letter to the shareholders, President M. E. Taschereau said that market research indicates that inventories of fiber held by asbestos cement producers have been significantly reduced from the high levels reported at the beginning of 1978. Demand for asbestos cement fiber, 85% of the Corporation's production capacity, is forecast to continue to improve with a shortage situation developing by mid-1979. Asbestos Corporation has the capacity to annually produce 230,000 tons of asbestos fiber, or about 12% of the Western World's production. Ore reserves at the Normandie Mine were exhausted in November 1977. However, the mill continues to process ore from the King-Beaver open pit. Studies are underway on the Penhale underground asbestos mine situated below the exhausted Normandie pit near Vimy Ridge. The open pit and mill at Asbestos Hill, located about 1,200 miles north of the Thetford area, at Putuniq, Ungava, Quebec, produced 258,300 tons of ungraded fiber in 1977 which was shipped to the finishing plant at Nordenham, West Germany, for a fiber yield of 79,300 tons. ACL completed its underground exploration program begun at Asbestos Hill in 1975. Results were to be analyzed prior to making a final decision concerning an underground mining operation. Open pit ore at Asbestos Hill will be exhausted in about six years. Capital expenditures, largely aimed at improving dust control at all operations, are continuing. Approximately $40-million will have been expended by the time the programs are completed. Proven ore reserves at year-end 1977 were 226,243,000 tons. In addition, there are 100-million tons classified as probable ore and 205-million tons categorized as possible ore.

Bell Asbestos Mines Ltd.—This company, a subsidiary of Turner & Newall Ltd., Manchester, England, is the only Canadian asbestos producer totally dependent on underground mining operations for its ore supply. The Bell Mine has been operating in Thetford Mines, Quebec, since 1877, producing mostly Grades 3-6 Chrysotile. As part of its expansion and improvement program, Bell temporarily halted production in July to begin two weeks of significant work on the No. 3 shaft. The work was necessary to meet the projected 28% increase in production as of January 1979. Annual asbestos fiber production capacity will be increased from the current 58,000 tons to 72,000 tons. Bell Asbestos has spent over $28-million to modernize its facilities since the program started in 1966. A considerable portion of the expenditure has been to improve health conditions at the work site.

Carey-Canadian Mines, Ltd.—A wholly-owned subsidiary of Jim Walter Corporation, Tampa, Florida, Carey-Canadian Mines produces short fiber Chrysotile (slip fiber) at its open pit mine and mill in 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. Because of its dust control improvement program, Carey-Canadian is confident it will meet the latest environmental mandates, as required several years

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hence by the Federal and Provincial governments. Running changes at the mill have been successful and production capacity of medium length fibers has been increased significantly. A new open pit, A, is under development six miles from the existing mining facilities. When worked at full capacity, this third pit will provide 2,000 tons of ore per day. The opening of pit A will allow continued feeding to the mill at East Broughton after pit B is finally worked out. Another pit, C, daily provides 4,000 to 5,000 tons of ore. Ore reserves at Carey-Canadian are 45-million tons of proven ore plus 75-million tons of probable and possible ore.

Cassiar Asbestos Corporation Ltd.— In its report to shareholders for the nine months ended September 30, 1978, Cassiar Asbestos reports a revenue of $73.2-million, down 14% from the corresponding period a year earlier, and net income of $13.1-million or $2.39 per share, down 20%. Fiber sales during the third quarter were 46,060 tons compared with 38,175 tons for the equivalent period in 1977. The increased sales resulted in net profit for the quarter of $4.8-million or 88¢ per share, up 27% from the third quarter of 1977. At the time of issue of the report (October 25), Cassiar's operations had been shut down due to strike action which began September 15. The company produces about 100,000 tons a year of Chrysotile asbestos at the Cassiar Mine at McDame Mountain, British Columbia. The open pit operation has a life span of some 20 years and ore reserves at year-end 1977, mineable by open pit methods, were calculated at 16,277,000 tons. A continued improvement in airborne fiber counts is being achieved with greater maintenance and dedicated effort on the part of employees and management to keep working places clean and free of dust. A diamond drilling program was carried out at the asbestos prospect at Kutcho Creek, in northern British Columbia. Results were sufficiently encouraging for Cassiar's Directors to consider continuing the drilling program during the summer of 1978. In August 1978 Cassiar Asbestos officially ceased operations at its Clinton Mine and Mill at Clinton Creek, in the Yukon Territory, because of the depletion of ore supply. During its ten-year life span the mine produced 1,033,699 tons of asbestos fiber valued at C$295-million. The closing of the Clinton Mine also resulted in the shutting down of Cassiar's Transport Division at Whitehorse.

Citlec Minerals Ltd.—Some exploration has been done on the prospect at St. Cyr in Richmond, Quebec, and a small drilling program is planned to search for asbestos in the "A" zone. Early this year it was learned the Vancouver-based company was continuing negotiations with major firms toward possible participation in the project.

Golden Gate Explorations Ltd.—This company intends to conduct a recommended large core diamond drilling program to assess the nature of the new zone indicated on the Rex asbestos prospect near Haines Junction, in the Yukon. During September and October, twelve rotary holes were completed and resulted in the indication of a new zone of Chrysotile asbestos, extending southward from the area where previous trenching and drilling had been done. The last hole showed the zone to extend about 700 feet south of the original surface pit trench (Northern Miner).

Great Northern Pulp & Paper Group Ltd.—A report has been submitted by Kilborn Ltd. which recommends drilling to 1,500 feet at the Daffodil asbestos property, Deloro Township, Cochrane District, Ontario. Aim is to

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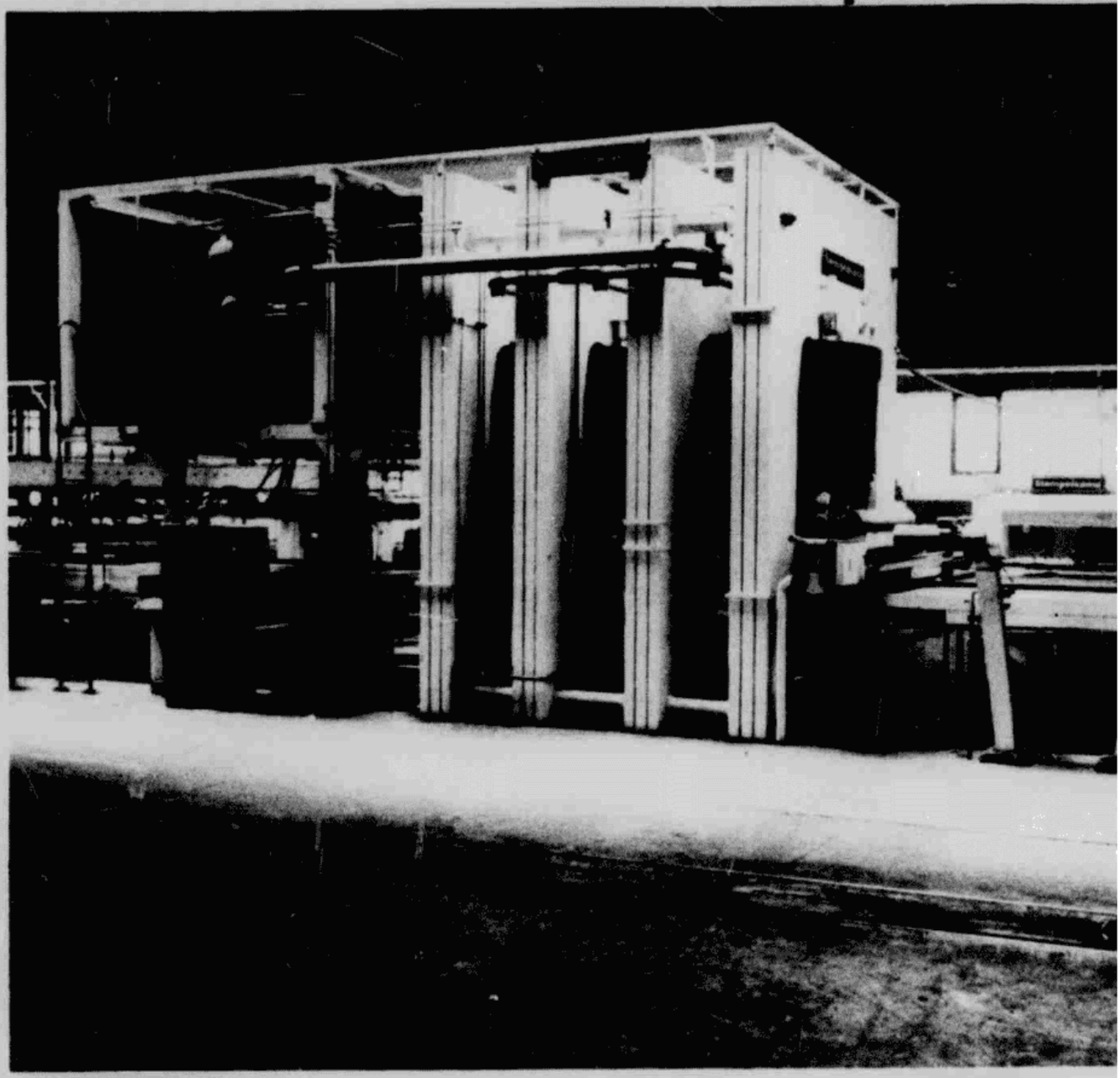
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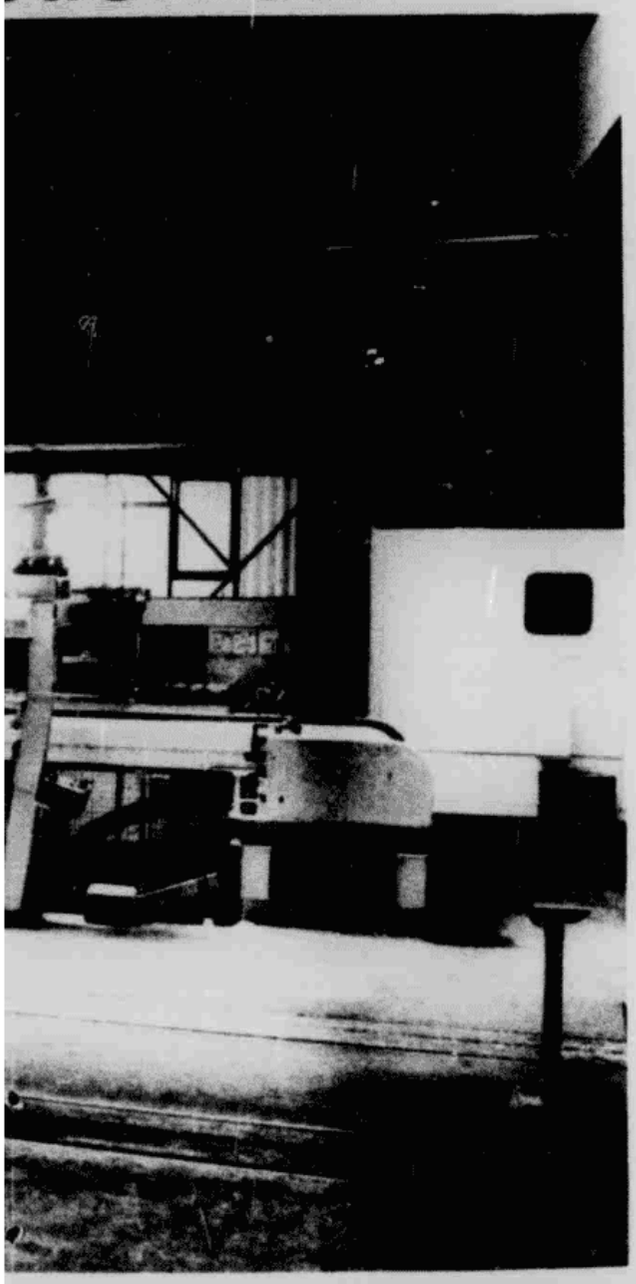
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prove reserves in the 37-million to 50-million ton range. A value of $12.94 per ton, in place, has been estimated which represents a recovery of 4.03% fiber. Financing arrangements are anticipated.

