2010 Minerals Yearbook

ANTIMONY [ADVANCE RELEASE]

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ANTIMONY

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A single company in the United States, in Montana, produced primary antimony metal and antimony oxide by upgrading imported antimony trioxide to a higher purity. 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 ago because of changing material requirements for batteries.

In 2010, about 36% of the primary antimony used in the United States was in 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.

Antimony was mined as a principal product or was a byproduct of the smelting of base-metal ores in 10 countries. Nearly all the world's primary antimony was mined in China (90%). Bolivia (3%), followed by Russia and South Africa (2% each), rounded out the world's top producers (table 9).

Production

Mine.—Stockpile Reserves LLC (Lovelock, NV) had no production in 2010 from its reactivated Fencemaker Mine, 80 kilometers southeast of Lovelock. The mine produced a small amount of antimony-in-concentrate in 2007, which was the first domestic antimony mine production since 2000. The mine had a long history of intermittent antimony production dating back to the 1880s. Stockpile Reserves continued to seek additional funding and cooperated with the Nevada regulatory authorities regarding required licenses and permits (Richard E. Brown, chief executive officer, Stockpile Reserves LLC, written commun., November 23, 2010).

Smelter.—The United States has only one antimony smelter, U.S. Antimony Corp. (USAC) (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 134 companies to which a U.S. Geological Survey antimony consumption survey was sent, 66 firms responded. Consumption data were estimated for the remaining 68 firms.

In 2010, consumption (reported and estimated) of primary antimony increased by 32% from that in 2009 (table 2). Both the nonmetal producers and the flame retardants usage categories registered significant increases, while the metal products category showed a modest increase. Industry sources attributed the increases to higher demand in selected commercial sectors (table 3).

Lead-antimony alloys were used in ammunition, antifriction bearings, cable sheaths, corrosion-resistant pumps and pipes, roof sheet solder, and tank lining. Antimony trioxide was used to enhance the flame-retardant properties of plastics, rubber and textiles, 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 2010, the average Platts Metals Week New York dealer price of antimony was $4.01 per pound, an increase of 70% compared with that in 2009 (table 1). The antimony price started the year at $2.85 per pound to $2.95 per pound and generally rose steadily through the year to finish December at $5.50 to $5.70 per pound. Industry sources attributed the marked price advance to an increase in world consumption as well as the closure of several antimony mines in China.

Foreign Trade

U.S. imports of antimony in 2010 were, as has been the case in the recent past, much larger than exports—about 10-fold larger (tables 5–8). Imports of antimony were 26,200 metric tons (t), an increase of 30% compared with that in 2009. China was the leading supplier to the United States of antimony oxide, followed by Belgium, Mexico, and Bolivia, in descending order (tables 7–8).

World Review

Chile.—Mandalay Resources Corp. (Toronto, Ontario, Canada) announced that it had started stockpiling silver-gold-antimony-bearing ore from the Dagny vein at its Cerro Bayo Mine in Patagonia. The Dagny vein was being developed separately from the Fabiola vein, which had started producing ore earlier. The company also commenced drilling at the Yasna vein, with the goal of adding significantly to the 69,000 metric tons per year (t/yr) of ore resources from the Dagny and the Fabiola veins. A fourth vein, Delia NW, was being permitted, with initial development scheduled for mid-2011. Mandalay's goals were to produce 1,870 kilograms per year of gold and 1,500 t/yr of antimony from Cerro Bayo. The Cerro Bayo mining and concentrator complex, acquired while in a care-and-maintenance status from Coeur d'Alene Mines Corp. in August 2010, was in the process of a restart by Mandalay, with plans to ramp up to its design production rate of 700 metric tons per day of ore by yearend 2011. The concentrator was scheduled to commence operation in the first quarter of 2011 (Mandalay Resources Corp., 2010; Metal-Pages, 2010).

China.—The Government set the 2010 antimony production quota at 100,000 t compared with 90,180 t in 2009, including 62,520 t for primary production and 30,480 t for recycling. The primary production quotas were allocated to producers in the provinces, but the recycling quotas were not yet allocated. Also, the Government stated that it would not approve any new projects for antimony, rare earths, or tungsten mining before June 30, 2011 (Ryan's Notes, 2010a).

