

# Tin

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World mine production of tin was expected to be about 197 000 t in 1996, compared to 186 200 t in 1995, due to capacity expansions in Indonesia, Peru and Australia. World tin metal production was forecast to be about 206 000 t in 1996, compared to 205 600 t in 1995, with new smelter capacity in Peru and Indonesia.

The settlement price of tin on the London Metal Exchange (LME) averaged US\$2.80/lb in 1996 compared to \$2.82/lb in 1995. Tin prices were influenced by events in the markets of other base metals, particularly copper, and by lacklustre demand.

The Association of Tin Producing Countries (ATPC) discontinued its system of export quotas after mid-year and lost two members (Thailand and Australia).

## CANADIAN DEVELOPMENTS

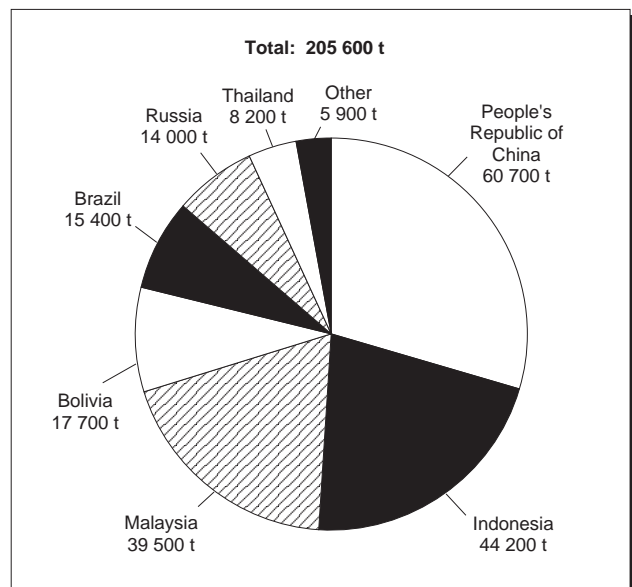
Adex Mining Corp. initiated a \$2 million feasibility study on its Mount Pleasant tin-tungsten-indium project in New Brunswick after Malaysia Smelting Corporation Berhad became a major shareholder of Adex with a \$28 million share placement in April. With the decline in domestic tin concentrate production in recent years, Malaysia Smelting Corporation has actively sought offshore sources of feed for its Butterworth, Malaysia, tin smelter. The remaining \$26 million was to be used toward the \$42 million cost of re-establishing mining operations at the former tungsten-molybdenum producer pending a positive production decision. By year-end a production decision was still pending. Mount Pleasant contains nine polymetallic zones including the North Zone (7.1 Mt grading 0.6% tin, 0.7% zinc and 91 g/t indium) and the Fire Tower Zone (9 Mt grading 0.03% tin, 0.1% zinc and 31 g/t indium). Mount Pleasant is North America's largest tin deposit and the world's largest reserve of indium.

There are currently no tin mines or smelters operating in Canada. Canada's consumption of refined tin in 1995 was 3044 t.

## WORLD DEVELOPMENTS

World mine production of tin was expected to total about 197 000 t in 1996, about 6% higher than in 1995, as production problems in China from severe flooding were more than offset by increases in Indonesia, Peru and Australia. Tin metal production was forecast to be slightly higher than the 205 600 t produced in 1995 with a new Peruvian smelter starting up in October. Demand for tin was expected to be about 210 000 t, over 4% lower than in 1995, but enough to result in a 1400-t reduction in LME stocks in 1996 to 10 600 t by the end of the year.

Figure 1  
World Production of Tin Metal, 1995<sup>P</sup>



Source: *World Nonferrous Metal Statistics*.

<sup>P</sup> Preliminary.

## China

China remained the world's leading producer of tin in concentrate in 1995 with a total of 51 600 t. In 1996, production was expected to be around 45 000 t of tin in concentrate as severe flooding caused production problems in June and July. Tin mining in China is also experiencing higher costs as operations shift from placer deposits to underground mining. Investment in equipment and technology has not kept pace with this transition.

The Gejiu tin mine of Yunnan Tin Corp. was damaged by floods in June and July, which resulted in some lost production. Flooding also forced the closure of several small tin mines in Guangxi Province. This situation compounded an already critical shortage of tin concentrates to the company's 30 000-t/y tin smelter in Yunnan Province, which forced Yunnan Tin to halve its production rate in May. Heavy flooding also forced the suspension of production for several weeks at Dacheng Mining Administration's Liuzhou tin smelter in Guangxi Province, which has a capacity of 3600 t/y of tin. The company's Laibin smelter, also in Guangxi Province, with a capacity of 10 000 t/y of tin, was unaffected.

China ranked first in the world in tin metal production in 1995 with a total of 60 700 t, but production in 1996 was expected to be substantially lower.

China exported 44 400 t of refined tin and tin alloys in 1995. This amount exceeded by 122% China's export quota assigned to it by the ATPC and resulted in China tightening export restrictions in 1996. Lower production and increased domestic demand in 1996 resulted in lower tin exports. For the first half of the year, Chinese tin exports were about 10 500 t, an amount below the half-year quota of 12 500 t set by the ATPC. However, exports for the entire year totalled 36 100 t.