Hedman Mines Ltd.—A Chrysotile open pit mine and mill is operated by this subsidiary of Gulf + Western Industries, Inc., near Matheson, Ontario. Some 10,000 to 15,000 tons of cationic fiber are shipped annually. Proven ore reserves to 300 feet vertical have been calculated at about 10-million tons. A greater tonnage exists to 740 feet vertical and beyond.

Hollinger Mines Ltd.—An asbestos occurrence was found on the Newton Township property of Hollinger's Rundle Gold Mines in the Horwood Lake-Rush Lake area near Timmins, Ontario. No further work has been done since diamond drilling over a year ago.

Johns-Manville Canada Inc.—This company, which recently changed its name from Canadian Johns-Manville Co. Ltd., is the leading asbestos mining company in Quebec and, in fact, 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 pit is continually being enlarged and the most recent measurements at hand are that it measures 6,500 feet east to west, 6,000 feet north to south and is 1,010 feet deep. J-M Canada's five-year, $77-million capital expenditure program is on schedule and is expected to be completed in 1981. The program is designed to ensure continuing profitable and safe mining operations at Jeffrey for the next 15 years. An annual production of 700,000 short tons is anticipated. Also a major Canadian manufacturer of asbestos-containing products, J-M Canada has annual sales of $276-million and a total employment of 4,200. The company is cooperating with the Quebec Department of Natural Resources in a pilot project to recover nickel-bearing ore from asbestos tailings. J-M Canada's parent company is Johns-Manville Corporation, Denver, Colorado.

Lac d'Amiante du Quebec, Ltee.—This mining company officially changed its name from Lake Asbestos of Quebec Ltd., effective November 1, 1978. A wholly-owned subsidiary of Asarco Inc., LAQ was incorporated by Asarco in 1952. The National property was acquired from National Asbestos Mines Ltd. in 1973. Both the Lake Asbestos and the National Mines Divisions first produced asbestos from their respective mines in 1958. The Lake Asbestos operation is at Black Lake and the National facility at Thetford Mines. Production of Chrysotile Grades 4-6 hit a record level in 1977, at 255,000 tons. Sales during the same year were 244,000 tons. Between 1976 and 1979 approximately $7-million is being spent for improvements in the workplace environment at Black Lake and to modernize and initiate an air purification program at National.

Lynx-Canada Explorations Ltd.—The original asbestos prospect in Deloro Township, south of Timmins, Ontario, is still held in good standing and Chairman T. P. Matthews reports that, although no exploration was planned in 1978, further work on the properties is hoped for in the not-too-distant future.

McAdam Mining Corporation Ltd.—Under an agreement reached in 1970, McAdam Mining granted a working option to Rio Tinto Canadian Explorations Ltd. on McAdam's 61 mining claims held at Roberge Lake,

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McCorkill Township, Quebec. Although Riocanex has decided to hold further development in abeyance, it is maintaining its option in good standing by continuing to pay McAdam $60,000 annually in advance royalties. Bulk samples from the "C" zone indicate the occurrence of good quality, slip-fiber Chrysotile. . . . Via another pact, made in 1976, McAdam entered into a joint venture with Campbell Chibougamau Mines Ltd. to explore and develop 96 mining claims located at McKenzie Bay, Roy Township, Quebec, just five miles from Lake Roberge. In order to obtain a 50% interest in these properties, McAdam has agreed to expend $230,000 on the project between March 1, 1976, and February 28, 1979. In 1978 McAdam sold half its interest in the properties to the Quebec Department of Natural Resources. In return, the Provincial agency will reimburse McAdam for one-half of the expenditures already incurred by the company and for one-half of McAdam's future expenditures on the "Q" project, as it is called. As of May 4, 1978, 5,000 feet of additional drilling had been done to continue exploration of the favorable zone which had been established by preliminary drilling in 1976. Results have been encouraging and visual estimates disclose wide sections over several hundred feet containing significant amounts of asbestos, largely of the cross-fiber Chrysotile variety with some fiber seams up to ¾".

Pathfinder Resources Ltd.—Further drilling and blasting to secure rock and fiber samples for study were to be undertaken at the 750-acre Lili asbestos property in Cleveland Township, Richmond County, Quebec. The site is some five miles southwest of Asbestos and is an extension of the Thetford Mines complex. Chrysotile Grades 4-7 are present in the deposit and a 100,000-ton-per-year operation is envisaged.

United Asbestos Inc.—Mining operations have not been resumed at the asbestos operation at Midlothian, Ontario, and United Asbestos' only current source of revenue is the joint venture at Black Lake—an asbestos mine owned by United but operated by Lake Asbestos. The company is presently operating under a trust deed whereby all assets are in the possession and control of a trustee. This situation is the result of action initiated by two major creditors in March 1977. A proposal was submitted to and accepted by United's creditors and ratified by the Court December 14, 1977, whereby all creditors will be fully paid from the net proceeds of the joint venture at Black Lake. Management estimates the period of repayment will be a maximum of five to six years. United is satisfied the Midlothian Mine is a viable operation but due to the shutdown will require a substantial additional investment to achieve commercial production.

UNION OF SOVIET SOCIALIST REPUBLICS

All indications are the USSR has surpassed Canada for the fourth consecutive year as the *leading world producer of asbestos.* In gathering data from several sources, it appears the Soviet Union unofficially produced 2.7-million tons of asbestos in 1977. Since many large expansion and modernization projects are underway throughout the nation, including the building of new mills and the opening of deposits, it is projected the USSR will increase its asbestos output 21.5% by 1981 and another 26.5% by 1986, as shown in the following table.

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ESTIMATES & PROJECTIONS OF USSR ASBESTOS PRODUCTION (TONS)

Combine	1975	1977	1981	1986
Uralasbest	1,250,000	1,750,000	1,990,000	1,990,000
Dzhetygara/ Koustanai	360,000	700,000	760,000	1,150,000
Tuvaasbest	205,000	240,000	265,000	300,000
Kiembay	..	..	250,000	500,000
Sayan	..	..	..	200,000
	1,815,000	2,690,000	3,265,000	4,140,000

These projections could be low if other considered development takes place. For instance, development is planned at the Molodezhnoye and Il'chirsk deposits in Buryat. The Molodezhyy deposit was designated in 1974 for development when the western section of the Bayrol-Amur Railway is constructed and operating. In connection with the latter, Itohchu Shoji K.K., Tokyo, has proposed cooperation with the Soviets in developing their asbestos industry, especially in the area being opened by the installation of the Railway.

Heretofore the USSR utilized most of its output internally but we are now witnessing an increase in *exports.* Exports were estimated at 400,000 tons in 1970 and 550,000 in 1976 and last year at this time we predicted an export total of 700,000 in 1981 and 850,000 in 1986. These predictions have already been exceeded as the export estimate for 1977 is now 800,000 tons. According to Mr. Filteau of QAMA, shipments from the USSR currently account for about 50% of Japanese fiber imports. In fact, he said, USSR sales to Japan in 1977 displaced some 100,000 tons of Quebec asbestos in that market. Also, barter arrangements and price discounting by the Soviets extended their penetration into western asbestos markets, including Western Europe. If the Soviet Union follows the pattern indicated at present by increasing production as per the above table and continuing to export larger quantities of the mineral, it could conceivably pass Canada and become the leading world asbestos supplier by the mid-1980's.

