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2015 Minerals Yearbook

ASBESTOS [ADVANCE RELEASE]

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Asbestos

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Domestic survey tables were prepared by Benjamin N. Bryden, statistical assistant, and the world production table was prepared by Lisa D. Miller, international data coordinator.

Asbestos, an industry term rather than a mineralogical term, is the generic name applied to a subset of silicate minerals that consist of bundles of separable fibers with high length-to-width ratios. The six types of asbestos that have been used in commercial products are the amphibole minerals actinolite, amosite, anthophyllite, crocidolite, and tremolite, as well as chrysotile, the asbestiform variety of serpentine. Chrysotile accounted for more than 93%, by weight, of global asbestos production from 1900 to 2000, followed by crocidolite, amosite, and anthophyllite. Actinolite and tremolite have never been widely produced or used. Other forms of amphibole asbestos also occur in nature but have no commercial applications (Virta, 2006, p. 195, 197).

U.S. consumption of asbestos was minimal during the late 1800s, when primary uses were fireproof garments, insulation and packing for steam locomotive and other boiler systems, and paper and millboard for fireproofing and heat insulation (Bowles, 1937, p. 8–10). Expansion of the automotive and construction industries during the early 20th century provided ready markets for asbestos, and demand for asbestos-containing items such as brake shoes and clutches, cement, flooring, packings and gaskets, and thermal and electrical insulation grew rapidly. Apparent consumption of asbestos in the United States increased from 20,400 metric tons (t) in 1900 (estimated) to 153,000 t in 1920 and 660,000 t in 1950 (fig. 1). Consumption continued to increase with the expansion of the U.S. economy following World War II and reached an alltime high of 803,000 t in 1973 (Virta, 2003, p. 3, 28–30). Asbestos was widely used in a variety of products because it is relatively inexpensive, resists corrosion and fire, has high mechanical strength, serves as a thermal and electrical insulator, exhibits good friction and wear characteristics, and is flexible enough to be spun and woven. The United States dominated global consumption of asbestos for most of the 20th century, accounting for as much as 83% of the worldwide total in 1920 and averaging 48% from 1920 through 1960. The Soviet Union surpassed the United States as the leading global asbestos consumer in 1970, and the U.S. remained one of the top five worldwide consumers until the late 1980s (Virta, 2003, p. 36–56).

Domestic and overseas markets began to contract during the early 1970s, when the first of numerous bans on asbestos products in the United States and abroad went into effect in response to health and liability issues associated with asbestos use. By 2000, domestic consumption decreased to 14,600 t (Virta, 2003, p. 30), similar to late-19th-century levels. Most U.S. manufacturers had ceased production of asbestos-containing products, begun using asbestos substitutes, and (or) replaced asbestos-containing products with ones that did not contain asbestos.

The last producer of asbestos in the United States ceased operations in 2002; domestic consumers have since been wholly dependent on imports to meet manufacturing needs. In 2015, U.S. apparent consumption fell to 343 t, less than 2% of that in 1900. World production of asbestos was 2.03 million metric tons (Mt), unchanged from that in 2014 (table 1).

Consumption

Apparent consumption of unmanufactured asbestos fiber in the United States was 343 t in 2015, down by 16% from 406 t in 2014 (table 1). With few exceptions, U.S. asbestos fiber consumption decreased in each of the past 30 years. The chloralkali industry, which uses asbestos to manufacture semipermeable diaphragms that separate chlorine generated in electrolytic cells from the starting brine, accounted for the vast majority (an estimated 95%) of domestic asbestos consumption during 2015 (table 2). The proportion of asbestos used by the chloralkali industry increased over the past several years, steadily rising from an estimated 35% of consumption in 2010 (Virta, 2011). Insufficient data were available to reliably identify other markets for asbestos fiber, but many industrial applications have completely disappeared in the United States since the first domestic ban on asbestos-containing products was implemented in 1973. In 2000, U.S. asbestos was principally sold for roofing products (62% of the market), gaskets (21%), and friction products (12%), whereas in 1972 the major uses were vinyl asbestos tile and sheet flooring (31%), asbestos-cement pipe (27%), roofing (10%), packing and gaskets (9%), friction products (brakes and clutches) (8%), and insulation (6%) (Clifton, 1975; Virta, 2002).