## Indonesia

Indonesia remained second in world tin mine production in 1995, accounting for 38 400 t of tin in concentrate. Tin metal production in 1995 was 44 200 t, which lifted Indonesia past Malaysia as the world's second most important producer.

Indonesia's major tin producer, PT Tambang Timah, completed an expansion of operations in 1996 that followed the installation of additional mine capacity and the commissioning of a new 13 000-t/y tin smelter in 1995 by the country's second largest tin producer, Renison Goldfields Consolidated Ltd. Tambang Timah commissioned a seventh furnace in November at its tin smelter on Bangka Island, raising its capacity to 48 500 t/y of refined tin. The company plans to reach an output of 47 000 t/y by 1997. To meet the increased demand for tin concentrate, Tambang Timah is developing two additional dredging operations to add to the 21 currently in operation

for a total capacity of 50 000 t/y of tin in concentrate by 1999. The shift to offshore dredging from inland operations has allowed Tambang Timah to lower its mine production costs.

## Malaysia

Malaysian mine production decreased for the sixth consecutive year from 32 000 t/y of tin in concentrate in 1989 to 6400 t/y in 1995. Malaysian mining companies faced rising production costs, declining grades and continued low tin prices. In March, the Malaysian government removed a 25% subsidy on power costs that was first initiated in 1985.

Despite a 3.7% increase in tin metal production in 1995 to 39 500 t, Malaysia slipped from second to third place behind China and Indonesia. Malaysia Smelting Corp. tripled its electrolytic tin capacity to 360 t/y early in the year. The 99.99%-pure electrolytic tin is used in solder for electronic applications. Malaysia Smelting Corp. operates a tin smelter at Butterworth with a nameplate capacity of 60 000 t/y of refined tin in grades of 99.85% tin or higher. Its actual production is currently about 24 000 t/y.

## Brazil

Brazil produced 19 400 t of tin in concentrate in 1995, which was down slightly from 1994, and a decline for the sixth consecutive year. Meanwhile, tin metal production fell for the third consecutive year to 15 400 t in 1995. Brazil ranked fourth and fifth in world tin-in-concentrate and metal production respectively in 1995.

Parapanema SA was reorganized early in the year following its acquisition by a group of pension funds, a steel mill and other shareholders. In addition to Parapanema, the group also acquired copper producer Caraiba Metais S.A., copper fabricator Eluma, and the nonferrous metals company Companhia Paraibuna de Metais under a new holding company named Companhia Brasileira de Metais Nao-Ferrosos. Following the merger, Parapanema planned to increase production over two years to a rate of 20 000 t/y of tin in concentrate from the 12 300 t produced in 1995.

Parapanema moved to further cut operating costs, announcing that it planned to move its 25 000-t/y tin smelter from Sao Paulo to the Pitinga mine site in Amazonas State. The company is also developing a new two-stage smelting process to replace the current three-stage process.

Two of Brazil's leading tin smelting companies, Best Metais e Soldas and Companhia Estanifera do Brasil (Cesbra), moved portions of existing tin smelting operations to their 3600-t/y smelter in Rondonia State. The new smelter opened in 1995 under an equal joint venture between the two companies. Best

Metals ceased producing tin metal at its Sao Paulo smelter and moved part of its operations to the new Rondonia smelter. Likewise, Cesbra moved part of the tin smelting operations of its Volta Redonda smelter in Rio de Janeiro State to the Rondonia site.

## Peru

Tin mine production in Peru has continued to rise in recent years as the country's sole tin producer, Minsur SA, increased throughput at its San Raphael mine in 1995. Its mine production in 1995 was 22 300 t of tin in concentrate, compared to 4800 t in 1990.

Minsur's new tin smelter began operating in September with commissioning in October. The new smelter employs the Australian Ausmelt process and has an initial capacity of 15 500 t/y of tin grading 99.9% tin. Some development problems were encountered as Minsur's smelter is the first greenfield tin smelter to use the Ausmelt process. Concentrates from the San Raphael mine that in previous years were exported to Bolivian smelters are now treated at the new smelter located 240 km south of Lima on the coast of Peru.

## Bolivia

Bolivia produced 14 400 t of tin in concentrate in 1995, ranking it fifth in the world. The country was fourth in metal production, producing 17 700 t.

The planned privatization of the 21 000-t/y Vinto tin smelter of state-owned Empresa Metalurgica Vinto S.A. was postponed. The eventual privatization of Vinto will include joint-venture agreements to exploit the country's largest tin mines, Huanuni and Colquiri, which are owned by state-owned Corporation Minera de Bolivia (Comibol).

Much of Bolivia's tin mine production originates from small to medium-sized mines, some operated by miners' cooperatives. Bolivia is seeking investment for larger-scale mining projects with the commitment to invest in such projects being a condition of the privatization of state-owned mining and smelting assets.

## United States

The Defense Logistics Agency (DLA) sold 11 925 t of tin in fiscal year 1996 (ending October 1, 1996) out of an authorized 12 000 t. The total included the sale of 5000 t in September under a long-term contract. Under the Consolidated Annual Materials Plan for fiscal year 1997, the DLA is again authorized to sell 12 000 t of tin. It is also replacing daily tin sales with once-monthly sales of up to 200 t, as well as with long-term contracts of up to 5000 t in January and again in July 1997.