USSR Asbestos Combines

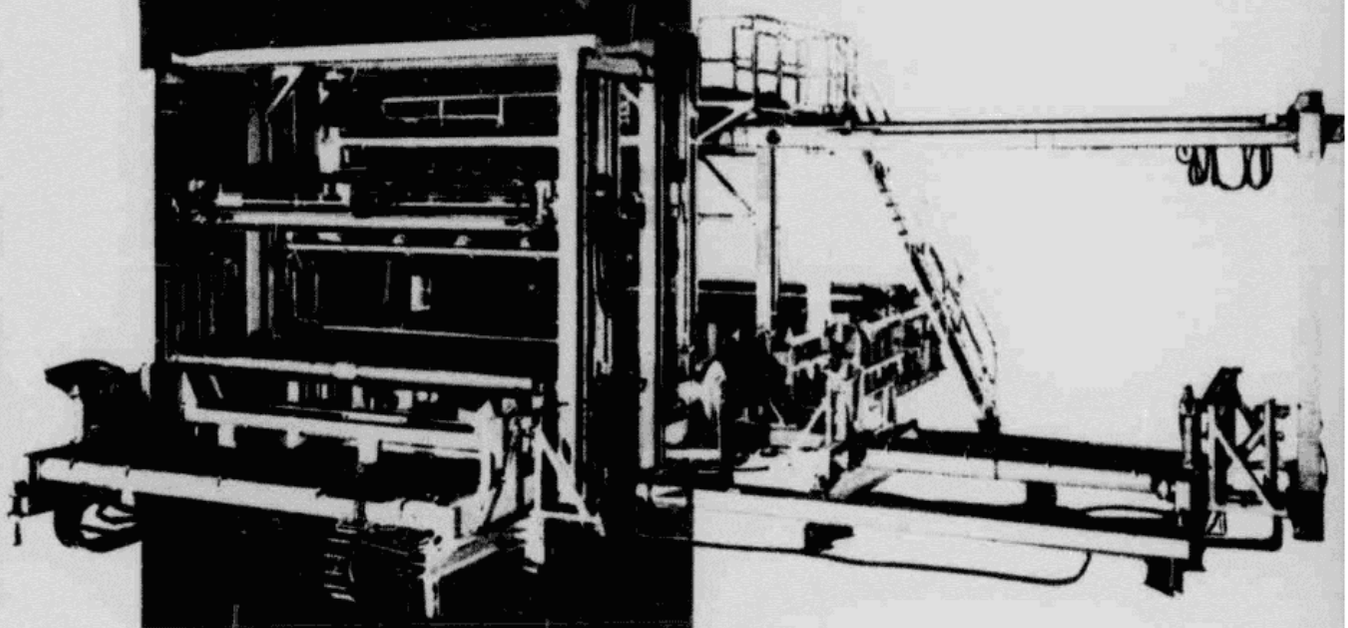
Three adjacent open pit asbestos mines are operating at *Uralasbest,* near Sverdiovsk in the Ural Mountains. This largest complex of its kind in the world produces some 1.8-million tons per year of asbestos Grades 1-6, in twenty types and mixes. An additional 350,000 tons of Grade 7 are produced annually. The processing plants operate 24 hours a day, 365 days a year. About 20,000 workers are employed at the mining, maintenance and auxiliary operations.

The *Koustanai* installations are the second largest in the USSR, operating at the Dzhetygara deposit in Kazakhstan, Kustanay Oblast'. Current annual production is 700,000 tons but this is to be increased to 760,000 tons by 1980 and 1.2-million tons by 1985.

The third largest complex is the *Tuvaasbest Combine* at Ak-Dovurak, near Krasnoyarsk in the Tuva Autonomous Republic in South Central

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Siberia. Output in 1977 was 60,000 tons from Mill No. 1 and 180,000 tons from Mill No. 2. By 1980 total production should reach 265,000 tons.

The *Kiembay asbestos deposit* at Orenburg Oblast', on the eastern slopes of the southern Urals, is under development, with the first stage to be completed in 1979 and full production of Grades 3-6 to be reached by 1982. The output is to be shared among participating Comecon members in proportion to their construction contribution. The countries involved are Poland, Bulgaria, East Germany, Romania, Czechoslovakia and Hungary.

Exploration work was completed in 1977 at the *Sayan asbestos deposit*, situated at the border of Krasnoyarsk Kray and Tuva A.S.S.R. Reserves have been estimated at 7-million tonnes. An annual capacity of 200,000 tonnes is anticipated when the combine is completed.

All of the new Soviet installations have characteristics similar to the facilities at Asbestos, Quebec, from which the USSR drew both technology and design.

REPUBLIC OF SOUTH AFRICA

The Republic of South Africa is unique in that it produces and supplies the three main varieties of asbestos used throughout the world, i.e., Chrysotile, Crocidolite (Blue) and Amosite. The country is the third largest asbestos producer in the world and supplies almost all of the Crocidolite and Amosite used internationally. The asbestos operations are all located in the Transvaal and Cape Province. Some production cutbacks were made this past year by major producers because of a decrease in demand, but once the world economy recovers and orders increase, South African asbestos producers are in position to raise output accordingly. "Industrial Minerals" reports that *South African asbestos fiber reserves* amount to 8.5-million tons, ranking second in the Western World (8%) and fourth globally (5%).

Comparing available statistics for yearly periods ending with the month of March, *production in 1978* was 8.5% less than in 1977 and marginally (less than 1%) higher than in 1976. Output of Cape Blue was down less than 1% from 1977 but ahead 17% over 1976; Chrysotile fell 8.5% below 1977 but rose 3% over 1976; Amosite dropped 25.5% from 1977 and 31.5% from 1976. No Tremolite (Anthophyllite) was produced in 1978 vs. 1,726 tonnes in 1977 and 1,885 tonnes in 1976. Some 100 tonnes of Transvaal Blue were produced in 1978 against none in 1977 or 1976. The ensuing table defines production, by variety of fiber, for the past five years.

SOUTH AFRICAN ASBESTOS PRODUCTION (METRIC TONNES)

YEAR TO	CAPE BLUE	CHRYSOTILE	AMOSITE	TREMOLITE	TVL BLUE
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

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Total tonnages of South African asbestos output for the above five years were: 1978—351,261, 1977—383,045, 1976—349,252, 1975—343,149, 1974—362,264.

South Africa, which *exports* 90% to 95% of her asbestos production, shipped less fiber this year although the value continued to increase. For four of the past five years ending March, values were R124,685,489 in 1978, R123,868,019 in 1977, R58,068,842 in 1975, and R51,474,972 in 1974. The following table shows historical data, by variety of asbestos, for the past three years. Note the 1978 increase in total value of less than 1% over 1977 and the 43.5% rise over the calendar year 1975.

VALUE OF SOUTH AFRICAN EXPORTS OF ASBESTOS

VARIETY	YEAR TO 3/78	YEAR TO 3/77	YEAR 1975
Cape Blue	R87,572,031	R82,559,619	R50,168,317
Chrysotile	15,154,558	17,013,381	10,454,554
Amosite	21,958,900	24,190,185	25,974,773
Tremolite	..	104,834	208,036
Transvaal Blue	..	..	..
	R124,685,489	R123,868,019	R86,805,680

South African Asbestos Mines

General Mining and Finance Corporation Ltd. dominates the South African asbestos industry via two producers—Msauli Asbes Ltd. (Chrysotile) and Griqualand Exploration and Finance Co. Ltd. (Gefco Blue). The other two largest producers are *Cape Asbestos South Africa (Pty) Ltd.* and *Asbestos Investments (Pty) Ltd.* (a member of the Eternit group of companies). The three medium-sized asbestos mining concerns are *Consolidated African Mines Ltd., Valley Asbestos (Pty) Ltd.* and *Wandrag Asbestos (Pty) Ltd.* Among the seven or so smaller producers, the two biggest are *Anglo-Dutch Exploration & Mining Co.* and *Dublin Consolidated Asbestos Mines (Pty) Ltd.*

The Federale Mynbou-General Mining Group—Gefco produces over 30% and markets almost half the total world output of Crocidolite asbestos from the Kuruman area of the Northwestern Cape Province. A major capital expenditure program was recently completed at its new plant, aimed at higher efficiency, better utilization of ore reserves and increased production. Production of Gefco Blue in 1977 reached 76,103 tonnes, 32% over 1976 and 55% ahead of 1975. . . . Msauli Asbes, through its wholly-owned mining subsidiary, African Chrysotile Asbestos Ltd., mines Chrysotile in the Barberton District of the Eastern Transvaal. Production of Grades 4-7 totaled 100,669 tons in 1977 vs. 83,936 tons in 1976 and some 84,000 tons in 1975. Production in 1978 was reduced to decrease fiber stocks to optimum levels and to match market demand. Capital expenditures in 1978 were to be about R700,000 mainly for continued shaft sinking and equipping, manhoisting arrangements, improved tailings disposal and further pressure packing and unitizing equipment for competitive marketing. Continuing prospecting programs include drilling

