Asbestos

By R. A. Clifton[1]

Shipments of asbestos (all chrysotile) in 1981 from mines in the United States decreased 6% from those in 1980. Imports in 1981 were 3% higher than those in 1980.

U.S. apparent consumption declined 3% in 1981. Canadian shipments in 1981 were 14% lower than those for 1980. Shipments from Canada to the United States rose slightly during 1981. Imports from Canada were 94% of total U.S. imports in 1981, and those from the Republic of South Africa accounted for 5%.

Table 1.—Salient asbestos statistics

	1977	1978	1979	1980	1981
United States:					
Production (sales) metric tons	92,256	93,097	93,354	80,079	75,618
Value thousands	$25,267	$27,987	$28,925	$30,599	$30,685
Exports and reexports (unmanufactured) metric tons	34,896	45,380	r43,291	r48,671	64,419
Value thousands	$12,075	$20,533	r$17,381	r$21,067	$21,508
Exports and reexports of asbestos products (value) do	$62,665	$119,915	r$137,690	r$141,653	$145,130
Imports for consumption (unmanufactured) metric tons	550,693	570,020	513,084	327,296	337,618
Value thousands	$145,146	$154,351	$135,210	$91,809	$103,893
Released from stockpile (unmanufactured) metric tons	188	--	1	--	--
Consumption, apparent[1] do	609,157	618,706	560,600	358,700	348,800
World: Production do	r4,793,451	r4,693,221	4,884,732	p4,887,215	e4,725,533

eEstimated. pPreliminary. rRevised.
[1]Measured by quantity produced, plus imports, plus stockpile releases, minus exports.

Legislation and Government Programs.—Regulatory agency procedures, proposals, and regulations, including asbestos related ones, were under review in 1981 to bring about conformance with Supreme Court decisions and new administration policy. Even prior to establishment of the Cabinet level Presidential Task Force on Regulatory Relief, Federal Register (F.R.) Jan. 30, 1981, the agencies had begun some changes. For example, the Occupational Safety and Health Administration (OSHA), in the January 19th F.R., published some final rule changes in the general cancer policy, and further changes were prepared in the January 23d F.R. The significant change proposed in the January 23d issue was that OSHA must consider all relevant evidence in making its determinations.

In the February 6th F.R., a Presidential memorandum postponing the promulgation of all regulations for 60 days was announced, and in the February 19th F.R., Executive Order 12291 requiring cost benefit analyses of all new and existing regulations was promulgated.

The Asbestos Information Association/North America presented to the Task Force on Regulatory Relief the following as those regulatory initiatives that most threaten the asbestos industry: (1) A proposal outstanding at OSHA since 1975 to reduce the permissible workplace exposure level from 2.0 to 0.5 fibers per cubic centimeter, and outstanding recommendations by the National Institute for Occupational Safety and Health to reduce that standard even further to 0.1 fiber; (2) announcement by advance notice of proposed rulemaking in 1979 at the Environmental Protection

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Agency (EPA), under Section 6 of the Toxic Substances Control Act (TSCA), to consider the possibility of banning all industrial and commercial uses of asbestos; (3) announcement by advance notice of proposed rulemaking in 1979 at the Consumer Product Safety Commission (CPSC) to consider the possibility of banning all uses of asbestos in consumer products; (4) outstanding water-quality criteria for asbestos issued by EPA under the Clean Water Act that, although they do not yet have formal regulatory impact, have already created marketing problems for asbestos-cement pipe manufacturers; (5) a proposal by EPA under TSCA Section 8(a) to collect enormous amounts of information on asbestos in support of numerous efforts to regulate asbestos more stringently; (6) a proposal by EPA to identify asbestos in schools; and (7) plans by EPA to reassess the existing National Emission Standard for a Hazardous Air Pollutant asbestos regulation with the possibility of tightening its requirements.

On June 17, the U.S. Supreme Court handed down a decision in the cotton dust case. Interpretations of the decision vary as the AFL-CIO says that the ruling flatly cuts out cost benefit analyses, while OSHA contends that only the mandatory nature of such analyses is removed.

