



2018 Minerals Yearbook

ANTIMONY [ADVANCE RELEASE]

ANTIMONY

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In 2018, 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 2018. Primary antimony metal production decreased by 47% to 331 t in 2018 (table 1). Primary antimony metal and antimony trioxide were produced by one company in Montana by upgrading imported antimony intermediate products. Secondary antimony production decreased by 7% to 4,090 t and was recovered as a component of lead alloys from recycled lead-acid batteries at secondary lead smelters (table 1).

Reported industrial consumption of primary antimony in 2018 decreased by 6% from that of the revised consumption in 2017 (tables 1, 3). About 40% of the reported primary antimony consumed in the United States was used 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 antimonial lead contained in recycled lead-acid batteries, was used in the manufacture of new batteries. Globally, end uses of antimony in 2018 were reported to be flame retardants, 50%; lead-acid batteries, 32%; plastics, 8%; and other, 10% (Roskill Information Services Ltd., 2020).

Antimony was commercially mined as a principal product or was recovered as a byproduct during the smelting of base-metal ores in 18 countries in 2018. China, the world's leading producer of primary antimony, accounted for 61% of world mine production, followed by Russia (20%) and Tajikistan (10%). Global mine production increased by 3% in 2018 compared with production in 2017 (table 8).

Production

Mine.—In 2018, 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., 2017a). In September 2017, the company reported that the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Forest Service, the Idaho Department of Lands, the Idaho Department of Environmental Quality, the Idaho Governor's Office of Energy and Mineral Resources, and the government of Valley County, ID, entered into an agreement to coordinate the Stibnite Gold project's permitting process (Midas Gold Corp., 2017b). In February 2018, the company published its mineral resource estimates for the Stibnite Gold project, which included measured and indicated resources that contain approximately 92 t of antimony and inferred resources that contain an additional 9 t (Midas Gold Corp., 2018a). In July 2018, State and Federal agencies updated the permitting schedule for the

project with an estimated March 2020 date for final Record of Decision approval (Midas Gold Corp., 2018b).

In September 2017, Renaissance Gold Inc., a Nevada-based gold and silver exploration company, began exploratory drilling of gold mineralization associated with high antimony concentrations at the Diamond Point, Spruce East, and Buffalo Canyon projects in Nevada. The company conducted gravity and magnetic surveys prior to drilling (Renaissance Gold Inc., 2017). The project was in the exploratory drilling phase in 2018 (Renaissance Gold Inc., 2018).

Primary Smelter.—The United States had only one primary antimony smelter, operated by U.S. Antimony Corp. (USAC) in Thompson Falls, MT. 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, lead alloys, and ordnance; antimony oxide as a raw material for flame retardants; and sodium antimonite for glass and other applications. The company also recycled antimony-containing products that would otherwise be discarded. In 2018, USAC reported selling about 674 t antimony as contained metal (315 t produced in the United States, 359 t in Mexico), a decrease of 21% compared with 858 t produced (602 t produced in the United States, 256 t in Mexico) in 2017. The significant decrease in U.S. antimony production in 2018 was attributed to a decrease of approximately 300 t in raw material supply from a North American supplier (U.S. Antimony Corp., 2019, p. 20, 23).

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, as well as from bearing metal, type metal, and other antimonial lead scrap. In 2018, 11 secondary lead smelters recovered 4,090 t of antimony, a 7% decrease from that in 2017 (table 1).

Consumption

Of the 135 companies to which a U.S. Geological Survey antimony consumption survey was sent, 106 companies responded. Consumption data were estimated for the remaining 29 firms. In 2018, apparent antimony consumption was 27,700 t, slightly more than that in 2017 (table 1). Reported industrial consumption of primary antimony was 6,190 t, a 6% decrease from the revised total in 2017 (tables 1, 3). The reported consumption of primary antimony in the United States in 2018 was used in three main types of products: flame retardants (antimony trioxide), 40%; metal products (lead-antimony alloys), 39%; and nonmetal products, 22% (table 3). Lead-antimony alloys were used in the production (in descending order of consumption) of lead-acid batteries, 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 a flame-retardant for coatings, fiberglass, paints, paper, plastics, rubber, and textile goods. Antimony oxide was used as a catalyst for production of polyester resins for fibers and film, as a catalyst for production of polyethylene terephthalate in plastic bottles, as a color fastener in paint, and as a phosphorescent agent in fluorescent light bulbs.

