

# Silver

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**S**ilver (Ag) is a naturally occurring metallic element with brilliant white lustre and a melting point of 961.9°C. It has the highest electrical and thermal conductivities of all metals and, although tarnished by sulphur, is relatively corrosion resistant. Silver is second to gold in malleability and ductility, being easily rolled or beaten into foil or drawn into fine wire. Its use for ornaments and utensils predates recorded history. Silver has also been an important medium of exchange since very early times.

The last chapter on silver covered the year 1992. Consequently, Canadian and world developments will be summarized for the period 1992 through 1997.

## **CANADIAN DEVELOPMENTS**

In 1997, silver was mined as a by-product of base-metal or gold mining. The Samatosum mine and Equity Silver mine in British Columbia were the last mines to primarily produce silver; they closed in 1992 and 1994, respectively.

In 1992, production of silver in concentrate totalled 1169 t with base-metal mines accounting for 81% of output, gold mines contributing 6%, and silver mines contributing 13%. Ore reserve depletion and production cutbacks or closures in response to weak base-metal prices contributed to a six-year decline in production that fell to a 46-year low of 740.3 t in 1994. In 1995, mine output expanded to 1244.6 t as mines re-opened or came on stream, such as the Eskay Creek gold mine in British Columbia, which produces approximately 370 t/y of silver in concentrate. Production continued to rise in 1996, but fell to 1212.6 t in 1997 due to mine closures such as the Faro lead-zinc mine in the Yukon.

In 1997, silver was being mined in Newfoundland, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, British Columbia, the Yukon and

Northwest Territories. Approximately 80 mines produce silver, with 20 of those mines accounting for about 80% of annual production. Base-metal mining produced 70% of the silver; the other 30% was derived from gold mining.

## **WORLD DEVELOPMENTS**

Silver is mined in more than 50 countries. According to data from the World Bureau of Metal Statistics, 11 countries were responsible for 82% of the world mine production of silver in 1997. In decreasing order of production, the countries were Mexico, Peru, the United States, Canada, Australia, Chile, China, Poland, Kazakstan and Bolivia. Data from the Silver Institute, headquartered in the United States in Washington, indicates that approximately 83% of the silver mined in 1996 came from base-metal or gold operations, and the remainder was produced by primary silver mines located principally in South America and Central America.

The world's mine production of silver declined from 14 578.4 t in 1992 to 13 353.3 t in 1994, largely due to reduced base-metal output in response to soft demand. Silver output subsequently rose to 14 593.2 t in 1997 as markets improved and base-metal mines re-opened or increased production, and new silver-rich gold mines came on stream (e.g., the Eskay Creek mine in Canada, the Mount Muro and Kelian mines in Indonesia, and the La Coipa mine in Chile).

The world's mine production of silver is expected to increase with the expansion or opening of silver-rich mines such as the Dukat silver mine or the Cannington lead-zinc mine.

In November 1997, Pan American Silver Corp. of Canada won the tender to acquire the mining licence that covers the Dukat silver mine in Russia, 400 km north of Magadan City. The mine, which opened in 1979, closed due to financial difficulties in April 1997. According to Pan American, prefeasibility work suggests the mine could re-open in the year 2000 and produce approximately 435.4 t of silver and 0.8 t of gold annually.

The Broken Hill Proprietary Company Limited commissioned the Cannington lead-zinc underground mine in Australia in mid-1997. At full capacity, it

will be the world's largest silver producer with a rated capacity of 750 t/y of silver in concentrate. Reserves are estimated at 45 Mt grading 11.1% lead, 4.4% zinc and 500 g/t silver.

In addition to mined ores and concentrates, silver is also recovered from recycled industrial scrap, photographic wastes, electronic goods, jewellery and other materials. According to data from the Silver Institute, recycled silver accounted for about 23% of world supply in 1996 and totalled approximately 4690 t. The amount of silver recovered from recycled materials also increased by about 7% from 1992 to 1996.

## CONSUMPTION AND USES

Between 1992 and 1997, data from the Silver Institute indicates that world demand increased by about 21%, due partly to increased electronic and photographic demand as well as to the greater use of silver as a store of wealth in countries such as India. The United States, India and Japan were the largest users of silver in 1997 consuming about 19.3%, 15.2%, and 14.7%, respectively, of world demand.

