SILVER

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The difference between the high and low prices for silver in 2000 was less than $1.00 per troy ounce. Except for a brief period in February when the high for the year of $5.53 per ounce was reached, the silver price moved steadily downward in 2000 to an average of $5.00 per ounce, 5% lower than the 1999 level. This smaller movement in price occurred at a time when fabrication demand increased by 5% and more than 5,900 metric tons (t) of above ground stocks were needed to meet world demand. Lower demand in the photographic sector was more than offset by increased demand in jewelry and silverware and an 11% increase in industrial applications, where silver used in electrical and electronics were large growth areas.

According to the Silver Institute, world mine output of silver increased for the sixth consecutive year and at 18,900 t was the highest in history; secondary supplies at 5,600 t from old scrap were the second highest level in 20 years. U.S. Government stocks, the only silver used for the various coin and commemorative programs, decreased by 717 t to a level of 678 t in 2000. Stocks located in the principal exchanges increased 17% to 2,920 t in 2000.

Global reserves of silver in demonstrated resources from producing and nonproducing deposits at the end of 2000 were estimated to be 280,000 t by the U.S. Geological Survey (USGS). Reserves for the United States were estimated to be 33,000 t. The reserve base (reserves plus measured and indicated resources that are marginally economic and some of those resources that are currently subeconomic) for the five leading silver producing countries (Australia, Canada, Mexico, Peru, and the United States) were estimated to be about 232,000 t or 55% of the world total.

The USGS has issued a report on undiscovered gold, silver, copper, lead, and zinc deposits in the United States (U.S. Geological Survey, 2000, p. 10). The estimate of the amount of silver in undiscovered mineral deposits ranged from greater than 290,000 t at a 90% probability to greater than 660,000 t at a 10% probability. The mean estimate for silver in undiscovered deposits was 460,000 t. Total discovered silver resources in the United States were estimated to be 330,000 t.

Legislation and Government Programs

The major legislative action affecting silver was the passage of the Commodity Futures Modernization Act of 2000 (CFMA) on December 15. Contrary to the recommendation of the

Silver in the 20th Century

At the beginning of the 20th century, the major uses for silver, other than coinage, were for jewelry and sterlingware. Mexico and the United States were the leading producers. U.S. production averaged about 1,700 metric tons per year. During World War II, technological advances that influenced the outcome of the war were made in electronics and photography. After the war, this technology was used to develop new consumer products. As the demand for consumer goods increased, so did the demand for silver, and as a result, the market price for silver increased. The Silver Act of 1946 authorized the U.S. Treasury to purchase domestically mined silver at $0.905 per troy ounce and to sell its silver holdings at $0.910 per ounce.

In the late 1950s and early 1960s, a second component was added to the demand side of the supply-demand equation—the investor-speculator. Silver certificates, authorized by the Silver Purchase Act of 1934, were redeemable for silver held by the Treasury. At a market price above $1.29, a profit could be made by redeeming the silver certificates, receiving 0.77 ounce of silver from the Treasury, and then selling the silver. In addition, at a market price above $1.38, a profit could be made by melting U.S. circulating coinage for its silver content. Realizing that it could not supply industrial consumers with silver mint coinage and maintain a stock of silver for redemption of silver certificates, the Government began demonetizing silver. Public Law 88-36, which repealed the Silver Purchase Act of 1934 and authorized the printing of Federal Reserve Notes not redeemable in silver, was passed in mid-1963. The coinage act of 1965 eliminated the use of silver in dimes and quarters and reduced the silver content of half-dollars. In 1967, silver coins were withdrawn from circulation and holders of silver certificates were given 1 year to redeem the certificates for silver. With the ending of the relation between silver and the U.S. monetary system in 1968, investor-speculator activities and industrial demand became the determinants of activity in the silver market.

By the turn of the century, silver had lost much of its standing as a precious metal and had become mostly an industrial metal, with about 70% of the metal consumed in industrial applications and photography. Most silver was being recovered as a byproduct of copper, gold, lead, and zinc production. The silver market experienced a period of volatility between 1979 and 1988, with the price reaching a high of $49.45 per ounce in 1980. The price spike, caused by the activities of a few investor-speculators, was short lived. Since then, the price has been mostly stable, averaging around $5.00 per ounce. U.S. mine production of silver in 2000 was about 1,860 tons.

President's Working Group on Financial Markets, the Congress exempted metals from the close supervision of the Commodities Futures Trading Commission (CFTC). The CFMA, however, did retain for the CFTC the authority to use its considerable tools to protect the public interest against fraud and price manipulation in the exempted metal commodities. Rules to implement the changes in regulating futures are still being finalized by the CFTC (Silver Users Association, 2001).

The Defense Logistics Agency (DLA) delivered all of the remaining 466,600 kilograms (kg) of silver in the National Defense Stockpile to the U.S. Mint for use in its coinage program. Under an agreement with the U.S. Treasury Department, the metal will continue to be carried as DLA stocks until the metal is consumed by the Mint. The transfer marked the end of the silver stockpile era, which at times was a hotly debated issue between silver users and producers. The stockpile is managed by the Defense National Stockpile Center, a branch of the DLA since the late 1960s. Part of the original 5,132 t of silver in the stockpile was auctioned in 1981, and the remainder has been used in the Mint's American Eagle coinage program. With the silver about to be exhausted, the Washington, DC-based Silver Institute turned bullish on the metal. The Institute concluded that when the Mint depletes its silver reserves, it must purchase silver for its coinage program on the open market and thereby boost silver demand by up to 1%. The Silver Users Association (SUA) disagreed, stating that the metal had been merely moved from one government warehouse to another and that the Mint had been using only about 218 metric tons per year (t/yr). At that rate, it would take about 6 years to use up the remaining Mint silver, which the SUA estimated to be about 1,400 t (Platt's Metals Week, 2000b).