Prices

In 2018, the average S&P Global Platts Metals Week New York dealer price of antimony was \$3.88 per pound, slightly less than that in 2017. The price for antimony started to recover in 2017 after a 23% decline in the average annual price in 2015 (the lowest average annual price since 2010) but began to decrease again during 2018 (table 1).

Foreign Trade

Domestic imports for consumption of antimony in 2018 were much greater than exports, as had been the case previously. Imports for consumption of antimony oxide (by antimony content) in 2018 were 19,200 t, an increase of 8% from that in 2017. Imports for consumption of antimony metal, alloys, and waste and scrap (gross weight) in 2018 were 6,520 t, a decrease of 4% from that in 2017. China was the leading supplier to the United States, accounting for 42% of antimony metal, alloys, and waste and scrap imports and 66% of antimony oxide imports in 2018 (tables 6, 7). Exports of antimony oxide (by antimony content) in 2018 were 1,750 t, an increase of 9% from that in 2017; Japan (26%) and Mexico (19%) were the leading destinations (table 5). Exports of antimony metal, alloys, and waste and scrap (gross weight) were 506 t, a decrease of 23% from that in 2017; Canada and Mexico were the leading destinations, accounting for 36% and 34%, respectively (table 4).

World Review

In 2018, global mine production of antimony increased by 3% to 147,000 t from the revised total of 144,000 t in 2017. China (61%), Russia (20%), and Tajikistan (10%) were the leading global producers of antimony (table 8). Global mine production was 24% less than the 193,000 t produced in 2013, the historical peak for global antimony mine production, owing primarily to declines in production in China. Globally, consumption of primary and secondary antimony was estimated to be about 184,000 t in 2018, slightly less than the revised 185,000 t in 2017 (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 2018, the mine produced 2,173 t of antimony in concentrate, a 30% decrease from the 3,115 t produced in 2017, owing to production delays in the beginning of 2018 (Mandalay Resources Corp., 2019, p. 5–7).

China.—In 2018, China continued to be the dominant producer of mined antimony, accounting for 61% of global mine production (table 8). The largest and highest grade deposits were in southern China, specifically in Guangxi Zhuang Autonomous Region and Hunan and Yunnan Provinces. China

was also the leading global producer of antimony metal and oxides, the leading importer of antimony contained in ore and concentrates, and the leading exporter of antimony metal and oxides. Antimony mine production was 89,600 t in 2018, a decrease of 11% from that in 2017 and about 36% less than that produced in 2014 (table 8). In 2017, China's Government carried out environmental inspections throughout the country in an effort to curb pollution (Metal Bulletin, 2017). Environmental inspectors shut down all private-sector antimony smelters in April 2017 and required upgrades to equipment and production technology to comply with environmental standards. After a brief reopening in the fall of 2017, the smelters were shut down again in December 2017 because of failure to meet environmental standards (Argus Metals International, 2017). In 2018, China's President Xi Jinping reemphasized focus on the environment and instituted capacity cuts to the industry (Argus Metals International, 2018).

Oman.—Strategic & Precious Metals Processing LLC [a joint venture among Oman Investment Fund (40%), Tri-Star Resources Plc (40%), and DNR Industries (20%)] continued development of the Oman Antimony Roaster project in Sohar, Oman. The facility was expected to produce 20,000 metric tons per year of antimony and about 1,600 kilograms per year (reported as 50,000 troy ounces per year) of associated gold. Operations had been projected to commence in 2017 but were delayed 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 in 2019 (Oman Observer, 2018).

