ANTIMONY

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Over one-half of the primary antimony used in the United States during 2001 went into flame-retardants; most of the remainder was used by the transportation, chemical, ceramics, and glass industries. Secondary antimony, which was derived almost entirely from recycled lead-acid batteries, was used in the manufacture of new batteries. The price of antimony, on average, was just slightly below that of 2000. World production rose by 31%.

The nation's only antimony producing mine closed in 2001 without any mine production during the year. Most primary antimony metal and oxide were produced domestically from raw material imports. Primary smelter production declined 14%. Most domestic smelting consisted of upgrading imported antimony trioxide to a higher purity. Primary antimony metal and oxide, with a total value of $38 million, were produced by three companies operating three plants—one in New Jersey, one in Montana, and one in Texas. Secondary antimony was recovered from scrapped lead-acid batteries at secondary lead smelters. The amount of antimony used by battery manufacturers is substantially lower than it was 10 years ago because of changing materials requirements for batteries. Industry stocks of antimony declined by 27% during 2001 as consumers used up stocks awaiting possible lower prices.

Antimony was mined as a principal product or was a byproduct of the smelting of base metal ores in 15 countries. Nearly all world primary antimony was mined in China (89%), Russia (3%), South Africa (3%), and Bolivia (1%) (table 9). World antimony reserves were estimated to be 2.1 million metric tons (Carlin, 2002).

Legislation and Government Programs

Sales of antimony by the Defense National Stockpile Center (DNSC) proceeded for the ninth consecutive year. Sales were conducted on a negotiated bid basis and were held bimonthly on the first Thursday of the month. There was no maximum limit to the quantity for which a company could submit a bid, but the minimum quantity was 18,144 kilograms (40,000 pounds). The materials offered were grade A and grade B ingots as well as cake and broken pieces. The antimony sulfide ore inventory has been depleted. In calendar year 2001, 4,621 metric tons (t) of antimony was sold. At calendar yearend 2001, the antimony inventory held by DNSC was 4,192 t. Antimony was stockpiled in Government warehouses in three depots, with Somerville, NJ, holding the largest amount (Defense Logistics Agency, 2001).

Production

Mine.—In the Coeur d'Alene District of Idaho, Sunshine Mining Co., the Nation's sole domestic antimony producer, closed in early 2001. There was no production during the year at the mine prior to its closure.

Smelter.—The domestic producers of primary antimony metal and oxide products were Amspec Chemical Corp., Gloucester City, NJ; Laurel Industries Inc., La Porte, TX; and U.S. Antimony Corp., Thompson Falls, MT. All replied to the U.S. Geological Survey (USGS) request for production data.

Secondary.—Old scrap, mostly lead battery plates, was the predominant source of the secondary antimony output. New scrap, mostly in the form of drosses and residues from various sources, supplied the remainder. Antimonial lead was the main market for scrap antimony.

Consumption

Consumption of primary antimony in 2001 was 21% lower than that in 2000 due in large part to the general economic downturn during the year. Flame-retardants, especially for plastics, accounted for most of the decrease. Lead-antimony alloys were used in automotive vehicle batteries, ammunition, corrosion-resistant pumps and pipes, tank linings, roofing sheet solder, cable sheaths, and antifriction bearings. Antimony trioxide, often dissolved in an organic solvent, was used to enhance the flame-retardant properties of rubber and textiles as well as plastics and other combustibles. Antimony was also used as a decolorizing and refining agent in some forms of glass such as optical glass. Of the 127 companies to which a USGS consumption survey was sent, 72 firms responded. Consumption data were estimated for the remaining 55 firms. The USGS estimates that actual consumption may be considerably higher than reported.

Prices

In 2001, antimony prices varied within a narrow range. The New York dealer antimony metal price, published by Platts Metals Week, started the year at $0.68 to $0.73 per pound and finished the year at $0.62 to $0.67 per pound. This price averaged $0.65 per pound for the year compared with $0.66 per pound in 2000. American Metal Market and Metal Bulletin ceased publishing the price for other forms of antimony such as high tint antimony trioxide, clean antimony sulfide concentrate, and lump antimony sulfide.