Industrial and decorative applications, such as coatings on mirrors, a bactericide or algicide in water purification systems, and contacts, conductors and batteries in the electrical and electronics industries, represent the largest demand for silver at over 35% of world consumption.

Silver used in silverware, jewellery and works of art as sterling silver (92.5% silver and 7.5% copper) and for silver plating accounts for over 30% of silver consumption, while its use in photographic films and papers accounts for just under 30%. The use of silver in coinage is now largely confined to numismatic coins and medallions, representing less than 3% of the market.

One of the most dramatic changes in world consumption has been the sharp rise in demand for silver in India. Since 1989, India has advanced from being the eighth largest user of silver to second place in 1997. Government-initiated economic reforms in 1990, combined with the liberalization of import restrictions and duties on silver beginning in 1993, were partially responsible for the surge in demand. The latter action had a profound effect on consumption. Demand in India almost doubled from 1807.7 t in 1992 to 3417.3 t in 1993, according to data from the Silver Institute.

## STOCKS

Silver stocks are held in a variety of forms ranging from consumer inventories (e.g., jewellery, coins, etc.) to bullion held by dealers, trading warehouses (such

as COMEX,<sup>1</sup> the Tokyo Commodity Exchange and the Chicago Board of Trade), the government (e.g., the U.S. Defense stockpile), banks, refiners, and others. Data from the Silver Institute indicate that the identifiable portion of these stocks have declined by approximately 45% from 1990 through 1996. More specifically, COMEX year-end stocks have declined at a rate of about 3100 t/y since 1992, with the exception of 1996 when COMEX began reporting inventories held by Wilmington Trust. At the end of 1997, COMEX stocks stood at about 3400 t.

The supply deficit resulting from growing fabrication demand and, at times, declining mine output during this period was largely responsible for the draw-down in identifiable inventories. Silver Institute data indicate that, for the period 1992-97, total demand exceeded total supply (mine and scrap) by over 17 900 t.

## PRICES

The large build-up in stocks that occurred in the 1980s because of oversupply from by-product production placed downward pressure on prices, which bottomed out in 1992 resulting in a 19-year low in the average annual price. The average annual London Silver Market spot price for 1992 was US\$3.95/oz. Subsequently, as stocks were drawn down in response to the supply deficit between 1992 and 1997, the price rose to a nine-year high of US\$6.27/oz on December 24, 1997.

## OUTLOOK

Canada's mine production of silver is expected to decline during the next few years because of ore reserve depletion at a number of operations, including the Gibraltar copper mine in British Columbia, the Gaspé copper mine in Quebec, and the Heath Steele lead-zinc mine in New Brunswick. Production will likely stabilize around 1150 t/y before increasing in the future as base-metal prices recover and mines come on stream or re-open, such as the Faro lead-zinc mine in the Yukon.

The world's mine production of silver is forecast to increase at a rate of about 3-4% per year into the next century with the opening of new or previously closed silver-rich gold or base-metal mines. Demand will likely continue to display a similar pace of growth as economic performance improves in Asian countries. Consumption may be further enhanced in the short to medium term if the political tension between India and Pakistan results in greater demand for silver as a store of wealth in the region.

<sup>1</sup> Commodities Exchange, Inc.

In 1998, the supply deficit, although expected to be somewhat reduced from previous years because of additional new mine capacity, will continue to contribute to a draw-down of inventories and support the silver price, which is expected to average between US\$5.00 and \$6.00/oz. As inventories are further reduced in the future, primarily silver-producing mines will likely come on stream and narrow the supply deficit while providing swing capacity to moderate market fluctuations. The average annual price of silver is expected to increase and to range between \$6.00 and \$7.00/oz early in the next century.

Silver prices may vary considerably on a daily or monthly basis in the short and medium term, depending on speculative buying and selling by fund managers and others, or if world events trigger an increase in investment demand.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 65. (2) Information in this review was current as of March 31, 1998.