Prices

The average U.S. customs unit value for all grades of imported asbestos fiber decreased by 2% to $1,780 per metric ton in 2015 from $1,830 per metric ton in 2014. Unit values of individual fiber grades were as follows: grade 3, $1,360 per metric ton; grade 4, $1,960 per metric ton; and unspecified fiber grades, $2,000 per metric ton (table 5).

Foreign Trade

In 2015, the United States imported 343 t of chrysotile valued at $612,000, a 16% decline from 406 t valued at $741,000 in 2014 (table 5). All asbestos mineral imports originated from Brazil. The United States also imported $4.63 million of manufactured products that contain asbestos, an 18% decrease from $5.63 million of asbestos product imports in 2014 (table 6). Items imported under the Harmonized Tariff Schedule (HTS) code for articles of asbestos-cement likely were manufactured using cellulose or other asbestos substitutes. Some

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nonasbestos products likely were included under other asbestos HTS codes as well based on reported imports from countries that have banned asbestos use.

Reported exports of unmanufactured asbestos fiber were 517 t with a free alongside ship value of $116,000 in 2015, an increase of 85% from 279 t valued at $54,000 during 2014 (table 4). However, these shipments were likely waste material or improperly classified as asbestos because asbestos has not been mined domestically since 2002. The United States exported and reexported $26 million of manufactured asbestos products in 2015, a 13% decrease from $29.8 million in 2014. Mexico was the leading destination, accounting for 17% of the value of exports, followed by the Philippines (16%), the Republic of Korea (15%), Canada (10%), the United Kingdom (6%), and Venezuela (4%) (table 3). The remainder was distributed among 83 other countries. Many reported export destinations have banned the use of asbestos and asbestos products, so shipments to these countries likely were misclassified.

Friction products (including brake linings, clutch linings, and disk pads) accounted for 32% of the value of manufactured asbestos-containing products exported from the United States in 2015, followed by gaskets, packing, and seals with 15% (table 4). Little or no asbestos board, asbestos friction components, asbestos gaskets and packings, asbestos insulating paper, and asbestos-cement products have been produced in the United States for many years. Shipments reported under these categories may have been reexports and (or) exports of products that were similar but did not contain asbestos.

World Review

Estimates of global asbestos fiber consumption from 2011 to 2014, by country, are presented in table 7. Complete data for 2015 were not available at the time of publication. Apparent consumption was calculated as production plus imports minus exports; data regarding changes in industry and government stocks were not available and thus were not considered. Apparent world consumption declined by 2% in 2014 to 2.01 Mt from 2.06 Mt in 2013. Decreases in consumption of more than 10,000 t took place in China, Indonesia, Kazakhstan, Thailand, and Ukraine, whereas consumption in Brazil, India, and Sri Lanka increased by more than 10,000 t. China was the leading consumer of asbestos in 2014, followed by Russia, India, Brazil, Indonesia, Uzbekistan, Vietnam, Sri Lanka, Thailand, and Kazakhstan. These 10 countries collectively accounted for 95% of the estimated worldwide asbestos consumption.

World production of asbestos fiber in 2015 was estimated to be 2.03 Mt, unchanged from that of 2014. Russia was the leading producer of asbestos, followed by China, Brazil, and Kazakhstan. These four countries accounted for nearly 100% of global production (table 8).

Outlook

Domestic use of unmanufactured asbestos fiber continues to decline as alternative materials and new technology displace it from the few remaining markets. Chloralkali production accounts for nearly all of the U.S. consumption, but imports of asbestos by this industry likely will decline in coming years as companies adopt asbestos-free cell membrane technology. Globally, asbestos-cement products are expected to continue as the leading market for asbestos. World production is likely to remain around 2.0 Mt for the near future, as it has since the late 1990s, owing to persistent demand for asbestos products in many regions of the world.