Chinese authorities were concerned that too much antimony was leaving the country in the form of refined metal rather than being processed into downstream products such as antimony trioxide. Reports indicated that the authorities were restricting antimony metal exports but that large quantities of antimony also were imported into China. Other events resulted in additional restrictions on Chinese antimony metal exports. Local regulators imposed stricter inspections on metal-producing plants following a serious lead poisoning accident in Chenzhou, Hunan Province. Almost all antimony smelters in China's leading antimony-producing area, Lengshuijiang (where Hsikwangshan Twinkling Star Co. Ltd., China's leading antimony producer, was located), were expected to be closed for safety inspections. In addition, antimony production in Yunnan Province was disrupted by a serious drought that affected the power and water supply (Ryan's Notes, 2010b).

Mexico.—USAC completed the construction of a flotation mill at San Antonio de la Cal in the Municipio of Toliman. Although the permits to construct and operate the facility were obtained, the Governor of the State of Queretaro declared that he would not allow the plant to operate because of the designation of a nearby area as a UNESCO World Heritage site. The plant has a production capacity of 150 metric tons per day. USAC was moving the mill to the neighboring State of Guanajuato. The plant was to process the rock for the Los Juarez, Soyatal, and other properties (U.S. Antimony Corp., 2011).

Outlook

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

Antimony recovered from 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, though at a more moderate rate. Following the advent in the 1970s of low-maintenance and maintenance-free automotive batteries, the antimony content of a typical automotive lead-acid battery has declined to about 0.6% or lower during 2001 through 2010.

In recent years, lead-acid battery manufacturers have initiated research and development programs that could ultimately lead to significant changes in lead-acid battery design. This research has already yielded performance improvements that would make lead-acid batteries viable options for future generation vehicles. The introduction of new lead-acid battery technologies for use in the hybrid vehicle market will likely require a different amount of lead per battery than conventional lead-acid batteries and could eventually reduce or eliminate the use of antimony in lead-acid batteries.

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TABLE 1

SALIENT ANTIMONY STATISTICS[1]

(Metric tons of antimony content unless otherwise specified)

		2006	2007	2008	2009	2010
United States:						
Mine production		--	W	--	--	--
Smelter production:						
Primary		W	W	W	W	W
Secondary		3,520	3,480	3,180	3,020	3,520
Exports:						
Metal, alloys, waste and scrap	gross weight	459	305	366	385	427
Antimony oxide[2]		1,680	1,640	1,830	1,710	2,120
Imports for consumption		23,200	21,900	29,000	20,200	26,200
Reported industrial consumption, primary antimony		10,500 r	9,690 r	8,140	6,770	8,910
Stocks, primary antimony, all classes, December 31		2,120	1,900	1,490	1,420	1,560
Price, average[3]	cents per pound	238.0	257.3	279.5	235.6	401.2
World, mine production		173,000	180,000	182,000	154,000 r	167,000 e

[e]Estimated. [r]Revised. 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	2009	2010
Metal	1,160	1,390
Oxide	4,990 r	6,890
Other[2]	616	636
Total	6,770	8,910

[r]Revised.

[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	2009	2010
Metal products:		
Antimonial lead	W	W
Bearing metal and bearings	14	26
Solder	44	34
Other[2]	1,950	2,130
Total	2,000	2,190
Nonmetal products:		
Ammunition primers	W	W
Ceramics and glass	W	W
Pigments	403	399
Plastics	W	W
Other[3]	2,030	3,140
Total	2,430	3,540
Flame retardants:		
Adhesives	217	213
Plastics	1,820 r	2,610
Rubber	42	36
Textiles	206	318
Other[4]	40	9
Total	2,330 r	3,180
Grand total	6,770	8,910

[r]Revised. W Withheld to avoid disclosing company proprietary data; included in "Other."

[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 3,020 metric tons (t) in 2009 and 3,520 t in 2010.

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

(Metric tons of antimony content)

Type of material	2009	2010
Metal	155 r	129
Oxide	900 r	1,060
Other[2]	363	372
Total	1,420	1,560

[r]Revised.

[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]

Country	2009 Gross weight (metric tons)	2009 Value (thousands)	2010 Gross weight (metric tons)	2010 Value (thousands)
Belgium	--	--	38	$434
Canada	85	$433	103	391
China	5	29	3	42
Colombia	3	20	--	--
France	39	503	13	366
Germany	8	25	7	27
India	17	66	81	249
Korea, Republic of	--	--	16	49
Mexico	113	362	82	372
Netherlands	13	40	2	6
Sweden	34	104	--	--
Switzerland	3	59	--	--
Taiwan	12	37	22	71
Trinidad and Tobago	--	--	8	47
United Kingdom	34	215	34	117
Venezuela	15	101	(2)	4
Other	3	9	18	59
Total	385	2,000	427	2,230

