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2007 Minerals Yearbook

ANTIMONY [ADVANCE RELEASE]

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ANTIMONY

James F. Carlin, Jr.

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

Stockpile Reserves Inc. (Lovelock, NV) announced that its reactivated Fencemaker Mine, located about 80 kilometers (50 miles) southeast of Lovelock, NV, produced a small amount of antimony-in-concentrate during 2007, the first domestic antimony mine production since 2001. The firm is seeking funds to develop the mine further. The mine has a long history of intermittent antimony production dating back to the 1880s (Richard Brown, Stockpile Reserves, Inc., written commun., February 11, 2008).

The majority of domestic smelting consisted of upgrading imported antimony trioxide to a higher purity. Most primary antimony metal and antimony oxide were produced domestically from imported raw material. A single company in Montana produced primary antimony metal and antimony oxide. Secondary antimony was recovered in lead alloy from scrapped lead-acid batteries at secondary lead smelters. The amount of antimony used by battery manufacturers was substantially lower than it was 10 years earlier because of changing materials requirements for batteries.

About 37% of the primary antimony used in the United States during 2007 went into flame retardants; most of the rest was used by the ceramic, chemical, glass, and transportation industries (table 3). Secondary antimony, which was derived almost entirely from recycled lead-acid batteries and contained in antimonial lead, was used in the manufacture of new batteries. In 2007, the average price of antimony was $2.57 per pound compared with $2.38 per pound in 2006 (table 1).

Antimony was mined as a principal product or was a byproduct of the smelting of base-metal ores in 10 countries. World mine production remained about the same as that in 2006. Nearly all the world's primary antimony was mined in China (88%), Bolivia (3%), South Africa (3%), Russia (2%), and Tajikistan and Australia (1% each) (table 9).

Production

Smelter.—The United States had only one antimony smelter, U.S. Antimony Corp. (USAC), based in Thompson Falls, MT. USAC produced antimony metal for bearings, lead alloys, and ordnance; antimony oxide as a raw material for flame retardants; and sodium antimonite for glass and other applications. USAC also recycled antimony-containing products that would otherwise be taken to landfill sites.

Consumption

Of the 153 companies to which a U.S. Geological Survey antimony consumption survey was sent, 82 firms responded. Consumption data were estimated for the remaining 71 firms. Reported and estimated U.S. consumption was less than one-half of net imports.

In 2007, consumption (reported and estimated) of primary antimony decreased by 8% from that of 2006 (table 2). The metal products and the flame retardant usage categories experienced moderate declines, while the nonmetal products category showed a small decrease.

Lead-antimony alloys were used in ammunition, antifriction bearings, automotive batteries, cable sheaths, corrosion-resistant pumps and pipes, roof sheet solder, and tank lining. Antimony trioxide, often dissolved in an organic solvent, was used to enhance the flame-retardant properties of rubber and textiles, plastics, and other combustibles. Antimony was also used as a decolorizing and refining agent in the manufacture of some forms of glass, such as optical glass.

Prices

In 2007, antimony prices remained in a fairly narrow range. Antimony prices started the year in the range of $2.53 to $2.58 per pound, ending the first quarter at $2.57 to $2.63 per pound. The antimony price ended the second quarter at $2.45 to $2.50 per pound, and ended the third quarter at $2.59 to $2.63 per pound. The antimony price ended the fourth quarter at $2.64 to $2.69 per pound. In 2007, the average antimony price increased by 8% compared with that of 2006.

Foreign Trade

U.S. imports of antimony in 2007 were, as has been the case in the recent past, much larger than exports—about 11-fold larger (tables 5-8). Imports of antimony decreased slightly from the level of 2006. China was the leading supplier to the United States of antimony metal and antimony oxide, and Bolivia was the leading supplier of antimony ore and antimony concentrate.

World Review

Australia.—AGD Mining Ltd. (Melbourne) announced that since it started production of antimony concentrate at its Costerfield Mine in March 2007 it has produced at a rate of 160 to 200 metric tons per month (t/mo) of antimony, less than one-half of the company's initial target rate of 5,500 metric tons per year (t/yr) (Platts Metals Week, 2007a).

