



2013 Minerals Yearbook

ANTIMONY [ADVANCE RELEASE]

ANTIMONY

By David E. Guberman

Domestic survey data and tables were prepared by Hoa P. Phamdang, statistical assistant, and the world production table was prepared by Glenn J. Wallace, international data coordinator.

In the United States, one company in Montana produced primary antimony metal and antimony oxide by upgrading imported antimony trioxide. Secondary antimony was recovered as a component of lead alloys from recycled lead-acid batteries at secondary lead smelters.

In 2013, about 32% of the reported primary antimony used in the United States was in flame retardants; most of the remaining antimony was used in ceramics, glass, and lead-base alloys (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 12 countries. Nearly all the world's primary antimony was mined in China (75%). Burma (6%) and Russia (5%) were the next two leading producers (table 9). Owing to a significant decline in China's mine production, estimated global mine production declined by 12% to its lowest level since 2009.

Production

Mine.—In 2012, First Liberty Power Corp. (FLPC) (Las Vegas, NV) announced plans to construct a mill to upgrade ore at its Fencemaker antimony project, about 194 kilometers northeast of Reno, NV. On October 14, FLPC began mining stibnite ore for upgrade and sale. By mid-December, more than 500 metric tons (t) of raw stibnite ore had been produced and in early 2014, 36 t was sold and shipped to Shenyang Huachang Antimony Chemical Co., Ltd. in China for further refining (First Liberty Power Corp., 2013a, b, 2014).

During 2013, Midas Gold Corp. (Vancouver, British Columbia, Canada) completed a mineral resource definition drill program at its Golden Meadows gold-antimony project in the Stibnite-Yellow Pine Mining District in Idaho. The company planned to significantly upgrade its mineral resource estimates for the project in early 2014 to allow for a complete prefeasibility study by midyear 2014 (Midas Gold Corp., 2013).

Smelter.—The United States had only one antimony smelter, operated by U.S. Antimony Corp. (USAC) (Thompson Falls, MT) in Montana. The company also operated a smelter and mines in Mexico. 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 discarded. USAC reported that overall antimony production (as contained metal) in 2013 was 807 t compared with 646 t in 2012, an increase of 25% owing to an increase in volume of raw material produced in Mexico. During 2013, sales of antimony products increased by about 80 t from those in 2012. During the past few years, the company has focused on increasing its antimony production in Mexico. USAC reported that one of

its antimony-producing mines that ships directly to its smelter in Mexico came onstream during the third quarter of 2013. Another property that supplied mill feed to the flotation mill received its explosives license and was providing mined underground rock rather than dump rock. The smelter at Madero, Mexico, was operating at 100% of its capacity, and a permit was being prepared to triple its throughput. Natural gas was to be hooked up early in January 2014 at the smelter to reduce fuel costs by approximately 70% (U.S. Antimony Corp., 2013; 2014, p. 3).

Consumption

Of the 115 companies to which a U.S. Geological Survey (USGS) antimony consumption survey was sent, 86 firms responded. Consumption data were estimated for the remaining 29 firms. In 2013, consumption (reported and estimated) of primary antimony was 7% greater than that in 2012 owing to increases in consumption for nonmetal products and flame retardants (table 2).

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 also was used as a decolorizing and refining agent in the manufacture of some forms of glass, such as optical glass.

Prices

In 2013, the average Platts Metals Week New York dealer price of antimony was \$4.63 per pound, a decrease of 18% compared with that in 2012 (table 1). The average monthly price for antimony started 2013 at \$4.98 per pound, decreased to \$4.29 per pound in July, increased to \$4.70 per pound in October, and declined to \$4.30 per pound by yearend.

Foreign Trade

U.S. imports of antimony (metal content) in 2013 were, as has been the case in the recent past, much larger than exports—about sixfold larger (tables 5–8). Imports of antimony contained in metal, concentrates, and oxide were 24,700 t, an increase of 9% compared with that in 2012. China was the leading supplier to the United States of antimony metal and antimony oxide (tables 7, 8).

World Review

Canada.—Antimony mine production in Canada decreased in 2013 following the closure of Hunan Nonferrous Metal Corp. Ltd.'s Beaver Brook Mine in central Newfoundland during the fourth quarter of 2012. In May 2013, Tri-Star Resources Plc

(London, United Kingdom) entered into a Letter of Intent for the Acquisition of Portage Minerals Inc., a mineral exploration company that explored for antimony and gold in eastern Canada. Tri-Star announced in October 2013 that the acquisition had been duly completed by way of an amalgamation with Tri-Star Antimony Canada Inc. to form a new company, Tri-Star Antimony Canada Inc., that was wholly owned by Tri-Star. As a consequence of the transaction, Tri-Star owned Portage's Bald Hill deposit (New Brunswick), one of the largest undeveloped antimony projects in Canada (Tri-Star Resources Plc, 2014, p. 6).