## Other

Norminco Ltd. announced in early April that it had restarted production at its Leichhardt Creek alluvial tin mine in Australia. The dredging operation was closed in early January 1996 due to groundwater problems. In January 1997, Norminco was placed into receivership and operations at the mine were, once again, discontinued. The mine had been producing at a rate of 1 t/d of tin in concentrate before operations were suspended.

The future of Zimbabwe Mining and Development Corporation's (ZMDC) Kamativi tin mine in Zimbabwe remained unclear as a group of local investors who planned to re-open the mine failed to present a concrete proposal to ZMDC. The Kamativi mine ceased production in 1994 after several years of financial losses. A final decision on the mine's closure is expected in mid-1997.

In the United Kingdom, South Crofty Holdings Ltd. completed an operational review of its South Crofty tin mine in Cornwall after a \$9 million improvement project of shaft deepening, diamond drilling and equipment replacement. Mine throughput, ore grades and mill recoveries have all increased as a result of the improvements and the company expects the mine to return to profitability in the near future.

## RECYCLING

Efforts continue to be made to improve the recycling rate for tin-plated steel containers. Magnetic recycling provides an efficient means of extracting steel cans from municipal solid waste streams. For every tonne of steel scrap that is put into a steel furnace, direct savings of 1.5 t of iron ore and 0.5 t of coke result, as well as a 70% energy saving and a 40% water saving.

According to the Canadian Steel Can Recycling Council, steel cans made from domestically produced steel and consumed in Ontario reached a recycling rate in excess of 77% in 1995, slightly higher than the rate in 1994. The high recycling rate is primarily a result of the blue box curbside collection system that has existed in Ontario for several years.

Steel cans are cheaper to manufacture than aluminum cans. They are also easy to recycle, do not require detinning when reintroduced into the furnace, and aluminum tops for the cans provide the aluminum that steel-makers use to remove oxygen in the remelting process.

In the United States, according to the Steel Recycling Institute, more than 17.8 billion steel cans were recycled in 1995, resulting in a recycling rate of 56%. This compares to a rate of 53% in 1994, 48% in 1993,

41% in 1992 and 34% in 1991. The U.S. steel industry's current goal is for an overall recycling rate of 66%. In Europe, the recycling rate for steel cans reached 40% in 1995 compared to 34% in 1994. Steel is therefore well above the recycling target of 15% by 2001 set under the European Packaging and Waste Directive.

The lowest rate of recycling for steel cans is in the general line, which includes containers for such products as paints, varnish and aerosols. Once only collected through household hazardous waste collection programs or magnetically at some specialized facilities, more of these cans are now being recycled through curbside and drop-off recycling programs. The Steel Recycling Institute has called for the increased recycling of general-line steel containers in the United States.

Researchers at the University of Connecticut have developed a high-temperature electrochemical process using potassium stannate to detin food containers that are usually difficult to process because of the enamels used to coat them.

## INTERNATIONAL ORGANIZATIONS

### The Association of Tin Producing Countries

The Association of Tin Producing Countries (ATPC) is an organization of tin-producing states which, at the beginning of 1996, comprised China, Malaysia, Indonesia, Thailand, Bolivia, Australia, Zaire and Nigeria. The ATPC began a supply rationalization scheme in March 1987. Its objective was to accelerate the absorption of the huge tin inventories caused by the cessation of International Tin Council buffer stock operations and to prevent further price declines. The program involved the establishment of yearly export quotas among its members.

Although tin stocks have fallen dramatically from 73 000 t at the beginning of the scheme to 25 000 t at the end of 1995, many believe that, in recent years, free market conditions have been responsible for stock declines, not ATPC quotas. China, for example, greatly exceeded its ATPC quotas in 1994 and 1995. After debate by member countries over the effectiveness of continuing the scheme, the ATPC decided in September 1995 to scrap export quotas after June 1996.

Two ATPC members, Thailand and Australia, left the organization at the end of 1996. Thailand's decision was prompted by the country becoming a net importer of tin, while Australia indicated that its decision reflected Australia's commitment to end export controls. Brazil, which is currently not a member of the organization but which observed ATPC quotas in 1995 and during the first half of 1996, still intends to join the ATPC.

### ITRI Ltd.

ITRI Ltd., formerly the International Tin Research Institute, is entrusted with the task of maintaining and extending the use and effectiveness of tin in modern technology. Its headquarters and laboratories are in Uxbridge, England. Formerly funded by ATPC member countries, the organization was privatized as of January 1, 1995. As a result, private tin-producing companies are now responsible for funding and any liabilities arising from research and development activities. Well over 50% of the world's tin production is represented by ITRI Ltd. members with ongoing efforts to increase this percentage. ITRI Ltd.'s goal is to create an additional 20 000-30 000 t/y of tin consumption within three years.