Cambria Mining Ltd. (London, United Kingdom) announced that the antimony concentrate production at its Augusta, Victoria site was running below the quantity that had been projected. The firm had hoped to reach its targeted antimony ore production level of 5,000 t/mo during the first quarter, in view of having secured extra mining equipment and expanding its mine development team. The company's plant processed 4,300 t of antimony ore in the fourth quarter of 2006, producing

187 t of antimony-gold concentrate containing 56% antimony. All the concentrate is being sold under a contract to Zhongnan Antimony and Tungsten Trading Co. in China (Mining Journal, 2007).

Canada.—The minor metals trading house, Wogen Plc (London, United Kingdom) took its first-ever stake in a mine as part of a deal to secure an antimony source. Wogen took a small stake in the BeaverBrook antimony mine (Newfoundland). The mine had been dormant for many years because of low antimony prices. As part of the deal, Wogen obtained a marketing agreement for production from the mine (American Metal Market, 2007).

China.—China Metallurgical Group [(MCC) (Beijng)] reported that it planned to invest $20 million to explore its antimony and tungsten property in the middle of Hunan Province. The firm had purchased the 100-year-old Zhazixi Antimony Mine, which had a capacity of 3,000 t/yr of refined antimony. MCC appointed Zhongye Hunan Tungsten and Antimony Co., Ltd. to operate the mine (AntimonyNet, 2007).

According to statistics published by the Government Administration of Customs in China, antimony exports from China, the world's leading antimony producer, declined 61% in 2007 compared with exports in 2006. The main export destinations were Japan, the Republic of Korea, the Netherlands, and the United States (Metal-Pages, 2008). Several antimony producers in China reported a marked reduction in the production of antimony concentrates. Hsikwangshan Twinkling Star Co., which has an antimony production capacity of 40,000 t/yr in Hunan Province, expected its antimony output to reach only 27,000 t in 2007. Shenzhen JieFu Industry Development, which has a 20,000-t/yr antimony capacity facility in Guangdong Province, was only operating the plant at about 50% of its capacity. Industry observers noted that rampant smuggling had reduced business through legal channels during 2007 (Platts Metals Week, 2007c).

Japan.—Japanese manufacturers of flame retardant materials started testing antimony ingots of non-Chinese origin, in a move to diversify their antimony supply sources. Japanese customs statistics showed that Japan imported 40 t of antimony from Kyrgyzstan for the first time in April, and 3 t from Peru in February, also for the first time. China supplies 95% of Japanese antimony imports (Platts Metals Week, 2007b).

Mexico.—USAC announced that its subsidiary (Antimonio de Mexico, SA de C.V.) leased a mill site to process rock from the Coahuila antimony and silver deposit in the State of Queretaro. Components for the crushing plant and flotation mill were nearing completion at the USAC antimony facility in Thompson Falls. Mexican Government statistics indicate that the Coahuila deposit has a resource of 1 million metric tons with a grade of 1.8% antimony and 8.1 troy ounces per metric ton silver. In August 2006, USAC had announced that it had completed construction of its antimony smelting plant at the deposit site. The plant was designed to process antimony ores and concentrates and produce antimony metal and oxide along with silver and gold byproducts. The plant would treat mainly material from the Coahuila deposit, but other smelter feedstock was being negotiated from sources in Canada, Europe, Honduras, Mexico, Peru, and the United States (Platts Metals Week, 2006).

Outlook

The use of antimony as an ingredient in flame retardants is expected to remain its principal use. That is expected to be true for global as well as U.S. markets.

Antimony recovered from old scrap has long been an important part of the total antimony supply domestically, but the recovery decline during the past 30 or more years is expected to continue. Following the advent in the 1970s of low-maintenance and maintenance-free automotive batteries, the antimony content of a typical automotive lead-acid battery in 2007 had fallen to about 0.6% or lower. Industry sources think the antimony level in lead-acid batteries could reach zero by 2020.

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Other

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TABLE 1
SALIENT ANTIMONY STATISTICS[1]

(Metric tons of antimony content unless otherwise specified)

		2003	2004	2005	2006	2007
United States:						
Mine production		--	--	--	--	W
Smelter production:						
Primary		W	W	W	W	W
Secondary		5,600	3,650	3,030	3,520 r	3,480
Exports:						
Metal, alloys, waste and scrap	gross weight	771	566	740	459	305
Antimony oxide[2]		2,910	3,240	1,400	1,680	1,640
Imports for consumption		26,700	33,500	22,700	23,200 r	21,900
Reported industrial consumption, primary antimony		9,230	11,400	9,140	10,400	9,590
Stocks, primary antimony, all classes, December 31		6,320	2,830	2,110	2,120 r	1,900
Price, average[3]	cents per pound	107.5	130.3	160.5	238.0	257.3
World, mine production		116,000	142,000 r	171,000 r	173,000 r	170,000 e

eEstimated. rRevised. W Withheld to avoid disclosing company proprietary data. -- Zero.