The U.S. Mint is responsible for safeguarding much of the Nation's precious metals and strategic stockpiles and is the custodian of a significant portion of its silver resources. The values of the resources are reported at the lower of cost or market value. Amounts and values of custodial silver in the custody of the Mint at the end of September 30, 2000, were 220,063 kg of silver with a market value of $34.58 million (at $4.8875 per fine troy ounce) and a statutory value of $9.148 million. A statutory rate of $1.29292 per fine troy ounce was used to value the custodial reserves held by the Mint (U.S. Mint, August 14, 2001, United States Mint 2000 annual report, accessed August 16, 2001, via URL http://www.usmint.gov).

Production

In 2000, silver was produced in the United States from precious-metal ores at about 30 lode mines and from base-metal ores at about 24 lode mines. More than 30 t of silver was produced at each of 11 mines; their aggregated production equaled about 80% of total domestic production. Fewer than 10 placer operations recovered silver in 2000, and the quantity recovered was less than 1% of the total domestic production of 1,860 t.

The Sunshine Mine and Refinery Complex.—The Sunshine Mine and Refinery Complex, in the Coeur d'Alene mining district near Kellogg, ID, is comprised of the Sunshine Mine, a 1,000-ton-per-day (t/d) concentrator, an antimony refinery, a silver refinery, and associated facilities. The facility is an integrated operation that can produce refined silver with a purity of 99.99%. The silver refinery has the capacity to recover up to 249 t/yr of silver and 1,810 t/yr of copper.

The Sunshine Mine, one of the few remaining primary silver-producing mines, is an underground mine that began operations in 1884 and has produced more than 10,900 t of silver since that time. The underground workings consist of multiple levels developed of the Jewel shaft, the main production shaft. It extends from the surface to a depth of 122 meters (m) and is complemented by other exterior shafts with developed levels as deep as 170 m. The ore extracted from the Sunshine Mine was processed by the flotation concentrator, which produced a high-grade silver concentrate and a lead concentrate. The silver concentrate was transferred to the antimony refinery for antimony removal. After antimony removal, the silver concentrate was either transferred to the company's silver refinery for recovery of silver and copper or sold to a commercial smelter. Sunshine suspended operations at its silver refinery in 1995 pending higher levels of available feed and began shipping its silver concentrate to an outside smelter (Sunshine Mining & Refining Co., 2001a).

In September 2000, Sunshine Mining & Refining filed for chapter 11, allowing the silver miner to reorganize while receiving protection from its creditors (Metal Bulletin, 2000).

On February 16, 2001, Sunshine Mining & Refining announced that the Sunshine Mine was closed. The closing came shortly after Sunshine was notified by its primary customer that it was closing the smelter to which the Sunshine Mine shipped concentrates and that the smelter would no longer accept deliveries. Prior to the announcement, the mine's management sought alternative economic markets for the mine's production; however, the company was not able to secure an alternate and economically viable contract for its concentrates. The mine was placed on care-and-maintenance, and Sunshine was forced to initiate a mass layoff of its employees. The mine produced 121 t of silver in 2000 (Sunshine Mining & Refining Co., 2001b).

McCoy/Cove Gold-Silver Mine.—Ore and waste rock was mined from the open pits at a rate of 51,000 t/d in 2000 compared with 107,000 t/d in 1999. The lower mining rate was attributed to higher development requirements and to mining less productive drift-and-fill cuts as opposed to mining open stopes in 1999. The mill at McCoy/Cove used flotation and agitation leach circuits to recover gold and silver from high-grade oxide ore and sulfide ores not amenable to heap leaching. The majority of the ore processed through the mill in 2000 was from sulfide ores mined during the year. The Cove South Deep underground mine contributed 54,500 t to the mill and produced approximately 333 kg of gold and 134 t of silver. In 2001, McCoy/Cove will process ore from stockpiles and the Cove South Deep underground mine. Residual heap leaching was expected to continue in 2001. As a result, McCoy/Cove is expected to produce about 60% less gold and silver in 2001 compared with the 5,100 kg of gold and 383 t of silver produced in 2000 (Echo Bay Mines Ltd., 2001).

Lucky Friday Mine.—The Lucky Friday Mine, a deep underground silver and lead mine in northern Idaho and 100%

owned by Hecla Mining Co., has been a producing mine since 1958. In 1991, Hecla discovered several mineralized structures containing high-grade silver ores in an area known as the Gold Hunter property about 1,500 m northwest of the then-existing Lucky Friday workings. A feasibility study was completed in 1997, and full production was reached in the second quarter of 1998. The principal mining method at the Lucky Friday Mine was ramp access, cut-and-fill. Ore produced from the mine was processed in a 1,000 t/d conventional flotation mill. The flotation process produced a silver-lead concentrate and a zinc concentrate. In 2000, ore was processed at a rate of 953 t/d at the mine site and produced 156 t of silver; silver production in 1999 was 138 t. During 2000, about 94.0% of the silver, 93.6% of the lead, and 41.4% of the zinc was recovered (Hecla Mining Co., 2001b).

Greens Creek Mine.—The Greens Creek Mine is a joint-venture arrangement of Hecla Mining Co., Kennecott Greens Creek Mining Co. (manager of the mine), and Kennecott Juneau Mining Co. Kennecott Greens Creek and Kennecott Juneau are wholly owned subsidiaries of Kennecott Corp.