ITRI Ltd. is currently concentrating on research in a number of end-use fields such as tin-based flame retardants and smoke suppressants, lead-free solders and solderable coatings for use in electronics, new plating techniques for tinplate applications, lead-free high-tin alloy capsules for wine and spirit bottles, and tin as a replacement for lead in shot for shotgun cartridges. The interest in lead-free solders arises from concerns about the disposability of electronic components. In the ammunition application, promising ballistic trials have been completed.

ITRI Ltd. has also commercialized a cyanide-free tin-zinc plating system known as Stanzec (75% tin, 25% zinc). Commercial development of the Stanzec plating process has recently been completed and is now ready for testing. The alloy is considered to be a cheaper, environmentally friendly anti-corrosion coating on steel. Applications are also expected in fasteners for the automotive and aerospace industries.

## CONSUMPTION AND USES

World tin consumption was 220 300 t in 1995, a 4% increase over 1994. The greatest increase was in Asia, particularly China, where demand in tinplate and solder applications is particularly strong. Consumption in 1996 was expected to be about 5% lower than in 1995 as some inventories built up in 1995 were consumed during the first half of 1996.

Solder is the largest market for tin and currently represents approximately one third of tin consumption in the Western World. In Canada it accounts for about 52% of tin consumption. Strong growth in the electronics industry, which accounts for over 50% of tin used in solders, has provided a new impetus for tin use. Increasing miniaturization in electronics has led to the development of higher-quality solder pastes capable of finer printings. Increasing environmental concerns over the lead content in solders have resulted in research and development of lead-free products for the electronics industry to meet possible future legislation. In recent years, the demand for

tin with a purity of 99.99% has increased for electronic applications.

The amount of tin in solder depends on the application, with the current average being 30-70%. In tin-lead solders, tin is the active metal forming the bond with the metals being joined. The lead serves to lower the melting point of the solder. For higher-temperature applications, alloys of high tin content (above 95% tin) are often used. The tin is alloyed with small amounts of antimony or silver. Metals such as bismuth or indium may be added to tin-based solders to lower the melting point. Such solders are known as fusible alloys. One such alloy is Indalloy 227, which has a composition of 77.2% tin, 20% indium and 2.8% silver.

Tinplate is the second most important use and accounts for almost one third of world tin metal consumption and 35% of Canadian consumption. Tinplate use in the canning industry has been under severe competitive pressure from aluminum, except for large containers where, due to rigidity problems with aluminum, tin-plated steel is still preferred. Can manufacturers in Canada and the United States have increasingly switched to aluminum in the production of beverage cans. However, the volatility of aluminum prices has led can manufacturers in Europe to consider switching back to tin-plated steel.

Tin-plated steel's share of the European beverage can market has risen from 20% to over 50% in the last two years. Major reasons for this are volatile aluminum prices, efforts to reduce the weight of steel cans, and a more aggressive marketing effort to inform consumers of the high magnetic recovery rate of tinplate from domestic waste. Tin-plated steel still only represents about 16% of the worldwide beverage can market; however, this percentage is expected to grow in the future.

Tinplate is also capturing a larger share of the growing aerosol can market which, in 1995, represented 8.6 billion units. Tinplate's increased popularity is due to the same reasons as for its growth in the beverage can market.

Tinplate competition also comes from non-tin-coated steels, polymer-coated steel, and tin-free steel (TFS). TFS is steel plate that is electrolytically coated with a thin layer of metallic chrome and chrome oxide.

Tin is also used in an array of inorganic and organic chemicals. The largest application for organo-tin compounds is for the heat stabilization of plastic (polyvinyl chloride), which is used as pipe and conduit, house siding and fittings. In recent years, tin has captured a growing share of this application due to health concerns over the use of lead. Heat-stabilized polyvinyl chloride contains 6-17% tin. Organo-tin compounds are also used in agricultural pesticides, in anti-fouling paints for ships, and in biocidal compounds for the protection of materials such as paints, textiles and building materials.

Recent research has shown the effectiveness of tin-based compounds as flame and smoke inhibitors. As fire retardants, these compounds are non-toxic, safe and easy to handle, and have a wide range of applications. Two such compounds, zinc hydroxystannate and zinc stannate, are being marketed worldwide for use as fire retardants and smoke inhibitors for polymeric materials. Tin is also used for tinning (which includes electronic uses, hot dipping and electroplating in the electronics industry), in the manufacture of pewterware, and in bronze, brass and other tin-containing alloys.

Indium-tin oxide is a vital component in computer display panels. A rapid expansion in the market for display technology in uses such as liquid crystal displays in laptop computers and televisions has increased the demand for tin.

Tin-containing alloys are used in construction, machinery and equipment, consumer durables and non-toxic bismuth-tin shot. Tin-zinc alloys are known for their corrosion resistance. A recently developed and commercialized tin-nickel alloy electroplating process has led to coatings that are characterized by their hardness, good lubricating qualities and attractive appearance. The requirement for environmentally safe plating systems and finishes has, as with most other applications of tin, resulted in increased research into developing and promoting tin-based products as non-toxic materials.

Tin capsules are suitable in wine-bottling because they are considered to be non-toxic, are easily adapted to existing capping technology, form an attractive, high-quality product, and can be easily and safely opened.