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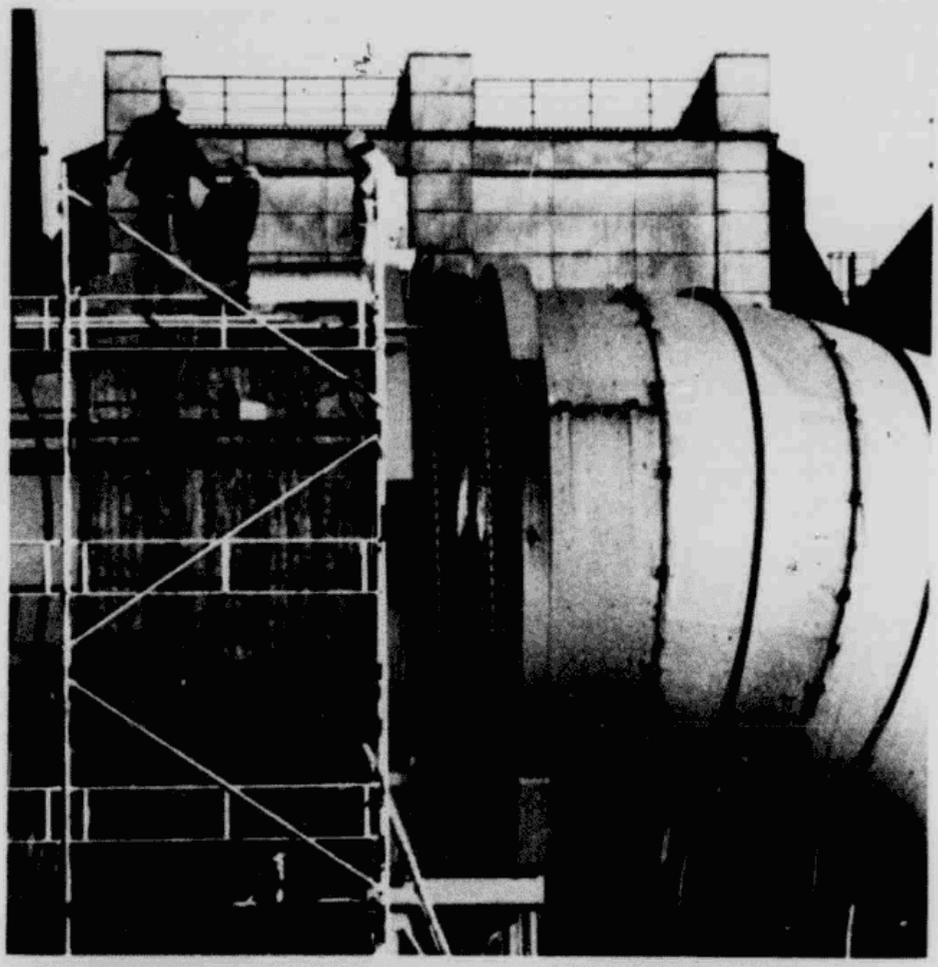
to evaluate known orebodies and to explore promising fiber indications in the southern portion of the claim area. . . . Gefco and Msauli fiber is sold internationally through wholly-owned subsidiaries Central Asbestos Co. Ltd., London, England; Central Asbestos (South Africa) (Pty) Ltd.; and Putten's Asbestos Corporation of South Africa (Pty) Ltd.

Cape Asbestos South Africa—This company was registered in South Africa in 1893 and is a wholly-owned subsidiary of Cape Industries Ltd., a company incorporated in the United Kingdom. CIL is 67% owned by Charter Consolidated Ltd., which, in turn, is an associated company in the U.K. of Anglo American Corporation of South Africa Ltd. Cape Asbestos South Africa is a holding company for three asbestos mining operations and is the largest amphibole asbestos producer in the world. Blue asbestos fibers are produced at the Pomfret Mine in the Northeastern Cape Province and at the Koegas Mine on the banks of the Orange River. The latter operation has an annual capacity of 20,000 tonnes and has been producing for 85 years. However, the depletion of ore reserves and uneconomic mining conditions resulted in a phasing out process and the Koegas Mine is to be closed at the end of this year. Cape Asbestos also produces the fawn amphibole Amosite at the Penge Mine in the Northeastern Transvaal. This operation has an annual production capacity of 90,000 tonnes. Early this year milling time at Penge was reduced from two to one shift per day. The new Pomfret mill complex was officially opened August 22, 1978, thus marking the completion of a US$12-million expansion program. The mill is designed to meet future demand for Blue asbestos fibers, to offer grade alternatives and to provide excellent working conditions for employees. The new mill is now operating at its capacity of 30,000 tonnes per annum. Since the existing mill has a capacity of 40,000 tonnes, total annual capacity at Pomfret is now 70,000 tonnes. Beginning in 1979, the Pomfret operation will assume the prior commitments of the Koegas facility.

Asbestos Investments—This organization has the capacity to annually produce 63,000 tons of Crodicolite asbestos via two subsidiaries located in the Northern Cape Province: Kuruman Cape Blue Asbestos (Pty) Ltd. and Danielskuil Cape Blue Asbestos (Pty) Ltd. Kuruman operates two milling plants at Whitebank which have a combined capacity of 30,000 tons per year. In addition, a new mining/milling facility at Klipfontein, Postmasburg District, has an output of 18,000 tons per annum. Danielskuil operates mines on the farm Ouplaas in the Danielskuil District. Annual production capacity is 15,000 tons.

Consolidated African Mines is capable of producing 8,000 tons of Grades 4-7 in the Barberton District of the Transvaal. The company's principal sales agent is Commonwealth & Overseas Asbestos Corporation (Pty) Ltd. . . . *Valley Asbestos Mines* yearly markets an estimated 10,000 tonnes of Crocidolite from combined operations in the Postmasburg District, Cape Province. The joint facilities are those of Groenwater Asbestos Mining Co. (Pty) Ltd., Postmasburg Cape Blue Asbestos (Pty) Ltd. and Rooipoort Blue Asbestos (Pty) Ltd. . . . *Dublin Consolidated Asbestos Mines*, a principal subsidiary of Turner & Newall Ltd., produces Amosite near Pietersburg, in the Northern Transvaal. Part of the rights are tributed to S. A. Kirton (Pty) Ltd. Dublin also owns the Amianthus Mine at

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RHODESIA

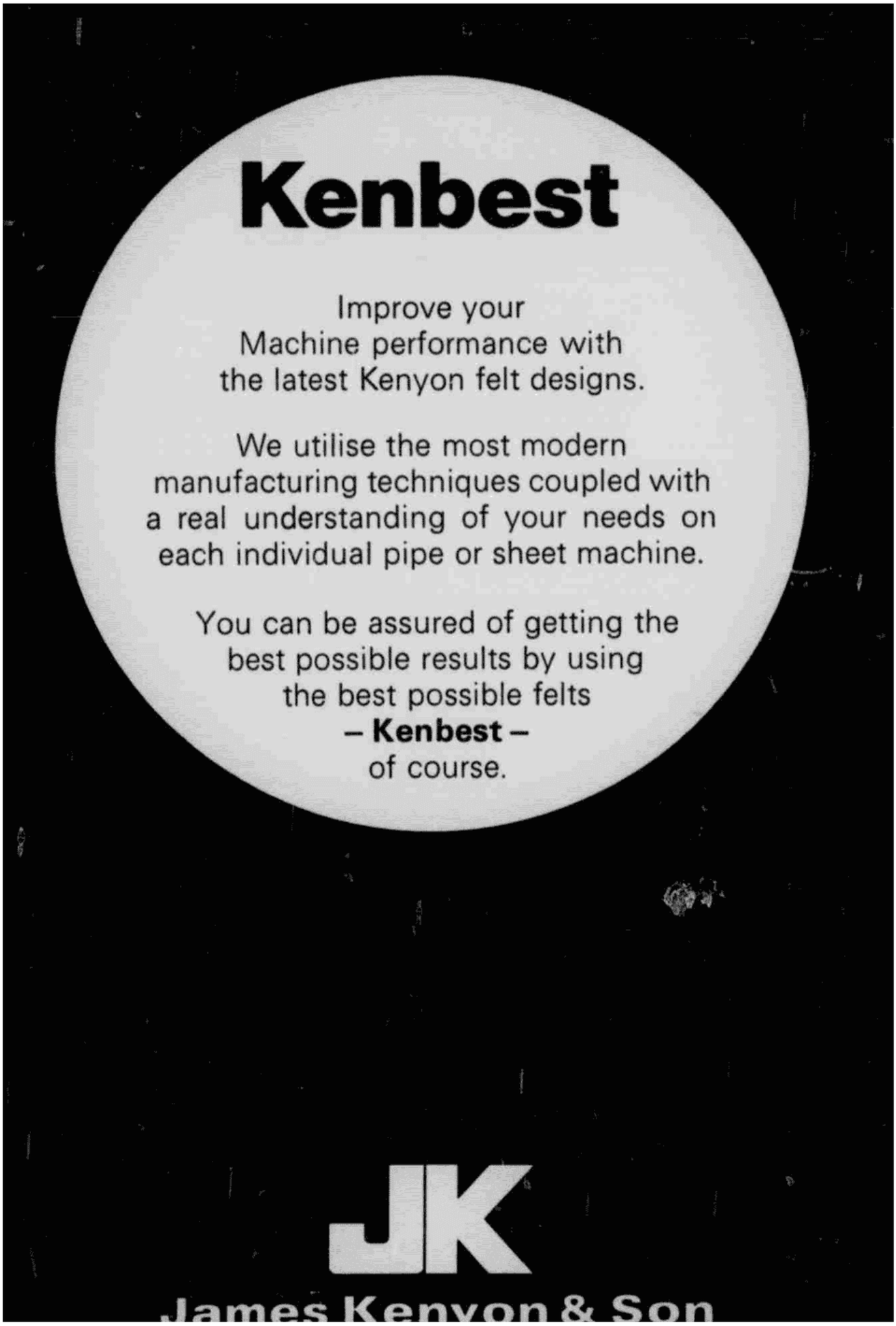
From the scant amount of information we have been able to secure since the Unilateral Declaration of Independence, in effect as of November 1965, it is believed that Rhodesia remains the fourth largest producer of asbestos in the world. Because of the new Kudu Mill, which was to be operational by mid-1977, it is conceivable that Rhodesia now has or soon will have the capacity to produce 420,000 tons of fiber per year, mostly of the Chrysotile variety. If future demand for its products warrants production at full capacity, Rhodesia could surpass South Africa and become the third largest asbestos producer on a worldwide basis. The U.S. Bureau of Mines estimates *Rhodesian asbestos production* at 220,000 tons in 1977 compared with 180,000 tons each in 1976 and 1975. The Mines Bureau further estimates Rhodesia exported 200,000 tons of asbestos in 1975 vs. 165,000 tons in 1973 and 80,000 tons in 1972. Turner & Newall Ltd. has interests in one of the major mining firms in Rhodesia, but has been cut off from that operation since shortly after the UDI.

