

South African Asbestos: Production, Exports, and Destinations, 1959-1993

John S. Harington, DSc,^{1*} and Neil D. McGlashan, DSc²

Production and export figures of South African asbestos were analyzed over 1959-1993. They show stable sales of chrysotile. Those of crocidolite and amosite reached their peaks in the mid-1970s, after which trade fell drastically, crocidolite to 5% of its earlier peak and amosite to nil. Factors responsible for these virtual collapses were health issues, stricter legislation in First World countries, and litigation. In 1992, 21 countries continued to import crocidolite, although in reduced quantities. In the early 1960s, Europe and North America were the major recipients of South African asbestos. By 1989-91, these regions were surpassed by the Far East, which took over 90% of chrysotile and 70% of amosite. For crocidolite at that time, the Middle East took nearly 40%, Europe 28%, and Africa 21%. This implies that the newly importing countries can confidently expect an increase in asbestos-related disease and death well into the twenty-first century, even if the trade ceased now. Am. J. Ind. Med. 33:321-326, 1998. © 1998 Wiley-Liss, Inc.

KEY WORDS: South African crocidolite; amosite; chrysotile; production; exports; destinations

INTRODUCTION

Until amosite operations ceased in 1992, South Africa had the unique distinction of producing all three major types of primary commercial asbestos, crocidolite, amosite, and chrysotile. All three have long been associated with asbestos disease, but information on the epidemiology of mesothelioma in South Africa relates chiefly to crocidolite. Comparatively little is known about the health effects of amosite and virtually nothing about those of chrysotile [Felix et al., 1994]. These authors give a comprehensive history of the hazards and the mining of South African asbestos, which reinforces Felix's stark account [1991] of mining communities severely affected by crocidolite.

With such evidence in mind, we considered it worthwhile to examine the production and export of South African asbestos from 1959 to 1993, and by which countries and in what quantities each of the three types of South African asbestos was imported. The year 1959 was chosen partly because more detailed trade figures became available then and because it was shortly after that date that the association of malignant mesothelioma with exposure to asbestos was proved, in this case to crocidolite in South Africa [Wagner et al., 1960].

The South African asbestos trade started in the early nineteenth century when crocidolite was first reported between 1803 and 1806 near Prieska in the northwestern Cape by a geologist named Lichtenstein. Mining [Hall, 1930] and exports [Mining Statistics 1983; 1985] started in the same year. By 1930, 7,000 tons per year were produced [Hall, 1930], but there are no records available of the amounts exported at that time nor to what countries.

Amosite was discovered near Penge in Sekhukhuneland in the Transvaal, some 200 miles northeast of Johannesburg, by C.J. Ward in 1907, and mining started there in 1914 [Hall, 1930; Beukes and Dreyer, 1986]. Although the mining of amosite in the Transvaal took place later than that of

¹Unit of Cell Biology, Department of Zoology, University of the Witwatersrand, Johannesburg, South Africa

²Department of Geography and Environmental Studies, University of Tasmania, Hobart, Australia

*Correspondence to: John Harington, Department of Zoology, University of the Witwatersrand, WITS 2050, South Africa.

