



2019 Minerals Yearbook

ANTIMONY [ADVANCE RELEASE]

ANTIMONY

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In 2019, no marketable antimony was mined in the United States. A mine in Nevada that had extracted about 800 metric tons (t) of stibnite ore from 2013 through 2014 was placed on care-and-maintenance status in 2015 and had no reported production in 2019. Primary antimony metal production increased by 14% to 377 t in 2019 (U.S. Antimony Corp., 2020). Primary antimony metal and antimony trioxide were produced by one company in Montana by upgrading imported antimony intermediate products. Secondary antimony production increased slightly to 4,140 t and was recovered as a component of lead alloys from recycled lead-acid batteries at secondary lead smelters (table 1).

Reported consumption of primary antimony in 2019 was 5,820 t, a decrease of 7% from the revised consumption in 2018. Secondary antimony, which was derived almost entirely from antimonial lead contained in recycled lead-acid batteries, was used in the manufacture of new batteries. In 2019, apparent antimony consumption (primary and secondary antimony production plus imports of unwrought antimony metal and antimony oxide minus exports of unwrought antimony metal and antimony oxide) was 26,500 t, 4% less than that in 2018 (table 1). The worldwide end-use distribution of antimony in 2019 was reported to be flame retardants, 50%; lead-acid batteries, 32%; plastics, 8%; and other, 10% (Roskill Information Services Ltd., 2020).

Antimony was mined commercially as a principal product or was recovered as a byproduct during the smelting of base-metal ores in 15 countries in 2019. China, the world's leading producer of antimony, accounted for an estimated 55% of world mine production, followed by Russia (19%) and Tajikistan (17%). Estimated global mine production increased by 10% to 162,000 t in 2019 compared with production in 2018 (table 8).

Production

Mine.—In 2019, no marketable antimony was mined in the United States. In April 2017, Midas Gold Corp. (Canada) announced commencement of the feasibility study for the Stibnite Gold project near Yellow Pine, ID (Midas Gold Corp., 2017). In February 2018, the company published its mineral resource estimates for the Stibnite Gold project, which included measured and indicated resources of approximately 92 t of antimony and inferred resources of an additional 9 t (Midas Gold Corp., 2018). In December 2019, the company announced that the project continued to advance, the Draft Environmental Impact Statement for the Stibnite Gold project would be available for public review in January 2020, and the Final Record of Decision for the project's permitting process was expected in the first quarter of 2021 (Midas Gold Corp., 2019).

In September 2017, Renaissance Gold Inc., a Canada-based gold and silver exploration company, began exploratory drilling of gold mineralization associated with high antimony

concentrations at the Buffalo Canyon, Diamond Point, and Spruce East projects in Nevada. The company conducted gravity and magnetic surveys prior to drilling (Renaissance Gold Inc., 2017). In October 2019, the company announced that the exploratory drilling was ongoing and some of the drilling projects had been rescheduled for 2020 (Renaissance Gold Inc., 2019).

Primary Smelter.—The United States had only one primary antimony smelter, operated by U.S. Antimony Corp. (USAC) (Thompson Falls, MT) in Montana. The smelter processed intermediate antimony products from Australia, Canada, and Mexico; recovered precious metals; and produced antimony trioxide and metal. The company also operated a smelter and mines in Mexico. The company produced antimony metal for bearings, storage batteries, and ordnance; antimony oxide as a raw material primarily for flame retardants; and sodium antimonate primarily for glass in cathode ray tubes and other applications. In 2019, USAC reported selling 711 t of antimony as contained antimony (361 t produced in the United States and 350 t in Mexico), a 5% increase compared with 674 t produced in 2018 (315 t produced in the United States and 359 t in Mexico) (U.S. Antimony Corp., 2020, p. 1, 18, F-21).

Secondary Antimony.—All of the secondary antimony in the United States was produced at secondary lead smelters from scrap battery grids and other battery parts, and from bearing metal, type metal, and other antimonial lead scrap. In 2019, 11 secondary lead smelters recovered 4,140 t of antimony, a slight increase from that in 2018 (table 1).

Consumption

The U.S. Geological Survey sent antimony consumption surveys to 134 companies, and 105 companies responded. Consumption data were estimated for the remaining 29 firms. Reported consumption of primary antimony in 2019 was 5,810 t, a 7% decrease from the revised total in 2018. The reported consumption of primary antimony in the United States in 2019 was divided between three main groups of products: flame retardants (antimony trioxide), 42%; metal products (lead-antimony alloys), 36%; and nonmetal products, 22% (tables 1–3). In 2019, apparent consumption of antimony was 26,500 t, 4% less than that in 2018.