In the July 21st F.R., the EPA clarified which asbestos exports must be reported under the TSCA. EPA considers three categories of asbestos exports to be reportable: (1) bulk shipments of raw fiber; (2) an asbestos-containing mixture that assumes the shape of its container—for example, asbestos-containing paints; and (3) an asbestos-containing mixture that is formed to a shape that must be fundamentally changed before use. Given as examples of types of products that are not subject to the rule are asbestos-cement pipe, brake linings, sheet gasketing, unfinished asbestos textiles, floor tiling, and rolls of asbestos paper.

On December 7, the Supreme Court refused to review the separate rulings of Federal Appellate Courts that held that any insurer would be liable for health impairment claims during the period of exposure to asbestos as well as during manifestation of the disease.

Environmental Impact.—It is practically impossible to separate the large drop in 1980 in asbestos consumption into economic environmental parts. It would seem to be mainly economic, but the very large number of lawsuits about asbestos exposure-related diseases and their coverage in the media are bound to have some effect on the market. The scope of these effects was discussed by Senator Hart and printed in the Congressional Record. The Senator introduced into the Record an article from the National Law Journal (Oct. 19, 1981) entitled "The Asbestos Case Explosion" by James Granelli.[2] Mr. Granelli says that two recent Federal Appellate Court rulings and a recent medical study could radically expand the size and number of the asbestos-related disease lawsuits. These lawsuits are already the largest type of product-liability case in the country. Any "radical expansion" of the 12,000 to 15,000 cases pending (5,000 in California alone) could overwhelm the courts.

Seamen and shipyard workers, the largest group of plaintiffs, have been deemed by an October ruling of the 4th U.S. Circuit Court of Appeals to come under admiralty law; their suits can be tried in Federal courts, thereby avoiding the statute of limitations that bind many State courts.

On October 1, Judge David Bazelon, writing for the District of Columbia Circuit Court of Appeals, settled the hard-fought question of the "moment of liability" so important to the insurance carriers. He ruled that the insurance coverage was triggered both at the time of exposure and manifestation and also while the asbestos fibers were in residence.

The Johns Manville Corp. had 8,000 cases pending involving 13,500 plaintiffs and had settled 1,000 cases. The plaintiffs have won 56% of the cases that went to trial and were awarded amounts ranging from $16,000 to $1,857,600.

The disposal of 395 cases in 1980 by trial or settlement resulted in an average award of $76,000 to the plaintiffs. In the first 9 months of 1981, 302 cases were disposed of with an average cost of $58,500 per case to the defendant. A business publication suggested that in the long run, these cases may be a social rather than a legal problem.[3] It suggested that the huge scope of potential liabilities from asbestos and other latent diseases may be too great for an industry or group of industries to bear. The Government may have to step in. The inclusion of the tobacco industry and the Government itself as codefendants in many suits may influence congressional decisions.

According to one of its journals, the medical profession apparently thinks that environmental regulations are sometimes based on incomplete, inaccurate, or misinterpreted data.[4] Affairs of the American Medical Association (AMA) in their report

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on "Carcinogen Regulations" gave the following as major conclusions: (1) Although such carcinogens as asbestos and chromates have been identified in the workplace, there is no definitive epidemiologic evidence that the United States has experienced an overall increase in the incidence of cancer related to high levels of pollutants or contaminants in the environment; (2) much more research relating the development of cancer in animals to a parallel development in humans is needed before that relationship can be used to mandate regulating substances in the human environment; (3) the AMA should continue to encourage Federal regulatory agencies to use an independent review processs for full scientific assessment—one that will objectively consider experimental biases and define the limits of testing accuracy before a formal proposal is made to regulate a potential carcinogen; and (4) the AMA should advise Federal regulatory agencies of the importance of providing a comment period of at least 90 days after the proposal of a regulation so that there may be indepth peer review of the proposed policy or rule.