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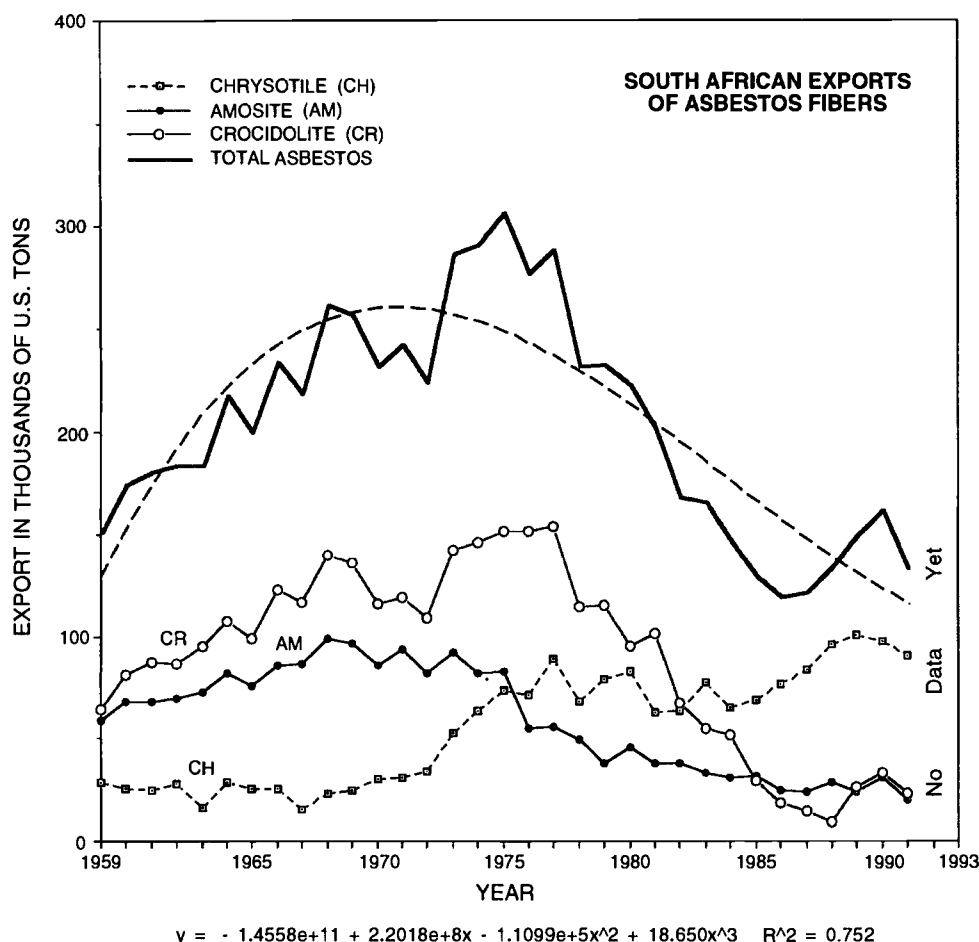


FIGURE 1. South African exports of chrysotile, amosite, and crocidolite, 1959-1991.

crocidolite in the Cape, it was produced in amounts well in excess of crocidolite from 1928-1959. Thereafter, crocidolite became the dominant fiber by tonnage [Harington et al., 1971]. Some crocidolite is found at Pietersburg in the Transvaal, but the yields are much lower than those from the Cape. Between 1959 and 1991, Transvaal crocidolite exports ranged from 0.6% to 11% of Cape crocidolite figures.

Small amounts of South African tremolite and anthophyllite, also amphiboles, are available, but these are not exploited to any extent. For these fibers, production and export figures are minimal. They were no longer listed from 1973. In the analyses to follow, figures for tremolite and anthophyllite and for Transvaal crocidolite are included with those for Cape crocidolite.

Chrysotile was first recognized in South Africa in 1905 in the eastern Transvaal [Mining Statistics 1983, 1985], and prospecting started in 1915. The most productive mining and milling operation is near Barberton, which started in the early 1940s [Hart, 1988; SAMI, 1985, p148]. This enterprise, unlike that of crocidolite and amosite mines, is still working close to production capacity at ~90,000 tons per annum [Hart, 1992].

SOURCE MATERIALS

All tonnages throughout this report are quoted in US ton equivalents (equal to 2,000 lbs). Figures for the production and export of South African chrysotile, amosite, and crocidolite over the period 1959-82 were obtained from the quarterly information circulars *Minerals/Minerale* (MM) of the Department of Mines of the Republic of South Africa. For destinations of these exports, MM provides data from 1959-1964. From about 1965-1981, such details were no longer available because of sanctions applied to the ruling South African government at that time. From 1982, the Department of Mineral and Energy Affairs resumed detailed publication of all asbestos operations in its annual reports of selected commodities in the mineral industry (1983-1993/94) under the name *South Africa's Mineral Industry* (SAMI). These publications also provide information on individual countries receiving South African exports. Information on the most recent 2 years of exports and destinations are withheld in each issue of SAMI for reasons of company confidentiality. Further details of the many countries importing South African asbestos from 1980-1992 were provided by SAMI printouts.