-- 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 6

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

Country	2009 Gross weight (metric tons)	2009 Antimony content[2] (metric tons)	2009 Value (thousands)	2010 Gross weight (metric tons)	2010 Antimony content[2] (metric tons)	2010 Value (thousands)
Australia	28	23	$105	20	17	$55
Belgium	17	14	135	16	13	114
Brazil	2	2	21	20	17	118
Canada	218	181	1,210	238	198	1,780
Chile	2	2	11	56	46	159
China	44	37	175	132	110	389
Colombia	20	17	96	81	67	633
Costa Rica	2	2	13	20	17	117
France	14	12	61	25	21	83
Germany	49	41	276	166	138	810
Hong Kong	58	48	150	80	66	208
India	63	52	205	--	--	--
Indonesia	54	45	265	27	22	164
Italy	14	12	47	(3)	(3)	7
Japan	128	106	596	104	86	380
Korea, Republic of	54	45	203	229	190	774
Mexico	993	824	4,950	474	393	3,130
Netherlands	61	51	282	80	66	463
Singapore	2	2	23	76	63	235
South Africa	52	43	172	9	7	40
Spain	4	3	6	--	--	--
Taiwan	34	28	109	95	79	479
Thailand	16	13	61	40	33	108
United Kingdom	119	99	435	538	447	1,620
Venezuela	3	2	12	14	12	122
Other	5 r	4 r	36 r	10	9	42
Total	2,060	1,710	9,660	2,550	2,120	12,000

[r]Revised. -- Zero.

[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.

[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 7

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

Country	2009 Gross weight (metric tons)	2009 Antimony content[2] (metric tons)	2009 Value (thousands)	2010 Gross weight (metric tons)	2010 Antimony content[2] (metric tons)	2010 Value (thousands)
Antimony ore and concentrate:						
Bolivia	121	83	$521	70	49	$332
Canada	(3)	(3)	4	--	--	--
China	62	40	109	20	20	52
Italy	85	43	375	218	112	1,450
Total	268	167	1,010	308	181	1,840
Antimony oxide:						
Belgium	1,860	1,540	9,520	2,240	1,860	16,500
Bolivia	1,940	1,610	8,180	719	597	5,060
Brazil	--	--	--	2	1	13
China	11,200	9,310	43,100	19,100	15,800	107,000
France	456	378	2,850	156	130	1,070
Germany	(3)	(3)	7	4	3	18
Hong Kong	--	--	--	20	17	113
Japan	182	151	1,040	364	302	2,000
Mexico	2,430	2,020	14,700	1,940	1,610	10,600
Netherlands	154	128	1,080	134	111	925
Taiwan	115	95	557	236	196	1,150
Other	(3)	1 r	20 r	(3)	(3)	29
Total	18,300	15,200	81,000	24,900	20,600	144,000

[r]Revised. -- 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	2009 Quantity (metric tons)	2009 Value (thousands)	2010 Quantity (metric tons)	2010 Value (thousands)
Australia	95	$398	194	$891
Bolivia	58	236	18	90
China	3,040	14,900	4,530	35,600
Hong Kong	--	--	19	202
India	10	82	43	413
Japan	(2)	153	56	163
Mexico	1,170	1,740	363	495
Peru	212	995	--	--
United Kingdom	44	362	50	424
Vietnam	119	590	79	633
Other	(2)	126 r	4	158
Total	4,750	19,600	5,360	39,100

[r]Revised. -- 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]	2006	2007	2008	2009	2010[e]
Australia[e, 4]	1,600	1,010	1,500	1,000	1,000
Bolivia	5,460	3,881	3,905	2,990 [r]	4,980
Canada[5]	269 [r, 6]	193 [r, 6]	132 [r, 6]	66 [r, 6]	1,000
China[e]	153,000	163,000	166,000	140,000	150,000
Guatemala	--	1,000 [e]	--	--	--
Kyrgyzstan[e]	50	10	10	10	10
Peru, refined[e]	691	590	531	530	530 [p]
Russia, recoverable[e]	3,500	3,500	3,500	3,500	3,000
South Africa[5]	4,362	3,354	3,370	2,800	3,000
Tajikistan[e]	2,000	2,000	2,000	2,000	2,000
Thailand, content of ore and concentrate	1,409	--	--	--	--
Turkey[e]	1,100	1,200	1,300	1,200 [r]	1,500
Total	173,000	180,000	182,000	154,000 [r]	167,000

[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 18, 2011.

[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.