Lead-antimony alloys were used primarily in the production of lead-acid batteries, as well as for ammunition, antifriction bearings, cable sheaths, corrosion-resistant pumps and pipes, roof sheet solder, and tank linings. Antimony oxide was used primarily in conjunction with halogen to form flame-retardant systems, as well as for coatings, fiberglass, paper, plastics, rubber, textile goods, and paints. Antimony oxide also was used as a catalyst for production of polyester resins for fibers and film, as a catalyst for production of polyethylene

pterathalate in plastic bottles, as a color fastener in paint, and as a phosphorescent agent in fluorescent light bulbs.

Prices

In 2019, the average S&P Global Platts Metals Week New York dealer price of antimony was \$3.90 per pound, essentially unchanged from that in 2018. After a 23% decline in 2015 (from \$4.25 per pound), the average annual price increased by 22% to \$3.98 per pound in 2017 (from \$3.35 per pound in 2016) and was relatively stable in 2018 and 2019 (table 1).

Foreign Trade

Domestic imports for consumption of antimony in 2019 were much more than exports, as had been the case in recent years. Imports for consumption of antimony oxide (by antimony content) in 2019 were 17,300 t, a decrease of 10% from those in 2018 (table 6). Imports for consumption of unwrought antimony in 2019 were 6,670 t, an increase of 7% from those in 2018 (table 7). China was the leading supplier to the United States, accounting for 30% of unwrought antimony imports and 75% of antimony oxide imports in 2019 (tables 6–7). India accounted for 23% of unwrought antimony imported to the United States in 2019. Exports of antimony oxide (by antimony content) in 2019 were 1,570 t, a decrease of 10% from that in 2018; Japan (36%), Mexico (10%), and France (9%) were the leading destinations (table 5). Exports of unwrought antimony were 370 t, a decrease of 26% from that in 2018; Canada and Mexico were the leading destinations, accounting for 14% and 44%, respectively (table 4).

World Review

In 2019, global mine production of antimony increased by 10% to 162,000 t from the 2018 total of 147,000 t (table 8). China (55%), Russia (19%), and Tajikistan (17%) were the leading global producers of mined antimony. Globally, consumption of primary and secondary antimony was estimated to be about 182,000 t in 2019, slightly less than 184,000 t in 2018 (Roskill Information Services Ltd., 2020).

Australia.—Mandalay Resources Corp. (Canada) operated the Costerfield gold-antimony mine in Victoria. Mandalay purchased the idled mine in 2009 and restarted operations in 2010. In 2019, the mine produced 2,030 t of antimony in concentrate, a 6% decrease from 2,170 t in 2018. The company also projected increases of the annual antimony production of up to 3,000 to 3,500 t in 2020 (Mandalay Resources Corp., 2020, p. 5, 7).

China.—In 2019, China continued to be the dominant producer of mined antimony, accounting for 55% of global mine production (table 8). The largest and highest grade deposits were in southern China, specifically in Guangxi Autonomous Region, Hunan Province, and Yunnan Province. China was also the leading global producer of antimony metal and oxide, leading importer of antimony contained in ore and concentrates, and leading exporter of antimony metal and oxide. Antimony mine production was estimated to be about 89,000 t in 2019, essentially unchanged from that in 2018 (table 8).

Oman.—Strategic & Precious Metals Processing LLC [a joint venture among Oman Investment Fund (40%), Tri-

Star Resources Plc (40%), and DNR Industries Ltd. (20%)] continued development of the Oman Antimony Roaster project in Sohar. The facility was expected to produce 20,000 metric tons per year of antimony and about 1,600 kilograms per year of associated gold. Operations had been projected to commence in 2017 but were pushed back to the first quarter of 2018 (Oman Observer, 2017). In June 2018, it was reported that the plant construction was 97% complete and was expected to ramp up to full operating capacity by 2019 (Oman Observer, 2018). In June 2019, Strategic & Precious Metals Processing LLC (SPMP) announced the launch of their antimony-gold facility in Sohar (Oman Observer, 2019b). In October 2019, SPMP announced that the first production of antimony metal at the facility had commenced in July 2019 (Oman Observer, 2019a).

