PLAINTIFF'S EXHIBIT

UC-2644

"ASBESTOS IN THE UNITED STATES--SUPPLY AND DEMAND"

Remarks by
Robert A. Clifton, U.S. Bureau of Mines

before the Third International Conference on the
Physics and Chemistry of Asbestos

Laval University, Quebec, Canada

August 17 - 21, 1975

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INTRODUCTION

It is easy to understand an asbestos-supply interest in the United States, which has, at least historically if not at the moment, led the world in asbestos consumption. Appraisal of the present and future ability of the United States to supply the demands of its industrial users of asbestos is the subject of this paper.

UNITED STATES DOMESTIC SUPPLY

The first recorded transaction dealing with asbestos in the United States took place more than 100 years ago when $18 worth of asbestos was imported from somewhere in 1873. The United States has been importing asbestos ever since, and by far the majority of the asbestos supply needed to meet the U.S. demand has and will come from abroad. Since the turn of the century, for example, there have been only 2 years in which the imports have represented less than 90% of the apparent consumption.

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If the domestic supply meets such a small portion of the demand, will it remain significant? I can only say that we hope so. At present, the viability of an asbestos mining industry in the United States is a controversial question. During 1974, U.S. mines produced only 75% as much asbestos as in the alltime record high year of 1973. Two of our seven operating mines (about 40% of '73 production) have closed. A third announced either closure or sale to an employees group (since accomplished). Marginal profits and the added expenses of meeting environmental requirements seem to tell the story of the closings, and those reasons plus seriously depleted reserves, the story of the near closing.

What domestic supplies are left, and what of the future? A major Quebec-type chrysotile mine is operating with limited reserves in Vermont. There is a similar mine in California with considerably more reserves but with financial and perhaps other operating problems. We have a smaller chrysotile mine in Arizona and a small anthophyllite mine in North Carolina. There is a very interesting tremolite discovery in Texas with beautiful long and strong and spinnable fibers that may be in

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production soon, and there is a chrysotile discovery on Tanana Indian land in the Eagle quadrant of Alaska. The Tanana and Cassiar situations seem to have complementary features. One possibly has a viable ore body, and the other has a fully equipped mine and mill at a nearly depleted ore body a few miles away. A U.S. Bureau of Mines study summarized in Bureau of Mines Information Circular 8672 indicates considerably higher mining costs in Alaska due, principally, to wages, but the continuing demand for asbestos may soon require that presently subeconomic resources be reevaluated.

I have deliberately refrained, so far, from discussing the asbestos deposits of the Joaquin Ridge near Coalinga, Calif. Two companies are operating mines there now and a third closed last year. This deposit is so vast that one of the operators told me that he had 800 years of reserves at present production rates. That deposit just could hold a key to the future as the world's reserves of longer asbestos fiber become depleted. These admittedly short fibers are reported to have exceeded the critical length and have been able to reinforce every matrix in which tested. Asbestos is still the best substitute for asbestos, and perhaps this innovative industry will find means by which the short fibers can be made to act long.

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I was gratified that a 2-year study by the National Academy of Sciences-National Research Council agreed with some of my hypotheses. This study, entitled "Mineral Resources and the Environment," was released in February of this year and a few quotes from the Chemical and Engineering News review of it seem appropriate: "The first true shortages are perhaps only a matter of a few years away." * * * "Asbestos. . . [is]among other mineral resources that may soon be in short supply, particularly in the U.S." * * * "The committee recommends that the government maintain stockpiles of threatened materials." * * * "Substitutes must be found for . . . asbestos. . ."

DEMAND

Figure 1 is taken from the asbestos chapter of the soon to be published 1975 edition of Mineral Facts and Problems. It should serve as a good bridge between the portions of this presentation covering supply and those covering demand. It shows how our major areas of supply feed the total demand and then breaks down to final major end-use areas, which we will cover later. Note that nearly 97% of the imports came from Canada and that a little over 97% of total imports was chrysotile.