## TARIFFS

Item No.	Description						
		MFN	Canada GPT	USA	United States Canada	EU MFN	Japan <sup>1</sup> WTO
2616.10	Silver ores and concentrates	Free	Free	Free	Free	Free	Free
71.06	Silver (including silver plated with gold or platinum), unwrought or in semi-manufactured forms, or in powder form						
7106.10	Powder	Free	Free	Free	Free	1.5%	0.8%
7106.91	Unwrought	Free	Free	Free	Free	Free	1%
7106.92	Semi-manufactured						
	Containing by weight 92.5% or more of silver:						
7106.92.11	In bars, sheets or plates	Free	Free	Free	Free	1.5%	1-2.3%
7106.92.19	Other	7%	Free	Free	Free	0.7%	1-2.3%
	Containing by weight less than 92.5% of silver:						
7106.92.21	Containing by weight 50% or more of copper	2.5%	Free	Free	Free	0.7%	1-2.3%
7106.92.22	Containing by weight less than 50% of copper	6.5%	Free	Free	Free	0.7%	1-2.3%
7107.00	Base metals clad with silver, not further worked than semi-manufactured	3%	Free	Free	Free	1.8%	2.3%

Sources: Customs Tariff, effective January 1998, Revenue Canada; Harmonized Tariff Schedule of the United States, 1998; Worldtariff Guidebook on Customs Tariff Schedules of Import Duties of the European Union (37th Annual Edition: 1997); Customs Tariff Schedules of Japan, 1997.

<sup>1</sup> WTO rate is shown; lower tariff rates may apply circumstantially.

TABLE 1. CANADA, SILVER PRODUCTION AND TRADE, 1995-97

Item No.	1995		1996		1997P		
	(kilograms)	(\$000)	(kilograms)	(\$000)	(kilograms)	(\$000)	
<b>PRODUCTION</b> (Shipments) <sup>1</sup>							
	British Columbia	462 259	105 902	481 110	109 361	469 862	100 389
	New Brunswick	285 313	65 364	239 382	54 414	240 149	51 310
	Ontario	241 226	55 264	183 190	41 641	204 728	43 742
	Quebec	165 851	37 996	165 048	37 517	204 050	43 597
	Yukon	35 062	8 033	113 058	25 699	38 450	8 215
	Manitoba	x	x	x	x	36 071	7 707
	Northwest Territories	19 524	4 473	22 725	5 166	18 036	3 854
	Saskatchewan	x	x	x	x	732	156
	Newfoundland	165	38	1 428	325	496	106
	Total	1 244 606	285 136	1 242 846	282 510	1 212 574	259 075
<b>EXPORTS</b>							
2603.00.81, 2607.00.81, 2608.00.81, 2616.10.81, 2616.90.81	Silver contained in ores and concentrates						
	Japan	115 361	18 948	212 528	47 647	78 878	15 761
	United States	1 376	308	25 447	5 230	35 742	7 484
	Korea, Republic of	38 894	6 760	50 399	11 318	28 071	6 185
	Australia	10 301	1 782	9 691	1 804	11 144	2 425
	Italy	12 838	1 544	24 829	4 308	13 244	1 805
	Belgium	10 490	1 350	46 358	7 884	12 168	1 297
	France	6 366	659	3 497	361	6 689	694
	China	7 160	1 439	7 942	2 048	1 994	300
	Other countries	26 334	4 070	7 553	1 292	1 236	157
	Total	229 120	36 860	388 243	81 891	189 166	36 108
2603.00 2603.00.81	Copper ores and concentrates Silver content	101 619	18 965	57 765	11 882	15 396	2 400
2607.00 2607.00.81	Lead ores and concentrates Silver content	36 299	6 259	115 276	26 001	78 706	16 882
2608.00 2608.00.81	Zinc ores and concentrates Silver content	46 352	5 607	37 898	4 635	28 300	2 910
2616.10 2616.10.81 2616.90 2616.90.81	Silver ores and concentrates Silver content Precious metal ores and concentrates Silver content	44 845 6	6 028 1	177 305 -	39 374 -	66 076 688	13 772 143
71.06  7106.10 7106.91 7106.92	Silver (including silver plated with gold or platinum), unwrought or in semi-manufactured forms, or in powder form Silver powder Unwrought silver Silver in other semi-manufactured forms (including silver plated with gold or platinum)	9 435 1 114 314 86 138	1 973 256 150 20 770	1 240 1 314 896 122 683	68 303 677 28 811	603 1 131 728 148 606	152 249 630 37 904
7107.00	Base metals clad with silver, not further worked than semi-manufactured	204	31	448	83	933	127
<b>IMPORTS</b>							
2603.00.00.81, 2604.00.00.81, 2607.00.00.81, 2608.00.00.81, 2616.10.00.81, 2616.90.00.10	Silver contained in ores and concentrates						
	United States	51 312	8 556	81 071	14 836	115 204	19 911
	Peru	49 965	7 763	126 456	18 437	80 906	12 837
	Mexico	33 363	6 816	53 273	9 335	32 408	5 270
	Bolivia	19 837	2 952	15 637	2 565	10 853	1 674
	Russia	116 736	31 103	77 259	26 022	7 237	1 407
	Switzerland	304	33	-	-	4 372	863
	Chile	10 621	1 748	19 364	3 044	9 509	796
	Other countries	15 660	2 850	20 624	4 004	13 685	2 079
	Total	297 798	61 821	393 684	78 243	274 174	44 837
2603.00 2603.00.00.81	Copper ores and concentrates Silver content	24 793	4 124	46 871	7 837	46 791	8 994
2604.00 2604.00.00.81	Nickel ores and concentrates Silver content	-	-	-	-	-	-