Kudu Mine (Pvt) Ltd., Bulawayo, has the Kudu Asbestos Mine at Essexvale Estate and the Wynnes/Wynnes South Mine at Drumbulchan, both in Bulawayo. Annual production at the Kudu enterprise was to have been increased from 50,000 to 250,000 tons. . . . *Rhodesian & General Asbestos Corporation (Pvt) Ltd.*, Shabani, operates the Shabani Mine at Shabani Township, Gwelo, plus the nearby Gaths, Temeraire and King Mines. It also holds mining leases at Crown Land in Victoria. . . . *Pangani Asbestos Mines (Pvt) Ltd.*, Filabusi, runs the Pangani Mine at Winifred, Bulawayo, the Vanguard Mine at Clifton, Gwelo, the Boss Mine at Tokwedale, Victoria, and a Central Fiber Plant at Oreti Siding, Gwelo. . . . *Asbestos Investments* owns the Pangani operation as well as the Boss Mine at Mashaba and the Vanguard and Rex Mines at Belingwe. . . . In addition, *A.D. Theron and Sons (Pvt) Ltd.*, Gwanda, runs the Thornwood Mine at Thornwood Block, Bulawayo; *D.S.O. Asbestos (Pvt) Ltd.*, Mashaba, runs the D.S.O. Mine at Crown Land, Victoria; and the *Elenem Syndicate*, Bulawayo, has the Sihande Mine at Gwelo. . . . An accidental discovery of a new asbestos orebody at a mine near Gwanda was made during shaft sinking at a new section of an existing facility. The mine owner anticipates that ore reserves between the old and new properties give the mine a life of six years at a milling rate of 120,000 tonnes a month.

AUSTRALIA

Chrysotile Corporation of Australia Pty. Ltd., a subsidiary of *Woodsreef Mines Ltd.*, continues to steadily increase *asbestos production* at the Woodsreef Mine, Barraba, New South Wales. Total output since the start of operations in February 1972 through June 1978 reached 313,176 tonnes, as follows: 3,338 tonnes from February to June 1972; 31,826 tonnes for the year ended June 1973; 41,242 tonnes to June 1974, 41,699

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tonnes to June 1975; 61,151 tonnes to June 1976, 65,911 tonnes to June 1977 and 68,009 tonnes to June 1978.

Exports of asbestos from Australia reached 32,145 tonnes valued at A$20,004,922 for the year ended June 1978, an increase of 15% in quantity and 92.5% in value over the corresponding period a year earlier. Compared with the year ended June 1976, tonnage decreased 15.5% but value rose 69.5%. Actual figures for the three latest annual periods are: Year to June 1978—32,145 tonnes valued at A$20,004,922; Year to June 1977—28,011 tonnes valued at A$10,384,430; Year to June 1976—38,139 tonnes valued at A$11,793,186.

Australia imported 55,265 tonnes of asbestos valued at A$25,978,419 for the year ended June 1978, down from the same period a year earlier 21.4% in tonnage and 11.6% in value. The 1978 breakdown by variety of asbestos is: Chrysotile—24,949 tonnes (down 35.9%), valued at $12,091,393; Amosite—16,841 tonnes (up 8.2%), $7,951,628; Other—13,495 tonnes (down 15.2%), $5,935,398. Total tonnage and value for the past four yearly periods are: Year to June 1978—55,265 tonnes valued at A$25,978,419; Year to June 1977—70,342 tonnes valued at $29,414,733; Year to June 1976—56,246 tonnes valued at $17,852,927; Year to June 1975—50,879 tonnes valued at $11,195,399. Interestingly, as Woodsreef continues to increase production of asbestos, Australia, historically a net importer, may begin to see her exports exceeding imports.

Woodsreef Mines—In its report for the nine months ended July 31, 1978, fiber production at the asbestos mines at Barraba and Baryulgil totaled 49,914 tonnes, marginally higher than that produced in the prior fiscal year. Fiber shipments for the latest period reached 37,869 tonnes vs. 36,759 tonnes. In the latest financial quarter there was an improvement in the recovery rate and benefits were obtained from the availability of several ore faces for blending purposes. Development work on the trial tailings recovery circuit continued and anticipated recoveries were confirmed, Further work has been done toward developing the wet milling process, the result of which warrants additional research. On October 24, 1978, the Australian Commonwealth Government announced its decision to offer a loan of up to A$1.4-million to assist in maintaining the operations of Chrysotile Corporation's asbestos mine at Barraba. The offer is based on the willingness of the N.S.W. Government and the Commercial Bank of Australia to also contribute toward keeping the company in operation. The State Government has offered to waive royalty payments to the end of 1979 and to advance up to $2-million to assist the company over that period. The company has encountered difficulties almost from the start of its operations in 1972 and except for the period from mid-1975 to August 1977 had operated in a loss situation. It has been under receivership/managership since November 1973.

PEOPLES REPUBLIC OF CHINA

China continues to be the fifth largest producer of asbestos in the world, primarily Chrysotile. Principal operation is the *Shihmien (meaning asbestos) Mine* in Szechuan Province. Reserves are calculated at 28-million tonnes and the product is said to qualify as a top-grade textile

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fiber. Szechuan has a second major asbestos deposit called *Penghsien*, fairly close to Shihmien and not well known. Outside the Province the most productive asbestos deposits are located in *Laiyuan County, Hopeh.* Asbestos has also been found in *Yuankiang County, Yunnan Province.* Production estimates for China by the U.S. Bureau of Mines are 220,000 tons in 1977 against 190,000 tons in 1976 and 165,000 tons in 1975.

CYPRUS

Production of asbestos in Cyprus was again at a higher-than-normal level, totaling 37,133 tons valued at £4,931,037 for the year ended June 1978. Although down 17.5% in quantity and less than 1% in value from the previous like period (an unusually high production year), the tonnage for the latest twelve months was 17% above the year to June 1976 and value was up 84%. A like pattern for the past five years is as follows: Year to June 1978—37,133 tons valued at £4,931,037; Year to June 1977—45,135 tons valued at £4,955,921; Year to June 1976—31,744 tons valued at £2,679,465; Year to June 1975—33,582 tons valued at £2,360,880; Year to June 1974—30,275 tons valued at £1,849,900.

Exports of asbestos from Cyprus for the calendar year 1977 rose 7.5% in tonnage and 32.5% in value over 1976 and 24.5% in quantity and 79% in value over 1975. By fiber grade, 1977 exports were 21,353 long tons valued at £2,887,185 for Grade 3S, 13,290 tons valued at £1,502,745 for Grade HSH and 142 tons valued at £7,725 for the lower grades. The export picture for the past four years is: Year 1977—34,785 long tons valued at £4,397,655; Year 1976—32,318 tons valued at £3,306,296; Year 1975—27,930 tons valued at £2,127,054; Year 1974—32,660 tons valued at £2,085,035.

Cyprus Asbestos Mines Ltd. is the only asbestos producer on the Island of Cyprus. Stock at year-end 1977 at the Amiandos Mine consisted of 715 tons of long fiber grades and 6,070 tons of shorts. . . . Early in 1978 it was learned that *Cytechno Ltd.*, Nicosia, is seeking permission to begin asbestos mining in the Troodos Mountains. The company is appealing against a decision reached in 1970 by the Inspector of Mines to not renew prospecting licenses because of the effect mining would have on tourism in the area. Cytechno claims the decision is annually costing the Cypriot economy some $190.6-million.