In 1981, the first drafts of the long awaited reports on the National Toxicology Program animal feeding study became available. They give no indication of carcinogenicity from ingested asbestos.

Table 2.—Stockpile goals and Government inventories as of December 31

(Metric tons)

	Stockpile goals	Total inventories			Sales of excesses, 1981
		1979	1980	1981	
Amosite	15,422	38,587	38,587	38,587	--
Chrysotile	2,722	9,034	9,034	9,034	--
Crocidolite	--	2,163	2,163	754	1,409
Total	18,144	49,784	49,784	48,375	1,409

DOMESTIC PRODUCTION

Mines in the United States shipped about 6% less asbestos in 1981 than in 1980, but the value was practically identical. Three States produced asbestos; California was the leader, followed by Vermont and Arizona. Total output was 75,618 tons valued at $30.7 million.

Calaveras Asbestos Corp. was California's and the Nation's leading producer from its Copperopolis Mine. One other mine was also active in California. On the Joaquin Ridge near Coalinga, in San Benito County, Union Carbide Corp. operated its Santa Rita Mine.

The Vermont Asbestos Group's Lowell Mine in Orleans County, Vt., is second in the country in production.

Arizona production in 1981 was below the 1980 level. The Jaquays Mining Corp. in Gila County had the only active asbestos mine in the State. This mine will probably be closed in 1982.

Employment in U.S. asbestos mines and mills averaged about 450 persons during 1981.

Table 3.—Asbestos producers in the United States in 1981

State and company	County	Mine	Type of asbestos
Arizona: Jaquays Mining Corp	Gila	Chrysotile	Chrysotile.
California:			
Calaveras Asbestos Corp	Calaveras	Copperopolis	Do.
Union Carbide Corp	San Benito	Santa Rita	Do.
Vermont: Vermont Asbestos Group	Orleans	Lowell	Do.

CONSUMPTION AND USES

Total U.S. asbestos consumption decreased 3% from 1980 to 1981. Chrysotile was 90% of that consumed; crocidolite, 9%. Small amounts of both amosite and anthophyllite were reported used.

Asbestos-cement pipe decreased its share of the asbestos used from 40% in 1980 to 37% in 1981. Chrysotile was 76% of that

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Table 4.—U.S. asbestos consumption by end use, grade, and type

(Metric tons)

	Chrysotile								Crocidolite	Amosite	Anthophyllite	Total asbestos
	Grades 1 and 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Total chrysotile				
1980	400	3,600	86,900	89,500	19,900	132,300	--	332,600	24,400	1,700	--	358,700
1981:												
Asbestos-cement pipe	--	--	71,300	26,100	1,100	--	--	98,500	31,300	--	--	129,800
Asbestos-cement sheet	--	100	300	2,500	2,500	12,300	--	17,700	1,400	200	--	19,300
Flooring products	--	--	--	400	--	67,800	--	68,200	--	--	--	68,200
Roofing products	--	100	400	1,100	7,300	22,900	--	31,800	--	--	--	31,800
Packing and gaskets	--	1,000	1,600	5,200	100	11,400	--	19,300	--	--	--	19,300
Insulation:												
Thermal	--	--	200	--	--	5,800	--	6,000	--	--	--	6,000
Electrical	--	300	--	--	--	300	--	600	--	--	--	600
Friction products	--	--	1,100	14,200	5,800	26,900	--	48,000	--	--	100	48,100
Coatings and compounds	--	--	100	300	1,100	11,600	--	13,100	--	--	--	13,100
Plastics	100	100	--	300	--	600	--	1,100	--	--	--	1,100
Textiles	--	1,700	--	--	--	--	--	1,700	--	--	--	1,700
Paper	--	100	--	400	900	300	--	1,700	200	--	--	1,900
Other	--	100	200	100	200	6,200	--	6,800	--	1,100	--	7,900
Total	100	3,500	75,200	50,600	19,000	166,100	--	314,500	32,900	1,300	100	348,800

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used in asbestos-cement pipe and crocidolite the rest. Flooring products with 20%, friction products with 14%, roofing products with 9%, and asbestos-cement sheet and packing and gaskets with 6% each, were the other major uses.