Outlook

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 could make lead-acid batteries viable options for future generation hybrid vehicles. These batteries might 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 in North America 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 with 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. Mine projects in Australia, Bolivia, Canada, Kyrgyzstan, and Turkey are in various stages of development and could potentially become new sources of supply (Roskill Information Services Ltd., 2018, p. 77).

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TABLE 1
SALIENT ANTIMONY STATISTICS¹

(Metric tons, antimony content, unless otherwise specified)

	2015	2016	2017	2018	2019
United States:					
Smelter production:					
Primary ²	645	664	621	331	377
Secondary	3,740	3,810	4,370	4,090	4,140
Exports:					
Ore and concentrates	31	12	46	38	9
Unwrought antimony	720	446	643	497	370
Antimony oxide ³	1,760	1,330	1,600	1,750	1,570
Waste and scrap	723	177	11	9	14
Imports for consumption:					
Ore and concentrates	308	119	61	96	121
Unwrought antimony	5,320	7,110	6,810	6,320	6,670
Antimony oxide ³	16,700	16,100	17,800	19,200	17,300
Waste and scrap	466	41	16	202	17
Apparent consumption of antimony ⁴	23,900	25,900	27,400	27,700	26,500
Reported industrial consumption, primary antimony	5,920	6,860	6,550	6,260 ^r	5,810
Price, average ⁵	3.27	3.35	3.98	3.88	3.90
World, mine production	150,000	148,000	140,000 ^r	147,000	162,000 ^e

^eEstimated. ^rRevised. do. Ditto.

¹Table includes data available through October 14, 2020. Data are rounded to no more than three significant digits, except prices.

²Contains residual antimony from primary antimony consumption and antimony produced at the primary antimony facility. Source: U.S. Antimony Corp., 2019, Antimony, gold & silver, zeolite production information: Thompson Falls, MT, U.S. Antimony Corp. (Accessed August 21, 2021, via http://www.irdirect.net/UAMY/sec_filings/).

³Antimony content data were calculated by the U.S. Geological Survey using 83% average antimony content of “crude” antimony trioxide and finished antimony trioxide senarmonite.

⁴Primary and secondary antimony smelter production plus imports of unwrought antimony metal and antimony oxide minus exports of unwrought antimony metal and antimony oxide.

⁵New York dealer price for 99.65% metal, cost, insurance, and freight at U.S. ports. Source: S&P Global Platts Metals Week.

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

(Metric tons, antimony content)

Class of material consumed	2018	2019
Metal	1,770	1,480
Oxide	3,850 ^r	3,690
Other ²	647	645
Total	6,260 ^r	5,810

^rRevised.

¹Table includes data available through October 14, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes residues and sulfide, excludes rubber products.

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

(Metric tons, antimony content)

Product	2018	2019
Metal products:		
Antimonial lead	W	W
Bearing metal and bearings	8	7
Solder	13	17
Other ²	2,360	2,070
Total	2,380	2,100
Nonmetal products:		
Ammunition primers	W	W
Ceramics and glass	204	190
Pigments	W	W
Plastics	254	245
Other ³	874 ^r	853
Total	1,330	1,290
Flame retardants:		
Adhesives	45	72
Plastics	2,030 ^r	1,900
Pigments	--	--
Rubber	50	78
Textiles	426	382
Total	2,550 ^r	2,430
Grand total	6,260 ^r	5,810

^rRevised. W Withheld to avoid disclosing company proprietary data, not included in the totals. -- Zero.

¹Table includes data available through October 14, 2020. Data 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 ammunition primers, pigments, and miscellaneous products; excludes rubber products.

