USGS
science for a changing world

Mineral Industry Surveys

For information, contact:
John Jorgenson, Bismuth Commodity Specialist
U.S. Geological Survey
989 National Center
Reston, VA 20192
Telephone: (703) 648-4912, Fax: (703) 648-7757
E-mail: jjorgenson@usgs.gov

Carolyn F. Crews (Data)
Telephone: (703) 648-7949
Fax: (703) 648-7975
E-mail: ccrews@usgs.gov

Internet: http://minerals.usgs.gov/minerals

BISMUTH IN THE FIRST QUARTER 2003

Total bismuth consumption in the United States was 431,000 kilograms during the first quarter of 2003, down from the average quarterly consumption of 2002 (table 1).

Comparisons of consumption by category indicate that the levels of use have changed somewhat between each category on a percent basis comparing the first quarter of 2003 to the annual figures for 2002 (table 2). Whereas the percentage use in chemicals and pharmaceuticals has remained constant, the use in bismuth alloys has dropped off by the same percentage amount that the use in metallurgical additives has increased. Total estimated consumption for first quarter of 2003 decreased when compared with that of the first quarter of 2002.

The New York dealer price for bismuth as published in Platts Metals Week began the quarter at a price range of $2.70**C**$3.10 per pound. The price dipped slightly in mid-February, but rose again to end the quarter at the same range of $2.70**C**$3.10 per pound.

Reserves.—Several bismuth-containing deposits are in various stages of study. Roscoe Postle Associates Inc. (Canada) has prepared an independent technical report on the Bonfim gold/tungsten project in Brazil's Rio Grande do Norte State for Verena Minerals Corp. (Canada). The report, based on assays of gold, tungsten, and bismuth, recommends additional exploration, including diamond drilling, geologic mapping, and continuous channel sampling of previous mining areas (Verena Minerals Corporation, 2003§[1]).

Fortune Minerals Ltd. (Canada) announced encouraging results from the first hole of a planned 35-hole drill program designed to expand resources at its recently discovered NICO cobalt-gold-bismuth deposit near Yellowknife, Northwest Territories, Canada (Fortune Minerals Ltd., 2003). An earlier pre-feasibility assessment generated attractive returns based on underground bulk mining with additional mill feed obtained from small open pits (Fortune Minerals Ltd., 2003§[1]).

Tiberon Minerals Ltd. (Canada) has begun a metallurgical test program to enhance bismuth recovery from its 70%-owned Nui Phao tungsten polymetallic deposit in Vietnam. The results of a pre-feasibility study were encouraging and, in the bankable feasibility stage, testing is underway to lower bismuth losses from the sulfide stream estimated at 2,100 metric tons (t) of metal per year (Tiberon Minerals Ltd., 2003a§). This phase of metallurgical testing is targeted for completion in 2003 for a mine anticipated to produce 10,000 t of polymetallic ore daily (Tiberon Minerals Ltd., 2003b§).

Uses.—Scientists at Russia's Institute of High Energy Physics have reportedly completed a second phase of experiments designed to create a new reactor fueled by lead and bismuth rather than uranium and plutonium. The potential for commercial development is not yet known (Mining Journal, 2003).

The U.S. Environmental Protection Agency in coordination with industry continues to prepare life-cycle studies of lead-free solders in anticipation of pending restrictions on lead-containing solders in Europe and Japan. Industry experts believe U.S. industry must respond to these impending restrictions in a competitive and timely manner, identifying viable alternatives to traditional lead-tin solders or risk losing as much as $240 billion in revenues over a 3-year period. One of the lead-free solder alternatives being considered contains 3.3% bismuth (U.S. Environmental Protection Agency, 2002§).

In a parallel study, begun in 2002 by Japan, the Republic of Korea, and the European Union, researchers continue to develop system solutions for advanced and sustainable lead-free soldering. The Next Generation Environment-Friendly Soldering Technology (EFSOT) study has been initiated to investigate lead-free soldering technologies with respect to providing analyses of biological impact, environmental effects, and recycling criteria. The European portion of this study is planned for completion in September 2005 (EFSOT, 2003§).