China.—In October, China's State Reserve Bureau purchased 10,500 t of antimony for its national stockpile. The purchase was made in two parts, with 4,500 t purchased at \$10,755 per metric ton for immediate delivery and the remaining 6,000 t to be delivered during the next several months. China stockpiled about 4,500 t of antimony in 2012. In 2013, China's Ministry of Land and Resources published a mining quota for antimony. Antimony ore production was restricted to 98,000 t in 2013, compared with 74,360 t in 2012 and 105,000 t in 2011. Despite the mining restrictions, antimony ore production in 2013 exceeded the published quota. Separately, in December, China's Ministry of Commerce released minor metals export quotas for the first half of 2014. During the first half of 2014, the export quotas were 6,301 t of antimony metal and 41,477 t of antimony trioxide, compared with 7,128 t of antimony metal and 33,544 t of antimony trioxide during the same period in 2013 (Hu, 2013b, c; Metal Bulletin, 2013).

Fifteen antimony smelters in Lengshuijiang city in Hunan Province planned to merge to form a new company called the Hunan Ksikwangshan Antimony Group by the end of March 2014. The Lengshuijiang smelters accounted for about 60% of total antimony production in China. The consolidation was thought to be an attempt to alleviate overcapacity that has resulted in many smelters either operating below capacity or remaining idle. Antimony producers in China were also preparing to form an industry association in 2014 as a subsidiary of the China Nonferrous Metals Industry Association. One of the primary goals of the association was to help its members obtain technologies to develop and produce more value-added downstream products (Hu, 2013a; Zhao, 2013).

Oman.—In October, Tri-Star announced that it had entered into a nonbinding Memorandum of Understanding with Oman Investment Fund, a sovereign wealth fund of the Sultanate of Oman, and Castell Investments Ltd (a subsidiary of Dubai Transport Co.) to establish a joint-venture company to construct and operate an antimony roaster in Oman. The roaster would have the capacity to produce 20,000 metric tons per year of antimony metal and antimony trioxide and was projected to cost \$60 million to build. The first full year of operation was expected to be 2016. Raw materials (sulfide concentrates) were to be imported from Tri-Star's mines in Canada and Turkey and from other suppliers, and the antimony metal and trioxide produced were expected to be exported primarily to customers in Asia, Europe, and the United States (Tri-Star Resources Plc, 2013).

South Africa.—Village Main Reef (Bryanston), an antimony and gold producer, announced plans to double antimony production at its Cons Murch Mine in Limpopo Province during the next 2 years. The mine was the only substantial antimony producer in Africa, and antimony concentrates produced were

exported to India. The mine produced an average of 500 metric tons per month (t/mo) of antimony concentrate, containing about 60% antimony. Reported reserves at the mine were 1.14 million metric tons of ore with an antimony grade of 2.23% antimony (25,400 t of contained antimony). If the production increases, Cons Murch would produce about 1,000 t/mo of antimony concentrate. In addition to the underground mine, the company had a tailings recovery project that had the potential to produce a total of 74,200 t of antimony during an 8-year life (Spicer, 2013).

Outlook

Flame retardants are expected to remain the principal use of antimony, globally as well as in the United States. The increase in antimony prices during the past few years has led some producers of flame-retardants to switch to less expensive substitutes where possible.

Antimony recovered from scrap has been an important part of the total domestic antimony supply. Recovery, however, is limited to the quantity contained in end-of-life batteries. Since 2001, a typical automotive lead-acid battery has contained a maximum of 0.6% antimony.

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. Although the introduction of new lead-acid battery technologies for use in the hybrid vehicle market likely would increase overall lead-acid battery demand, these batteries are expected to use less lead per battery than conventional lead-acid batteries and could reduce or eliminate the use of antimony in lead-acid battery alloys. Consumption of antimony for batteries has declined over the past few decades as many newer starting, lighting, and ignition battery designs, such as sealed "maintenance free" batteries, are manufactured with alloys of lead and calcium, selenium, or tin instead of antimony owing to performance and price advantages. Lead-antimony alloys are still expected to be used in deep cycle batteries for motive power in boats, forklifts, golf carts, and some standby batteries.

Although production has declined in China and its antimony reserves may be declining, numerous antimony prospects around the world are being explored and developed, and future supplies of antimony are expected to be sufficient to meet demand.