One percent of the chrysotile used was spinning grades 1, 2, or 3. Of the rest, the grade 7's were the most used at 53%, the 4's next at 24%, the 5's at 16%, and the 6's at 6%.

PRICES

Cassiar Resources, Inc., started the year optimistically with price increases that averaged 12% higher than those of 1980. Most other Western Hemisphere producers raised their published prices by varying amounts. The depressed markets and high producer inventories, though, made for a buyer's market with much selling below the listed prices. Because most of the asbestos used in the United States came from Canada, Quebec prices set the pattern. Quebec prices are given below.[5]

Quotations for Asbestos Corp. (Quebec) chrysotile, f.o.b. mine, as of January 1, 1981, follow:

Grade	Description	Value per metric ton
3Z to 3F	Spinning fiber	Can$1,325-$2,199
4T to 4A	Asbestos-cement fiber.	937- 1,384
5Z to 5D	Paper fiber	548- 757
6D	Paper and shingle fiber.	450- 470
7TS to 7D	Shorts	138- 278

African asbestos producers privately negotiate sales, thereby ruling out market quotations. The following tabulation shows the average value per metric ton of imports from the Republic of South Africa, regardless of grade, calculated from 1981 and previous U.S. Department of Commerce data:

Type	1977	1978	1979	1980	1981
Amosite	$589	$569	$577	$902	$725
Crocidolite	582	624	686	689	676
Chrysotile	485	451	679	692	595

FOREIGN TRADE

There was a 2% increase in the value of asbestos and asbestos products exported from the United States in 1981 over that of 1980. The fiber share of the export dollar remained at 13% in 1981. All of the gain was accounted for by a 2.4% increase in the value of manufactured asbestos products. There was a 23% decrease in the unit value of imported fibers to $430 in 1981.

In 1981, the United States recovered 160% of the cost of imported asbestos by exporting and reexporting fibers and products.

Canada remained the largest user of U.S. asbestos and products accounting for 34% of the value of exports of these products in 1981, followed by Mexico, 14%, and Saudi Arabia, 7%. Other major buyers of U.S. asbestos and products were, in descending order, Japan, Venezuela, Australia, the United Kingdom, the Federal Republic of Germany, Colombia, and the Netherlands.

Canada provided 94% of the asbestos fiber imported into the United States in 1981, and the Republic of South Africa provided 5%. Several countries provided the remainder. Chrysotile again dominated the imported types with 98% of the total. The dollar value of imported fiber in 1981 was 13% higher than that of 1980.

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Table 5.—Countries importing U.S. asbestos fibers and products, by type and country

(Thousand dollars)

Country	1980			1981		
	Unmanufactured fibers	Manufactured products	Total	Unmanufactured fibers	Manufactured products	Total
Australia	68	3,231	3,299	117	4,480	4,597
Canada	951	60,182	61,133	1,029	55,754	56,783
Colombia	168	1,638	1,806	55	1,867	1,922
Germany, Federal Republic of	1,146	3,618	4,764	713	3,098	3,811
Japan	4,233	3,840	8,073	4,246	4,171	8,417
Mexico	4,410	8,980	13,390	5,267	18,344	23,611
Netherlands	--	3,288	3,288	14	1,680	1,694
Saudi Arabia	67	13,362	13,429	118	11,717	11,835
United Kingdom	373	4,258	4,631	206	3,627	3,833
Venezuela	239	3,202	3,441	222	4,951	5,173
Other	9,082	35,700	44,782	9,362	34,842	44,204
Total	20,737	141,299	162,036	21,349	144,531	165,880