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TABLE 1
SALIENT ASBESTOS STATISTICS[1]

		2011	2012	2013	2014	2015
United States:						
Exports and reexports:						
Unmanufactured:						
Quantity[2]	metric tons	169	47	27	279	517
Value[3]	thousands	$207	$69	$48	$54	$116
Asbestos products, value[3]	do.	$27,000	$26,400	$33,300 r	$29,800 r	$26,000
Imports for consumption, unmanufactured:						
Quantity	metric tons	1,180	1,610	772	406	343
Value[4]	thousands	$1,100	$2,520	$1,160	$741	$612
Consumption, apparent e	metric tons	1,180	1,020	772	406	343
World, production	do.	2,000,000 r	2,020,000	2,050,000	2,030,000 r	2,030,000 e

eEstimated. rRevised. do. Ditto.
[1]Data are rounded to no more than three significant digits.
[2]Includes exports of crudes, fibers, stucco, sand, and refuse. May also include reexports and nonasbestos materials. Asbestos is no longer mined in the United States.
[3]Free alongside ship value; unmanufactured exports include crudes, fibers, stucco, sand, and refuse. May also include reexports and nonasbestos material.
[4]U.S. customs declared value.

TABLE 2
U.S. ASBESTOS CONSUMPTION BY END USE, GRADE, AND TYPE[1, 2]

(Metric tons)

	Chrysotile					
End use	Grade 3	Grade 4	Grade 5	Grade 7	Unspecified grade	Total
2014:						
Chloralkali industry	187	186	--	--	--	373
Other	--	--	--	--	33	33
Total	187	186	--	--	33	406
2015:						
Chloralkali industry	102	223	--	--	--	325
Other	--	--	--	--	18	18
Total	102	223	--	--	18	343

-- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Estimated end use distribution based on prior year end use data, import data, and industry trends.

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TABLE 3
VALUE OF U.S. EXPORTS AND REEXPORTS OF ASBESTOS FIBERS AND ASBESTOS-BASED PRODUCTS, BY COUNTRY[1,2]

(Thousand dollars)

Country	2014			2015		
	Unmanufactured fiber[3]	Manufactured products	Total	Unmanufactured fiber[3]	Manufactured products	Total
Australia[4]	--	298	298	3	40	43
Brazil	--	141	141	--	86	86
Canada	--	1,760 r	1,760 r	4	2,560	2,560
China	--	475	475	--	634	634
France[4]	--	21	21	--	--	--
Germany[4]	--	775	775	--	111	111
Guatemala	--	1,170	1,170	--	401	401
Italy[4]	--	574	574	--	83	83
Japan[4]	--	534	534	--	258	258
Korea, Republic of[4]	--	3,850	3,850	--	3,920	3,920
Mexico	54	6,390 r	6,440 r	14	4,370	4,390
Netherlands[4]	--	10	10	--	61	61
Philippines	--	2,440	2,440	--	4,190	4,190
United Kingdom[4]	--	260 r	260 r	4	1,620	1,630
Venezuela	--	1,170	1,170	88	999	1,090
Other[4]	--	9,920 r	9,920 r	4	6,640	6,640
Total	54	29,800 r	29,800	116	26,000	26,100

rRevised. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Free alongside ship value.
[3]Includes exports of crudes, fibers, stucco, sand, and refuse. May also include nonasbestos materials. Asbestos is no longer mined in the United States.
[4]Destination country has banned the use of asbestos. Data may include some nonasbestos products.

Source: U.S. Census Bureau.

TABLE 4
U.S. EXPORTS AND REEXPORTS OF ASBESTOS AND ASBESTOS-BASED PRODUCTS, BY PRODUCT[1]

	2014		2015	
	Quantity (metric tons)	Value[2] (thousands)	Quantity (metric tons)	Value[2] (thousands)
Unmanufactured, asbestos[3]	279	$54	517	$116
Manufactured:				
Cement products[4]	NA	275	NA	219
Friction products[5]	NA	9,220 r	NA	8,420
Gaskets, packing, and seals	NA	4,790	NA	4,020
Paper and millboard	NA	405	NA	339
Other articles[6]	NA	15,100	NA	13,000
Total	NA	29,800 r	NA	26,000

rRevised. NA Not available.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Free alongside ship value.
[3]Includes crudes, fibers, stucco, sand, and refuse. May also include nonasbestos materials. Asbestos is no longer mined in the United States.
[4]May include reexports and also cellulose fiber panel, sheet, tile, and tube cement products because asbestos-cement products are not manufactured in the United States.
[5]May include some nonasbestos brake and clutch shipments.
[6]May include some nonasbestos materials.