Trade

Imports of antimony were, as is usually the case, much larger than exports—about five-fold larger in 2001 (tables 5-8). Imports declined about 9%, with the category of antimony ore and concentrate registering the largest decline. China re-

emerged as the largest supplier of antimony ore and concentrate. China remained the dominant provider of antimony metal and antimony oxide.

Exports of metal alloys, waste and scrap increased substantially. However, the increase is not believed to be the beginning of a trend.

World Review

Australia.—Hillgrove Gold Ltd. announced plans to become an integrated producer of antimony trioxide (Platts Metals Week, 2001b).

Burma.—Myanmar Mayflower Mining Co. was reported to be active with a capacity of 4,500 metric tons per year of antimony (Platts Metals Week, 2001b).

China.—Key producers reduced their shipments during the year. All mining in Guangxi Province was suspended for the year following a fatal accident at Longquan Mining Co. in July, estimated to have killed 80 workers. The Guangxi region accounts for 80% of the world's antimony supply (American Metal Market, 2001). Guangxi Province is adjacent to Vietnam, and reports indicated that considerable smuggling in Guangxi through Vietnam avoided official export quotas. Production in the province was less affected by low prices than were other producers because resources are abundant and output costs are low. A good example was the situation at the Guanglong Antimony Refinery in Guangxi, which was reported to have produced 2,000 t of ingot in 2001, about the same as in 2000. According to the China National Nonferrous Metals Industry's information center, the country's antimony production capacity was 140,000 t annually.

Eight Chinese antimony operations were granted export rights for 2001. In March, the Government gave antimony export rights for the first half of the year to seven of those operations: Hsikwangshan Mining Administration, Huachang Antimony, Xiangxi Gold Mine, Liuzhou Huaxi Group, Huandong Metals Material Plant, Yunnan Muli Antimony, and Guizhou Dongfeng Enterprise. However, only Zhazixi Antimony was issued export rights for the last half of 2001. The Government reportedly only issues supply rights to operations that can meet state requirements for capacity, environmental, and smelting standards as well as product quality (Platts Metals Week, 2001a).

Two branches of Liuzhou-based China Tin Group Co. (Huaxi) in the Guangxi Autonomous Region increased their production plans for antimony in 2002. The Hechi Smelter was expected to produce 16,000 t of lead and antimony combined in 2002, up from a combined 15,000 t in 2001. The Jinchengjiang smelter was expected to produce a total of 15,000 t of lead and antimony in 2002, an 80% increase over 2001 (Antiake, 2001).

South Africa.—Consolidated Murchison Ltd., South Africa's sole antimony producer, announced plans to expand its output despite current low prices that have caused other Western producers to curtail operations. With gold as a byproduct of its antimony mining, Murchison has been able to withstand the low prices. Murchison is developing its Beta shaft to replace depleted reserves and is committed to maintaining reserves equivalent to 6 years of output. That goal is likely to remain intact even though reserves at the mine's Athens shaft are declining. Athens has a 4-year life expectancy at its current ore production rate of 10,000 metric tons per month (t/mo). The Athens shortfall will be compensated by ore from the Beta shaft, and Murchison believes Athens could also be extended. The Athens and Beta shafts are expected to produce ore at a rate of 10,000 t/mo each, during 2002, and the Monarch shaft is expected to match their combined output. Moreover, if underground exploration, particularly at deeper levels, further adds new reserves, the company could find itself with three producing shafts, each with a capacity of 20,000 t/mo. Processing this potential mine output would call for an expansion of the treatment plant, which at present can process 50,000 t/mo of ore if it operates 7 days a week. Murchison delivers all of its production of antimony sulfide concentrate to an onsite oxide plant, which converts sulfide concentrate into crude antimony oxide for export to refineries in Mexico and the United States (Platts Metals Week, 2001b).

Outlook

Although, domestic antimony consumption, especially for important uses such as flame retardants, experienced a decline in 2001, demand is likely to remain strong in the near-term future. A few new antimony mines have been developed around the world in recent years, but continuing low antimony prices will probably prevent them from coming fully onstream any time soon. At its current rate of sales, the DNSC will be selling antimony for only a few more years.

