

TIN

By James F. Carlin, Jr.

Domestic survey data and tables were prepared by Elsie D. Isaac, statistical assistant, and the world production tables were prepared by Linder Roberts, international data coordinator.

Tin has not been mined in the United States since 1993; consequently, the country is totally reliant on imports and recycling for its industry and manufacturing needs. Twenty-five firms consumed 83% of the reported primary tin used domestically in 2001. The major uses were as follows: Electrical solders, 24%; metal can containers, 21%; transportation, 14%; construction, 11%; and others, 30%. The estimated value of primary tin metal consumed domestically was about \$240 million. Industry stocks rose moderately.

About 13,900 metric tons (t) of tin, one-half from old scrap and one-half from new scrap, was recycled (table 5). Almost one-fifth of the tin consumed in the United States was recycled metal produced at three detinning plants and 65 secondary nonferrous-metal processing plants. Interest remained strong in the recycling of used tin cans, partly because of rising disposal fees and limited space at landfills. The recycling rate for steel cans was 58% in 2001 and 2000, compared with 56% in 1995 and 15% in 1988.

The Defense Logistics Agency (DLA), which manages the National Defense Stockpile (NDS), sold 5,246 t of pig tin from the stockpile during 2001.

World primary tin mine output declined by 9% (tables 1 and 9). Industry observers believed that world supply and demand were in approximate equilibrium. World primary tin smelter production and the average composite price for tin declined. Of the 22 countries in which tin was mined, the top 6 accounted for 92% of the world total of 222,000 t. China was the largest producer (36% of the world total) and was followed by Indonesia (23%), Peru (17%), Brazil (6%), Bolivia (6%), and Australia (4%). World tin reserves were estimated to be 8 million metric tons (Mt). Assuming that world primary consumption will be about 200,000 metric tons per year (t/yr), these reserves would last 38 years. Most tin reserves are in Asia and South America.

Legislation and Government Programs

In 2001, DLA sold 5,246 t of pig tin to two companies. Both sales were long-term contracts allowing for deliveries of the tin over a 1-year period. There were no spot market sales of tin. The effect of NDS tin sales on domestic markets is assessed by the Market Impact Committee, composed of several Federal agencies, including the U.S. Geological Survey (USGS).

The NDS tin is stored at four Government sites, with the largest inventories at Hammond, IN, and Baton Rouge, LA. The other sites are Point Pleasant, WV, and New Haven, IN.

The tin inventory as of December 31, 2001, was 54,294 t.

Production

Mine.—Tin was not produced at any U.S. mine in 2001. Until 1993, a few small tin mines had operated sporadically in the United States for many years. However, USGS canvasses confirm that there has been no domestic tin production since that year.

Secondary.—Industry observers believe the United States is the world's largest producer of secondary tin. Most secondary tin has been produced in the United States from various scrapped alloys of tin and recycled in those same alloy industries. Secondary tin from recycled fabricated parts has been used in many kinds of products and is a particularly important source of tin for the manufacture of solder and brass/bronze.

Midco Industries Co., a secondary tin and lead producer, closed its operation indefinitely at yearend 2001. The privately owned company, based in St. Louis, MO, was dependent on Chemetco Corp. (IL) for feedstock, but Chemetco filed for Chapter 7 bankruptcy liquidation on November 11, 2001, and thus no longer could supply secondary raw materials to Midco.

The Steel Recycling Institute (SRI), funded by domestic tinplate producers, continued to promote the collection, preparation, and transportation of steel can scrap. The Institute reported that, in 2001, the steel can recycling rate surpassed the aluminum can recycling rate and became the most recycled food and beverage container in the United States. The recycling rate for steel cans, most of which are made from tinplate, was 58% in 2001 with 1.5 Mt of steel cans being recycled (Steel Recycling Institute, 2002).

Consumption

In 2001, domestic consumption of primary tin declined 10%. Domestic consumption data for tin were developed by the USGS from a voluntary survey of tin consumers. Of the 146 firms to which a survey form was sent, 110 responded, including the major consumers.

The total number of metal cans shipped in 2001 reached 136 billion, about the same as in 2000. However, the Can Manufacturer's Institute no longer provides a breakdown by types of can (i.e. aluminum vs. steel). Steel (essentially tinplate and tin-free steel) dominated in the food, pet, and the "general line" can markets, and aluminum held 100% of the

beverage can market (Can Manufacturer's Institute, 2002).