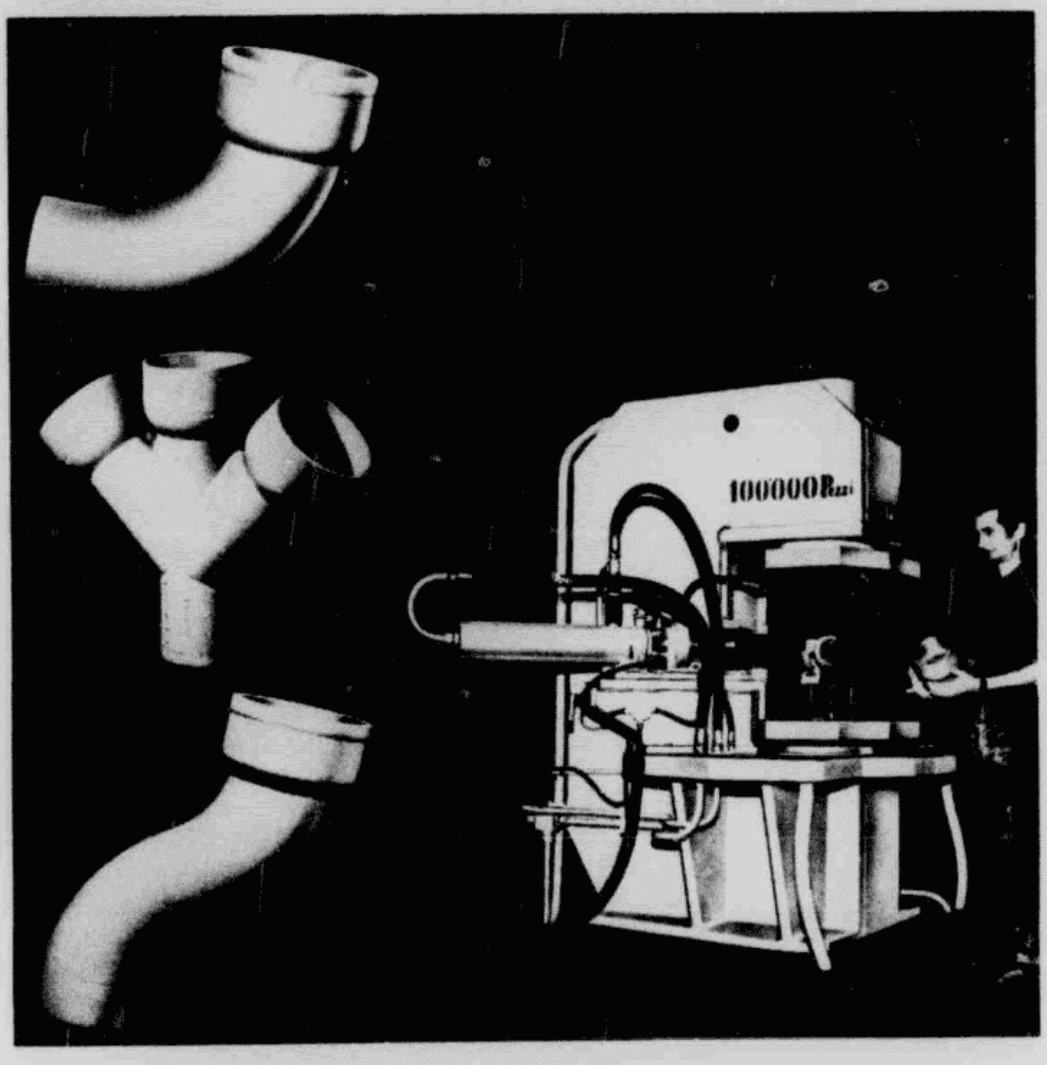
SWAZILAND

Asbestos continues as the most important revenue earner for Swaziland, contributing 64% of the total ex-mine sales in 1977, reports the "Mining Journal." *Havelock Asbestos Mines (Swaziland) Ltd.* is maintaining operations at a high level of efficiency and earnings increased significantly after the end of 1977. An agreement in principle has been reached with the Swazi Nation whereby Swaziland will acquire an additional 10% in the equity share capital of the company so that it and Turner & Newall Ltd. will become equal partners. Under the pact, Havelock mining leases will be extended for a period of 20 years to the year 2006 and the company will secure a larger area for mining development and ex-

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ploration. Asbestos production estimates for Swaziland are 50,000 tons in 1977, 46,128 tons in 1976 and 45,436 tons in 1975.

OTHER COUNTRIES

Bolivia—At Cochabamba, a semi-mechanized project was begun in 1975 to standardize and classify fiber grades. It was projected the facility would be producing 10,000 tons annually by the end of this year.

Brazil—An open pit Chrysotile mine is operated by *S. A. Mineracao de Amianto* at Cana Brava, Gois State, 160 miles northwest of Brasilia. SAMA, which accounts for some 95% of total Brazilian asbestos production, 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 50-million tons of rock or 3.5-million tons of fiber. Annual production reached 95,000 tonnes valued at US$29,826,000 in 1976 and plans call for annual output of 115,000 tonnes by 1979 and 125,000 tonnes by 1980.

Colombia—Completion of construction of the mill building and other minor structures at the Chrysotile processing plant at Antioquia, near Campamentos, has been reported by *Minera Las Brisas S.A.* Financial arrangements are being finalized for a total investment of some US$10-million and production is expected by early 1981, with a start-up rate of 6,000 tonnes per year and an eventual output of 16,000 tonnes. The project involves investors from Switzerland and South Africa with participation by Eternit Colombiana, an asbestos-cement products manufacturer.

Greece—Construction for the new US$68-million, 100,000-tonnes-per-year asbestos fiber plant was begun in April 1978 at the *Zindanion asbestos mines* near Kozani, in northern Greece. About 75% of the production will be exported with annual net earnings of US$30-million. Scheduled for completion by mid-1980, the plant will employ 320 people. The integrated development project will be carried out by Asbestos Mines of Northern Greece and by Mining S.A., a company belonging to the government-controlled Hellenic Industrial Development Bank (ETVA).

India—We regret to advise that information which appeared in the October 1978 issue of ASBESTOS, on page 42, concerning "Anthophyllite From India" is completely erroneous. Our contributor of the information, Jama Exports, Bombay, advises that its source of the data had "miscalculated" and, therefore, submitted a wrong account of grades available and prices for each grade. Both Jama Exports and this Magazine sincerely apologize for any inconvenience to our readers caused by the publication of the inaccurate data.

Italy—Most of the asbestos produced in Italy is from the Balangero Mine of *Amiantifera Di Balangero S.p.A.*, Milano. Improvement in 1976 included a system for dust-free bagging, new filters to decrease air pollution and new equipment at the open pit mine at San Vittore to cope with greater depth and larger quantities of overburden. Estimated production was 170,000 tons in 1977, 181,649 tons in 1976 and 162,034 tons in 1975.

Mexico—It was reported by the Mexican Department of Resource Minerals that asbestos activity in Mexico has been nominal in 1978. Development of *Concepcion Papalo in the Quicatlan District,* near Oaxaca, is

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still at the pilot plant planning stage. Expectations this time last year were that by this year the mine and mill would have begun producing annually around 60,000 tons of Chrysotile fiber Grades 4-6. . . . Our information source further advises the deposit at *El Canon del Novillo,* near Ciudad Victoria in the State of Tamaulipas, is on an "abandoned status-quo" and that exploration at *Baja California* has been deferred by the Government for continuance in 1979.

Mozambique—Minas Gerais de Mozambique Lta. was scheduled to begin Anthophyllite Grades 3-7 production in 1976 at Mavita, 50 kilometers southwest of Vila Pery. Proven ore reserves have been calculated at 250,000 tons, with probable ore listed at 1-million tons.

New Zealand—Lime & Marble Ltd., Nelson, advises the situation remains unchanged from our last report on the Pyke Asbestos prospects. Surface geologic work indicated significant intercepts of Quebec Standard Grades 3 and 4 Chrysotile fiber. Lime and Marble, which controls the property, is seeking a farm-in partner for further exploration and development. *Kennecott Explorations (Australia) Ltd.* has the right to a 20% participating interest in any commercial development.

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

Taiwan—Seven small asbestos mines operate in Taiwan, primarily producing the Actinolite variety for domestic use in the making of plastics and as fillers and heat insulating compounds. Production for the first half of 1978 reached 557 tonnes, indicating a possible 1,114 tonnes for the year 1978.

Turkey—Adana Atermit and *Amyant Sanayii A.S.* operate the two largest of six asbestos mining operations in Turkey. The U.S. Bureau of Mines estimates Turkish production at 11,000 tons in 1977, 10,557 tons in 1976 and 17,081 tons in 1975.