Table 6.—U.S. exports and reexports of asbestos and asbestos products

Product		1979		1980		1981	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
EXPORTS							
Unmanufactured:							
Crudes, fibers, and stucco	metric tons	31,635	r$12,868	36,426	$17,044	50,131	$17,328
Sand and refuse	do.	10,501	3,642	11,793	3,693	13,995	4,021
Total	do.	r42,136	r16,510	r48,219	r20,737	64,126	21,349
Products:							
Asbestos fibers	do.	2,559	6,784	2,695	8,610	3,840	9,544
Shingles and clapboard	do.	7,323	3,875	4,535	2,560	21,771	3,686
Other articles of asbestos	do.	17,758	13,301	16,646	14,236	17,504	14,292
Gaskets	do.	4,203	4,556	438	3,542	451	4,144
Packing and seals	do.	2,405	14,497	2,118	15,661	1,598	18,179
Insulation	do.	NA	4,524	NA	6,151	NA	8,185
Other articles, n.s.p.f	do.	NA	22,806	NA	25,442	NA	23,660
Brake linings and disk brake pads	do.	NA	55,270	NA	55,471	NA	50,058
Clutch facings and linings	number	NA	9,334	NA	9,626	NA	12,783
Total		XX	r$134,947	XX	r$141,299	XX	144,531
REEXPORTS							
Unmanufactured:							
Crudes and fibers	metric tons	1,039	851	383	307	240	150
Sand and refuse	do.	116	20	69	23	53	9
Total	do.	1,155	871	452	330	293	159
Products:							
Asbestos fibers	do.	--	--	--	--	6	34
Shingles and clapboard	do.	--	--	477	78	34	20
Gaskets	do.	--	--	--	--	1	7
Packing and seals	do.	4	109	1	5	1	2
Insulation	do.	--	--	NA	1	NA	17
Other articles, n.s.p.f	do.	NA	68	NA	14	NA	120
Brake linings and disk brake pads	do.	NA	2,492	NA	219	NA	149
Clutch facings and linings	number	NA	52	NA	24	NA	234
Other articles of asbestos	metric tons	NA	22	3	13	1	16
Total		XX	2,743	XX	354	XX	599

rRevised. NA Not available. XX Not applicable.

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Table 7.—U.S. imports for consumption of asbestos fibers by type, origin, and value

Type	Canada		Republic of South Africa		Other		Total	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
1979	495,914	$123,673	16,328	$11,135	842	$402	513,084	$135,210
1980:								
Chrysotile:								
Crude	129	20	--	--	29	32	158	52
Spinning fibers	5,424	4,571	360	338	567	578	6,351	5,487
All other	309,886	78,371	2,041	1,379	899	721	312,826	80,471
Crocidolite (blue)	[1]52	12	7,545	5,201	--	--	7,597	5,213
Amosite	[1]49	302	315	284	--	--	364	586
Total	315,540	83,276	10,261	7,202	1,495	1,331	327,296	91,809
1981:								
Chrysotile:								
Crude	--	--	957	554	--	--	957	554
Spinning fibers	4,450	4,124	471	175	90	91	5,011	4,390
All other	313,917	86,704	7,802	4,762	1,875	2,000	323,594	93,466
Crocidolite (blue)	--	--	7,376	4,988	--	--	7,376	4,988
Amosite	--	--	506	367	174	128	680	495
Total	318,367	90,828	17,112	10,846	2,139	2,219	337,618	103,893

[1]Transshipment from the Republic of South Africa.

WORLD REVIEW

A wide-ranging survey of asbestos-cement use was reported at an industry meeting and described in a trade publication.[6] The trends are detailed in figure 1, which shows a decline in use in Western Europe and North America and increases in the rest of the world after 1970. These curves illustrate what has become increasingly apparent in the last decade. The growth areas for asbestos consumption are in the less developed portions of the world.