Outlook

Asia is expected to continue to be the leading consuming region of antimony, accounting for 60% of global consumption by 2019. Globally, flame retardants are expected to remain the principal use of antimony (Roskill Information Services Ltd., 2020).

Antimony recovered from scrap has been an important part of the total domestic antimony supply. Recovery, however, is limited to that 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 still are expected to be used in deep-cycle batteries for 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. Russia and Tajikistan will remain the two leading producers of antimony after China. The construction of the Oman antimony roaster will become important for the antimony sector in the coming years. 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)

	2014	2015	2016	2017	2018
United States:					
Smelter production:					
Primary ²	540	645	664	621	331
Secondary	4,280	3,740	3,810	4,370	4,090
Exports:					
Ore and concentrates	gross weight	41	31	12	46
Unwrought antimony ³	do.	961	720	446	643
Antimony oxide ⁴		1,670	1,760	1,330	1,600
Waste and scrap ⁵	gross weight	612	723	177	11
Imports for consumption:					
Ore and concentrates		378	308	119	61
Unwrought antimony ³	gross weight	5,640	5,320	7,110	6,810
Antimony oxide ⁴		17,600	16,700	16,100 ^r	17,800 ^r
Waste and scrap ⁵	gross weight	568	466	41	16
Apparent consumption of antimony ⁶		25,400	23,900	25,900	27,400
Reported industrial consumption, primary antimony		6,220 ^r	5,920 ^r	6,860 ^r	6,550 ^r
Stocks, primary antimony, all classes, December 31		NA	NA	NA	NA
Price, average ⁷	dollars per pound	4.25	3.27	3.35	3.98
World, mine production		175,000 ^r	150,000 ^r	148,000 ^r	144,000 ^r

^rRevised. do. Ditto. NA Not available.

¹Table includes data available through April 5, 2022. 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 and silver, zeolite production information: Thompson Falls, MT, U.S. Antimony Corp. (Accessed May 31, 2019, via <http://usantimony.com/production.htm> and http://www.irdirect.net/UAMY/sec_filings/.)

³For exports, includes unwrought antimony powders and antimony articles (Schedule B codes 8110.10.0000 and 8110.90.0000, respectively). For imports, includes unwrought antimony powders and antimony articles (Harmonized Tariff Schedule of the United States codes 8110.10.0000 and 8110.90.0000, respectively).

⁴Antimony content data were calculated by the U.S. Geological Survey.

⁵For exports, includes antimony waste and scrap (Schedule B code 8110.20.0000). For imports, includes antimony waste and scrap (Harmonized Tariff Schedule of the United States code 8110.20.0000).

⁶Primary and secondary antimony smelter production plus imports of unwrought antimony metal and antimony oxides minus exports of antimony, unwrought antimony, metal, and antimony oxides.

⁷New York dealer price for 99.65% metal, cost, insurance, and freight U.S. ports. Source: S&P Global Platts Metals Week.

TABLE 2
REPORTED INDUSTRIAL CONSUMPTION OF
PRIMARY ANTIMONY IN THE UNITED STATES,
BY CLASS OF MATERIAL¹

(Metric tons, antimony content)

Class of material consumed	2017	2018
Metal	1,690	1,770
Oxide	4,140 ^r	3,770
Other ²	718	647
Total	6,550 ^r	6,190

^rRevised.