TABLE 4
U.S. EXPORTS OF ANTIMONY METAL, ALLOYS, AND WASTE AND SCRAP,
BY COUNTRY OR LOCALITY¹

Country or locality	2018		2019	
	Gross weight (metric tons)	Value (thousands)	Gross weight (metric tons)	Value (thousands)
Unwrought antimony:²				
Australia	--	--	(3)	\$16
Austria	1	\$30	--	--
Brazil	--	--	26	82
Canada	180	577 ^r	51	243
Chile	--	--	7	20
China	9	38	25	226
Costa Rica	(3)	3	--	--
Czechia	7	23	7	20
Eswatini	1	46	(3)	16
France	3	203	--	--
Germany	39	125	6	104
Guatemala	3	33	3	48
Hong Kong	13	41	5	14
Israel	--	--	22	140
Italy	2	5	4	11
Japan	--	--	4	13
Korea, Republic of	7	20	12	38
Malta	(3)	18	(3)	15
Mexico	163 ^r	877 ^r	164	1,030
Peru	(3)	10	--	--
Philippines	--	--	2	16
Poland	8	25	11	33
Saudi Arabia	10	30	--	--
Singapore	1	5	(3)	3
Slovakia	7	21	--	--
Spain	1	3	4	14
Sweden	5	25	1	6
Taiwan	14	44	10	30
Thailand	11	33	(3)	6
United Kingdom	6	168	(3)	6
Venezuela	7	83	3	37
Vietnam	--	--	1	4
Total	497^r	2,490^r	370	2,190
Waste and scrap:⁴				
India	--	--	5	21
Mexico	9	38	9	40
Total	9	38	14	61

¹Revised. -- Zero.

¹Table includes data available through November 3, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes unwrought antimony powders and antimony articles (Schedule B codes 8110.10.0000 and 8110.90.0000, respectively).

³Less than ½ unit.

⁴Includes antimony waste and scrap (Schedule B code 8110.20.0000).

Source: U.S. Census Bureau.

TABLE 5
U.S. EXPORTS OF ANTIMONY OXIDE, BY COUNTRY OR LOCALITY¹

Country or locality	2018			2019		
	Gross weight (metric tons)	Antimony content ² (metric tons)	Value (thousands)	Gross weight (metric tons)	Antimony content ² (metric tons)	Value (thousands)
Australia	57	47	\$245	52	43	\$252
Brazil	54	45	293	116	96	565
Canada	91	76	441	45	37	200
Chile	25	21	290	4	3	33
China	57	47	180	31	25	98
Colombia	86	72	703	20	17	148
Costa Rica	53	44	411	76	63	384
France	96	79	324	179	149	491
Germany	182	151	885	90	74	424
Guatemala	--	--	--	1	1	3
Hong Kong	15	13	40	25	21	66
Indonesia	17	14	109	34	28	222
Ireland	--	--	--	(3)	(3)	3
Italy	30	25	241	47	39	337
Japan	551	458	3,420	677	562	3,830
Korea, Republic of	50	42	170	8	7	22
Malaysia	46	38	161	50	41	173
Mexico	404	335	3,110	192	159	1,140
New Zealand	--	--	--	(3)	(3)	5
Saudi Arabia	1	1	3	--	--	--
Singapore	39	32	145	79	65	268
South Africa	8	7	32	--	--	--
Taiwan	28	24	68	39	32	98
Thailand	31	26	106	17	14	58
Trinidad and Tobago	24	20	63	4	4	35
Turkey	34	28	258	102	85	637
United Kingdom	117	97	407	1	1	15
Venezuela	8	7	90	--	--	--
Total	2,110	1,750	12,200	1,890	1,570	9,500

-- Zero.

¹Table includes data available through September 9, 2020. Data 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 using 83% average antimony content of "crude" antimony trioxide and finished antimony trioxide senarmonite.

³Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY, BY CLASS AND COUNTRY OR LOCALITY¹

Country or locality	2018			2019		
	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	1	1	\$11	--	--	--
Bosnia and Herzegovina	--	--	--	1	1	\$11
China	90	62	540	91	62	488
Germany	--	--	--	1	(3)	5
India	--	--	--	40	27	261
Italy	43	34	322	36	30	238
Mexico	(3)	(3)	58	--	--	--
Netherlands	--	--	--	(3)	(3)	5
Total	134	96	931	169	121	1,010
Antimony oxide:						
Belgium	2,070	1,720	16,500	2,060	1,710	14,400
Bolivia	1,300	1,080	9,240	1,180	977	6,900
Brazil	23	19	81	--	--	--
Canada	8	7	63	45	37	226
China	15,400	12,800	93,900	15,600	12,900	77,400
France	367	305	3,010	446	370	3,170
Germany	(3)	(3)	5	3	3	24
Hong Kong	60	50	436	80	66	503
India	17	14	133	6	5	47
Italy	--	--	--	1	1	5
Japan	739 ^r	613 ^r	4,160	755	627	4,030
Korea, Republic of	63	53	332	80	66	390
Mexico	1,270	1,050	8,320	302	251	1,180
Singapore	--	--	--	1	1	7
Taiwan	75	62	515	--	--	--
Thailand	1,780	1,480	5,340	280	232	840
Turkey	2	2	22	--	--	--
United Kingdom	--	--	--	(3)	(3)	4
Total	23,100	19,200	142,000	20,800	17,300	109,000

^rRevised. -- Zero.