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ASBESTOS

SUPPLY-DEMAND RELATIONSHIPS-1973

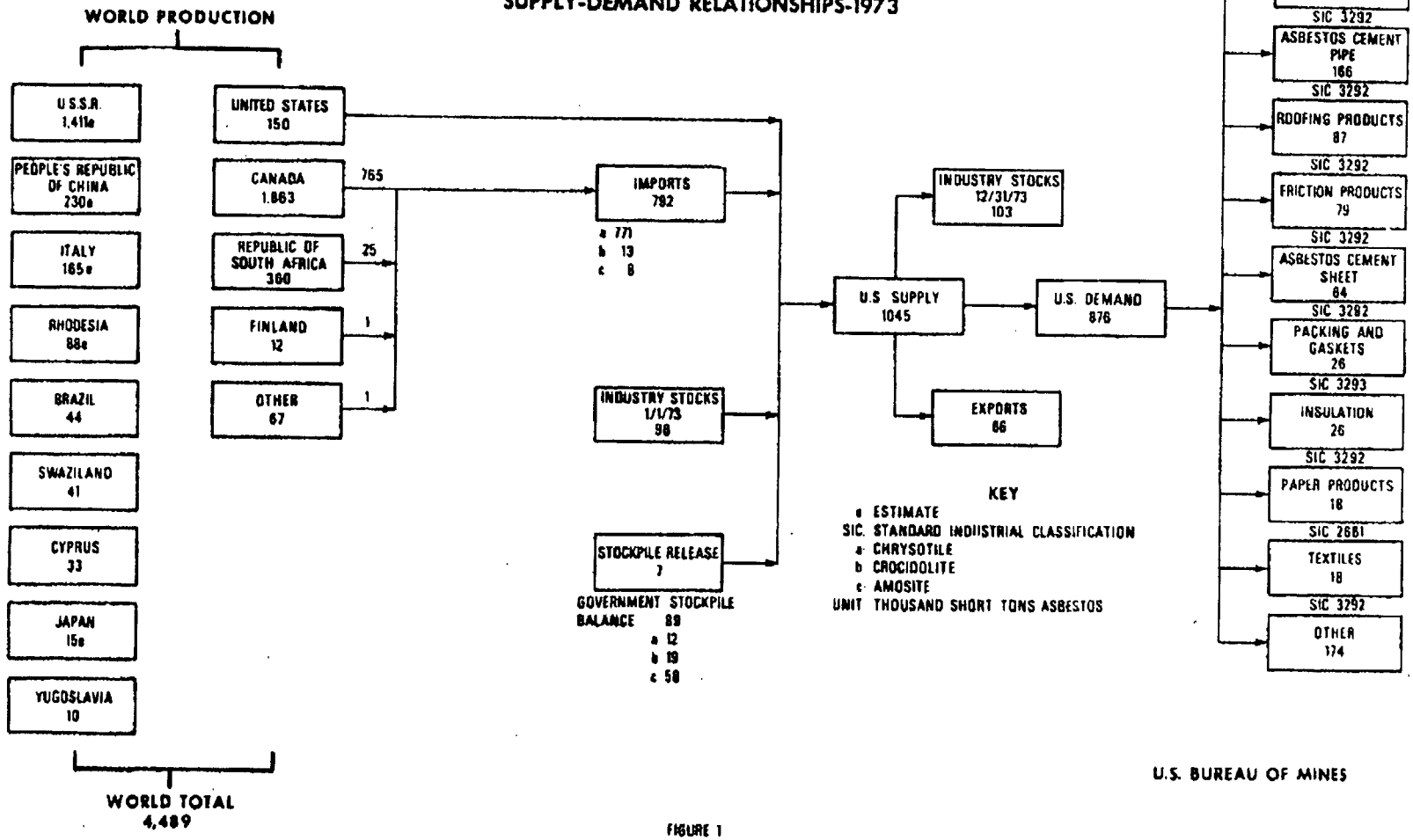


FIGURE 1

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I wish that I could talk about demand in other than statistical terms. One definition describes a statistician as "a man who can draw a mathematically precise line from an unwarranted assumption to a foregone conclusion." Having said that, I will now have to admit that 5 years on this job have made a statistician of me and that some of their tools (particularly regression analysis and trend projection) are valuable means of describing sets of data.

My previous reports describing U.S. asbestos demand as "remarkably stable" were based on several 20 year analyses within the 1950-73 span, which showed very little change in the average annual growth rate and stayed well below 1%. As I became more of a statistician, though, I found that by careful selection of the span of historical data, I could influence the outcome. For example, for the 50-year span 1925-74, the average annual growth rate was 1.43%, which projected to the year 2000 would call for a demand of 1.9 million short tons. I think that the data shown in figure 2 (also from the forthcoming Mineral Facts and Problems) illustrate what I think the U.S. demand would be in the year 2000 in a buyer's market. Note that the growth rates of the 20 year trend and the 10 year trend both project large demand in the year 2000.