¹Table includes data available through May 5, 2021. Data are rounded to no more than three significant; 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	2017	2018
Metal products:		
Antimonial lead	W	W
Bearing metal and bearings	8	8
Solder	14	13
Other ²	2,390	2,360
Total	2,410	2,380
Nonmetal products:		
Ammunition primers	W	W
Ceramics and glass	W	W
Pigments	W	W
Plastics	132 ^r	254
Other ³	1,190 ^r	1,080
Total	1,330 ^r	1,330
Flame retardants:		
Adhesives	50	45
Plastics	2,420	1,950
Pigments	45	--
Rubber	54	50
Textiles	238	426
Total	2,810	2,470
Grand total	6,550 ^r	6,190

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

¹Table includes data available through May 5, 2021. 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, ceramic and glass, 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	2017		2018	
	Gross weight (metric tons)	Value (thousands)	Gross weight (metric tons)	Value (thousands)
Australia	17	\$59	--	--
Austria	4	65	1	\$30
Belgium	6	26	--	--
Canada	163	497	180	576
China	47	162	9	38
Colombia	3	9	--	--
Czechia	3	11	7	23
Eswatini	1	41	1	46
France	2	134	3	203
Germany	5	27	39	125
Guatemala	--	--	3	33
Hong Kong	--	--	13	41
Italy	1	3	2	5
Korea, Republic of	2	8	7	20
Mexico	329	1,240	171	915
Netherlands	1	58	--	--
Poland	--	--	8	25
Saudi Arabia	--	--	10	30
Slovakia	--	--	7	21
Sweden	5	19	5	25
Taiwan	23	71	14	44
Thailand	3	9	11	33
Turkey	7	21	--	--
United Kingdom	14	281	6	168
Venezuela	10	122	7	83
Other	7 ^r	53 ^r	2	38
Total	653	2,920	506	2,520

^rRevised. -- Zero.

¹Table includes data available through May 5, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

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

Country or locality	2017			2018		
	Gross weight (metric tons)	Antimony content ² (metric tons)	Value (thousands)	Gross weight (metric tons)	Antimony content ² (metric tons)	Value (thousands)
Australia	34	28	\$103	57	47	\$245
Belgium	20	16	89	--	--	--
Brazil	--	--	--	54	45	293
Canada	139	115	716 ^r	91	76	441
Chile	5	4	42	25	21	290
China	47	39	155	57	47	180
Colombia	108	90	685	86	72	703
Costa Rica	36	30	279	53	44	411
France	77	64	258	96	79	324
Germany	190	158	635	182	151	885
Hong Kong	(3)	(3)	12	15	13	40
India	2	2	5	--	--	--
Indonesia	59	49	346	17	14	109
Israel	20	17	155	--	--	--
Italy	12	10	87	30	25	241
Japan	438	364	2,590	551	458	3,420
Korea, Republic of	90	75	314	50	42	170
Malaysia	25	21	74	46	38	161
Mexico	292	242	1,190	404	335	3,110
Netherlands	10	8	27	--	--	--
Saudi Arabia	--	--	--	1	1	3
Singapore	23	19	59	39	32	145
South Africa	13	11	28	8	7	32
Switzerland	3	2	11	--	--	--
Taiwan	121	100	299	28	24	68
Thailand	10	8	63	31	26	106
Trinidad and Tobago	49	41	127	24	20	63
Turkey	2	2	17	34	28	258
United Kingdom	69	57	378	117	97	407
Venezuela	37	31	381	8	7	90
Total	1,930	1,600	9,130	2,110	1,750	12,200

^rRevised. -- Zero.

¹Table includes data available through May 5, 2021. 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.

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	2017			2018		
	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	(3)	(3)	\$9	1	1	\$11
Bosnia and Herzegovina	6	5	35	--	--	--
China	(3)	(3)	8	90	62	540
Germany	3	2	18	--	--	--
India	(3)	(3)	3	--	--	--
Italy	54	41	420	43	34	322
Japan	(3)	(3)	3	--	--	--
Mexico	12	12	44	(3)	(3)	58
Total	75	61	540	134	96	931
Antimony oxide:						
Belgium	2,150	1,780	16,500	2,070	1,720	16,500
Bolivia	1,300	1,080	8,630	1,300	1,080	9,240
Brazil	--	--	--	23	19	81
Canada	19	16	129	8	7	63
China	13,800	11,400	81,300	15,400	12,800	93,900
Cocos Islands	10	8	30	--	--	--
France	461	383	3,610	367	305	3,010
Germany	--	--	--	(3)	(3)	5
Hong Kong	--	--	--	60	50	436
India	6	5	47	17	14	133
Italy	2	2	15	--	--	--
Japan	526 ^r	437 ^r	2,760 ^r	740	614	4,160
Korea, Republic of	32	27	171	63	53	332
Mexico	911	756	8,510	1,270	1,050	8,320
Taiwan	20	17	128	75	62	515
Thailand	2,280	1,890	6,850	1,780	1,480	5,340
Turkey	--	--	--	2	2	22
United Kingdom	8	6	38	--	--	--
Total	21,500	17,800 ^r	129,000	23,100	19,200	142,000