Production.—Chinese production of bismuth plummeted 36% to 700 t in the first quarter of 2003. Of this output, about 480 t was exported and the balance was consumed domestically.

Industry sources have estimated that about one-third of China's bismuth smelters have closed due to high operating

[1]References that include a section mark (§) are found in the Internet References Cited Section.

costs and low international prices. It is anticipated that over half of the production capacity lost will not come back on stream.

Hunan Shizhyuan Nonferrous Metals Co., Ltd. (China) plans to maintain bismuth production at 600 t in 2003, with two-thirds of the total output for export (Platts Metals Week, 2003). Bismuth annual metal production capacities for China's major producers are: Hunan Shizhyuan, 700 t; The Jinwang Group, 400 t; and Jiangxi Rare Metals & Rare Earth Tungsten Group Corp., 300 t (Metal Bulletin, 2003b).

Lower ore grades and other production problems have limited Latin American production (Metal Bulletin, 2003a). These problems, along with the reduction of Chinese output, may portend price recovery.

Consumption.—Japan appears to be continuing its trend toward increased consumption of bismuth with imports of 115 t during the first two months of 2003, compared to an average import rate for the past ten years of 300 t annually. This additional consumption may reflect Japanese leadership in the replacement of lead in copper alloys and in solders (Metal-Pages, 2003§).

References Cited

Fortune Minerals Ltd., 2003 (April 22), Fortune Minerals extends NICO high-grade core at depth: London, Ontario, Canada, Fortune Minerals Ltd. news release, 2 p.

Metal Bulletin, 2003a, Bismuth remains stable, as indium pauses for breath: Metal Bulletin, no. 8744, January 30, p. 6.

Metal Bulletin, 2003b, Low prices dog Chinese bismuth producers: Metal Bulletin, no. 8767, April 24, p. 8.

Mining Journal, 2003, Minor metals in February: Mining Journal, v. 340, no. 8725, February 28, p. 151.

Platts Metals Week, 2003, Shizhuyuan bismuth output at 600 mt: Platts Metals Week, v. 74, no. 8, February 24, p. 5.

Internet References Cited

EFSOT, 2003 (February 17), EFSOT – Next Generation Environment-Friendly Soldering Technology website, Berlin, Germany, accessed April 16, 2003, at URL http://www.efsot-europe.info.

Fortune Minerals Ltd., 2003 (January 23), Fortune Minerals announces improved economics for the NICO deposit using updated metal prices: London, Ontario, Canada, Fortune Minerals Ltd. news release, accessed January 31, 2003, at URL http:// www.fortuneminerals.com.

Metal-Pages, 2003, (April 15), Bismuth cruising at higher altitude, accessed April 16, 2003, at URL http://www.metal-pages.com.

Tiberon Minerals Ltd., 2003a (February 26), Tiberon begins bismuth metallurgical study: Calgary, Alberta, Canada, Tiberon Minerals Ltd. news release, accessed May 5, 2003, at URL http://www.tiberon.com.

Tiberon Minerals Ltd., 2003b (January 15), Tiberon releases Nui Phao prefeasibility study results: Calgary, Alberta, Canada, Tiberon Minerals Ltd. news release, accessed January 31, 2003, at URL http://www.tiberon.com.

Verena Minerals Corporation, 2003 (March 6), Roscoe Postle completes independent technical report on Bonfim gold/tungsten project: Toronto, Ontario, Canada, Verena Minerals Corporation news release, accessed May 5, 2003, at URL http://www.verena.com.

U.S. Environmental Protection Agency, 2002 (June), Design for the Environment, Lead-Free Solder Partnership, Assessing life-cycle impacts in the electronics industry, accessed April 10, 2003, at URL http://www.epa.gov/dfe/pubs/solder/solderfact.pdf.