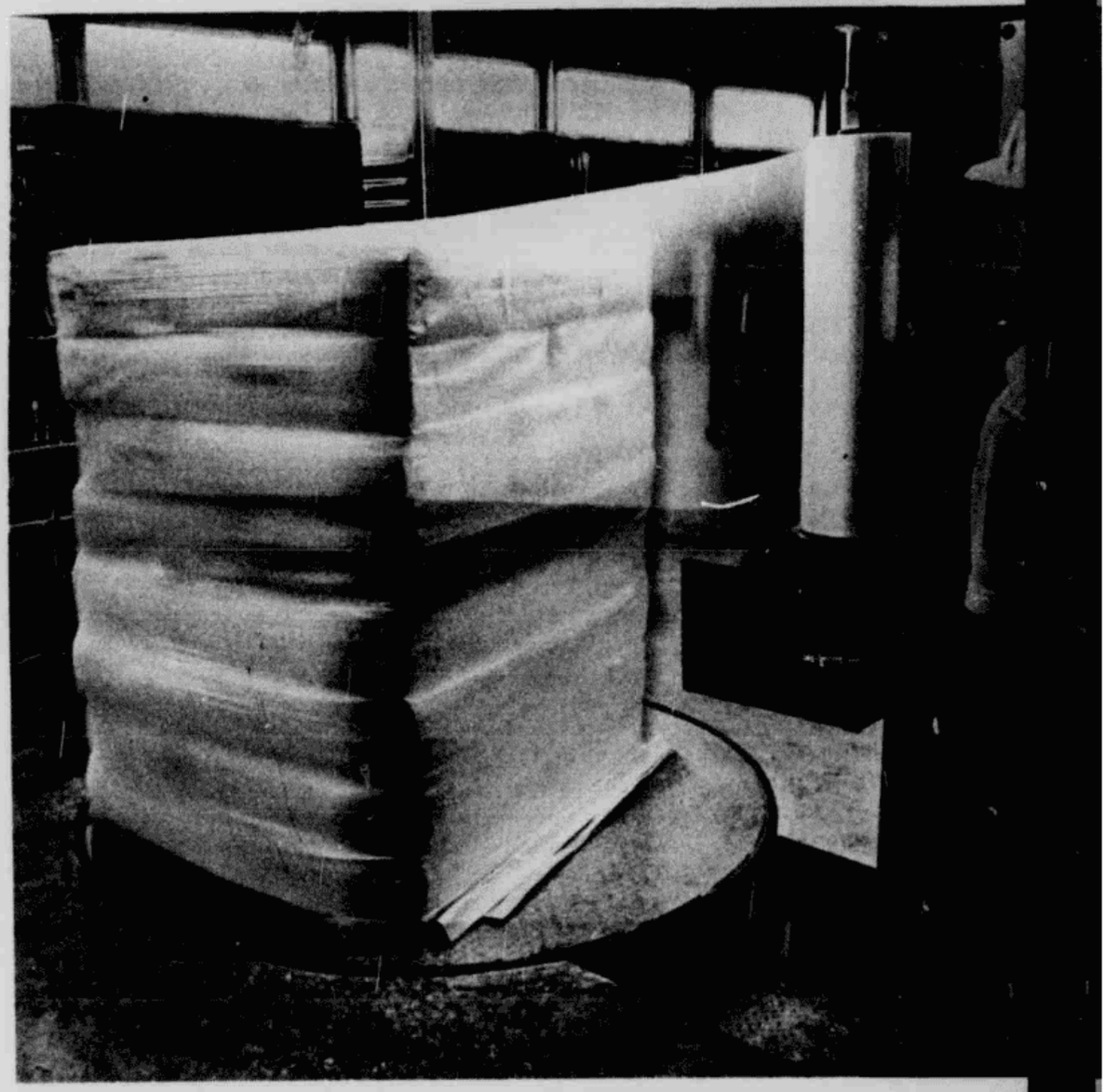
Yugoslavia—A 15,000-tons-per-year mill is in the offing, following successful testing of ore at the *Stragari Asbest Mine,* Stragari, Serbia. Yugoslavian asbestos reserves are said to amount to over 21-million tonnes of ore. U.S. Mines Bureau estimates a production total of 9,994 tons in 1977 vs. 14,330 tons in 1976 and 13,451 tons in 1975.

NEXT ISSUE—PART II:

INTERNATIONAL ASBESTOS PRODUCTS INDUSTRY

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RETIREMENTS

George Barge—President and a Director, Atlas Asbestos Co. Ltd., March 31, 1978.

Jack Ford—Managing Director, Scapa Textiles Ltd.; continues as a Board Member on part-time consulting basis; June 30, 1978.

William H. Foster—Vice President of Operations, Asbestos Corporation Ltd.; December 31, 1978.

Elmer H. Haug—Director of Engineering, Asarco Inc.; March 1978.

Richard H. Hellings—Managing Director, Humes Industries (Malaysia) Bhd.; March 2, 1978.

Paul E. Leclerc—Sales Director, Region #1, Asbestos Corporation Ltd.; August 1, 1978,.

William J. Mercer—Regional Sales Representative for Mineral Fiber Roofing and Siding, Supradur Manufacturing Corporation; September 1978.

Robert Richter—Vice President-Controller, Asarco Inc.; Summer 1978.

Dr. Lewis H. Rogers—Executive Vice President, Air Pollution Control Association; October 31, 1978; appointed APCA Executive Vice President-Emeritus upon retirement.

Willis G. Sullivan—Secretary, A & M Insulation Company; December 22, 1977; will devote full time to promoting the Tympanuchus Cupido Pinnatus Society.

Ernst Walther—Managing Director, S.A. Asbestos Trading (Pty) Ltd.; December 31, 1977; remains active in the Industry as a Director of Asbestos Investments (Pty) Ltd.

DEATHS

Nelson F. Bain—Vice President of Marketing, Atlas Asbestos Company Ltd.; December 1977.

Michael T. Charters—Director of C-E Process Equipment Development Laboratory, Combustion Engineering, Inc.; February 10, 1978.

Yangos Hadjistavrinou—First Cypriot Director, Geological Survey Department of Cyprus; January 3, 1978.

Percy H. Hagen—Retired Sales Executive, Raybestos-Manhattan, Inc.; March 2, 1978.

Edgar V. Hall—Executive Vice President and General Manager, Asphalt Roofing Manufacturers Association; August 26, 1978.

John R. Hindle—Chairman, Scapa Group of Companies; early 1978.

W. J. Johnson—Managing Director, Johnson's Co. Ltd.; Consultant and Vice President-Johnson's Co., Asbestos Corporation Ltd.; May 27, 1978.

Malcolm Meyer—Retired Chairman of the Board and Chief Executive Officer, CertainTeed Corporation; thereafter served as Consultant and a Director; April 4, 1978.

Elhanan Pelles—President, Association of Engineers and Architects in Israel; March 14, 1978.

John Sutton—Editor, "Roofing Siding Insulation"; March 5, 1978.

C. Branton Wheatley—Chairman of the Board and Chief Executive Officer, Pacor Inc.; active as an Executive in the affairs of the Philadelphia Insulation Contractors Association and the National Insulation Contractors Association; March 30, 1978.

Ladd L. Wilson—Former President of Sall Mountain Mining Company and of Protective Papers Division of Nicolet Inc.; recipient of Asbestos Story Ring, Casting No. 2; July 4, 1978.

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FRONT COVER ILLUSTRATIONS—1978

April—Accompanies feature article describing modifications to press rolls on Mazza-type, asbestos cement machines as developed by A. E. Alpine; photograph depicts the most suitable configurations for water removal grooves which are specified after "blend" and type of felt have been reviewed.

May—Striking example of the use of Everite's Canalit asbestos-cement roofing elements on new railway station at Durban, South Africa.

June—100-pounds of fiber pressed into two-cubic-foot cakes which are bagged, palletized and stretch-wrapped in two-ton units; units are loaded into 20-ton shipping containers for transporting to world markets; photograph supplied by Lac d'Amiante du Quebec, Ltee.

July—Two photographs; one of the Ingersoll-Rand T5-DH Drillmaster and DHD-130 Superdrill with on-board air supply supplemented by the Spiro-Flo DXL-5000-S portable compressor which has capacity of 5,000 cfm at 125 psig; the other a view of the T5-DH Drillmaster with tower down showing button bit of the DHD-130 downhole drill.

October—Two photographs from Wheeler Protective Apparel, Inc.; show a worker attaching snap closures as part of the Wheeler fabricating operation and a stack of Southern Asbestos' Gardian asbestos fabric ready for cutting operation.

November—Ore from Pomfret Blue Asbestos Mine being conveyed up the 2A shaft to the sorting plant; tailings conveyor from the Pomfret mill plant; photographs from Cape Asbestos South Africa (Pty) Ltd.

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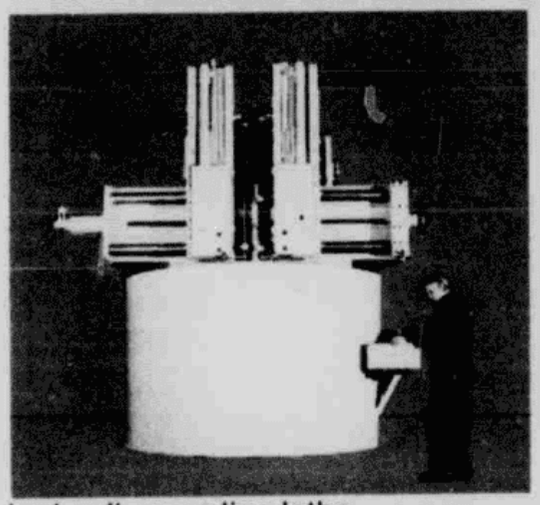
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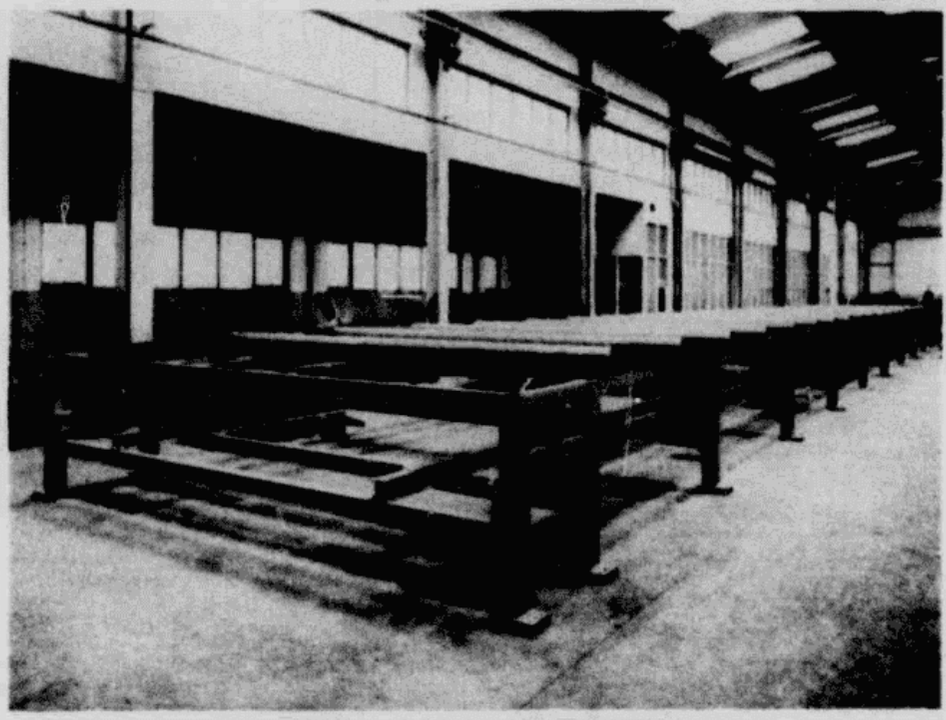
Farben Industrial Development, Torino, Italy; page 41

Systraplan GmbH & Co. KG, Herford, West Germany; page 63

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EXPORTS FROM CANADA

From: Statistics Canada

JULY 1978

Short Tons

UNMANUFACTURED ASBESTOS:	Crude	Milled Gp 3	Milled Gp 4&5	Shorts Gp 6-9
Western Europe	..	552	9,091	5,933
Eastern Europe	..	100	1,160	..
Middle East	..	60	310	..
Africa	..	..	750	100
Asia	..	339	6,482	8,276
Oceania	..	..	2,958	74
So. & Cen. America & Antilles	..	271	8,537	3,239
United States	..	1,257	10,406	28,082
	..	2,579	39,694	45,704

The total amount of unmanufactured asbestos exported in *July 1978* was 87,977 short tons, valued at C$34,712,000.