Greens Creek, a polymetallic deposit containing gold, lead, silver, and zinc, lies within the Admiralty Island National Monument in Alaska. The Greens Creek property includes 17 patented load claims and one patented millsite claim in addition to property leases from the U.S. Forest Service. In 2000, Greens Creek mined approximately 1,500 t/d underground from the 200 South, the Southwest, and the West ore zones. Ore from the underground trackless mine was milled at the mine site. The mill produced gold/silver doré and bulk lead and zinc concentrates. In 2000, the mine produced 295 t of silver compared with 327 t in 1999 (Hecla Mining Co., 2001a).

Galena Mine.—On September 9, 1999, Coeur d'Alene Mines Corp. acquired 50% of Silver Valley Resources Corp. from ASARCO Inc., increasing its ownership interest in Silver Valley to 100%. Silver Valley owned and operated the Coeur and Galena Mines in the Coeur d'Alene mining district of Idaho. The Galena Mine property is immediately west of the city of Wallace in Shoshone County in northern Idaho. The mine is an underground silver-copper mine and is served by two vertical shafts. The mine uses the drift-and-fill mining method with sand backfill to extract ore from the high-grade silver-copper vein deposits that constitute the majority of the ore reserves. Silver and copper are recovered by a flotation mill that produces a silver-rich concentrate. Silver recovery through the mill averaged 96% in 2000, which was consistent with 1999. In 2000, the mine produced 125 t of silver compared with 70 t in 1999 (Coeur d'Alene Mines Corp., 2001).

Consumption

Silver has become mostly an industrial metal with demand made up almost exclusively of four major components—electrical and electronic, photography, jewelry, and silverware. In 2000, U.S. consumption of silver, including scrap, was estimated to have been about 5,600 t. Photography, the largest end-use category, accounted for about 2,990 t. The second largest end-use category, batteries/electrical/electronic products, consumed about 1,060 t. About 500 t of silver was consumed in sterlingware, jewelry, and silverplate. Global consumption was estimated to have been 25,000 t, an increase of more than 435 t from that consumed in 1999 (Silver Users Association, 2000).

Prices

Unlike the high prices for platinum-group metals, the price of silver was mostly flat in 2000. Silver prices showed some strength in the first few weeks of the year, reaching the high of $5.75 for the year in early February. Despite strong demand, prices began a long descent in late February that lasted through the rest of the year. The average price in 2000 was $5.00 per ounce, $0.25 below the average for 1999.

Trade

In 2000, the United States imported 3,940 t of silver in ash and residues, ores and concentrates, doré, and refined bullion. The value of these imports was $654 million. Canada (31%), Mexico (38%), and Peru (2%) were the leading foreign sources of imports. The United States exported 380 t of silver in ore and concentrates, refined silver bullion, and doré. The value of these exports was $61.7 million.

World Review

Global silver supply increased in 2000 because of strong growth in the mining sector and disinvestment in a market where the price of silver was in decline for most of the year. Much of the increase in silver supply can be attributed to the return of the Mexican silver industry to a more dominant position after lower than normal output in 1999. Restrictions imposed on Industrias Peñoles S.A. de C.V.'s Torreón processing facility were lifted in February and full production was reached by June 2000. Another factor was increased production at the giant Cannington silver-lead-zinc mine in Australia. Cannington was the leading silver producing mine in 2000, and Peñoles retained its position as the leading silver producer. Global production in 2000 increased 7% to 18,900 t compared with 17,700 t in 1999.

China.—China ended its state monopoly of the buying and selling of silver, first on a trial basis from August 1999, and then officially on January 1, 2000. For the first time since 1949, domestic silver producers are no longer required to sell their production to the People's Bank of China (PBOC), previously the sole purchaser and distributor of silver in China. The Government also discontinued the official silver price, set by the PBOC, and the license system for processing and trading silver articles, excluding silver coinage. The Shanghai-based Huatong Nonferrous Metal Trading Center was designated as the first market to operate silver trade in the country as of January 1, 2000. After opening the market, China encouraged silver exports and limited imports. China produces about 1,300 t/yr of silver and consumes about 800 t/yr (Platt's Metals Week, 2000).

Mexico.—Strong world demand for silver encouraged more investment by Mexican silver producers resulting in a production increase of 6% to 2,620 t in 2000. Output in 1999

was 2,467 t, substantially lower than the record 2,686 t produced in 1998.

Mexico derives about 50% of its production from primary silver mines and the balance as a byproduct of copper, lead, and zinc production. Mexico's leading silver producer, Peñoles, contributed 1,390 t of mined silver in 2000, more than 50% of the country's total output; refined silver output was a record 2,302 t. Normal operations resumed at the Torreón refinery in 2000, but this was not the only reason for increased production. At Peñoles' Tizapa Mine, output rose by 20% to 212 t, and production at Mina Proaño increased by 84 t to 744 t. The results at Proaño were largely due to expansions completed at the mine in 1999 that raised ore output by about 30% (Silver Institute, 2001, p. 19).

Central America and South America.—In 2000, there was a significant change in the source of silver supply in South America. Output from primary silver mines declined by 42%, while silver as a byproduct from gold and lead-zinc operations increased significantly. The change mostly resulted from the completion of mining at the high-grade Chimberos silver deposit in Chile, which produced 510 t of silver in 1999. With the closure of Chimberos, operators concentrated equipment and personnel on the adjacent La Coipa gold mine, with the result that silver output at the mine increased by more than 50%. Further gains were made at El Peñon gold mine, which contributed 125 t in 2000. According to the Silver Institute, Peru increased its silver output by 9% to 2,438 t, driven by growth in primary gold, copper, and zinc-lead operations. In 2000, Central America's and South America's share of global silver production fell by 2% to 4,500 t, representing about 24% of global production (Silver Institute, 2001, p. 19-20).