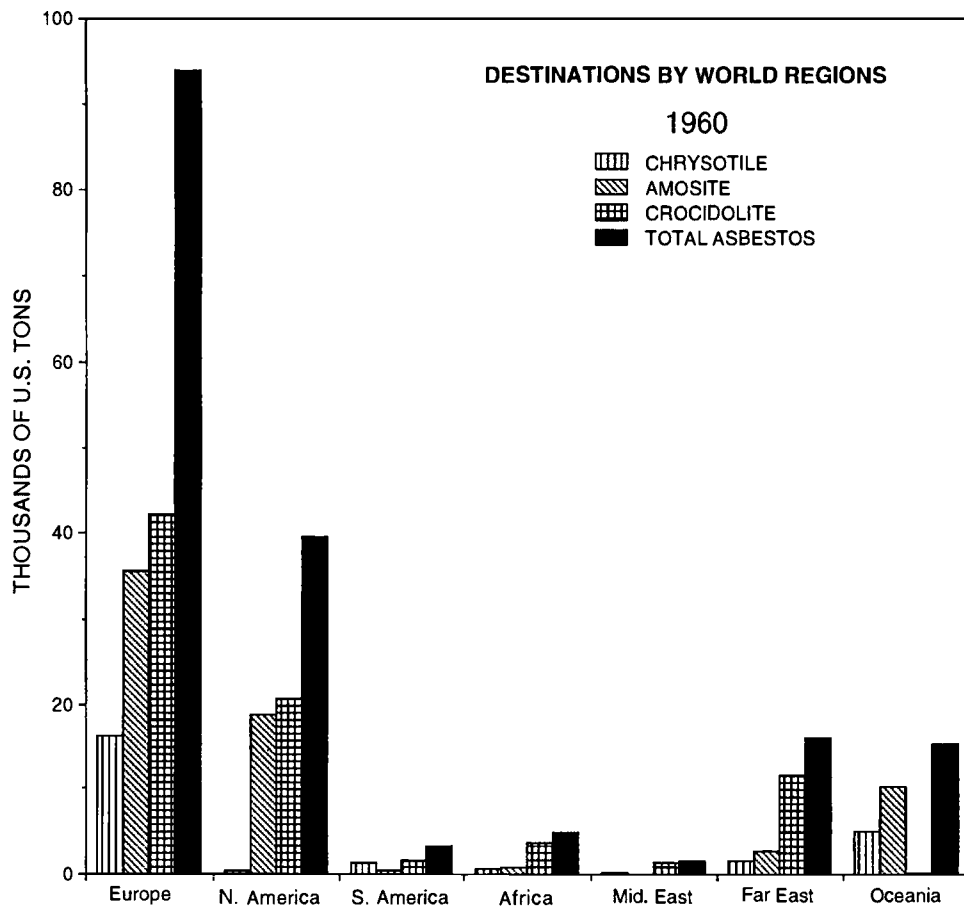


FIGURE 2. 1960 destinations of South African asbestos to seven major world regions.

Earlier data on international and southern African asbestos trade over 1935-1963 were compiled by May [1965]. During 1957-1962, world production was estimated at 3 million tons. By 1992, the latest available figure was 2.9 million tons, a closely comparable figure. The former USSR contributed 52.8% of this, Canada (predominantly Quebec Province) 18.2%, and South Africa ranked 7th with 4.1% [SAMI, 1993/4].

About 95% of the world's production of asbestos is of chrysotile, of which three-quarters of Canadian output serves the markets of North America and Asia, particularly Japan. South African production of crocidolite, amosite, and chrysotile, and other countries' asbestos make up most of the remaining 5% [Hart, 1988].

South Africa has long been the international provider for amosite and crocidolite and the major producer of asbestos in Africa. Others are Zimbabwe and Swaziland, both exclusively producers of chrysotile. In 1992, South Africa produced 135,400 tons of chrysotile, amosite, and crocidolite, and Zimbabwe 152,561 and Swaziland 32,818 tons of chrysotile. With the exception of these three, no other African country produces asbestos. Principal African importers of asbestos are Algeria, South Africa, Egypt, Tunisia, and Morocco, followed by Ghana, Zambia, Kenya, Senegal, and

Burundi, in that order [World Mineral Statistics, 1988-92; 1994].

South African export figures for total asbestos and for chrysotile, amosite, and crocidolite, together accounting for 95% of production, are shown in Figure 1.