[1]Data are rounded to no more than three significant digits, except prices.

[2]Antimony content is calculated by the U.S. Geological Survey.

[3]New York dealer price for 99.5% to 99.6% metal, cost, insurance, freight U.S. ports.

TABLE 2
REPORTED INDUSTRIAL CONSUMPTION OF
PRIMARY ANTIMONY IN THE UNITED STATES[1]

(Metric tons of antimony content)

	Class of material consumed			
Year	Metal	Oxide	Other[2]	Total
2006	1,600	8,710 r	119	10,400
2007	1,340	8,160	86	9,590

rRevised.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes residues and sulfide.

TABLE 3
REPORTED INDUSTRIAL CONSUMPTION OF PRIMARY ANTIMONY IN THE UNITED STATES, BY PRODUCT[1]

(Metric tons of antimony content)

Product	2006	2007
Metal products:		
Antimonial lead	W	W
Bearing metal and bearings	20	21
Solder	61	71
Other[2]	2,920	2,430
Total	3,000	2,520
Nonmetal products:		
Ammunition primers	W	W
Ceramics and glass	258	231
Pigments	215	329
Plastics	W	W
Other[3]	3,130	2,940
Total	3,600	3,500
Flame retardants:		
Adhesives	664	454
Plastics	2,820 r	2,710
Rubber	122	154
Textiles	205	252
Other[4]	10	10
Total	3,820	3,580
Grand total	10,400	9,590

rRevised. W Withheld to avoid disclosing company proprietary data.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes ammunition, cable covering, castings, sheet and pipe, and type metal.
[3]Includes fireworks and rubber products.
[4]Includes paper and pigments.

Note: Secondary antimonial lead production was 3,520 metric tons (t) in 2006 (revised) and 3,450 t in 2007 (estimated).

TABLE 4
INDUSTRY STOCKS OF PRIMARY ANTIMONY IN THE UNITED STATES, DECEMBER 31[1]

(Metric tons of antimony content)

Type of material	2006	2007
Metal	421	424
Oxide	1,690 r	1,450
Other[2]	15	18
Total	2,120 r	1,900

rRevised.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes ore and concentrate, residues, and sulfide.

TABLE 5
U.S. EXPORTS OF ANTIMONY METAL, ALLOYS, AND WASTE AND SCRAP, BY COUNTRY[1]

	2006		2007	
Country	Gross weight (metric tons)	Value (thousands)	Gross weight (metric tons)	Value (thousands)
Canada	215	$801	20	$94
Mexico	134	592	61	251
Netherlands	14	60	7	20
Sweden	39	147	48	154
Switzerland	21	90	25	95
Other	36	166	144	501
Total	459	1,860	305	1,120

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 6
U.S. EXPORTS OF ANTIMONY OXIDE, BY COUNTRY[1]

	2006			2007		
Country	Gross weight (metric tons)	Antimony content[2] (metric tons)	Value (thousands)	Gross weight (metric tons)	Antimony content[2] (metric tons)	Value (thousands)
Argentina	36	30	$209	11	9	$57
Australia	19	16	104	25	21	87
Belgium	64	53	230	28	23	227
Brazil	146	121	620	86	71	442
Canada	176	146	676	123	102	460
Chile	4	3	22	6	5	33
China	174	144	726	196	163	840
Colombia	68	56	295	139	115	762
Costa Rica	21	17	95	14	12	88
France	34	28	226	17	14	64
Germany	120	100	411	116	96	460
Hong Kong	26	22	74	19	16	48
India	18	15	95	21	17	113
Indonesia	3	2	9	21	17	105
Italy	20	17	95	17	14	102
Japan	396	329	1,560	174	144	681
Korea, Republic of	88	73	310	93	77	194
Mexico	245	203	1,100	375	311	2,080
Netherlands	68	56	214	43	36	142
New Zealand	15	12	99	4	3	26
Singapore	93	77	922	82	68	355
South Africa	11	9	36	12	10	35
Spain	7	6	44	10	8	69
Sweden	5	4	14	171	142	444
Taiwan	69	57	333	80	66	386
Thailand	11	9	56	71	59	368
United Kingdom	24	20	125	18	15	71
Other	57 r	50 r	177 r	7	9	68
Total	2,020	1,680	8,870	1,980	1,640	8,810

rRevised.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Antimony content is calculated by the U.S. Geological Survey.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY, BY CLASS AND COUNTRY[1]