Current Research and Technology

Bacteria Resistant to Silver May Have Industrial Applications.—Scientists in Sweden have isolated bacteria that grow silver crystals and store them on the edges of their cell walls. The bacteria, *Pseudomonas stutzeri*, were originally found growing naturally on rocks in silver mines. The researchers were able to grow the bacteria in the laboratory and manipulate the shape in which they formed silver crystals. Most of the crystals were composed of pure silver, but some were silver sulfide. The scientists also discovered that the bacteria could produce and store as much as 25% of the cell's weight in silver. This discovery could lead to new techniques for the recovery of silver from ores, as well as growing superthin and elasticlike silver crystals to specific shapes and sizes for use in electronics and optical applications (Silver News, 2000a).

Government Scientists Produce Silver-Only Dental Fillings.—Metallurgists at the U.S. National Institute of Standards and Technology (NIST) have developed a method for making pure silver powder for use in filling dental cavities. Traditionally, an amalgam of mercury, which has strong corrosion resistance and good mechanical strength, was the material of choice. Now, NIST scientists have found a way to remove naturally occurring silver oxide from the surface of silver metal powder by treating it with a dilute acid solution that removes the oxide layer. The pure silver particles can then be compacted with normal dental tools until they harden. These fillings are 80% as dense and at least as strong as mercury-alloy amalgams. The observed values of flexural strength for the silver compacts were reported to be equal or superior to mercury amalgams. Corrosion resistance, microleakage, and marginal toughness values of the compacts were found to be superior to those of amalgams. Although the American Dental Association has deemed mercury-containing amalgams safe, as long as the materials remain intact, materials that do not contain mercury are more desirable (Advanced Materials & Processes, 2000).

Spent Silver Catalyst May be Used as a Bactericide.—Catalysts make industrial processes, such as the production of plastics, more efficient by increasing the rates of reaction and eliminating unwanted chemical reactions and their byproducts. After periods of use, catalysts become deactivated and must be regenerated. In the case of silver catalysts, refiners remove the silver from its substrate, usually alumina, refine it, and place it onto a new substrate. Although not all of the silver can be economically removed from the substrate, studies have shown that the used silver catalyst substrates retain enough silver to enable the material to be used as an effective bactericide or fungicide. When immersed in water, the spent catalyst will release the more readily available silver immediately, inactivating a large range of bacteria, including *E. coli.* The remaining silver, more strongly bound within the pore structure of the alumina, dissolves more slowly and supplies a concentration of about 5 parts per billion and provides a long-term sanitation effect (Silver News, 2000b).

Outlook

Mine production of silver in 2000, as in the previous 11 years, was less than demand. The difference between demand and newly mined silver was filled by aboveground stocks. In the past 11 years, referred to by some as the "deficit" years, the holders of aboveground stocks have released almost 50,000 t of silver at an average price of $4.86 per ounce, or about $0.14 below the average in 2000. The scale of the deficit was slightly smaller than in 1999 as stockholders' disinvestment of silver (estimated by the Silver Institute at 1,300 t) provided 4.8% of the world's fabrication demand.

The outlook for the silver market depends somewhat on the level of future prices needed to continue filling the gap between demand and newly mined and secondary silver. It has been shown that disinvestment continues at every price level—even when approaching a 20-year low of $3.55 per ounce in 1993. Disinvestment, therefore, is expected to continue to fill the longstanding deficits in the supply of silver. While the market takes these deficits in stride, thanks to the continued release of stocks, lower prices are resulting in some mine closures. If low prices persist or fall even more, it could induce further high-profile mine closures and the suspension or delay of new projects. The size of the currently forecasted deficits could escalate further, which would result in even speedier drawdown of stocks.

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GENERAL SOURCES OF INFORMATION

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TABLE 1
SALIENT SILVER STATISTICS 1/

		1996	1997	1998	1999	2000
United States:						
Mine production	metric tons	1,570	2,180	2,060	1,950	1,860
Value	thousands	$262,000	$329,000	$368,000	$329,000	NA
Refinery production:						
Domestic and foreign ores and concentrates	metric tons	NA	2,200	2,300	2,000	2,780
Scrap (old and new)	do.	NA	1,360	1,700	1,500	1,680
Exports, refined	do.	2,900	2,980	2,250	481	279
Imports for consumption, refined	do.	2,580	2,120	2,800	2,660	3,810
Stocks, December 31:						
Industry	do.	NA	395	400	NA	462
Futures exchanges	do.	4,550	3,430	2,360	2,490 r/	2,920
Department of the Treasury	do.	402	484	582	617	220
National Defense Stockpile	do.	1,450	1,220	1,030	778	458
Price, average per troy ounce 2/		$5.19	$4.89	$5.54	$5.25	$5.00
Employment, mine and mill workers 3/		1,400	1,550	1,550	1,500	1,200
World, mine production	metric tons	15,100 r/	16,500 r/	17,200 r/	17,600 r/	18,300 e/

e/ Estimated. r/ Revised. NA Not available.
1/ Data are rounded to no more than three significant digits, except prices.
2/ Price data are the annual Handy & Harman quotations published in Platt's Metals Week.
3/ Employment data are from the Mine Safety and Health Administration.