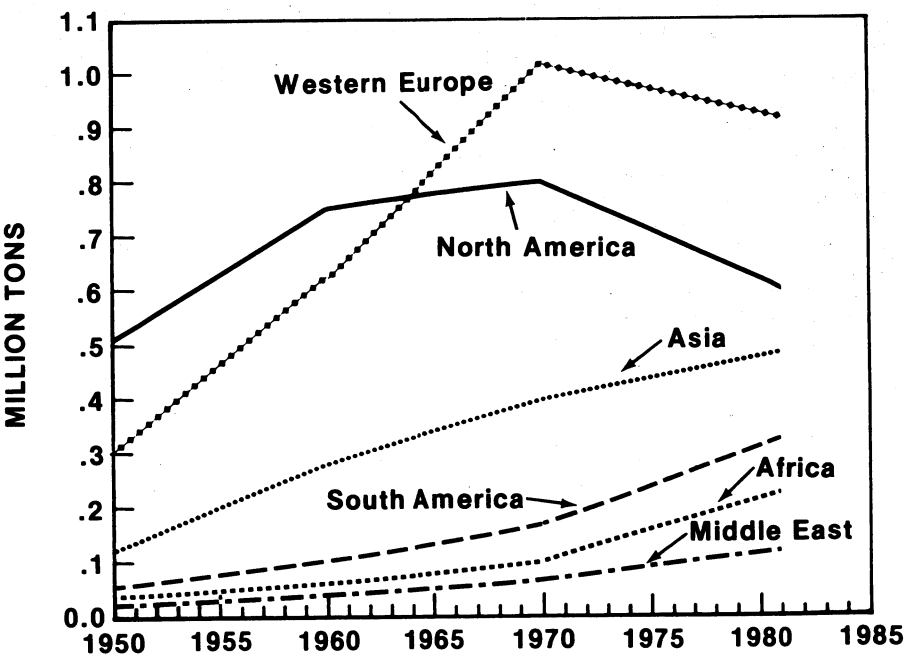


Figure 1.—Asbestos consumption by geographical area.

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Australia.—Woodsreef Mines, Ltd., in Barraba received enough funds from its parent company, Trans Pacific Asbestos, Ltd., of Canada, to retire its bank loan and come out of receivership. It still owes large amounts to the Australian Federal Government and the New South Wales government. In midsummer, the recession forced reduction in work from a normal 3 shifts per day 5 days per week to 1 shift per day 5 days per week.

Canada.—As of October, the Quebec asbestos producers had inventories of about 200,000 tons. This was in spite of many layoffs and temporary mine and/or mill closures. In late November, a Canadián mining paper described the past 12 months as harder on the asbestos industry than any previous period in its history.[7] The article cited an 11% downturn in sales for the first 7 months of 1981 when compared with the already low sales of 1980 and saw no apparent improvement for later in the year. An anomaly during the first part of the year saw sales of the short fibers (40% by weight of the production) grow by 0.8% while the others declined by 15.1%.

In November, the Quebec government and General Dynamics Corp. finally agreed to the terms under which control of the Asbestos Corp. would be transferred from the latter to the former.[8] The first phase, effective immediately, called for the transfer of 51% of the voting stock of General Dynamics Canada, Ltd., which owned 54.65% of Asbestos Corp., to the Quebec government. The price was Can$16 million. The agreement allows further acquisition at 2- and 5-year intervals.

After a temporary closure in August, Advocate asbestos mine near Baie Verte in Newfoundland was scheduled for permanent closure on December 31, 1981. The principal owners, Johns Manville Canada, Inc., and Compagnie Financiere Eternit S.A. of Belgium, said that the decision to close was mainly a problem of cash flow and the economics of an overburden-to-ore ratio of 6 to 1 compared with that in Quebec of 3 to 1. Trans Pacific Asbestos, Ltd., showed late-year interest in acquiring Advocate to showcase their Woodsreef wet milling process. The Newfoundland government, interested in maintaining the more than 500 jobs, said that at least three other firms were interested in the acquisition of Advocate.

Greece.—On April 17, 1981, the asbestos mill at Kozani and mine at nearby Zidani were officially opened. Full production at a 100,000-metric-ton-per-year capacity was expected in 1981 with production of grades 4, 5, 6, and 7.

