



Significant events affecting bismuth prices since 1958

1959-64	Prices set by producers
1970-74	Major increase in demand for bismuth as a metallurgical additive to aluminum, iron, and steel caused price to reach an all-time high
1975-81	World production grew faster than consumption
1980	Bolivia ceased production, ASARCO Incorporated suspended producer price
1980-82	Economic recessions
1984	Bismuth consumption increased, especially in the United States and Japan
1988	Miners' strikes cut off all shipments from Peru for several months
1989-90	U.S. consumption decreased, especially for metallurgical additives and chemicals; this, combined with increased imports, large world stocks, impending releases from Government stockpiles, and dealer reaction, caused the price to drop, in spite of bismuth's increasing potential for replacing lead in environmentally sensitive applications
1990	U.S. Department of Defense (DOD), having lowered the goal for bismuth in the National Defense Stockpile (NDS) from 990 to 480 metric tons, began selling the excess bismuth
1992	DOD announced plans to sell all bismuth remaining in the NDS within a 10-year period
1996	Amendments to 1986 Safe Drinking Water Act; U.S. Fish and Wildlife Service gave final approval to Bi97%-Sn shot for waterfowl hunting; Asarco announced impending closure of the Omaha, NE, plant (the sole producer of primary bismuth in the United States)
1997	Omaha plant closed in June, the NDS exhausted its supply of bismuth in November
1998-99	Low prices reduced bismuth to coproduct status with gold, copper, and tungsten at the Tasna Mine in Bolivia and delayed reopening

Demand for bismuth in the United States was small prior to World War II. The chief use was for medicines; bismuth compounds were used to treat such conditions as digestive disorders, venereal diseases, and burns. Minor amounts of bismuth were consumed in fusible alloys for fire sprinkler systems and fuse wire. Bismuth has always been produced mainly as a byproduct of lead refining. The price, which was controlled by the major producers until the mid-1960's, usually reflected the cost of recovery. In World War II, bismuth, considered to be a strategic and critical material, was used for solders, fusible alloys, and medications and in atomic research. To stabilize the market, the producers set the price at \$1.25 per pound during the war and at \$2.25 per pound from 1950 until 1964 (U.S. Bureau of Mines, 1966).

In the early 1970's, demand for bismuth as a metallurgical additive to aluminum, iron, and steel increased rapidly. This, combined with increased consumption in other categories, caused the producer price to increase dramatically in 1974 to a peak of \$12.00 per pound in June. By August, the price dropped back to \$9.00 per pound and remained there through the rest of the year. For the complete year 1974, the 21% decrease in domestic demand affected all categories of consumption (Wyche, 1976).

This was followed by 7-year decline in prices owing to increased world production with little growth in consumption. Asarco, the only domestic producer, suspended its list price on October 1, 1980. Until then, the annual average price reported was the Asarco price for 99.99%-pure bismuth. After 1980, the New York dealer price was reported (Carlin, 1981).

In Bolivia, the only country where bismuth was mined as a principal product, it was not possible to make a profit at the lower prices, and production virtually ceased in 1980 (Metal Bulletin, 1982). During the recessions of 1980 and 1981-82, declining domestic consumption and an excess of stocks held by world producers caused the price to drop to a low of \$1.30 per pound in January 1983.

In 1984, the price began to climb as consumption increased worldwide, especially in the United States and Japan. In 1988, a series of miners' strikes in Peru, one of the largest producers of bismuth in the world, cut off all shipments for several months (King, 1988; Mining Journal, 1988). This led to the price reaching nearly \$7 per pound, even though domestic consumers were able to compensate for this loss by obtaining bismuth elsewhere.

In late 1989, the price of bismuth began to drop owing to lower consumption, increased imports, large world stocks, and dealer reaction to the plan to sell 510 tons of the bismuth in the NDS within 10 years (American Metal Market, 1990). The Defense Logistics Agency (DLA) sold more than 59 tons from the NDS in 1990 and more than 57 tons in 1991. U.S. imports also increased in 1989 and 1990, which further increased the supply of bismuth and helped keep the price near \$3.00 per pound. In 1992, the DLA released 91 tons of bismuth from the NDS and announced a new plan to release

the remaining 740 tons during a period of 10 years (Jasinski, 1993).