TABLE 2
MINE PRODUCTION OF SILVER IN THE UNITED STATES, BY STATE 1/

(Kilograms)

State	1998	1999	2000
Arizona	211,000	183,000	132,000
California	11,300	7,670	8,610
Colorado	W	W	W
Idaho	447,000	416,000	416,000
Nevada	670,000	597,000	633,000
South Dakota	1,960	W	1,410
Washington	622	W	1,560
Other 2/	723,000	748,000	671,000
Total	2,060,000	1,950,000	1,860,000

W Withheld to avoid disclosing company proprietary data, included with "Other."
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes Alaska, Missouri, Montana, New Mexico, Utah, and States indicated by symbol W.

TABLE 3
LEADING SILVER-PRODUCING MINES IN THE UNITED STATES IN 2000, IN ORDER OF OUTPUT 1/

Rank	Mine	County and State	Operator	Source of silver
1	McCoy/Cove	Lander, NV	Echo Bay Mines Limited	Gold ore.
2	Greens Creek	Juneau, AK	Kennecott Greens Creek Mining Company	Zinc ore.
3	Rochester	Pershing, NV	Coeur Rochester, Inc.	Gold ore.
4	Red Dog	Northwest Arctic, AK	Cominco Alaska Inc.	Lead-zinc ore.
5	Sunshine	Shoshone, ID	Sunshine Mining & Refining Co.	Silver ore.
6	Lucky Friday	do.	Hecla Mining Company	Do.
7	Bingham Canyon	Salt Lake, UT	Kennecott Utah Copper Corp.	Copper-molybdenum ore.
8	Galena	Shoshone, ID	Silver Valley Resources Corp.	Silver ore.
9	Ken Snyder	Elko, NV	Euro-Nevada	Gold ore.
10	Mission Complex 2/	Pima, AZ	ASARCO Incorporated	Copper ore.
11	Montana Tunnels	Jefferson, MT	Apollo Gold Co.	Zinc ore.
12	Bagdad	Yavapai, AZ	Phelps Dodge Corp.	Copper-molybdenum ore.
13	Denton-Rawhide	Mineral, NV	Kennecott Minerals Company	Gold ore.
14	Morenci	Greenlee, AZ	Phelps Dodge Corp.	Copper-molybdenum ore.
15	Sierrita	Pima, AZ	do.	Do.
16	Continental	Silver Bow, MT	Montana Resources Inc.	Do.
17	Brushy Creek	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
18	Round Mountain	Nye, NV	Round Mountain Gold Corp.	Gold ore.
19	Buick	Iron, MO	Doe Run Resources Corp.	Lead ore.
20	Betze-Post/Goldstrike	Eureka, NV	Barrick Gold Corp.	Gold ore.
21	Ray	Pinal, AZ	ASARCO Incorporated	Copper ore.
22	Carlin Mines Complex	Elko, Eureka, NV	Newmont Gold Company	Gold ore.
23	Chino	Grant, NM	Phelps Dodge Corp.	Copper-molybdenum ore.
24	Lone Tree	Humboldt, NV	Newmont Gold Corp.	Gold ore.
25	Fletcher	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
26	McLaughlin	Napa, CA	Homestake Mining Company	Gold ore.
27	Sweetwater	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
28	Beartrack	Lemhi, ID	Meridian Gold Inc.	Gold ore.
29	Dee Gold	Elko, NV	Glamis Gold Ltd. Dee Gold Mining Company	Do.
30	Rosebud	Pershing, NV	Hecla Mining Company	Do.
31	Cresson	Teller, CO	Cripple Creek & Victor Gold Mining Co.	Do.
(3/)	Florida Canyon	Pershing, NV	Florida Canyon Mining, Inc.	Do.

1/ The mines on this list accounted for 97% of U.S. mine production in 2000.

2/ Includes Eisenhower, Mission, Pima, and San Xavier Mines.

3/ Production data at Florida Canyon are withheld; mine is among the top 32 silver-producing mines in the United States, but is not shown in rank order to avoid disclosing company propriety data.

TABLE 4
U.S. EXPORTS OF SILVER, BY COUNTRY 1/

Year and country	Silver ores and concentrates		Bullion		Doré		Total	
	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)
1999	70,800	$14,200	481,000	$84,400	64,400	$11,400	616,000	$110,000
2000:								
Argentina	--	--	--	--	--	--	--	--
Armenia	--	--	--	--	--	--	--	--
Australia	--	--	398	78	--	--	398	78
Austria	--	--	--	--	--	--	--	--
Bahamas, The	--	--	--	--	--	--	--	--
Belgium	--	--	--	--	--	--	--	--
Brazil	90	16	--	--	--	--	90	16
Canada	57,100	7,720	2,170	421	--	--	59,300	8,140
China	--	--	--	--	--	--	--	--
Colombia	--	--	152	19	--	--	152	19
Denmark	--	--	--	--	--	--	--	--
Dominican Republic	--	--	--	--	--	--	--	--
Ecuador	--	--	--	--	--	--	--	--
Egypt	--	--	--	--	--	--	--	--
Finland	--	--	--	--	--	--	--	--
France	13	3	666	86	--	--	679	89
Germany	39	7	31	6	--	--	70	13
Greece	--	--	--	--	--	--	--	--
Guatemala	--	--	97	18	--	--	97	18
Hong Kong	--	--	--	--	--	--	--	--
India	--	--	19,100	3,000	--	--	19,100	3,000
Ireland	--	--	--	--	--	--	--	--
Israel	--	--	--	--	--	--	--	--
Italy	--	--	--	--	--	--	--	--
Japan	240	44	108,000	18,300	--	--	109,000	18,400
Korea, Republic of	--	--	--	--	--	--	--	--
Lebanon	--	--	--	--	--	--	--	--
Mexico	7,650	1,320	33,900	5,620	18,400	3,530	60,000	10,500
Netherlands	--	--	24	4	--	--	24	4
Netherlands Antilles	--	--	--	--	--	--	--	--
New Zealand	--	--	--	--	--	--	--	--
Panama	--	--	--	--	--	--	--	--
Peru	--	--	--	--	--	--	--	--
Philippines	--	--	--	--	--	--	--	--
Poland	--	--	--	--	--	--	--	--
Romania	--	--	--	--	--	--	--	--
Russia	--	--	--	--	--	--	--	--
Singapore	--	--	--	--	27	6	27	6
South Africa	--	--	--	--	--	--	--	--
Spain	--	--	--	--	--	--	--	--
Sweden	--	--	--	--	--	--	--	--
Switzerland	--	--	10,100	1,560	12,500	2,060	22,600	3,610
Taiwan	--	--	1,840	316	239	59	2,080	375
Thailand	--	--	312	46	--	--	312	46
Trinidad and Tobago	--	--	--	--	--	--	--	--
United Kingdom	--	--	98,000	16,000	4,800	787	103,000	16,800
Uruguay	--	--	3,390	620	--	--	3,390	620
Vietnam	--	--	--	--	--	--	--	--
Other	--	--	37	8	--	--	37	8
Total	65,100	9,110	279,000	46,100	36,000	6,440	380,000	61,700