Source: U.S. Census Bureau.

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TABLE 5
U.S. IMPORTS FOR CONSUMPTION OF ASBESTOS FIBERS,
BY TYPE AND ORIGIN[1]

Type	Brazil	
	Quantity (metric tons)	Value[2] (thousands)
2014:		
Chrysotile:		
Spinning fibers, grade 3	187	$213
Milled, grade 4	186	333
All other	33	194
Total	406	741
2015:		
Chrysotile:		
Spinning fibers, grade 3	102	139
Milled, grade 4	223	437
All other	18	36
Total	343	612

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]U.S. customs declared value.

Source: U.S. Census Bureau; data adjusted by U.S. Geological Survey.

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TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF PRODUCTS WITH BASIS OF ASBESTOS IN 2015

HTS[1] code	Category	Quantity (metric tons)	Value[2]	Major sources[3]	Percent of category total[4]
2524.90.00.00	Asbestos minerals	343	$612,000	Brazil	100% of weight.
6811.40.00.00	Asbestos-cement products	45	108,000	China	93% of weight.
6812.80.90.00	Crocidolite products (except footwear)[5]	34	24,600	do.	100% of weight.
6812.91.90.00	Clothing (except footwear)[5, 6]	(7)	5,600	do.	Do.
6812.92.00.00	Paper, millboard, and felt[5, 6]	NA	5,030	do.	100% of value.
6812.93.00.00	Compressed asbestos fiber jointing[5, 6]	NA	49,100	China, Japan[8]	Do.
6812.99.00.01	Other fabricated asbestos fibers[5, 6]	4	21,300	Norway[8]	99% of weight.
6812.99.00.02	Yarn and thread[5, 6]	58	534,000	Mexico	Do.
6812.99.00.03	Cords and string[5, 6]	1	11,800	China	100% of weight.
6812.99.00.04	Woven or knitted fabric[5, 6]	(7)	30,700	Italy[8], United Kingdom[8]	100% of weight.
6812.99.00.10	Products for use in civil aircraft[5, 6]	NA	11,300	China, Mexico	100% of value.
6812.99.00.20	Gaskets, packing, and seals[5, 6]	7	184,000	Israel[8], China, Japan[8], Taiwan	93% of weight.
6812.99.00.25	Building materials[5, 6]	NA	159,000	El Salvador	98% of value.
6812.99.00.55	Asbestos articles not elsewhere specified[5, 6]	NA	29,300	Brazil, Belgium[8], Canada, Mexico, China	90% of value.
6813.20.00.10	Brake linings and pads, civil aircraft[9]	NA	103,000	Switzerland[8], Japan[8], United Kingdom[8]	96% of value.
6813.20.00.15	Brake linings and pads, other[9]	NA	1,350,000	Germany[8], Japan[8], Spain[8], Peru	60% of value.
6813.20.00.20	Other friction materials, civil aircraft[9]	NA	302,000	Japan[8]	99% of value.
6813.20.00.25	Other friction materials[9]	NA	1,700,000	China, Japan[8]	94% of value.

Do., do. Ditto. NA Not available.
[1]Harmonized Tariff Schedule of the United States.
[2]U.S. customs declared value.
[3]Countries are listed in decreasing order. Includes all countries with a percentage contribution of 10% or more.
[4]Percentage contribution of total imports by major import sources, by weight or value.
[5]Mixtures with a basis of asbestos or with a basis of asbestos and magnesium carbonate.
[6]Excludes crocidolite products.
[7]Less than ½ unit.
[8]Country has imposed a ban on asbestos. Material may have been misclassified as asbestos or transshiped.
[9]Articles with a basis of asbestos, of other mineral substances, or of cellulose, whether or not combined with textile or other materials (containing asbestos).

Source: U.S. Census Bureau.