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TABLE 1
SALIENT ANTIMONY STATISTICS 1/

(Metric tons of antimony content unless otherwise specified)

	1997	1998	1999	2000	2001
United States:					
Production:					
Primary:					
Mine (recoverable antimony)	356 2/	489 2/	450 2/	W	--
Smelter	26,400	24,000	23,800	20,900	18,000 e/
Secondary	7,550	7,710	8,220	7,920	6,660
Exports of metal, alloys, waste and scrap (gross weight)	652	898	473	1,080	1,730
Exports of antimony oxide 3/	3,230	3,270	3,190	6,040 r/	5,880
Imports for consumption	39,300	34,600	36,800	41,600 r/	37,900
Reported industrial consumption, primary antimony	13,500	12,700	13,500	16,400 r/	12,900
Stocks, primary antimony, all classes, December 31	10,800	10,600	10,900	6,780 r/	4,970
Price, average, cents per pound 4/	97.8	71.8	62.7	65.5	64.7
World, mine production	154,000 r/	116,000 r/	107,000 r/	115,000 r/	151,000 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/ Data from 10-K reports.
3/ Antimony content is calculated by the U.S. Geological Survey.
4/ New York dealer price for 99.5% to 99.6% metal, c.i.f. 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
2000 r/	1,800	14,500	96	16,400
2001	1,600	11,300	77	12,900

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	2000	2001
Metal products:		
Antimonial lead	1,040 r/	1,050
Bearing metal and bearings	42	52
Solder	135 r/	78
Other 2/	1,760 r/	1,590
Total	2,980 r/	2,770
Nonmetal products:		
Ammunition primers	26	W
Ceramics and glass	1,020 r/	346
Pigments	620	653
Plastics	1,330 r/	1,050
Other 3/	495 r/	544
Total	3,490 r/	2,590
Flame-retardants:		
Adhesives	332	W
Plastics	8,940 r/	6,210
Rubber	402 r/	242
Textiles	221	255
Other 4/	10 r/	880
Total	9,910 r/	7,580
Grand total	16,400 r/	12,900

r/ Revised. 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 was 7,920 in 2000 and 6,660 in 2001.

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

(Metric tons of antimony content)

Type of material	2000 r/	2001
Metal	2,540	647
Oxide	3,970	4,060
Other 2/	270	255
Total	6,780	4,970

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	2000 Gross weight (metric tons)	2000 Value (thousands)	2001 Gross weight (metric tons)	2001 Value (thousands)
Canada	274	$525	155	$279
Chile	6	11 r/	--	--
Colombia	10	16	--	--
El Salvador	10	17	--	--
Japan	10	119	--	--
Korea, Republic of	40	48	--	--
Mexico	721	1,630	1,540	2,400
Switzerland	1	21	6	78
Thailand	2	72	--	--
Other	4	428 r/	27	323
Total	1,080	2,890 r/	1,730	3,080

r/ Revised. -- Zero.
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/

Country	2000 Gross weight (metric tons)	2000 Antimony content 2/ (metric tons)	2000 Value (thousands)	2001 Gross weight (metric tons)	2001 Antimony content 2/ (metric tons)	2001 Value (thousands)
Argentina	115	95	$302	83	69	$272
Australia	128	106	254	72	60	145
Belgium	13	11	40	19	16	26
Brazil	98	81	386	277	230	727
Canada	1,730	1,440	3,930	1,380	1,140	3,240
China	134	111	264	11	9	112
Colombia	118	98	214	67	56	133
France	50	42	130	28	23	76
Germany	102	85	438	68	56	178
Indonesia	--	--	--	6	5	13
Italy	--	--	--	5	4	20
Japan	130	108	509	41	34	214
Korea, Republic of	55	46	135	15	12	38
Mexico	3,820	3,170	5,680	4,360	3,620	6,930
Singapore	77	64	158	74	61	225
Spain	48	40	181	56	46	237
Taiwan	29	24	78	20	17	53
Turkey	62	51	189	83	69	239
United Kingdom	402	334	834	194	161	700
Other	157 r/	130 r/	479 r/	242	199	715
Total	7,280	6,040	14,200	7,090	5,880	14,300

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.