## PRICES AND STOCKS

The tin settlement price on the LME began the year at US\$2.86/lb and remained in the \$2.80-\$2.90/lb range through January and the first half of February on speculative buying and decreases in LME stocks. The price of tin fell to \$2.69/lb on March 7, but fund buying and the influence of copper on tin markets again strengthened tin prices, which rose to the year's high of \$3.00/lb on April 23. Some Chinese selling into world tin markets occurred at this time as the China National Nonferrous Metals Import and Export Corporation indicated in late March that \$2.90/lb would be China's minimum selling price.

The price of tin fell sharply in mid-May following events in copper markets and it experienced short rallies to \$2.90/lb on July 4 and \$2.81/lb on September 3 before falling below \$2.70/lb in October due to lacklustre demand and speculative selling. The price reached the year's low of \$2.58/lb on December 30 and closed 1996 at \$2.62/lb. The average price of tin on the LME for 1996 was US\$2.80/lb.

LME tin stocks stood at 12 000 t at the beginning of 1996. They decreased modestly throughout 1996 to close the year at 10 600 t. World tin stocks were estimated by the World Bureau of Metal Statistics to be 22 400 t at the end of October 1996.

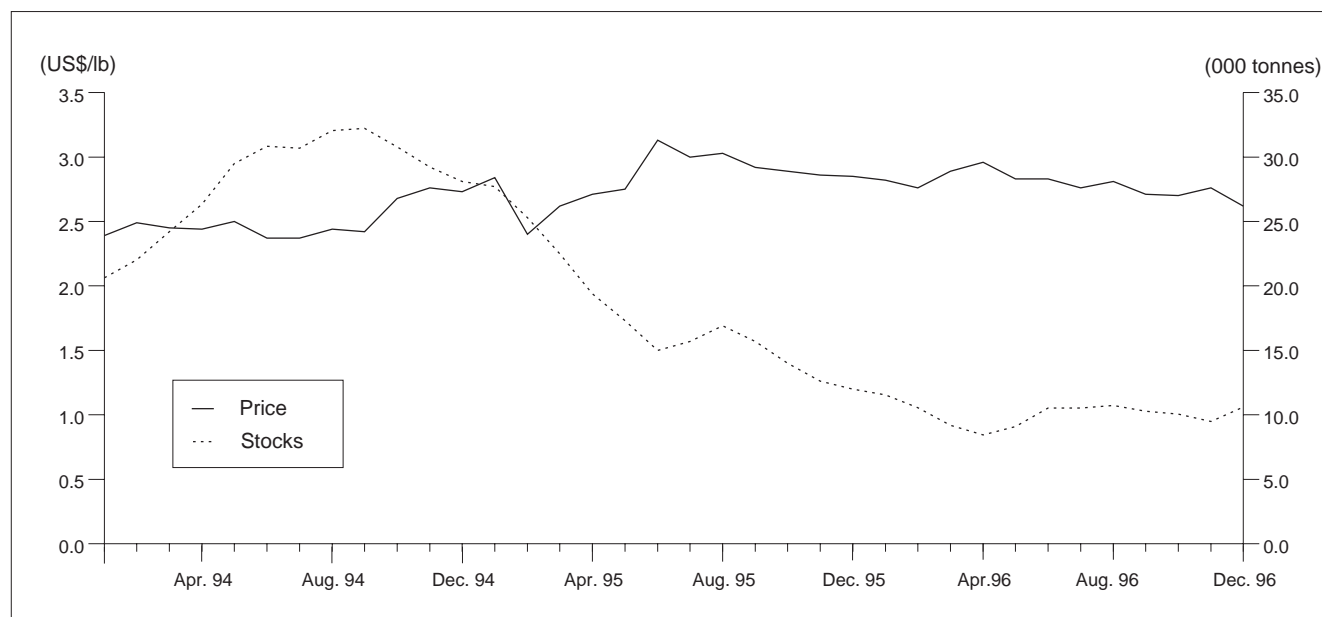
## OUTLOOK

World demand for tin is forecast to grow by about 2% in 1997 with tinplate recapturing a modest amount of the beverage can market lost in recent years to aluminum, and with increased demand for low-lead solder in the electronics industry. However, a portion of this growth will likely be offset by increased metal production from Indonesia and Peru. China may also export more tin to Western markets with no further ATPC quotas in place.

China will again likely have a major influence on tin markets in 1997. The country is believed to have a surplus of domestic tin metal stocks, and exports could increase with any sustained price increases. Despite these factors, a very small metal deficit and a corresponding decrease in world tin stocks is forecast. With the potential buffering mechanism of increased Chinese exports and lacklustre demand, the price of tin is forecast to improve only modestly in 1997. It will also likely continue to be influenced by developments in the markets of other base metals, particularly copper. The tin price is predicted to average US\$2.80/lb in 1997.

*Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 70. (2) Information in this review was current as of January 31, 1997.*

**Figure 2**  
**LME Tin Stocks vs. LME Settlement Prices, 1994-96**



Sources: Reuters; World Nonferrous Metal Statistics.

Note: End-of-month data.