TABLE 1 (cont'd)

Item No.		1995		1996		1997P	
		(kilograms)	(\$000)	(kilograms)	(\$000)	(kilograms)	(\$000)
<b>IMPORTS (cont'd)</b>							
2607.00	Lead ores and concentrates						
2607.00.00.81	Silver content	26 305	5 054	132 428	20 421	99 198	14 457
2608.00	Zinc ores and concentrates						
2608.00.00.81	Silver content	36 166	5 726	46 497	9 211	49 196	8 913
2616.10	Silver ores and concentrates						
2616.10.00.81	Silver content	210 523	46 915	167 841	40 764	78 971	12 468
2616.90	Precious metal ores and concentrates						
2616.90.00.10	Silver content	11	4	46	10	18	5
71.06	Silver (including silver plated with gold or platinum), unwrought or in semi-manufactured forms, or in powder form						
7106.10	Silver powder	10 642	1 739	8 364	1 989	12 016	2 318
7106.91	Unwrought silver	97 171	21 341	49 064	9 896	131 368	31 075
7106.92	Silver semi-manufactured	45 046	7 972	39 721	6 829	159 210	26 840
7107.00	Base metals clad with silver, not further worked than semi-manufactured	4 801	946	3 001	906	1 869	797

Sources: Natural Resources Canada; Statistics Canada.

– Nil; P Preliminary; x Confidential.

1 Includes silver in crude bullion obtained directly from placer workings and lode gold mines, and recoverable silver in all types of ores and concentrates shipped.

Note: Numbers may not add to totals due to rounding.

TABLE 2. CANADA, SILVER PRODUCTION, TRADE<sup>1</sup> AND CONSUMPTION, 1975, 1980, AND 1985-97

	Production <sup>2</sup>	Exports			Imports	Consumption <sup>3</sup>
		In Ores and Concentrates	Refined Silver	Total	Refined Silver	Refined Silver
(kilograms)						
1975	1 234 642	471 410	713 566	1 184 976	420 078	642 089
1980	1 070 000	396 690	881 761	1 278 451	339 180	265 938
1985	1 197 072	338 834	1 325 694	1 664 528	575 815	217 613
1986	1 087 989	373 232	1 292 552	1 665 784	169 074	312 905
1987	1 374 946	488 235	555 665	1 043 900	140 960	331 245
1988	1 443 166	448 069	1 144 120	1 592 189	119 608	457 698
1989	1 312 433	527 204	1 023 562	1 550 766	251 330	531 046
1990	1 381 257	624 756	1 269 760	1 894 516	132 630	579 407 <sup>a</sup>
1991	1 261 359	523 859	991 211	1 515 070	156 092	399 295 <sup>a</sup>
1992	1 168 968	420 196	1 054 957	1 475 153	165 527	364 470
1993	879 113	226 773	1 066 034	1 292 807	263 194	472 530
1994	740 342	146 685	1 097 226	1 243 911	202 448	420 427
1995	1 244 606	229 120	1 210 091	1 439 211	157 659	425 893 <sup>r</sup>
1996	1 242 846	388 243	1 439 267	1 827 510	100 149	408 894 <sup>r</sup>
1997P	1 212 574	189 166	1 281 870	1 471 036	304 464	..