In the early 1990's, research began on the evaluation of bismuth as a nontoxic replacement for lead in such uses as ceramic glazes, fishing sinkers, food-processing equipment (Murray, 1993), free-machining brasses for plumbing applications (Feder, 1991), lubricating greases, and shot for waterfowl hunting (Lowry, 1993). During the middle 1990's, growth in these areas remained slow in spite of direct or indirect Government backing of bismuth for lead replacement. The 1996 Amendments to the 1986 Safe Drinking Water Act require lead-free plumbing for new installations and repairs of facilities providing potable water by August 1998. Also, the U.S. Fish and Wildlife service gave final approval for the use of bismuth-tin shot for waterfowl hunting (U.S. Fish and Wildlife Service, 1997). In 1997, after extended negotiations with local and Nebraska State authorities on environmental remediation, Asarco closed its Omaha smelter, the only site of domestic bismuth production. Also in 1997, the DLA sold all the bismuth remaining in the NDS (American Metal Market, 1997). Thus, the United States became completely dependent on imports for its supply of primary bismuth.

At the end of the decade, total demand increased moderately as consumption for new uses, especially hunting and plumbing applications, began to increase. Supply remained adequate and prices remained low. Owing to low prices for bismuth, the reopening of the Tasna Mine in Bolivia, closed since 1980, was delayed. When production starts, bismuth, copper, gold, and tungsten will be coproducts (Mining Journal, 1999). In the original plan, bismuth was to be the main product (Tice, 1997).

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Annual Average Bismuth Price¹
 (Dollars per pound²)

Year	Price	Year	Price	Year	Price	Year	Price
1906	1.25	1930	1.35	1954	2.25	1978	3.38
1907	1.25	1931	1.25	1955	2.25	1979	3.01
1908	1.75	1932	0.85	1956	2.25	1980	2.64
1909	1.75	1933	1.08	1957	2.25	1981	2.52
1910	1.93	1934	1.20	1958	2.25	1982	1.61
1911	2.13	1935	1.05	1959	2.25	1983	1.72
1912	2.03	1936	1.00	1960	2.25	1984	4.27
1913	2.00	1937	1.00	1961	2.25	1985	5.18
1914	2.88	1938	1.05	1962	2.25	1986	3.25
1915	2.88	1939	1.10	1963	2.25	1987	3.65
1916	3.63	1940	1.25	1964	2.30	1988	5.78
1917	3.43	1941	1.25	1965	3.43	1989	5.76
1918	3.43	1942	1.25	1966	4.00	1990	3.56
1919	3.08	1943	1.25	1967	4.00	1991	3.10
1920	2.55	1944	1.25	1968	4.00	1992	2.66
1921	1.95	1945	1.25	1969	4.63	1993	2.50
1922	1.98	1946	1.44	1970	6.00	1994	3.25
1923	2.50	1947	1.98	1971	5.26	1995	3.85
1924	2.03	1948	2.00	1972	3.63	1996	3.65
1925	2.00	1949	2.00	1973	5.25	1997	3.50
1926	3.03	1950	2.06	1974	9.25	1998	3.60
1927	2.30	1951	2.25	1975	8.25		
1928	1.98	1952	2.25	1976	7.50		
1929	1.70	1953	2.25	1977	6.00		

¹Prices for 99.99%-pure bismuth.

²To convert to dollars per kilogram, multiply by 2.20462.

Note:

1906-23, ASARCO Incorporated, producer price, *in* U.S. Geological Survey, Mineral Resources of the United States.

1924-31, ASARCO Incorporated, producer price *in* U.S. Bureau of Mines, Mineral Resources of the United States.

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1981-93, New York dealer price, *in* Metals Week [through June 14, 1993].

1993-98, New York dealer price, *in* Platt's Metals Week.