Country	2006			2007		
	Gross weight (metric tons)	Antimony content[2] (metric tons)	Value (thousands)	Gross weight (metric tons)	Antimony content[2] (metric tons)	Value (thousands)
Antimony ore and concentrate:						
Belgium	5	4	$28	17	11	$72
Bolivia	181	130	526	204	139	646
China	20	20	99	59	55	293
Italy	--	--	--	33	22	101
Total	205	153	653	313	226	1,110
Antimony oxide:						
Belgium	2,030	1,680	7,410	2,050	1,700	11,400
Canada	--	--	--	1	(3)	3
China	12,800	10,600	48,900	14,000	11,600	54,900
France	2	2	15	2	2	16
Germany	4	4	65	5	4	76
Hong Kong	20	17	96	52	43	258
India	--	--	--	18	15	102
Japan	268	222	1,990	248	206	2,000
Mexico	10,600	8,780	37,200	9,600	7,970	48,500
Netherlands	1	1	18	9	7	93
Russia	--	--	--	4	3	16
Thailand	--	--	--	2	2	9
United Kingdom	(3)	(3)	6	(3)	(3)	16
Vietnam	2,000	1,660	6,610	80	66	251
Total	27,700	23,000	102,000	26,100	21,700	118,000

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Antimony ore and concentrate content reported by the U.S. Census Bureau. Antimony oxide content is calculated by the U.S. Geological Survey.

[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY METAL, BY COUNTRY[1]

Country	2006 Quantity (metric tons)	2006 Value (thousands)	2007 Quantity (metric tons)	2007 Value (thousands)
Belgium	299	$1,330	613	$2,960
Bolivia	40	192	54	267
Canada	126	1,060	10	115
China	5,070	24,100	3,770	19,900
Germany	(2)	99	(2)	119
Hong Kong	19	78	240	1,190
Japan	(2)	54	1	36
Mexico	800	907	648	840
Peru	846	3,610	419	1,950
Russia	--	--	8	80
Vietnam	57	287	157	842
Other	2	28	--	--
Total	7,260	31,800	5,920	28,300

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9
ANTIMONY: WORLD MINE PRODUCTION, BY COUNTRY[1, 2]

(Metric tons, antimony content unless otherwise specified)

Country[3]	2003	2004	2005	2006	2007[e]
Australia[e, 4]	900 [r]	120 [r]	120 [r]	1,600 [r]	2,000
Bolivia	2,585	2,633	5,098	5,460 [r]	5,500
Canada[5]	153	105	79 [r]	90 [r]	90 [p]
China[e]	100,000	125,000	152,000 [r]	153,000 [r]	150,000
Guatemala	2,000 [e]	2,686	1,007	-- [r]	--
Kyrgyzstan[e]	40	20	10	50	30
Peru, refined[e]	356	356	807 [6]	810	810
Russia, recoverable[e]	2,000	3,000	3,000	3,500	3,500
South Africa[5]	5,291	4,967	5,979	4,362 [r]	4,400
Tajikistan[e]	1,800	2,000	2,000	2,000	2,000
Thailand, content of ore and concentrate	38	52	347	936 [r]	-- [6]
Turkey[e]	650	900	1,000 [r]	1,300 [r]	1,500
Total	116,000	142,000 [r]	171,000 [r]	173,000 [r]	170,000

[e]Estimated. [p]Preliminary. [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]Table includes data available through May 22, 2008.
[3]In addition to the countries listed, antimony may have been produced in Iran, but information is inadequate to estimate output.
[4]Antimony content of antimony ore and concentrate, lead concentrates, and lead-zinc concentrates.
[5]Antimony content of concentrate.
[6]Reported figure.