^rRevised. -- Zero.

¹Table includes data available through May 5, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²Antimony content of ore and concentrate 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 7
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY METAL, ALLOYS,
AND WASTE AND SCRAP, BY COUNTRY OR LOCALITY¹

Country or locality	2017		2018	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Bolivia	144	\$1,050	177	\$1,350
Brazil	--	--	(2)	2
Burma	--	--	133	1,050
Canada	8	218	(2)	93
China	3,600	28,500	2,740	22,300
France	--	--	(2)	4
Germany	(2)	59	(2)	13
Hong Kong	40	308	40	315
India	1,390	10,600	1,640	13,600
Japan	123	1,520 [†]	193	1,900
Korea, Republic of	230	1,840	19	148
Mexico	133	976	44	249
Singapore	--	--	24	204
Sweden	20	154	39	331
Switzerland	--	--	25	189
Tajikistan	--	--	10	85
Thailand	61	502	391	3,170
Turkey	40	290	40	312
United Kingdom	431	5,010	349	5,220
Vietnam	617	4,630	663	5,310
Total	6,830	55,700 [†]	6,520	55,800

[†]Revised. -- Zero.

¹Table includes data available through May 5, 2021. Data 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 8
ANTIMONY: WORLD MINE PRODUCTION, BY COUNTRY OR LOCALITY¹

(Metric tons, antimony content, unless otherwise specified)

Country or locality	2014	2015	2016	2017	2018
Australia ²	3,639	3,712	3,598	3,115	2,173
Bolivia	4,186	3,843	2,669	2,881 ^r	3,110
Burma	3,600 ^e	3,000 ^e	2,780 ^r	3,060 ^r	2,641
Canada ²	5	1	-- ^r	1 ^r	1
China	140,400 ^r	120,700	107,500 ^r	100,000 ^{r,e}	89,600
Ecuador ^e	6	19	6	53	50
Guatemala	--	--	25	25 ^e	25 ^e
Honduras ^e	94	21	3	3	12
Iran ^e	220	330	500	300	600
Kazakhstan, concentrate	481	500 ^e	573	700 ^e	300 ^e
Kyrgyzstan ^e	790	650	1,000	750	370
Laos	620	1,166 ^r	242	320 ^r	300 ^e
Mexico	270 ^e	90 ^e	116	243	260 ^e
Pakistan	127	114 ^r	21 ^r	15 ^r	28
Russia	8,000 ^e	6,300 ^r	11,900	14,400	30,000 ^e
South Africa, concentrate ²	815	302 ^r	350 ^r	--	--
Tajikistan, ore	8,060 ^e	7,000 ^e	14,000 ^e	14,000 ^e	15,240
Turkey, concentrate ^e	3,070	1,950	2,520 ^r	2,500 ^r	2,400
Vietnam ^{e,3}	1,100	220	230 ^r	230 ^r	240
Total	175,000 ^r	150,000 ^r	148,000 ^r	144,000 ^r	147,000

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through October 15, 2019. 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 ore and concentrates, lead concentrates, and lead-zinc concentrates.

³Figures were converted to antimony content (using a conversion factor of 40% antimony) from metric tons gross weight of concentrate, which was reported as follows: 2014—2,745; 2015—548; 2016—572; 2017—576; 2018—588.