## TARIFFS

Item No.	Description	Canada			United States	EU	Japan <sup>1</sup>
		MFN	GPT	USA	Canada	MFN	GATT
2609.00	Tin ores and concentrates	Free	Free	Free	Free	Free	Free
7204.30	Waste and scrap of tinned iron or steel	Free	Free	Free	Free	Free	Free
8001.10	Tin, not alloyed	Free	Free	Free	Free	Free	Free
8001.20	Tin alloys						
8001.20.10	Tin-antimony alloys	Free	Free	Free	Free	Free	2.8%
8001.20.20	Tin-lead-antimony alloys	Free	Free	Free	Free	Free	2.8%
8001.20.90	Other	Free	Free	Free	Free	Free	2.8%
8002.00	Tin waste and scrap	Free	Free	Free	Free	Free	Free
8003.00	Tin bars, rods, profiles and wire						
8003.00.10	Bars and rods, not alloyed or of tin-antimony alloys	Free	Free	Free	Free	1.3%	3.2%
8003.00.20	Bars and rods, of tin-lead-antimony alloys	3.4%	Free	Free	Free	1.3%	3.2%
8003.00.30	Bars and rods, of phosphor-tin alloys	3.4%	1%	Free	Free	1.3%	3.2%
8003.00.40	Wire of tin-lead alloys (tinsel) for use in the manufacture of braids, cords, tassels, ribbons or trimmings	Free	Free	Free	Free	1.3%	3.2%
8003.00.50	Bars and rods, of other alloys; profiles; other wire	3.4%	1%	Free	Free	1.3%	3.2%
8004.00	Tin plates, sheets and strip, of a thickness exceeding 0.2 mm						
8004.00.10	Of tin-lead-antimony alloys	2%	Free	Free	Free	1%	3.2%
8004.00.20	Of phosphor-tin alloys	2%	Free	Free	Free	1%	3.2%
8004.00.90	Other	2%	Free	Free	Free	1%	3.2%
8005.00.10	Tin foil of a thickness (excluding any backing) not exceeding 0.2 mm	Free	Free	Free	Free	1.6%	4.1%
8005.00.20	Tin powders, not alloyed	3.2%	Free	Free	Free	1.2%	4.1%
8005.00.30	Tin alloyed powders, flakes	3.1%	3%	Free	Free	1.2%	4.1%
8006.00	Tin tubes, pipes and tube or pipe fittings (i.e., couplings, elbows, sleeves)	2%	Free	Free	Free	1.8%	4.1%
8007.00	Other articles of tin	5.9%	3%	1%	0.3-0.4%	2.1%	4.7%

Sources: Customs Tariffs, effective January 1997, Revenue Canada; Harmonized Tariff Schedule of the United States, 1997; The "Bulletin International des Douanes," Journal No. 14 (18th Edition), European Union, 1995-1996, "Conventional" column; Customs Tariff Schedules of Japan, 1996.

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

Note: Where there is a tariff "range," a complete match of the HS code was not available; therefore, the high and low for the product in question are shown.

**TABLE 1. CANADA, TIN PRODUCTION AND TRADE, 1995 AND 1996, AND CONSUMPTION, 1994 AND 1995**

Item No.		1995		1996P	
		(tonnes)	(\$000)	(tonnes)	(\$000)
<b>PRODUCTION</b>					
	Tin content of tin concentrates and lead-tin alloys	-	-	-	-
<b>EXPORTS</b>					
2609.00	Tin ores and concentrates				
	Malaysia	47	145	-	-
	Brazil	-	-	-	-
	Total	47	145	-	-
7204.30	Waste and scrap of tinned iron or steel				
	United States	13 330	2 171	34 831	4 830
	Other countries	329	140	579	196
	Total	13 659	2 311	35 410	5 026
8001.10	Tin, not alloyed, unwrought				
	United States	196 <sup>r</sup>	1 841 <sup>r</sup>	270	2 359
	South Korea	-	-	2	15
	Total	196 <sup>r</sup>	1 841 <sup>r</sup>	272	2 374
8001.20	Tin alloys, unwrought				
	United States	925	6 237	1 110	7 067
	Other countries	-	-	...	6
	Total	925	6 237	1 110	7 073
8002.00	Tin waste and scrap				
	United States	15 048	3 573	5 898	1 745
	Other countries	21	9	21	9
	Total	15 069	3 582	5 919	1 754
8003.00	Tin bars, rods, profiles and wire				
	United States	419	3 432	564	4 260
	Other countries	-	-	3	21
	Total	419	3 432	567	4 281
8004.00	Tin plates, sheets and strip, of a thickness exceeding 0.2 mm				
	United States	28	41	58	96
	United Kingdom	4	93	3	65
	Other countries	1	21	1	23
	Total	33	155	62	184
8005.20	Tin powders and flakes				
	South Korea	1	43	-	-
	Other countries	...	16	-	-
	Total	1	59	-	-
8006.00	Tin tubes, pipes, and tube or pipe fittings	-	-	-	-
8007.00	Tin articles, n.e.s.				
	United States	..	5 190	..	2 926
	Other countries	..	3 186 <sup>r</sup>	..	1 626
	Total	..	8 376 <sup>r</sup>	..	4 552