South Africa, Republic of.—General Mining Union Corp. (Gencor) made an offer for the former Cape Asbestos, Ltd., asbestos properties acquired in 1979 by Transvaal Consolidated Land and Exploration, Ltd. Gencor was already South Africa's largest asbestos producer through its 31% ownership of Griqualand Exploration and Finance Co. and Msauli Asbestos, Ltd.

Turkey.—A recent report cited in an international magazine from the Union of Chambers projected the value of Turkey's asbestos production to rise 37% from 1979 to $1.7 million in 1981.[9]

U.S.S.R.—The U.S.S.R. reported that the second stage of the Lenin asbestos plant in the Tuva Autonomous Soviet Socialist Republic reached full production. Design capacity was 120,000 tons per year.

A translation from the Russian gave a thumbnail sketch of the Uralasbest combine.[10] It produced 62.4% of the Soviet asbestos output. It also provided all the asbestos exported from the Soviet Union. The combine incorporated 20 sections and subsections, including two asbestos mines, three asbestos milling plants, anthophyllite asbestos mining, an asbestos millboard factory, mechanical works, and factories for large building panels and other structural building materials. The total personnel numbered about 19,000, including 15,000 of labor force.

Zimbabwe.—Data on the production of asbestos and other minerals during the years of unilaterally declared independence (UDI) became available. For the UDI years 1966-79, inclusive, asbestos was the primary revenue-producing mineral with a value 32% above the next highest revenue producer (gold) and 23% of the total mineral value. Asbestos production maintained a healthy growth rate during that period.

Amiantos of Switzerland closed, in April of 1981, its Pangani, Vanguard, and Buss Mines. The no-longer-viable mines produced only 5% of Zimbabwean asbestos.

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Table 8.—Asbestos: World production, by country[1]

(Metric tons)

Country[2]	1977	1978	1979	1980[p]	1981[e]
North America:					
Canada (shipments)	1,517,360	1,421,808	1,492,719	1,323,053	[3]1,133,000
United States (sold or used by producers)	92,256	93,097	93,354	[3]80,079	[3]75,618
Latin America:					
Argentina	686	1,069	1,371	1,261	1,400
Brazil	92,773	122,815	138,457	169,173	180,000
Europe:					
Bulgaria[e]	500	700	600	652	700
Italy	149,327	135,402	143,931	157,794	142,000
U.S.S.R.[e]	1,900,000	1,945,000	2,020,000	2,150,000	2,220,000
Yugoslavia	9,066	10,360	10,041	12,106	[3]13,591
Africa:					
Egypt	478	349	238	316	325
Mozambique	--	--	789	800	800
South Africa, Republic of	380,164	257,325	249,187	276,759	[3]236,999
Swaziland[4]	38,046	[r]36,957	34,294	32,833	34,000
Zimbabwe	[r]273,194	[r]248,861	259,891	250,949	253,000
Asia:					
Afghanistan	13,000	[e]13,000	[e]4,000	--	--
China[e]	200,000	250,000	250,000	250,000	250,000
Cyprus	36,684	34,342	35,472	34,535	34,000
India	22,177	[r]24,623	32,094	31,253	32,000
Japan	6,307	5,746	3,502	3,897	3,500
Korea, Republic of	6,180	13,616	14,804	9,854	10,000
Taiwan	673	2,031	2,957	683	2,600
Thailand	4	4	--	--	--
Turkey	3,975	13,372	17,210	8,800	10,000
Oceania: Australia	50,601	62,744	79,721	92,418	92,000
Total	[r]4,793,451	[r]4,693,221	4,884,732	4,887,215	4,725,533

[e]Estimated. [p]Preliminary. [r]Revised.

[1]Table includes data available through Apr. 21, 1982.

[2]In addition to the countries listed, Czechoslovakia, North Korea, and Romania also produce asbestos, but output is not officially reported, and available general information is inadequate for the formulation of reliable estimates of output levels.

[3]Reported figure.

[4]Exports.

TECHNOLOGY

Examination of an EPA document published in 1981 left no doubt about that agency's interest in asbestos.[11] It described 49 different asbestos related research projects taking place in 10 laboratories under the guidance of 4 EPA offices. Of further interest is that 19 (39%) of the projects had to do with waterborne asbestos.