See footnotes at end of table.

TABLE 4--Continued
U.S. EXPORTS OF SILVER, BY COUNTRY 1/

Year and country	Other unwrought silver		Metal powder		Silver nitrate		Semimanufactured forms 2/		Waste and scrap	
	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)
1999	75,100	$14,400	324,000	$55,100	62,500	$7,330	122,000	$28,700	1,310,000	$223,000
2000:										
Argentina	--	--	--	--	--	--	495	97	--	--
Armenia	--	--	--	--	--	--	--	--	5,740	746
Australia	244	54	--	--	4,290	447	33	16	--	--
Austria	--	0	399	92	--	--	5	23	--	--
Bahamas, The	21	5	--	--	100	19	--	--	--	--
Belgium	231	55	80	20	--	--	5,150	1,130	255,000	73,400
Brazil	497	80	--	--	575	73	2,460	334	617	80
Canada	3,720	681	21,800	3,480	149,000	22,300	64,400	10,400	521,000	75,800
China	--	--	14,000	2,660	34,200	3,670	1,880	429	259,000	34,200
Colombia	30	6	49	3	--	--	39	8	--	--
Denmark	--	--	--	--	--	--	225	62	--	--
Dominican Republic	4,830	1,060	--	--	53	10	12	4	--	--
Ecuador	--	--	--	--	--	--	--	--	1,090	141
Egypt	--	--	--	--	--	--	1,450	346	--	--
Finland	--	--	224	35	--	--	18	16	--	--
France	277	97	17,900	3,130	--	--	4,030	1,620	731	108
Germany	11,400	2,340	65,000	11,700	63	22	2,100	931	161,000	45,200
Greece	--	--	317	48	--	--	--	--	--	--
Guatemala	--	--	--	--	--	--	--	--	--	--
Hong Kong	563	123	17,600	3,180	--	--	3,860	900	7,390	998
India	302	69	197	55	--	--	103	34	702	78
Ireland	--	--	2,880	432	--	--	248	59	21,700	3,380
Israel	--	--	411	244	--	--	264	83	500	246
Italy	72	41	318	53	--	--	3,700	661	101,000	12,800
Japan	386	108	142,000	28,000	43	8	7,970	1,810	53,500	16,500
Korea, Republic of	2,230	613	22,100	4,780	--	--	852	431	12,000	2,130
Lebanon	58	10	470	79	--	--	--	--	--	--
Mexico	4,450	755	4,630	812	27,300	2,690	19,500	4,140	53,700	10,900
Netherlands	92	21	10,300	1,770	38	3	790	164	505	68
Netherlands Antilles	227	50	--	--	--	--	--	--	--	--
New Zealand	--	--	--	--	--	--	709	236	--	--
Panama	--	--	--	--	--	--	113	22	--	--
Peru	--	--	26	4	--	--	175	17	--	--
Philippines	13	22	--	--	42	3	73	69	123	16
Poland	--	--	--	--	--	--	--	--	7,940	1,030
Romania	143	35	--	--	--	--	1	3	--	--
Russia	--	--	--	--	217	5	--	--	--	--
Singapore	311	69	1,640	370	102	3	2,790	756	503	65
South Africa	413	99	--	--	--	--	--	--	9,710	3,010
Spain	--	--	22	7	--	--	11,600	3,060	--	--
Sweden	38	9	10,600	1,450	--	--	2	4	44,600	6,650
Switzerland	112	131	580	89	--	--	220	259	8,340	2,680
Taiwan	22,200	4,030	57,500	18,600	478	66	7,970	2,120	4,940	649
Thailand	2,300	444	632	103	14	3	487	90	--	--
Trinidad and Tobago	--	--	--	--	44	3	104	20	--	--
United Kingdom	2,080	465	32,800	8,500	203	46	4,080	4,740	133,000	86,400
Uruguay	131	29	--	--	--	--	--	--	--	--
Vietnam	--	--	--	--	--	--	--	--	452	59
Other	125	28	79	20	53	10	260	99	53	63
Total	57,500	11,500	424,000	89,700	217,000	29,400	148,000	35,200	1,670,000	377,000

-- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Containing 99.5% or more by weight of silver.