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TABLE 7
ESTIMATED ASBESTOS CONSUMPTION, BY COUNTRY, 2011–14[1, 2, 3]

(Metric tons)

Region	2011	2012	2013	2014
Africa:				
Angola	1,320	880	581	409
Ghana	1,380	821	2,040	451
Nigeria	2,150	1,820	349	--
South Africa	4,210	1,350	854 r	4
Zimbabwe	3,990	3,940	4,360 r	5,280
Other	1,490	1,630	233 r	5,480
Total	14,500	10,400	8,420 r	11,600
Asia and the Middle East:				
Bangladesh	4,370	2,230	8,030	12,100
China	638,000	531,000	570,000	507,000
India	303,000	473,000	280,000 r	379,000
Indonesia	124,000	162,000	148,000 r	109,000
Iran	6,740	-60	97 r	--
Kazakhstan	155,000	5,290	67,200 r	39,500
Kyrgyzstan	8,220	8,190	7,200	5,630
Malaysia	6,760	2,350	4,960 r	1,970
North Korea	1,690	1,250	611	710
Pakistan	9,390	10,100	3,800 r	2,300
Philippines	3,250	1,970	2,650	2,670
Russia	283,000	196,000	482,000 r	478,000
Sri Lanka	61,100	54,700	23,000	42,100
Thailand	81,400	58,000	53,100	41,900
Turkmenistan	5,240	6,680	5,280 r	4,280
Uzbekistan	17,100	104,000	81,800 r	76,400
Vietnam	60,400	78,900	57,800	52,900
Other	1,260	-6,170	2,500 r	1,290
Total	1,770,000	1,690,000	1,800,000 r	1,760,000
Central and North America:				
Cuba	5,860	10,300	4,770	2,890
Mexico	10,200	17,000	7,110 r	10,200
Other	-22,300	913	921 r	1,230
Total	-6,260	28,300	12,800 r	14,300
Europe:				
Belarus	25,100	13,100	10,600 r	6,210
Ukraine	55,900	42,000	35,200 r	24,700
Other	-12	-4,610	661 r	669
Total	81,000	50,500	46,500 r	31,600
Oceania	45	34	250 r	26
South America:				
Bolivia	5,590	5,360	4,420	6,260
Brazil	189,000	168,000	165,000 r	181,000
Colombia	20,000	25,200	15,000 r	8,200
Ecuador	6,150	4,740	3,820 r	4,470
Other	1,480	1,310	910 r	220
Total	223,000	204,000	189,000 r	201,000
Other areas (nonspecified)	2,000	120	-- r	--
Grand total	2,080,000	1,980,000	2,060,000 r	2,010,000

rRevised. -- Zero.

[1]Calculated as country production plus imports minus exports. Changes in Government and industry stocks are not considered because data are unavailable. Production data were from table 8 and trade data were from the United Nations Commodity Trade database.

[2]Previously, Kazakhstan, Kyrgyzstan, Russia, Turkmenistan, and Uzbekistan were included under Europe to be consistent with country groupings in the early to middle 1900s. The table was revised to be consistent with current convention.

[3]Negative values are net exports (exports greater than production plus imports).

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TABLE 8
ASBESTOS: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country[3]	2011	2012	2013	2014	2015[e]
Argentina[4]	105	102	101 [r]	100 [e]	--
Brazil	306,321	304,569	290,825	311,230 [r]	311,000
Canada[e]	50,000	--	--	--	--
China[e]	385,000 [r]	420,000	420,000	410,000 [r]	400,000
India	274	359	267	227 [r]	200
Kazakhstan	223,200 [r]	241,200	243,400 [r]	213,100 [r]	215,000
Russia	1,031,880	1,050,000 [e]	1,100,000	1,100,000 [e]	1,100,000
Zimbabwe	--	30 [r]	377 [r]	--	--
Total	2,000,000 [r]	2,020,000	2,050,000	2,030,000 [r]	2,030,000

[e]Estimated. [r]Revised. -- Zero.
[1]World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.
[2]Marketable fiber production. Table includes data available through March 14, 2016.
[3]In addition to the countries listed, Afghanistan, North Korea, Romania, and Slovakia also produce asbestos, but output is not officially reported, and available general information is inadequate for the formulation of reliable estimates of output levels.
[4]Most uses of asbestos have been banned since 2001. An exception allowing the use of asbestos-containing diaphragms in the chloralkali process expired in 2014.