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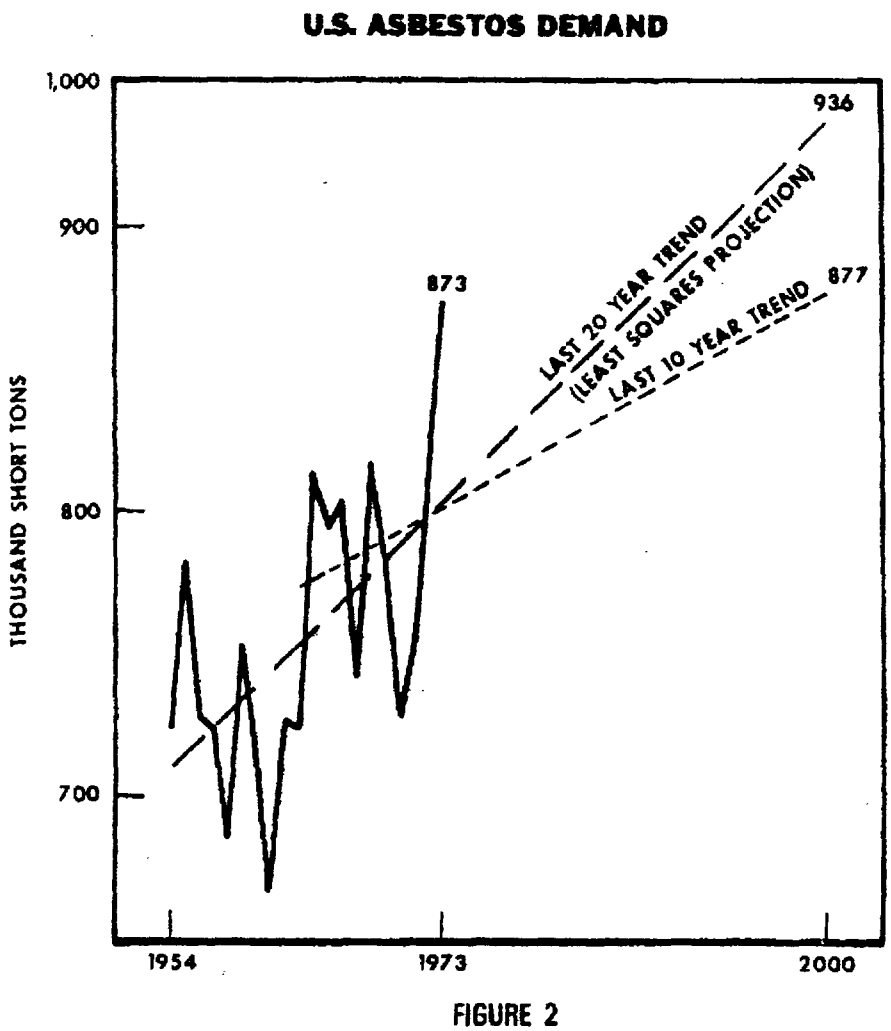


FIGURE 2

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The world market and the United States' place in it are changing a great deal. In the early fifties, the United States consumed about 50% of the world production, and now, only about 20%. Figure 3 from the 1972 Minerals Yearbook illustrates this point rather well. If each of the major consuming countries kept a near-constant share of an expanding market, the result would be a straight line as shown by Canada. The U.S.S.R. and Japan typify those countries whose rate of consumption has grown faster than the world production rate. The United States and United Kingdom have gone the other way. Note that the U.S. and U.S.S.R. trend lines cross. This indicates that if the U.S.S.R. has not already done so, it soon will surpass the United States as the number one consumer of asbestos fiber.

There are some trends to be seen in asbestos end-use patterns. In the process of improving the data collection system, the continuity necessary to observe these trends has suffered. My mailing list of questionnaires has increased from about 40 to about 700, and the questionnaire itself has been drastically revised and needs further revision now. I think that the 1973 data as shown in table 1 are fairly valid. The chrysotile data have been adjusted to agree