From the peaks of the mid-1970s, except for chrysotile, a steady decline of both production and exports of South Africa fiber set in, culminating in the cessation of amosite operations in June of 1992, due essentially to the collapse of its Far Eastern market and drastically lowered production and export of crocidolite (Fig. 1). This depressed situation is reflected in the figures for the South African asbestos mines' total labor force provided by the Minerals Bureau in Johannesburg: in 1980, 11,968 (21 mines); in 1985, 7,084 (9 mines); in 1990, 5,051 (8 mines); and in 1995, 1,940 (5 mines).

Official comment by SAMI [1983, p105] describes the market for amosite and crocidolite as being depressed for various reasons. In 1983, the possibility existed of a partial ban on the manufacture of certain asbestos products in the United States. This ban came into effect in 1989, but was rescinded in 1991 [Federal Register, 1994], a development welcomed by industry [SAMI, 1984, p131].

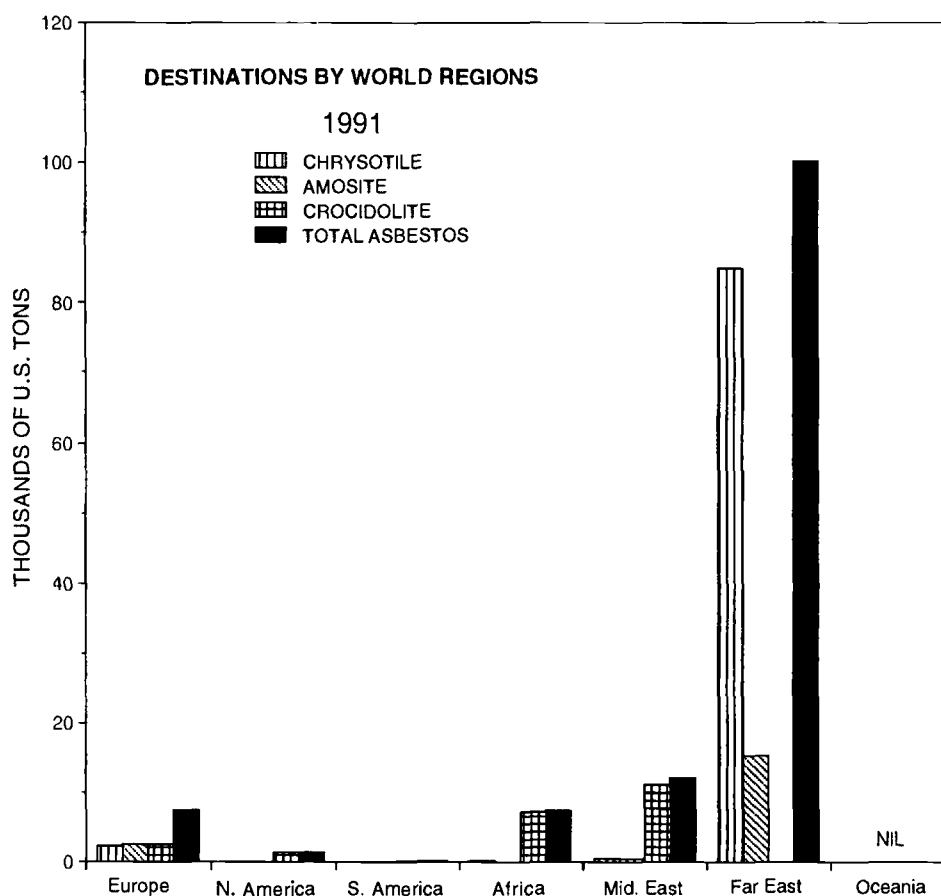


FIGURE 3. 1991 destinations of South African asbestos to seven major world regions.

In 1985, SAMI concluded (p148) that “despite the anti-asbestos lobby world-wide, asbestos fiber in general and amphiboles in particular, will continue to provide a range of products which contributes to an improved lifestyle for many people throughout the developed and developing world.” In addition, there was sufficient evidence . . . “that all fibers, whether chrysotile, amphibole, or other minerals or synthetic(s) (could) be used safely” [see also SAMI, 1985, p149; Hart, 1988].

DESTINATIONS OF EXPORTS

From 1936 to 1963, the bulk of South African asbestos went to Western Europe, including the United Kingdom, and to the United States, and smaller but increasing amounts to Australia and New Zealand, India and Pakistan, Latin America, and Japan [May, 1965]. Over the next 30 years, however, a dramatic shift of trade toward the Far East came to dominate the pattern for all three asbestos types, the major importers in 1991 being Japan (64%), South Korea (28%), and Thailand (5%) [SAMI Printouts, 1991]; see Figures 2 and 3.