References Cited

- First Liberty Power Corp., 2013a, First Liberty Power achieves first mined in America milestone: Lovelock, NV, First Liberty Power Corp. news release, October 15. (Accessed October 15, 2013, at <http://www.irdirect.net/pr/release/id/339707>.)
- First Liberty Power Corp., 2013b, First Liberty Power signs antimony concentrate sales agreement: Las Vegas, NV, First Liberty Power Corp. press release, December 16. (Accessed December 16, 2013, at <http://www.irdirect.net/pr/release/id/420468>.)
- First Liberty Power Corp., 2014, First Liberty Power shipping first containers of antimony ore: Las Vegas, NV, First Liberty Power Corp. press release, February 4. (Accessed February 4, 2014, at <http://www.irdirect.net/pr/release/id/467208>.)
- Hu, Hellen, 2013a, 15 antimony smelters in China's Lengshuijiang to merge: Metal-Pages, December 13. (Accessed December 13, 2013, via <http://www.metal-pages.com/>.)

Hu, Hellen, 2013b, China allocates first batch of antimony export quotas for 2014: Metal-Pages, December 16. (Accessed December 16, 2013, via <http://www.metal-pages.com/>.)

Hu, Hellen, 2013c, China's Ministry of Land and Resource published antimony ore mining quotas for 2013: Metal-Pages, September 13. (Accessed September 13, 2013, via <http://www.metal-pages.com/>.)

Metal Bulletin, 2013, China's State Reserve bought antimony for 66,000 yuan per tonne: Metal Bulletin, November 4. (Accessed November 4, 2013, via <http://www.metalbulletin.com/>.)

Midas Gold Corp., 2013, Midas Gold completes 7,000m drill program at its Golden Meadows project, Idaho: Vancouver, British Columbia, Canada, Midas Gold Corp. news release, December 3, 5 p. (Accessed December 3, 2013, at <http://www.midasgoldcorp.com/s/news.asp?ReportID=613830>.)

Spicer, Andi, 2013, World antimony 2013—Cons Murch aims to become Africa's antimony gateway—Ncube: Metal-Pages, December 6. (Accessed December 6, 2013, via <http://www.metal-pages.com/>.)

Tri-Star Resources Plc, 2013, Memorandum of understanding signed for the establishment and financing of a joint venture company to undertake Tri-Star Resources' roaster project: London, United Kingdom, Tri-Star Resources Plc news release, October 9. (Accessed March 25, 2014, at <http://www.tri-starresources.com/news/detail/108/>.)

Tri-Star Resources Plc, 2014, Annual report and financial statements for the year ended 31 December 2013: London, United Kingdom, Tri-Star Resources Plc, February 28, 48 p. (Accessed February 28, 2014, at <http://www.tri-starresources.com/upload-images/Tri-Star%20AR2013%20final.pdf>.)

U.S. Antimony Corp., 2013, U.S. Antimony reports increased Mexican production: Thompson Falls, MT, U.S. Antimony Corp. news release, December 16. (Accessed December 16, 2013, at http://www.usantimony.com/2013_newsroom_2013.htm#U.S._ANTIMONY_REPORTS_INCREASED_MEXICAN_PRODUCTION.)

U.S. Antimony Corp., 2014, Form 10-K—2013: U.S. Securities and Exchange Commission, 41 p. (Accessed March 25, 2014, at http://filings.irdirect.net/data/101538/000135448814001190/uamy_10k.pdf.)

Zhao, Ohmin, 2013, World antimony 2013—China to establish industry association for antimony in 2014: Metal-Pages, December 6. (Accessed December 6, 2013, via <http://www.metal-pages.com/>.)

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Antimony. Ch. in Mineral Commodity Summaries, annual.

Antimony. Mineral Industry Surveys, quarterly.

Antimony. Ch. in United States Mineral Resources, Professional Paper 820, 1973.

Antimony (Sb). Ch. in Metal Prices in the United States Through 2010, Scientific Investigations Report 2012–5188, 2013.

Other

Antimony. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.

TABLE 1
SALIENT ANTIMONY STATISTICS¹

(Metric tons of antimony content unless otherwise specified)

	2009	2010	2011	2012	2013
United States:					
Mine production	--	--	--	--	--
Smelter production:					
Primary	W	W	W	W	W
Secondary	3,020	2,630 [†]	2,860 [†]	3,050 [†]	4,400
Exports:					
Metal, alloys, waste and scrap	gross weight	385	427	581	847
Antimony oxide ²		1,710	2,120	3,590	3,870
Imports for consumption		20,200	26,200	23,500	22,600
Reported industrial consumption, primary antimony		6,770	8,860	8,610 [†]	8,050 [†]
Stocks, primary antimony, all classes, December 31		1,420	1,560	1,430	1,470
Price, average ³	cents per pound	235.6	401.2	650.3	564.5
World, mine production		158,000 [†]	184,000 [†]	191,000 [†]	180,000 [†]

[†]Estimated. [‡]Revised. NA Not available. W Withheld to avoid disclosing company proprietary data. -- Zero.