Source: U.S. Census Bureau.

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

Country	2000 Gross weight (metric tons)	2000 Antimony content 2/ (metric tons)	2000 Value (thousands)	2001 Gross weight (metric tons)	2001 Antimony content 2/ (metric tons)	2001 Value (thousands)
Antimony ore and concentrate:						
Australia	1,750	1,150	$751	474	314	$217
Austria	140	98	392	368	259	1,210
Bolivia	220	144	101	--	--	--
China	1,000	1,000	1,550	1,540	1,530	1,920
France	6	3	18	--	--	--
Hong Kong	62	60	65	--	--	--
Mexico	937	903	1,170	--	--	--
Russia	499	315	193	--	--	--
Thailand	20	16	12	225	185	96
Total	4,630	3,690	4,250	2,610	2,290	3,440
Antimony oxide:						
Belgium	3,690	3,070	6,560	3,770	3,130	6,450
Bolivia 3/	1,150	957	1,220	40	33	49
China	13,100	10,900	17,300	11,000	9,150	14,600
France	66	54	230	14	11	61
Germany	47	39	802	24	20	362
Guatemala	77	64	132	--	--	--
Hong Kong	453	376	622	790	656	966
Japan	33	27	274	69	57	429
Kyrgyzstan	224	186	247	--	--	--
Mexico	5,530	4,590	7,660	8,080	6,710	15,600
South Africa	3,830	3,180	999	3,750	3,110	900
Taiwan	29	24	53	41	34	63
Thailand	60	50	11	--	--	--
United Kingdom	176	146	298	60	50	65
Total	28,500	23,700	36,500	27,700	23,000	39,500

-- 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/ Antimony oxide from this country believed to be "crude" and would probably be shipped to refineries for upgrading.

Source: U.S. Census Bureau.

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

Country	2000 Quantity (metric tons)	2000 Value (thousands)	2001 Quantity (metric tons)	2001 Value (thousands)
Bolivia	100	$145	39	$41
Canada	62	274	69	253
China	12,500	16,400	9,730	11,600
Germany	(2/)	114	(2/)	40
Hong Kong	206	222	1,780	2,390
Japan	14	498	15	486
Kyrgyzstan	41	53	41	58
Mexico	801	555	667	447
Peru	210	275	123	123
Singapore	300	316	--	--
United Kingdom	--	--	(2/)	38
Other	11	271	149	181
Total	14,200	19,100	12,600	15,700

-- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

Source: U.S. Census Bureau.

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

(Metric tons)

Country	1997	1998	1999	2000	2001 e/
Australia 3/	1,900	1,800	1,679 r/	1,511 r/	1,500
Bolivia	5,999	4,735	2,790	1,907 r/	2,000
Canada 4/	529	428	357	364	360
China e/	131,000	97,400	89,600	99,300 r/	135,000
Guatemala	1,020 r/	400 r/	-- r/	-- r/	--
Honduras e/	300 5/	--	--	--	--
Kyrgyzstan e/	1,200 5/	150	100	150	150
Mexico 6/	849 r/	338 r/	126 r/	39 r/	40
Morocco e/ 4/	160	160	250 r/	-- r/	--
Peru (refined)	242 r/	364 r/	255 r/	461 r/	460
Russia (recoverable) e/	6,000	4,000	4,000	4,500	4,500
South Africa 4/	3,415	4,243	5,278	4,104 r/	3,900
Tajikistan e/	1,200 5/	1,500	1,800	2,000	2,500
Thailand (content of ore and concentrate)	53	199	59	84	90
Turkey e/	31 5/	30	180	360	350
United States	356	489	450	W	--
Total	154,000 r/	116,000 r/	107,000 r/	115,000 r/	151,000

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data; not included in "Total." -- Zero.

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

2/ Antimony content of ore unless otherwise indicated. Table includes data available through May 27, 2002.

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

4/ Antimony content of concentrate.

5/ Reported figure.

6/ Previously published data for Mexico included antimony mined in other countries and smelted in Mexico. The prior data were, in metric tons, as follows: 1997--1,909; 1998--1,301; 1999--273; 2000--52; 2001--50 (estimated).