¹Table includes data available through September 9, 2020. Data 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 using 83% average antimony content of "crude" antimony trioxide and finished antimony trioxide senarmonite.

³Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY METAL, ALLOYS,
AND WASTE AND SCRAP, BY COUNTRY OR LOCALITY¹

Country or locality	2018		2019	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Unwrought antimony:²				
Bolivia	177	\$1,350	148	\$955
Brazil	(3)	2	--	--
Burma	133	1,050	543	3,380
Canada	(3)	93	79	473
China	2,540 ^r	20,900 ^r	2,000	13,800
France	(3)	4	(3)	9
Germany	(3)	13	(3)	35
Hong Kong	40	315	82	527
India	1,640	13,600	1,540	10,300
Japan	193	1,900	172	1,350
Korea, Republic of	19	148	2	15
Kyrgyzstan	--	--	(3)	13
Mexico	38 ^r	236 ^r	153	1,160
Singapore	24	204	23	190
Sweden	39	331	2	19
Switzerland	25	189	--	--
Tajikistan	10	85	82	804
Thailand	391	3,170	302	1,970
Turkey	40	312	--	--
United Kingdom	349	5,220	355	4,680
Vietnam	663	5,310	1,180	8,150
Total	6,320^r	54,400^r	6,670	47,800
Waste and scrap:⁴				
Canada	--	--	12	33
China	196	1,410	--	--
Mexico	6	12	6	5
Total	202	1,430	17	37

^rRevised. -- Zero.

¹Table includes data available through November 3, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes unwrought antimony powders and antimony articles (Harmonized Tariff of the United States code 8110.10.0000 and 8110.90.0000, respectively).

³Less than ½ unit.

⁴Includes antimony waste and scrap (Harmonized Tariff of the United States code 8110.20.0000).

Source: U.S. Census Bureau.

TABLE 8
ANTIMONY: WORLD MINE PRODUCTION, BY COUNTRY OR LOCALITY¹

(Metric tons, antimony content, unless otherwise specified)

Country or locality	2015	2016	2017	2018	2019
Australia ²	3,712	3,598	3,115	2,173	2,032
Bolivia	3,843	2,669	2,881	3,110	3,000 ^e
Burma ³	3,000	2,780	3,060	2,641	6,000 ^e
Canada ²	1	--	1	1	1 ^e
China	120,700	107,500	97,700 ^r	89,600	89,000 ^e
Ecuador ^e	19	16 ^r	68 ^r	9 ^r	1
Guatemala	--	25	25 ^e	25 ^e	25 ^e
Honduras	21 ^e	3 ^e	3 ^e	12 ^e	--
Iran ^e	330	500	300	600	500
Kazakhstan, concentrate	500 ^e	573	700 ^e	300 ^e	300 ^e
Kyrgyzstan ^e	650	1,030 ^r	750	370	--
Laos	1,166	242	320	340 ^{r,e}	140
Mexico	90 ^e	116	243	260 ^e	300 ^e
Pakistan	114	21	15	-- ^r	--
Russia	6,300	11,900	14,400	30,000 ^e	30,000 ^e
South Africa ²	302	350	--	--	-- ^e
Tajikistan, ore	7,000 ^e	14,000 ^e	14,000 ^e	15,240	27,950
Turkey, concentrate	1,950 ^e	2,520	2,500 ^e	2,400 ^e	2,400 ^e
Vietnam ^{e,4}	220	230	230	240	310
Total	150,000	148,000	140,000 ^r	147,000	162,000 ^e

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through October 27, 2020. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Antimony content of antimony ores and concentrates, lead concentrates, and lead-zinc concentrates.

³Data estimated from United Nations Comtrade database for antimony ores and concentrates imported from Burma by China, India, Singapore, and Thailand.

⁴Figures were converted to antimony content (using a conversion factor of 40% antimony) from metric tons, gross weight, of concentrate, which was reported as follows: 2015—548; 2016—572; 2017—576; 2018—610; and 2019—764.