Sources: Natural Resources Canada; Statistics Canada.

.. Not available; P Preliminary; r Revised.

<sup>a</sup> Increase in number of companies being surveyed.

1 Beginning in 1988, exports and imports are based on the new Harmonized System and may not be in complete accordance with previous method of reporting. Ores and concentrates include HS classes 2603.00.81, 2607.00.81, 2608.00.81, 2616.10.81 and 2616.90.81. Refined silver includes HS classes 7106.10, 7106.91, 7106.92 and 7107.00. 2 Includes silver in crude bullion obtained directly from placer workings and lode gold mines, and recoverable silver in all types of ores and concentrates shipped. 3 Some years include only partial consumption for coinage.

**TABLE 3. WORLD MINE PRODUCTION OF SILVER, 1993-97**

	1993	1994	1995	1996	1997
	(tonnes)				
<b>EUROPE</b>					
Finland	29.3	26.1	27.1	33.8	32.2
Greece	59.2	44.9	45.0	16.1	35.9
Ireland	13.0	17.3	13.7	14.2	12.4
Portugal	36.0	31.8	38.6	34.0	33.9
Spain	180.0	175.0	123.6	65.9	65.9
Sweden	298.8	275.2	268.2	271.9	282.5
Yugoslavia, Former	25.1	18.3	31.1	68.8	42.6
Other Europe	20.2	18.8	19.6	14.0	9.3
<b>Total</b>	<b>661.6</b>	<b>607.4</b>	<b>566.9</b>	<b>518.7</b>	<b>514.7</b>
<b>AFRICA</b>					
Morocco	306.8	332.8	204.4	199.6	262.0
Namibia	71.7	64.0	69.0	42.4	33.5
South Africa	192.6	195.6	174.3	167.9	153.1
Zambia	18.1	12.1	8.4	9.6	6.9
Zimbabwe	16.8	10.9	10.9	10.8	4.3
Other Africa	15.3	5.3	5.3	5.3	5.3
<b>Total</b>	<b>621.3</b>	<b>620.7</b>	<b>472.3</b>	<b>435.6</b>	<b>465.1</b>
<b>ASIA</b>					
India	51.2	50.3	39.8	27.8	48.1
Indonesia	90.3	106.0	260.5	228.0	228.0
Japan	136.9	133.7	100.1	85.1	87.2
Malaysia	14.0	13.3	11.1	9.0	9.6
Philippines	32.5	31.9	31.1	25.1	19.6
Other Asia	89.4	172.1	164.6	164.0	161.9
<b>Total</b>	<b>414.3</b>	<b>507.3</b>	<b>607.2</b>	<b>539.0</b>	<b>554.4</b>
<b>AMERICAS</b>					
Canada	879.1	740.3	1 244.6	1 242.8	1 212.6
United States	1 640.0	1 480.0	1 450.0	1 430.0	1 661.0
Argentina	42.7	38.0	47.8	50.4	50.4
Bolivia	332.8	352.1	452.0	384.0	386.0
Brazil	160.0	150.0	145.0	140.0	140.0
Chile	985.0	959.2	1 037.8	1 129.9	1 088.0
Dominican Republic	1.7	9.2	21.1	17.1	13.7
Honduras	24.2	27.6	30.2	36.4	40.4
Mexico	2 416.0	2 334.0	2 495.0	2 498.6	2 672.8
Peru	1 621.2	1 666.7	1 908.3	1 949.0	2 058.8
Other Americas	10.0	8.6	3.7	3.0	2.9
<b>Total</b>	<b>8 112.7</b>	<b>7 765.7</b>	<b>8 835.5</b>	<b>8 881.2</b>	<b>9 326.6</b>
<b>OCEANIA</b>					
Australia	1 152.0	1 045.0	920.0	1 020.0	1 106.0
Papua New Guinea	96.1	65.7	65.2	59.0	49.2
Other Oceania	25.8	27.6	27.8	30.0	30.0
<b>Total Oceania</b>	<b>1 273.9</b>	<b>1 138.3</b>	<b>1 013.0</b>	<b>1 109.0</b>	<b>1 185.2</b>
<b>Total</b>	<b>11 083.8</b>	<b>10 639.4</b>	<b>11 494.9</b>	<b>11 483.5</b>	<b>12 046.0</b>
<b>OTHER COUNTRIES</b>					
Bulgaria	30.0	29.0	30.0	25.0	25.0
Poland	767.0	819.0	964.0	933.0	579.5
Romania	18.0	18.0	18.0	18.0	18.0
Kazakstan	450.0	408.4	402.1	414.3	389.3
Russian Federation	300.0	250.0	250.0	250.0	250.0
Uzbekistan	150.0	150.0	150.0	150.0	150.0
China, People's Republic of	840.6	812.0	918.0	918.0	918.0
Korea, D.P.R.	250.0	200.0	200.0	200.2	200.4
<b>Total</b>	<b>2 805.6</b>	<b>2 686.4</b>	<b>2 932.1</b>	<b>2 908.5</b>	<b>2 530.2</b>
<b>World total</b>	<b>13 889.4</b>	<b>13 325.8</b>	<b>14 427.0</b>	<b>14 392.0</b>	<b>14 576.2</b>