Over 1980-1992, 26 individual countries continued to import crocidolite, including the United States, which took

91,683 tons, Italy 59,747, Iran 50,056, Spain 37,042, Yugoslavia 34,654, Algeria 30,903, Romania 28,462, Mexico 26,668, France 13,066, Japan 12,270, Germany 11,353, and the United Kingdom 3,702. By 1984, the United States, ranked second to Italy in 1980, had drastically decreased its receipt of this fiber from 20,854 tons in that year to a mere 551 in 1992. Total cessation of imports of crocidolite occurred in Germany in 1987, France in 1988, and the United Kingdom in 1991. Virtual cessation occurred in Spain in 1987 and Japan in 1988. By 1992, the following 12 countries no longer imported crocidolite: Argentina, Belgium, Indonesia, Iran, Israel, South Korea, Singapore, Spain, Swaziland, Taiwan, Thailand, and Zimbabwe. Australia, Canada, and Romania were presumably not importing fiber as they were not listed in the 1992 printout returns.

In 1992, 21 countries were still importing crocidolite, several in comparatively small amounts (Fig. 4). India, in this list, is also among eight developing countries known to import asbestos from Brazil [Giannasi and Thébaud-Mony, 1997]. The total amount specifically of South African crocidolite imported in 1992 by the 21 countries amounted to 15,996 tons.

The three largest importers were members of the Arab League in North Africa and the Middle East, with 47% of the