Source: U.S. Census Bureau.

TABLE 5
U.S. IMPORTS FOR CONSUMPTION OF SILVER, BY COUNTRY 1/

Year and country	Silver ores and concentrates		Base metal ores and concentrates		Ash and residues		Bullion		Doré		Total	
	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)
1999	10,800	$1,970	2,750	$440	101,000	$8,970	2,660,000	$453,000	407,000 r/	$81,600	3,180,000	$546,000
2000:												
Argentina	--	--	--	--	--	--	--	--	--	--	--	--
Australia	--	--	--	--	1,310	213	--	--	--	--	1,310	213
Belgium	--	--	--	--	--	--	859	129	--	--	859	129
Brazil	--	--	--	--	--	--	--	--	--	--	--	--
Canada	1,420	229	--	--	23,900	2,810	1,210,000	202,000	--	--	1,240,000	205,000
Chile	--	--	--	--	--	--	7,000	1,060	49,600	13,600	56,600	14,600
China	--	--	--	--	--	--	606	106	--	--	606	106
Colombia	--	--	--	--	--	--	876	121	1,570	225	2,450	346
Costa Rica	--	--	--	--	--	--	--	--	--	--	--	--
Dominican Republic	--	--	--	--	--	--	--	--	--	--	--	--
El Salvador	--	--	--	--	--	--	--	--	--	--	--	--
France	--	--	--	--	--	--	100	14	--	--	100	14
Germany	--	--	--	--	--	--	--	--	--	--	--	--
Hong Kong	--	--	--	--	--	--	--	--	--	--	--	--
India	--	--	--	--	--	--	--	--	--	--	--	--
Japan	--	--	--	--	(3/)	239	--	--	--	--	(3/)	239
Korea, Republic of	--	--	--	--	--	--	--	--	--	--	--	--
Malaysia	--	--	--	--	--	--	--	--	--	--	--	--
Mexico	--	--	--	--	9,980	871	1,390,000	223,000	22,800	3,860	1,420,000	227,000
Netherlands	--	--	--	--	--	--	--	--	--	--	--	--
New Zealand	--	--	--	--	--	--	--	--	--	--	--	--
Nicaragua	--	--	--	--	--	--	140	26	--	--	140	26
Panama	--	--	--	--	--	--	456	56	--	--	456	56
Peru	--	--	--	--	--	--	86,700	13,900	--	--	86,700	13,900
Philippines	--	--	--	--	--	--	--	--	--	--	--	--
Poland	--	--	--	--	--	--	--	--	--	--	--	--
Russia	--	--	--	--	--	--	54,100	8,420	--	--	54,100	8,420
Singapore	--	--	--	--	--	--	--	--	--	--	--	--
Spain	--	--	--	--	--	--	--	--	--	--	--	--
Sweden	--	--	--	--	--	--	--	--	--	--	--	--
Switzerland	--	--	--	--	--	--	386	60	--	--	386	60
Taiwan	--	--	--	--	--	--	--	--	--	--	--	--
United Arab Emirates	--	--	--	--	--	--	--	--	--	--	--	--
United Kingdom	--	--	--	--	20,600	3,210	1,060,000	180,000	--	--	1,080,000	183,000
Other	--	--	--	--	--	--	334	69	--	--	334	69
Total	1,420	229	--	--	55,800	7,340	3,810,000	629,000	73,900	17,600	3,940,000	654,000

See footnotes at end of table.

TABLE 5--Continued
U.S. IMPORTS FOR CONSUMPTION OF SILVER, BY COUNTRY 1/

Year and country	Other unwrought silver (gross weight)		Metal powder (gross weight)		Silver nitrate (gross weight)		Semimanufactured forms 2/ (gross weight)		Waste and scrap (gross weight)	
	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)
1999	126,000	$22,200	120,000	$26,400	4,480 r/	$364	137,000 r/	$23,900 r/	1,640,000	$123,000 r/
2000:										
Argentina	--	--	--	--	--	--	--	--	16,000	115
Australia	--	--	41	12	30	3	--	--	39	455
Belgium	--	--	--	--	18,500	1,120	--	--	16,900	1,340
Brazil	--	--	4,970	524	2,520	258	7,700	705	375	491
Canada	136,000	24,800	71,000	12,200	421	77	81,800	17,100	420,000	56,600
Chile	633	800	--	--	--	--	15	7	236	63
China	(3/)	4	--	--	--	--	63	9	9,040	1,570
Colombia	--	--	--	--	--	--	--	--	--	--
Costa Rica	--	--	--	--	--	--	--	--	5,540	135
Dominican Republic	--	--	113	15	--	--	--	--	5,180	1,800
El Salvador	--	--	--	--	--	--	--	--	111	24
France	--	--	750	113	1,150	124	4,730	1,020	62,400	1,380
Germany	5	10	14,400	2,960	--	--	26,900	3,610	147,000	14,400
Hong Kong	--	--	--	--	--	--	11	5	40,300	196
India	--	--	--	--	--	--	405	79	--	--
Japan	39	16	117,000	26,400	251	42	1,230	550	16,800	11,500
Korea, Republic of	--	--	10	2	--	--	4,170	437	66,300	3,280
Malaysia	--	--	--	--	--	--	--	--	75,000	4,290
Mexico	66,800	11,000	18,700	3,120	799	92	4,760	334	65,400	10,100
Netherlands	--	--	32	3	--	--	240	73	668	272
New Zealand	--	--	--	--	--	--	--	--	198	406
Nicaragua	--	--	--	--	--	--	--	--	--	--
Panama	--	--	--	--	--	--	--	--	236	13
Peru	353	447	6,770	1,040	--	--	--	--	406	61
Philippines	--	--	--	--	--	--	--	--	28,200	806
Poland	9	11	--	--	--	--	1,500	125	--	--
Russia	--	--	--	--	--	--	72	13	--	--
Singapore	--	--	--	--	--	--	--	--	2,400	636
Spain	--	--	--	--	--	--	371	48	2,370	599
Sweden	--	--	--	--	--	--	--	--	97	1,440
Switzerland	--	--	343	72	--	--	359	124	689	112
Taiwan	14	12	65	11	--	--	355	55	39,300	300
United Arab Emirates	--	--	--	--	--	--	--	--	87,300	670
United Kingdom	46	15	37	9	500	58	4,250	1,190	3,560	3,970
Other	67	29	48	10	--	--	829	376	17,300	17,100
Total	204,000	37,200	235,000	46,500	24,200	1,770	140,000	25,800	1,130,000	134,000