TABLE 1 (cont'd)

Item No.		1995		1996 <sup>P</sup>	
		(tonnes)	(\$000)	(tonnes)	(\$000)
<b>IMPORTS</b>					
2609.00	Tin ores and concentrates	5	54	–	–
7204.30	Waste and scrap of tinned iron or steel	4 195	428	3 166	640
8001.10	Tin, not alloyed, unwrought	4 292	36 528	4 089	34 812
8001.20.10	Tin-antimony alloys	16	138	35	273
8001.20.20	Tin-lead-antimony alloys	96	766	206	1 440
8001.20.90	Other tin alloys	90	821	129	1 079
8002.00	Tin waste and scrap	319	1 120	489	1 452
8003.00.10.10	Tin bars and rods, not alloyed	15	140	12	97
8003.00.30	Tin bars and rods, of phosphor-tin alloys	. .	11	–	–
8003.00.50	Tin bars and rods, of other alloys; profiles; other wire	68	677	110	1 066
8004.00	Tin plates, sheets and strip, of a thickness exceeding 0.2 mm	106 <sup>r</sup>	950 <sup>r</sup>	79	728
8005.20.10	Tin powders, not alloyed	8	97	–	–
8005.20.20	Tin alloyed powders, flakes	47	879	–	–
8006.00	Tin tubes, pipes, and tube or pipe fittings	23	221	14	136
8007.00.00.10	Other articles of tin, anodes for electroplating	12	122	12	147
8007.00.00.20	Tin cooking utensils	}	13 068 <sup>r</sup>	. .	12 546
8007.00.00.30	Collapsible tubes				
8007.00.00.99	Tin articles, n.e.s.				
		<b>1994</b>		<b>1995</b>	
		(tonnes)			
<b>CONSUMPTION<sup>1</sup></b>					
	Solder	1 608		1 570	
	Tinplate and tinning	1 145		1 056	
	Babbitt	157		164	
	Bronze	120		155	
	Other uses (including collapsible containers, foil, etc.)	112		99	
	Total	3 142		3 044	

Sources: Natural Resources Canada; Statistics Canada.

– Nil; . . Not available or not applicable; . . . Amount too small to be expressed; n.e.s. Not elsewhere specified;

<sup>P</sup> Preliminary; <sup>r</sup> Revised.

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

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

**TABLE 2. CANADA, TIN PRODUCTION, TRADE<sup>1</sup> AND CONSUMPTION, 1975, 1980 AND 1985-96**

	Production <sup>2</sup>	Exports <sup>3</sup>	Imports <sup>4</sup>	Consumption <sup>5</sup>
(tonnes)				
1975	319	1 052	4 487	4 315
1980	243	883	4 527	4 517
1985	119	358	3 696	3 511
1986	2 356	3 727	3 925	3 270
1987	3 388	2 778	3 792	3 780
1988	3 787	3 591	4 004	3 489
1989	3 479	2 790	4 020	3 567
1990	3 844	2 828	3 625	3 600
1991	4 392	3 716	3 176	3 178
1992	58	401	3 195	3 042
1993	—	—	3 793	3 250
1994	—	37	4 438	3 142
1995	—	47	4 292	3 044
1996 <sup>p</sup>	—	—	4 089	..

Sources: Natural Resources Canada; Statistics Canada.

— Nil; .. Not available; <sup>p</sup> Preliminary.

<sup>1</sup> 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. <sup>2</sup> Tin content of tin concentrates shipped plus tin content in lead-tin alloys produced. <sup>3</sup> Tin in ores and concentrates (HS class 2609.00). <sup>4</sup> Tin metal (HS class 8001.10).

<sup>5</sup> Available data as reported by consumers; current coverage exceeds 90% whereas, until 1972, coverage was in the order of 80-85%.

**TABLE 3. WORLD TIN PRODUCTION, CONSUMPTION AND PRICES, 1985-96**

	Production		Consumption	Prices <sup>2</sup>	
	Tin in Concentrates	Metal <sup>1</sup>		LME <sup>3</sup>	N.Y. Dealer
	(000 t)			(US\$/lb)	
1985	197	213	216	5.57	5.25
1986	183	206	221	2.87	2.94
1987	186	203	227	3.10	3.15
1988	205	259	237	3.25	3.31
1989	232	262	237	3.93	3.97
1990	216	238	235	2.82	2.88
1991	192	201	219	2.54	2.59
1992	184	195	205	2.77	2.83
1993	183	196	208	2.34	2.39
1994	182	198	212	2.48	2.55
1995	186	206	220	2.82	2.95
1996	..	..	..	2.80	2.89

Sources: *World Nonferrous Metal Statistics; Metals Week.*

.. Not available.

<sup>1</sup> From primary and secondary material. <sup>2</sup> *Metals Week.* <sup>3</sup> London Metal Exchange. For 1987, 1988 and part of 1989, the "Europe Free Market" in-warehouse Rotterdam prices were used to calculate averages.