Sources: Natural Resources Canada; World Bureau of Metal Statistics.

**TABLE 4. AVERAGE ANNUAL SILVER PRICES, 1975-97**

Year	United States	United Kingdom
	(US\$/oz)	
1975	4.42	4.43
1976	4.35	4.35
1977	4.62	4.63
1978	5.40	5.42
1979	11.09	11.07
1980	20.63	20.98
1981	10.52	10.49
1982	7.95	7.92
1983	11.44	11.43
1984	8.14	8.15
1985	6.14	6.13
1986	5.47	5.47
1987	7.01	7.02
1988	6.54	6.53
1989	5.50	5.50
1990	4.82	4.83
1991	4.05	4.06
1992	3.94	3.95
1993	4.30	4.31
1994	5.29	5.26
1995	5.19	5.20
1996	5.19	5.20
1997	4.88	4.90

Sources: *Handy & Harman*; London Silver Market.

**TABLE 5. CANADIAN CONSUMPTION<sup>1</sup> OF UNMANUFACTURED SILVER, 1990-96**

	1990 <sup>d</sup>	1991 <sup>d</sup>	1992	1993	1994	1995	1996 <sup>p</sup>
	(kilograms)						
Coinage	115 417	64 175	64 096	118 614	x <sup>a</sup>	x <sup>a</sup>	x <sup>a</sup>
Sterling and electroplating	8 290	12 913	12 266	12 214	21 759	23 092 <sup>r</sup>	21 151 <sup>r</sup>
Silver alloys	16 734	13 357	14 210	5 346	12 851	11 316	9 347
Chemicals - silver salts and others	102 832	105 260	96 453	x <sup>a</sup>	x <sup>a</sup>	x <sup>a</sup>	x <sup>a</sup>
Wire, rod and sheet	13 782	7 604	9 746	4 821	2 488	1 930	2 200
Other uses	322 352	195 987	167 701	331 535 <sup>c</sup>	383 330 <sup>b</sup>	389 555 <sup>b</sup>	376 196 <sup>b</sup>
Total	579 407	399 295	364 470	472 530	420 427	425 893 <sup>r</sup>	408 894 <sup>r</sup>

Source: Natural Resources Canada.

<sup>p</sup> Preliminary; <sup>r</sup> Revised; x Confidential.

<sup>a</sup> Included in "Other Uses" to avoid disclosing confidential data. <sup>b</sup> Includes coinage and silver salts. <sup>c</sup> Includes silver salts. <sup>d</sup> Increase in number of companies being surveyed.

<sup>1</sup> Available data as reported by consumers.

Note: Numbers may not add to totals due to rounding.