r/ Revised. -- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Containing 99.5% or more by weight of silver.
3/ Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 6
SILVER: WORLD MINE PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1996	1997	1998	1999	2000 e/
Algeria e/	2	2	2	1 r/	1
Argentina	50	53	36	74 r/	78
Australia	1,013	1,106	1,474	1,720	2,060 3/
Bolivia	384	387	404	422	434 3/
Brazil 4/	30	27	34	42 r/	41
Bulgaria	49	32	24	25 e/	25
Burma	4	2	3	4	3
Canada	1,309	1,224 r/	1,196 r/	1,174 r/	1,161 3/
Chile	1,047	1,091	1,340	1,380 r/ e/	1,242 3/
China e/	1,140	1,300	1,300 r/	1,320 r/	1,600
Colombia 5/	6	4	5	7 r/ e/	8
Congo (Kinshasa) e/	1	1	1	1	1
Costa Rica e/	(6/)	(6/)	(6/) 3/	(6/) e/	(6/)
Dominican Republic	17	12	7	3 r/	--
Ecuador	1	2	2 e/	2 e/	2
El Salvador	--	(6/)	(6/)	(6/) e/	(6/)
Fiji	2	3	2	2 r/	1 3/
Finland e/	33 r/	32 e/	30	32 r/	24
France	2 e/	2	2 r/	1 r/	1
Ghana e/	2	3	4	4	36
Greece	17	45	45 e/	46 r/	37 3/
Honduras	29	35 e/	43	47	46
India	36	50	52	54 e/	40
Indonesia	255	219	349 3/	288 r/	26 3/
Iran e/	60	60	19 r/	21 r/	20
Ireland	15	13	13 e/	12 e/	16
Italy 7/	9	10 e/	10 e/	10 e/	4
Japan	85	87	94	94	104
Kazakhstan e/	468 3/	690 r/	726 r/	904 r/	927
Korea, North e/	50	50	50	50	50
Korea, Republic of 5/	254	268	339	489	591 3/
Macedonia e/	20 r/	19 r/	20 r/	22 r/	20
Malaysia	10	10	7	4 r/	(6/) p/
Mali e/	(6/)	1	1	1	1
Mexico	2,528	2,679	2,686	2,467 r/	2,621 3/
Mongolia e/	19	23	20	20	25
Morocco	200	261	307 r/	278 r/	289
Namibia	42	41	23	18 e/	18
New Zealand	30	32	23 r/ 3/	24 r/	23
Nicaragua	2 e/	3	4	3	3
Oman	--	--	1	1	1
Panama	1	2	2 e/	2	2
Papua New Guinea	59 r/	49 r/	59 r/	67 r/	73
Peru	1,970	2,090 r/	2,025 r/	2,231 r/	2,438 3/
Philippines	25	20	18 r/	18 r/	17
Poland	935	1,038 r/	1,108 r/	1,100	1,100
Portugal	34 r/	34 r/	32 r/	27 r/	25
Romania e/	60	60	60	50 r/	50
Russia e/	400	400	350	375	370
Saudi Arabia	17	17	14 r/	10 r/	9
Serbia and Montenegro	69	43	34 r/	8 r/	8 3/
Solomon Islands e/	(6/)	(6/)	2 r/ 3/	2 r/ 3/	(6/)
South Africa	169	144	144	141	144
Spain	109 r/	66 e/	47 r/	96 r/ e/	70
Sweden	272	304	299	300	300
Tajikistan	NA	NA	5	5	5
Tunisia	3	1 e/	3 r/	4 r/	4
Turkey e/	70	90	110	110	110
United States	1,570	2,180	2,060	1,950	1,860 3/
Uzbekistan e/	70	70	70	75	75
Zambia 8/	9	7	8	5 r/	5
Zimbabwe	10	6	7	5 r/	4 3/
Total	15,100 r/	16,500 r/	17,200 r/	17,600 r/	18,300

See footnotes at end of table.

TABLE 6--Continued
SILVER: WORLD MINE PRODUCTION, BY COUNTRY 1/ 2/

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. -- 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/ Recoverable content of ores and concentrates produced unless otherwise specified. Table includes data available through August 11, 2001.
3/ Reported figure.
4/ Includes the following quantities, in kilograms, identified as secondary silver: 1996--38,000; 1997--32,000; 1998--40,000; 1999--40,000 (estimated); and 2000--40,000 (estimated).
5/ Smelter and/or refinery production.
6/ Less than 1/2 unit.
7/ Includes production from imported ores.
8/ Year beginning April 1 of that stated.