**TABLE 4. WORLD CONSUMPTION<sup>1</sup> OF TIN METAL, 1991-95**

	1991	1992	1993	1994	1995P
	(tonnes)				
<b>WESTERN WORLD</b>					
United States	37 100	33 500	34 700	33 000	36 400
Japan	34 800	31 000	28 600	28 700	28 100
Germany	20 300	20 400	18 600	18 200	15 800
United Kingdom	10 200	10 400	10 400	10 400	10 500
South Korea	8 400	8 000	9 100	9 800	12 400
France	8 200	8 300	7 600	9 200	9 000
Taiwan <sup>e</sup>	6 200	5 900	6 800	7 900	7 300
Malaysia	3 800	4 600	5 200	5 700	6 000
Italy	5 200	5 500	5 300	4 700	5 800
Thailand	4 700	3 700	4 900	5 100	5 600
Spain <sup>e</sup>	4 900	5 500	6 800	6 700	5 200
Brazil	6 200	6 500	4 100	3 600	5 000
Other	33 200	24 700	23 900	24 100	24 800
Total Western World	183 200	168 000	166 000	167 100	171 900
<b>EASTERN COUNTRIES</b>					
Former Soviet Union	17 000	16 000	13 800	7 000	6 200
China, People's Republic of	14 700	12 900	21 100	30 900	35 600
Other	4 200	8 200	7 300	6 700	6 600
Total Eastern countries	35 900	37 100	42 200	44 600	48 400
Total world	219 100	205 100	208 200	211 700	220 300

Source: *World Nonferrous Metal Statistics*.<sup>e</sup> Estimated; <sup>p</sup> Preliminary.<sup>1</sup> Tin refined from primary and secondary sources.**TABLE 5. WORLD PRODUCTION<sup>1</sup> OF TIN IN CONCENTRATES, 1991-95**

	1991	1992	1993	1994	1995P
	(tonnes)				
<b>WESTERN WORLD</b>					
Indonesia	30 100	29 400	28 600	30 600	38 400
Peru	6 600	10 000	14 300	20 100	22 300
Brazil	29 300	28 500	23 300	19 700	19 400
Bolivia	16 800	16 500	18 600	16 000	14 400
Australia	5 400	6 600	8 100	7 400	8 600
Malaysia	20 700	14 300	10 400	6 500	6 400
Portugal	3 100	3 000	5 300	4 300	4 600
Thailand	10 900	8 400	4 700	3 100	3 000
Other	11 700	6 200	5 800	5 400	4 700
Total Western World	134 600	122 900	119 100	113 100	121 800
<b>EASTERN COUNTRIES</b>					
China, People's Republic of	42 100	43 800	49 100	54 100	51 600
Former Soviet Union <sup>e</sup>	13 700	14 000	11 100	10 600	8 100
Other	1 100	3 500	3 600	4 100	4 700
Total Eastern countries	56 900	61 300	63 800	68 800	64 400
Total world	191 500	184 200	182 900	181 900	186 200

Source: *World Nonferrous Metal Statistics*.<sup>e</sup> Estimated; <sup>p</sup> Preliminary.<sup>1</sup> Recoverable tin content of ores and concentrates produced.

**TABLE 6. WORLD PRODUCTION<sup>1</sup> OF TIN METAL, 1991-95**

	1991	1992	1993	1994	1995 <sup>P</sup>
	(tonnes)				
<b>WESTERN WORLD</b>					
Malaysia	42 700	45 600	40 000	38 100	39 500
Brazil	25 800	28 500	23 300	19 400	15 400
Indonesia	30 400	28 200	30 400	31 100	44 200
Bolivia	14 700	14 400	18 600	15 300	17 700
Thailand	11 300	10 900	8 300	7 800	8 200
Mexico	2 300	2 600	1 800	1 000	1 000
Other	18 300	7 500	6 000	2 500	2 600
Total Western World	145 500	137 700	128 400	115 200	128 600
<b>EASTERN COUNTRIES</b>					
China, People's Republic of	35 400	39 600	52 100	67 800	60 700
Former Soviet Union	18 000	15 000	13 500	12 200	14 000
Other	1 800	2 400	2 300	2 300	2 300
Total Eastern countries	55 200	57 000	67 900	82 300	77 000
Total world	200 700	194 700	196 300	197 500	205 600

Source: *World Nonferrous Metal Statistics*.<sup>P</sup> Preliminary.<sup>1</sup> Tin refined from primary and secondary sources.**TABLE 7. MONTHLY AVERAGE TIN PRICES, 1995 AND 1996**

	N.Y. Dealer		London Metal Exchange	
	1995	1996	1995	1996
	(US\$/lb)			
January	2.89	2.97	2.81	2.84
February	2.57	2.94	2.48	2.81
March	2.61	2.93	2.51	2.81
April	2.78	3.04	2.66	2.94
May	2.82	3.00	2.69	2.91
June	3.19	2.90	3.02	2.81
July	3.17	2.92	3.02	2.84
August	3.31	2.85	3.17	2.77
September	3.03	2.84	2.87	2.77
October	2.96	2.78	2.82	2.70
November	3.02	2.79	2.90	2.72
December	2.99	2.72	2.85	2.65
Yearly average	2.95	2.89	2.82	2.80

Source: *Metals Week*.