TABLE 1
SALIENT BISMUTH STATISTICS[1]

(Kilograms unless otherwise specified)

	2002	2003 First quarter
Consumption	2,230,000	431,000 [e]
Exports[2]	131,000	24,500
Imports for consumption	1,930,000	499,000
Price per pound, dealer, end of period	3.20	2.70
Stocks, end of period, consumer	88,800	133,000 [e]

[e]Estimated.
[1]Data are rounded to no more than three significant digits.
[2]Comprises bismuth metal and the bismuth content of alloys and waste and scrap.

TABLE 2
BISMUTH METAL CONSUMED IN THE UNITED STATES, BY USE[1]

(Kilograms)

Use	2002	2003[e] First quarter
Chemicals[2]	814,000	163,000
Bismuth alloys	985,000	160,000
Metallurgical additives	383,000	103,000
Other	45,300	5,430
Total	2,230,000	431,000

[e]Estimated.
[1]Data are rounded to no more than three significant digits, may not add to totals shown.
[2]Includes industrial and laboratory chemicals, cosmetics, and pharmaceuticals.

TABLE 3

U.S. EXPORTS OF BISMUTH METAL, ALLOYS AND WASTE AND SCRAP, BY COUNTRY[1]

(Kilograms)

	2002			2003			
Country	Year	December	Fourth quarter	January	February	March	First quarter
Belgium	759	--	--	--	10,500	--	10,500
Brazil	999	--	--	--	999	--	999
Canada	47,700	10,300	15,900	376	109	985	1,470
China	3,000	--	1,560	--	--	--	--
Costa Rica	--	--	--	492	--	--	492
Dominican Republic	500	158	158	--	162	108	270
Egypt	--	--	--	340	--	--	340
Germany	6	--	--	--	--	--	--
Hong Kong	332	--	43	35	--	26	61
Hungary	--	--	--	--	136	--	136
Israel	167	--	--	--	--	--	--
Japan	66	--	--	--	--	--	--
Korea, Republic of	4	--	--	--	--	--	--
Mayaysia	9,520	--	2,800	--	--	--	--
Mexico	34,800	2,520	2,850	--	1,500	6,140	7,640
Netherlands	5,990	--	--	--	--	--	--
Peru	4,000	--	--	--	--	--	--
Russia	2,070	531	531	--	--	1,510	1,510
Singapore	150	--	--	--	--	--	--
United Arab Emirates	58	58	58	--	--	--	--
United Kingdom	20,600	847	20,200	--	1,100	6	1,110
Total	131,000	14,400	44,100	1,240	14,500	8,770	24,500

-- Zero..

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

Source: U.S. Census Bureau.

TABLE 4

U.S. IMPORTS FOR CONSUMPTION OF BISMUTH METAL, BY COUNTRY[1]

(Kilograms, metal content)

	2002			2003			
Country	Year	December	Fourth quarter	January	February	March	First quarter
Bahamas, The	684	--	294	219	--	--	219
Belgium	724,000	90,200	235,000	54,700	36,100	51,900	143,000
Canada	49,800	2,610	6,230	2,040	1,380	9,200	12,600
China	393,000	20,400	68,700	92,000	40,700	20,200	153,000
Germany	835	--	--	46	36	16,600	16,600
Hong Kong	58,500	--	19,600	--	--	--	--
Italy	208	--	--	200	--	--	200
Japan	3,150	--	780	--	--	--	--
Mexico	518,000	56,600	149,000	38,000	72,400	18,000	128,000
Netherlands	102	20	20	3	--	12	15
Peru	19,500	--	--	--	--	--	--
United Kingdom	163,000	18,100	36,900	16,100	10,900	18,700	45,600
Total	1,930,000	188,000	516,000	203,000	161,000	135,000	499,000

-- Zero.

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

Source: U.S. Census Bureau.