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

²Antimony content data were calculated by the U.S. Geological Survey.

³New York dealer price for 99.65% metal, cost, insurance, and freight U.S. ports.

TABLE 2
 REPORTED INDUSTRIAL CONSUMPTION OF
 PRIMARY ANTIMONY IN THE UNITED STATES¹

(Metric tons of antimony content)

Class of material consumed	2012 ^r	2013
Metal	1,520	1,230
Oxide	5,850	6,440
Other ²	686	957
Total	8,050	8,620

^rRevised.

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

²Includes residues and sulfide.

TABLE 3
 REPORTED INDUSTRIAL CONSUMPTION OF PRIMARY ANTIMONY IN THE
 UNITED STATES, BY PRODUCT¹

(Metric tons of antimony content)

Product	2012	2013
Metal products:		
Antimonial lead	W	W
Bearing metal and bearings	13	21
Solder	46 ^r	54
Other ²	2,210 ^r	2,130
Total	2,270 ^r	2,210
Nonmetal products:		
Ammunition primers	W	W
Ceramics and glass	W	W
Pigments	369 ^r	1,050
Plastics	W	W
Other ³	2,900 ^r	2,580
Total	3,270 ^r	3,630
Flame retardants:		
Adhesives	78 ^r	84
Plastics	2,210 ^r	2,350
Rubber	39	148
Textiles	195	199
Total	2,520 ^r	2,780
Grand total	8,050 ^r	8,620

^rRevised. W Withheld to avoid disclosing company proprietary data; included in "Other."

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

²Includes ammunition, cable covering, castings, sheet and pipe, and type metal.

³Includes fireworks and rubber products.

TABLE 4
INDUSTRY STOCKS OF PRIMARY ANTIMONY IN
THE UNITED STATES, DECEMBER 31¹

(Metric tons of antimony content)

Type of material	2012	2013
Metal	117 ^r	261
Oxide	886	789
Other ²	431	424
Total	1,430	1,470

^rRevised.

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

²Includes ore and concentrate, residues, and sulfide.

TABLE 5
U.S. EXPORTS OF ANTIMONY METAL, ALLOYS, AND WASTE AND SCRAP,
BY COUNTRY¹

Country	2012		2013	
	Gross weight (metric tons)	Value (thousands)	Gross weight (metric tons)	Value (thousands)
Argentina	11	\$136	--	--
Canada	57	318	137	\$612
China	1	10	45	207
Egypt	1	30	--	--
Germany	9	29	4	20
Guatemala	15	49	4	13
India	--	--	14	58
Italy	(2)	4	62	96
Japan	1	19	78	484
Korea, Republic of	138	348	522	1,360
Mexico	438	2,080	473	1,710
Netherlands	--	--	8	24
Poland	17	54	20	62
South Africa	6	18	(2)	9
Taiwan	21	64	3	13
United Kingdom	34	105	106	328
Venezuela	86	973	68	440
Other	12 ^r	73 ^r	10	94
Total	847	4,310	1,550	5,540

^rRevised. -- Zero.

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

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 6
U.S. EXPORTS OF ANTIMONY OXIDE, BY COUNTRY¹

Country	2012			2013		
	Gross weight (metric tons)	Antimony content ² (metric tons)	Value (thousands)	Gross weight (metric tons)	Antimony content ² (metric tons)	Value (thousands)
Australia	17	14	\$110	70	58	\$381
Belgium	209	173	1,140	3	2	24
Brazil	15	12	90	2	2	26
Canada	195	162	1,320	59	49	516
Chile	18	15	74	--	--	--
China	251	208	1,200	199	165	855
Colombia	434	360	2,240	143	119	1,020
Costa Rica	88	73	592	66	55	399
France	65	54	177	45	37	179
Germany	229	190	879	265	220	1,000
Hong Kong	84	70	223	--	--	--
India	4	3	20	10	8	49
Indonesia	117	97	991	--	--	--
Italy	27	22	241	--	--	--
Japan	333	276	2,020	233	193	1,510
Korea, Republic of	571	474	1,670	177	147	758
Mexico	1,140	945	3,760	957	794	3,970
Netherlands	61	51	359	41	34	239
Peru	10	8	25	--	--	--
Singapore	105	87	518	29	24	139
South Africa	8	7	43	--	--	--
Spain	--	--	--	19	16	19
Switzerland	179	149	742	--	--	--
Taiwan	348	289	2,580	217	180	1,550
Thailand	19	16	50	56	46	146
United Arab Emirates	--	--	--	20	17	222
United Kingdom	29	24	245	85	71	520
Venezuela	95	79	368	212	176	645
Other	9	9	62	11	10	49
Total	4,660	3,870	21,700	2,920	2,420	14,200

-- Zero.