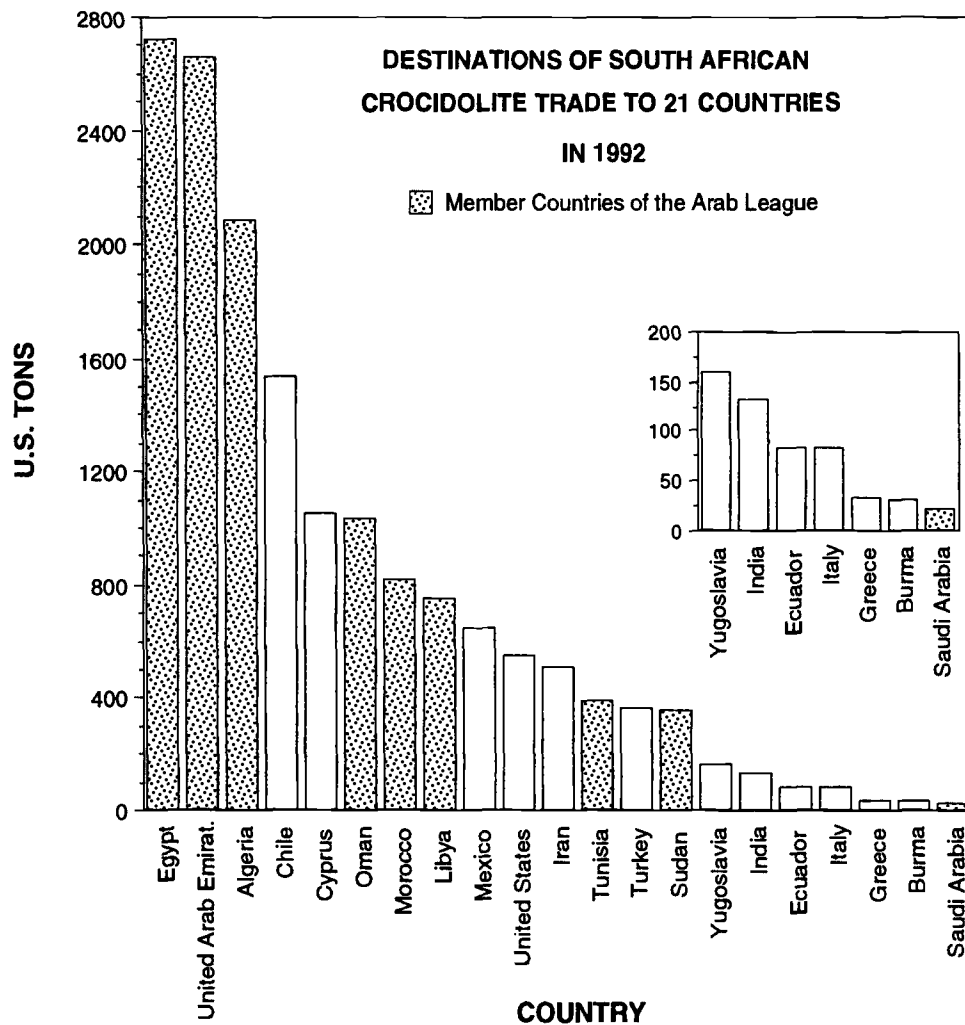


FIGURE 4. Destinations of South Africa crocidolite trade to 21 countries, 1992.

total. Six other Arab League countries imported a further 21% of the total of 15,996 tons, itself a mere 5% of the 344,234 imported by the 21 countries in the peak year, 1977.

DISCUSSION

The essence of the production and export figures of South African asbestos over 1959-1993 lies in the rise and fall of the amphibole asbestos industry occasioned by the mixed fortunes of the country's unique crocidolite and amosite trade. Exports of crocidolite dropped to 5% of their peak in the late 1970s and those of amosite ceased in 1993 from their peak in 1968. These precipitous falls contrast strongly with the stability of the chrysotile trade. Due to the strong steadying effect by the two world dominant producers of this fiber, South African production and exports held firm over the 1970s to the 1990s compared to the massive contemporaneous decrease in the sales and therefore the production, of amosite and crocidolite.

Yet another striking feature was the Far Eastern countries almost complete replacement of Europe and North America as the principal destinations for South African exports of asbestos over 1960-1991.

In South Africa, asbestosis, lung cancer, and mesothelioma followed the exploitation of asbestos, resulting in thousands of persons suffering progressive ill health or premature death [Felix et al., 1994]. Marchand [1991], in his account of the discovery of the association of mesothelioma with exposure to crocidolite in South Africa, reiterates this gloomy situation, evidenced [Felix, 1991; Felix et al., 1994, p277-278] by the history of the heavily crocidolite-polluted community at Mafefe in the Northern Transvaal, a matter that has still not been ameliorated. Elsewhere, workers and residents of Kuruman, Prieska, Pomfret, Barberton, and Badplaas shared a similar fate.

It remains to be seen what future effects are to be experienced in poor and developing countries to which asbestos, particularly crocidolite and amosite, has been sent

and to which crocidolite is still being exported. The crocidolite mining and milling operations in Australia, although closed in 1966, have also given rise to continuing health risks [de Klerk and Armstrong, 1992], which are remarkably similar to those resulting from the more extensive and longer developments in South Africa [Felix, 1991; Felix et al., 1994]. Here, the exact toll on nonwhite workers and residents repatriated or retired ill with debilitating and progressive disease will probably never be known.

The conclusion of the work by Felix and her colleagues [1994] and their strictures on the role of asbestos management influencing research in South Africa until the 1980s (p 272) make for rivetting but sad reading, emphasizing as they do the inexcusable role played by a neglectful industry and state over several decades [see also Marchand, 1991]. The asbestos tragedy has been called "one of the most colossal blunders of the twentieth century" by Bill Sells, a former executive for Johns-Manville, once a major manufacturer of asbestos products. "In my opinion," wrote Sells in 1994, "the blunder that cost thousands of lives and destroyed an industry was a management blunder, and the blunder was denial," instead of the "responsibility . . . and product stewardship" demanded of so serious a situation.

Concomitant with the reduction of asbestos use in developed countries, the increasing use in developing countries, albeit at lower overall tonnages, inevitably means that disease of long latency must continue to occur well into the twenty-first century. Even the ending of amosite operations in South Africa in 1992 and the considerable decrease in production of its even more dangerous relative, crocidolite, cannot at this date prevent further illness and deaths. It is unlikely that developing countries will be able to apply either "appropriate measures of protection" or "intelligent precautions" advocated by Murray in 1990, nor have they in place the medical care necessary to recognize "a silent epidemic of asbestos-related diseases" when this does occur [Giannasi and Thébaud-Mony, 1997]. In spite of the earlier and numerous reports of the hazardous effects of crocidolite, 59 countries continued to import it from South Africa in 1980 and 21 in 1992. The total ban so rationally urged is far from likely to be achieved.

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