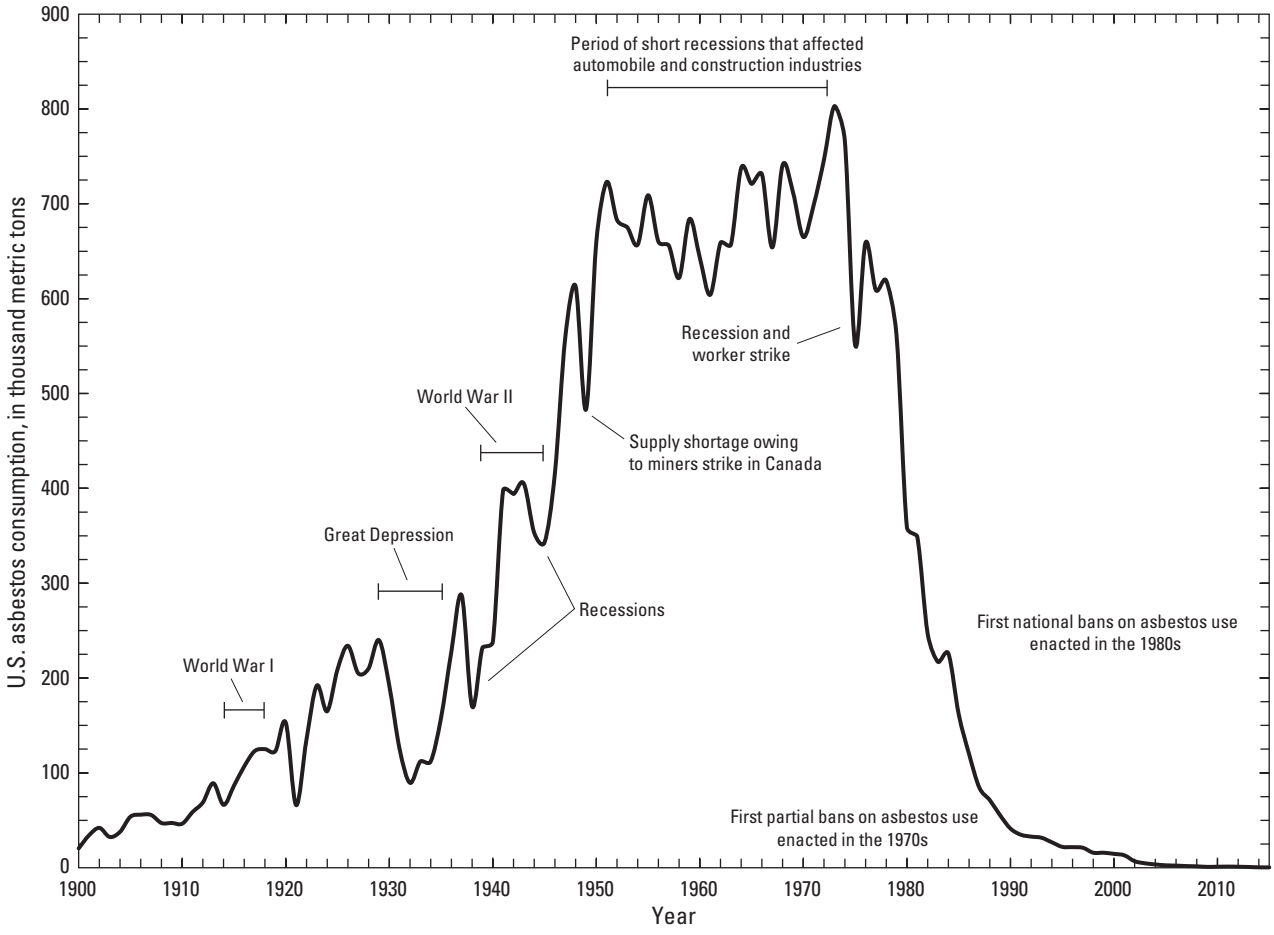


Figure 1. U.S. asbestos consumption from 1900 to 2015.

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