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

²Antimony content data were calculated by the U.S. Geological Survey.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY, BY CLASS AND COUNTRY¹

Country	2012			2013		
	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:						
Austria	--	--	--	4	2	\$32
Canada	(3)	(3)	\$2	--	--	--
China	120	100	890	98	89	681
India	--	--	--	104	46	398
Italy	362	261	3,730	286	204	2,670
Japan	41	19	153	(3)	(3)	8
Mexico	--	--	--	2	1	4
Total	523	380	4,780	494	342	3,790
Antimony oxide:						
Belgium	1,530	1,270	18,600	1,750	1,450	17,000
Bolivia	1,970	1,640	15,300	2,890	2,400	26,100
Chile	221	184	1,840	--	--	--
China	14,100	11,700	109,000	12,400	10,300	85,100
France	455	378	5,440	510	424	5,730
Germany	1	(3)	4	1	1	9
Hong Kong	60	50	669	20	17	190
India	13	11	161	--	--	--
Italy	--	--	--	16	13	198
Japan	542	450	3,040	558	463	3,040
Mexico	1,250	1,040	16,500	1,160	959	13,700
Spain	--	--	--	100	83	165
Taiwan	38	32	272	--	--	--
Thailand	460	382	920	2,500	2,080	5,000
United Kingdom	43	35	473	3	2	30
Other	10 ^r	7	89 ^r	--	--	--
Total	20,700	17,200	172,000	21,900	18,200	156,000

^rRevised. -- Zero.

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

²Antimony ore and concentrate content reported by the U.S. Census Bureau. Antimony content of oxide data were calculated by the U.S. Geological Survey.

³Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY METAL, BY COUNTRY¹

Country	2012		2013	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Bolivia	37	\$408	42	\$350
Canada	2	312	1	328
China	3,760	46,100	3,880	37,600
Germany	(2)	68	(2)	117
Hong Kong	144	1,680	448	4,440
India	745	8,410	904	9,590
Japan	81	318	115	339
Korea, Republic of	--	--	105	669
Mexico	149	300	172	383
Peru	--	--	303	2,580
United Kingdom	88	1,070	162	1,590
Vietnam	50	596	21	189
Other	-- ^r	-- ^r	19	189
Total	5,050	59,200	6,170	58,300

^rRevised. -- Zero.

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

²Less 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	2009	2010	2011	2012	2013 ^c
Australia ⁴	1,000 ^c	1,106	1,577	2,481	3,275 ^{5,*}
Bolivia	2,990	4,980	3,947	5,088 ^r	5,081 ^{5,*}
Burma ^c	3,700	5,900	7,000	7,400 ^r	9,000
Canada ^{c,4}	64 ⁵	9,000	10,000	6,000 ^r	76 ^{5,*}
China ^c	140,000	150,000	150,000	136,000 ^r	120,000
Kyrgyzstan ^c	700	700	1,500	1,200 ^r	1,200
Mexico	74	71	100	169	294 ^{5,*}
Peru	145	--	--	--	--
Russia ^c	3,500	6,000 ^{r,*}	6,348 ⁵	7,300 ^r	8,700
South Africa ⁴	2,673	3,239 ^r	3,175 ^r	3,066 ^r	2,400
Tajikistan ^c	2,000	2,000	4,500 ^r	4,248 ^{r,5,*}	4,675 ⁵
Turkey ^c	1,400	1,400 ^r	2,400 ^r	7,300 ^r	4,600
Total	158,000 ^r	184,000 ^r	191,000 ^r	180,000 ^r	159,000

^cEstimated. ^rRevised. -- Zero.

¹World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Table includes data available through May 14, 2014.

³In addition to the countries listed, antimony may have been produced in Iran, but information is inadequate to make reliable estimates of output levels.

⁴Antimony content of antimony ore and concentrate, lead concentrates, and lead-zinc concentrates.

⁵Reported figure.

*Correction posted August 2016.