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos cloth, dryer felts & sheets	C$ 139,000
Asbestos brake linings & facings	268,000
Asbestos-Cement building materials	1,186,000
Other basic asbestos products	307,000
	C$1,900,000

AUGUST 1978

UNMANUFACTURED ASBESTOS:	Crude ..	Milled Gp 3	Milled Gp 4&5	Shorts Gp 6-9
Western Europe	..	551	14,662	10,404
Eastern Europe	..	235	1,606	123
Middle East	..	..	5,460	147
Africa	..	..	1,530	..
Asia	..	115	10,201	8,581
Oceania	..	..	4,224	195
So. & Cen. America & Antilles	..	327	7,658	3,211
United States	..	300	11,430	42,814
	..	1,528	56,771	65,475

The total amount of unmanufactured asbestos exported in *August 1978* was 123,774 short tons, valued at C$46,264,000.

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos cloth, dryer felts & sheets	C$ 267,000
Asbestos brake linings & facings	247,000
Asbestos-Cement building materials	1,465,000
Other basic asbestos products	381,000
	C$2,360,000

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EXPORTS FROM CANADA—CONTINUED

JANUARY-AUGUST 1978

UNMANUFACTURED ASBESTOS:	Crude	Milled Gp 3	Milled Gp 4&5	Shorts Gp 6-9
Western Europe	..	4,299	122,806	87,742
Eastern Europe	..	2,655	21,948	1.635
Middle East	..	140	11,678	1,812
Africa	..	6	5,390	640
Asia	..	1,864	62,319	71,044
Oceania	..	10	28,596	1,524
So. & Cen. America & Antilles	..	1,282	67,952	28,396
United States	..	5,623	88,795	294,066
	..	15,879	409,484	486,859

The total amount of unmanufactured asbestos exported in *January-August 1978* was 912,222 short tons, valued at C$339,884,000.

MANUFACTURED ASBESTOS PRODUCTS:

Asbestos cloth, dryer felts & sheets	C$ 2,311,000
Asbestos brake linings & facings	2,116,000
Asbestos-Cement building materials	8,803,000
Other basic asbestos products	3,570,000
	C$16,800,000

January-August 1977: Canadian exports of unmanufactured asbestos totaled 1,062,207 short tons, valued at C$365,952,000; exports of manufactured asbestos products were valued at C$14,539,000.

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BIRTHDAY GREETINGS to . . .

Claude A. Kennedy, Director of Manufacturing Engineering, Raybestos Manhattan Industrial Products Company, Raybestos-Manhattan, Inc., North Charleston, South 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.

Charles E. Stiefken, Section Head, Asbestos Laboratory, Asarco Inc., South Plainfield, New Jersey, January 20.

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

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

Marion W. Oliver, Vice President-Engineering & Materials, Raybestos Manhattan Industrial Products Company, Raybestos-Manhattan, Inc., North Charleston, South Carolina, January 23.

R. O. Banks, Company Secretary, James Hardie Asbestos Ltd., Sydney, New South Wales, Australia, 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 Company, Raybestos-Manhattan, Inc., Manheim, Pennsylvania, January 28.

Charles A. Fried, Treasurer, Raybestos-Manhattan, Inc., Trumbull, Connecticut, January 31.

Gabriel Ferrucci, President, Raybestos Manhattan Industrial Products Company, and a Vice President of Raybestos-Manhattan, Inc., North Charleston, South Carolina, February 1.

John W. Oughtred, Manager-Sales, 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 & Chief Operating Officer, Rio Algom Ltd., Toronto, Ontario, February 5.

A. J. Austen, Chairman, Turners Engineering Products (Nigeria) Ltd., Turners Building Products (Arewa) Ltd., and Turners Building Products (Emene) Ltd., Kaduna and Enugu, Nigeria, February 8.

R. H. Dent, Chairman, Cape Industries, Ltd., London, England, February 9.

C. Fred Workman, President-Norristown Division, a Corporate Vice President and a Director, Nicolet Inc., Ambler, Pa., 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, Deputy Chairman, Turner & Newall Ltd., Manchester, England, February 12.

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

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W. J. JOHNSON 1901-1978
ASBESTOS CORPORATION LTD.

We regret to advise of the demise, on May 27, 1978, of *W. J. Johnson.* Born April 7, 1901, at Slocan, British Columbia, Mr. Johnson graduated from McGill University in 1923 with a Civil Engineering Degree. Following employment with J. S. Metcalf Company, Montreal, Quebec, from 1923 to 1933, he joined Johnson's Company Ltd. in 1934 as Pit Superintendent. Mr. Johnson was appointed Mine Manager in 1935, General Manager in 1946 and Managing Director in 1954. From 1964 to 1966 he served as Asbestos Corporation Consultant and Vice President-Johnson's Company. Upon reaching retirement age in 1966, Mr. Johnson took up residence in Fort Lauderdale, Florida, until his passing.

Other activities undertaken by Mr. Johnson include President of the Quebec Asbestos Mining Association in 1947 and 1963, Chairman of the QAMA Workmen's Compensation Safety Committee from 1950 to 1964, Councellor of the Canadian Institution of Mining and Metallurgy from 1945 to 1961, CIM President in 1963-64 and Chairman of the Thetford Mines Protestant School Board from 1956 to 1965.



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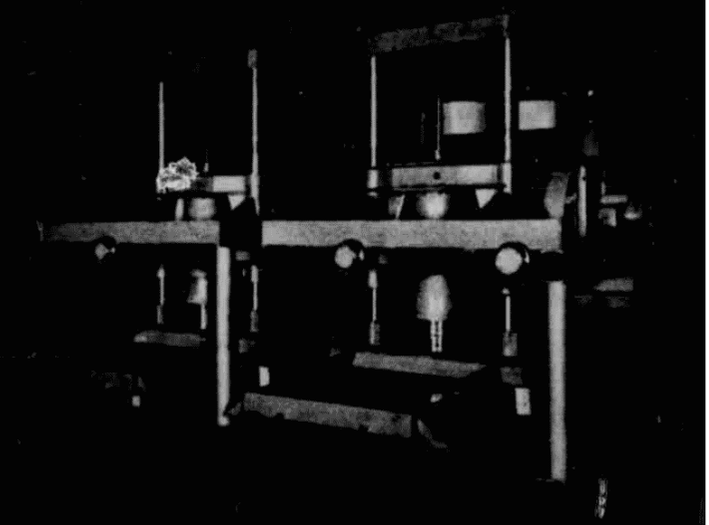
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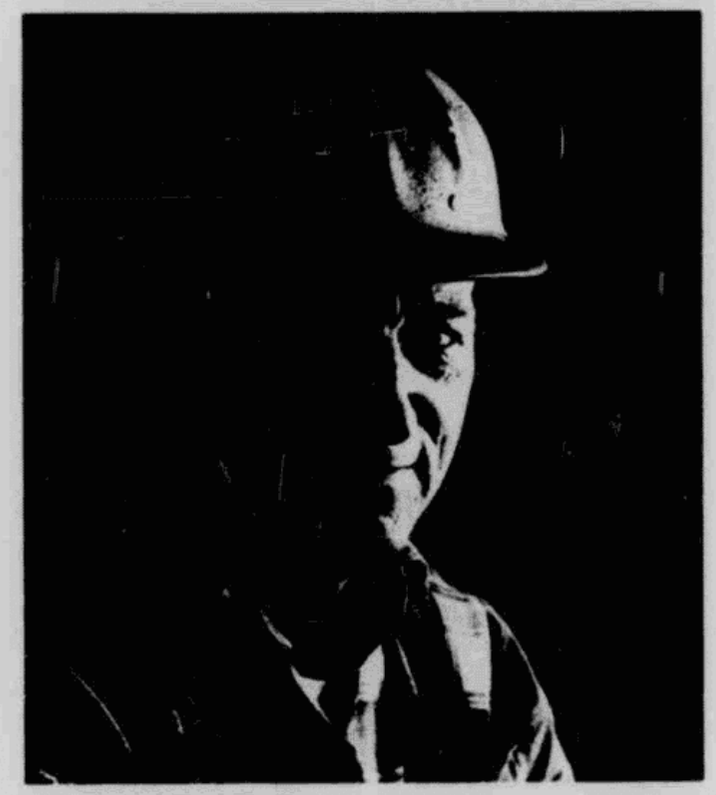
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