Funding from Trans Pacific Asbestos, Ltd., parent company of Australia's Woodsreef Mine, was intended to bring into operation a prototype mill to demonstrate its revolutionary wet milling process. At least one U.S. company was showing great interest in this process.

Substitutes.—A paper at a national glass conference gave some details about the asbestos uses in a glass plant and the hunt for substitutes.[12] The author conceded that to eliminate all asbestos one must be willing to accept lower operating efficiencies and higher operating and maintenance costs. He identified 72 separate kinds of equipment in all parts of the plant that contained asbestos.

Another paper detailed one company's very novel approach to a less hazardous substitute for asbestos.[13] Reasoning that, if condensed phosphates were degradable in cellular enzymes, fibrous condensed phosphates would be biodegradable and less capable of cellular damage and carcinogenicity; they produced such fibers. Analysis of the paper indicates that the following questions were not addressed: (1) Would the fibers that have much larger diameters be compatible with present asbestos manufacturing processes? (2) How would further fiberization to produce smaller fibers affect the physical parameters of the fibers? (3) Could long lasting cement products be made using these "fairly resistant to alkali" fibers?

If asbestos continues to be deemed a controllable hazard, then, because the less costly reinforcement will prevail, asbestos could likely win any economic battle. Figure 2 shows the efficacy of several reinforcing agents in plastic matrices. Asbestos is by far the least costly.

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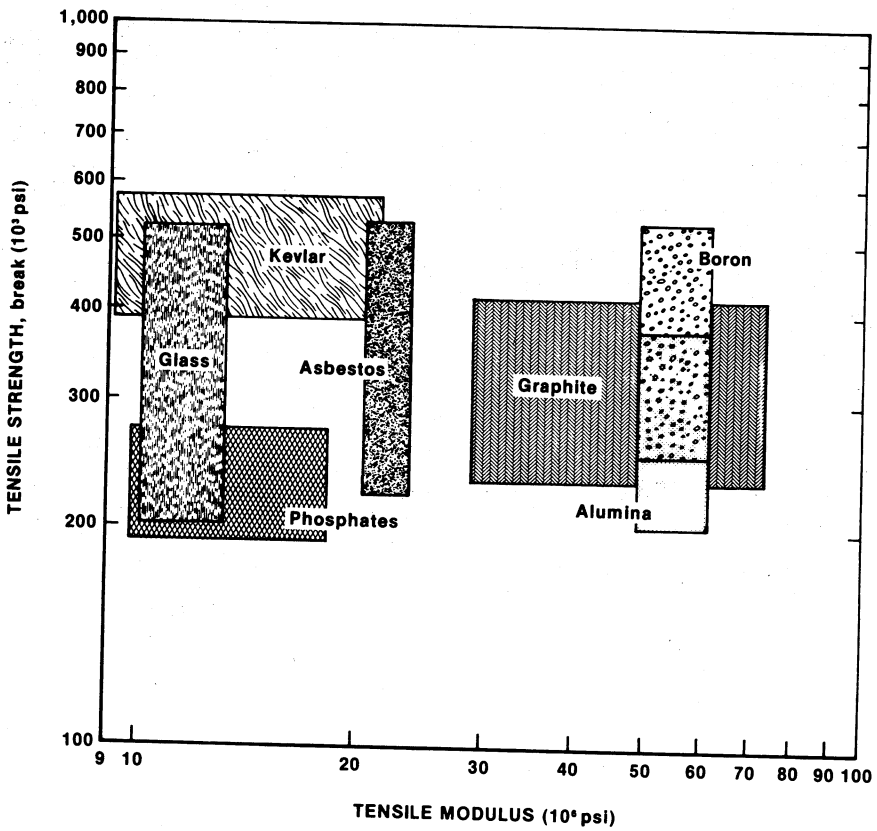


Figure 2.—Strength and modulus of selected fibers.

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