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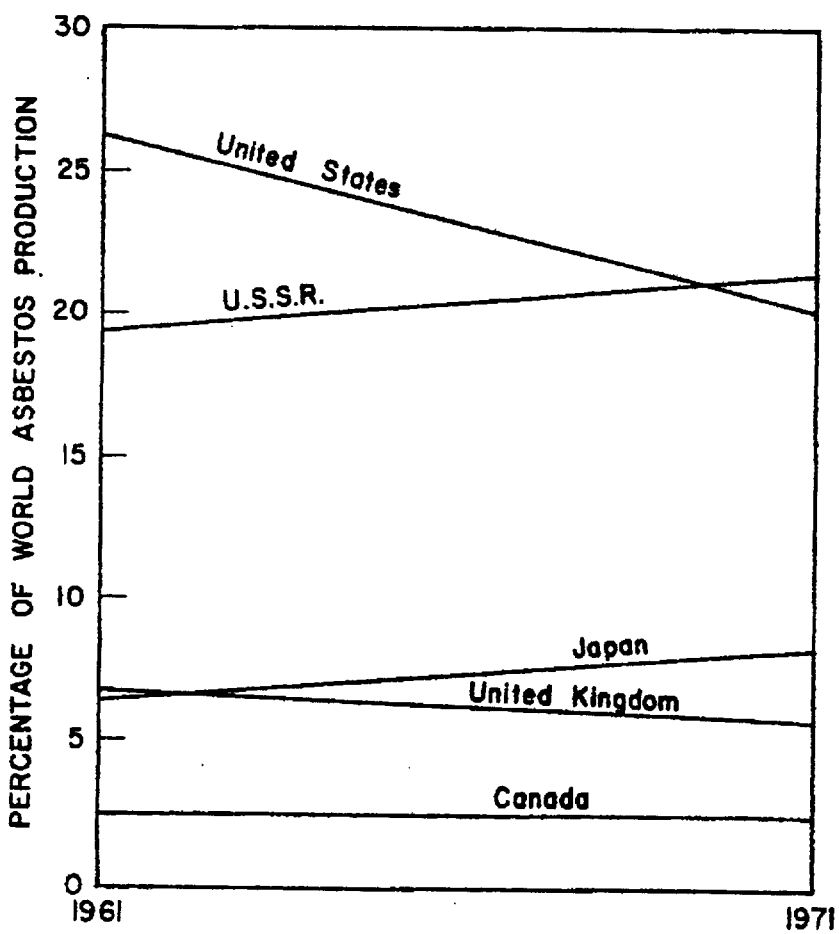


FIGURE 3

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with the U.S. apparent consumption figure. These same data have been grouped into BM I (Quebec 1, 2, and 3), BM II (Quebec 4 and 5), and BM III (Quebec 6, 7, and 8). Note that by far the majority of end uses are tied to the construction industry. This fact accounts for both the record high year of 1973 and the decline in 1974.

In 1972 I predicted, from a position of much less knowledge, that the asbestos industry would find itself able to meet the regulatory agency criteria at about the same time it was found that the stringent criteria were not needed. This is turning out to be the case, but don't look for rule relaxation. It's much harder to get something off the books once on, and the highly vocal voices that equate asbestos and doom are still around. The regulations, so far, appear to have done little real damage to the manufacturing side of the asbestos industry but have inhibited the producing side.

The asbestos industry has been able to create new markets when other materials such as glass fiber made major onslaughts on the old. I think, however, that this creativeness must take new directions in the face of a

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Table 1.--U.S. asbestos consumption in 1973
(short tons)

End uses	Chrysotile (adjusted)				Anthophyllite (reported)	Amosite (reported)	Crocidolite (reported)
	BM I	BM II	BM III	Total			
Flooring products	---	---	218,000	218,000	---	---	---
Asbestos cement pipe	---	64,000	95,000	159,000	139	198	6,646
Roofing products	---	16,600	70,100	86,700	---	310	---
Friction products	5,600	32,300	41,100	79,000	---	---	---
Asbestos cement sheet	---	24,700	36,800	61,500	54	77	2,380
Packing and gaskets	1,200	12,900	11,900	26,000	---	---	56
Insulation	1,200	5,600	15,600	22,400	---	3,587	---
Paper	---	700	17,100	17,800	---	3	218
Textiles	18,000	---	---	18,000	---	---	29
Other	---	14,800	149,400	164,200	969	98	8,634
Total	26,000	171,600	655,000	852,600	1,162	4,273	17,966

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quite possible worldwide depletion of this valuable resource. The asbestos industry must answer such questions as the following: How can this end product be made with less asbestos to be as good as it now is? How can every last fiber be extracted from this ore? If no adequate substitute exists, can one be synthesized?

The outlook includes greatly expanded exploration efforts worldwide. Absolutely clean asbestos mills and manufacturing plants are also foreseeable, both for worker protection and for preservation of a valuable product. Every asbestos outcropping ever recorded will be reevaluated as will every abandoned mine. In these circumstances, fiber prices probably will continue to climb. Stockpiling asbestos may reach an unprecedented level, and substitute synthesis research is likely to be revived and carried much further into the applications field than ever before.

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