U.S. Steel Group announced that the U. S. Bankruptcy Court approved the company's plan to purchase LTV Corp.'s tin mill products business. The purchase agreement, announced October 2001, was delayed when LTV filed for Chapter 11 bankruptcy protection in December. Under the terms of the agreement, U.S. Steel will lease the land and take title to the buildings, facilities, and inventory of LTV's Indiana Harbor Works tin mill (IN), which it will operate as an ongoing business. Tin mill employees at Indiana Harbor will become U.S. Steel employees and the company will also have the right to transfer certain tin line equipment from LTV's Aliquippa tin mill (PA) to U.S. Steel. The Indiana plant consists of a 270,000-ton-per-year tinplate line and a 155,000-ton-per-year tin free line. U.S. Steel Group, part of the USX-USS Group, the largest steelmaker in North America, already manufactures tin mill products. Both firms rank as major tin consumers (Platts Metals Week, 2001j).

USS-POSCO Industries Corp. (CA) announced that it would upgrade its #1 continuous annealing line to increase its tinplate capacity. POSCO, the West Coast's only producer of tin mill products, expects to reach a yearly capacity of about 500,000 t in 2002. The upgrade of its annealing line, costing about \$2 million, was expected to be completed by 2002 (American Metal Market, 2001e).

Wheeling-Pittsburgh Steel Corp. and Ohio Coatings Co. announced agreements with Nippon Steel Trading America Inc. for the distribution of Ohio Coatings' tin mill products. The agreements were designed to improve the liquidity and profitability of both Wheeling-Pittsburgh and Ohio Coatings, which is a joint venture with Korea's Dongyang in Yorkville, OH. Under terms of the agreements, Wheeling-Pittsburgh retains the exclusive distributorship for all Ohio Coatings' tin mill products, but has appointed Nippon Steel Trading as its distributor. Nippon Steel Trading America (formerly Nittetsu Shoji America) holds a preferred stock position in Ohio Coatings, which has the only electrolytic tinning line constructed in the United States in the past 30 years (Metal Bulletin, 2001i).

Shipments of steel mill products in the United States totaled 103 Mt in 2000. Tin mill products represented 3.4% of those shipments, according to the American Iron and Steel Institute. Data for the first half of 2001 show domestic tinplate production was 1,024,000 t, a marked drop of 11.4% from the same period in 2000. The capacities of domestic tinplate and tin-free steel producers were:

- National Steel Corp. (Portage, IN); 950,000 tons per year (t/yr).
- Weirton Steel Corp. (Weirton, WV); 900,000 t/yr.
- U.S. Steel Corp. (Gary, IN); 660,000 t/yr and (E. Chicago, IN); 540,000 t/yr.
- U.S.S./POSCO (Pittsburgh, CA); 530,000 t/yr.
- Bethlehem Steel Corp. (Sparrows Point, MD); 450,000 t/yr.
- Ohio Coatings Corp. (Yorkville, OH); 250,000 t/yr.

During 2001, tinplate producers that were in Chapter 11 bankruptcy protection included: LTV Steel Corp., Bethlehem Steel Corp., and Wheeling-Pittsburgh Steel Corp.

In 2001, U.S. Steel, the Nations's largest tin mill operator, announced the closure of its tin mill at the Fairless Works near Philadelphia, PA. The tin mill had a capacity of 250,000 t/yr. In addition, U.S. Steel shut down one of the two tin mills it acquired from LTV (the Aliquippa, PA, facility). Industry observers tended to look favorably on these closures because they represented a long-needed reduction of capacity (Metal Bulletin Monthly, 2001a).

Prices

The Platts Metals Week average composite price for tin metal declined by 15% compared with that of 2000. Platts Metals Week average composite tin price was \$3.56 per pound in January, its highest monthly level all year. Along with most other base metals, the price of tin fell considerably on the world's metal exchanges as a consequence of a global economic slowdown in the manufacturing sector. During July, the tin price breached the post-1985 "tin crash" London Metal Exchange Ltd. (LME) cash low of \$4,310 per ton in September 1993. On August 7, the tin price reached a modern alltime low LME cash price of \$3,630 per ton. The early August drop was the lowest level seen since the tin contract was reintroduced to the LME in 1989.

Some observers had expected weaker prices in 2001 when LME tin stocks rose to 12,900 t in January, up 40% from a year earlier. LME tin stocks continued to climb throughout the year, standing at 20,700 t by mid-September, a 60% increase. A notable LME stock increase can be an indicator of declining demand. Industry observers believed that the specific causes for the stock increase and price decline were two-fold: (1) Insufficient production cutbacks by the world's tin miners and smelters left the global market with an excess of tin; and (2) a sharp worldwide decline in "high tech" industries, many of which are solder consumers for electronics manufacturing, slackened demand (Metal Bulletin Monthly, 2001b).

In Malaysia, the Kuala Lumpur Tin Market began trading in U.S. dollars on February 9. The exchange first announced its trade pricing conversion in September 2000 to attract foreign business, but had to wait for approval by Malaysia's Ministry of Primary Industries. The currency change was expected to facilitate international trading (American Metal Market, 2001b). The LME remained the primary trading arena for tin. Tin was one of only six metals traded on the LME. The other metals were aluminum, copper, lead, nickel, and zinc.

Trade

U.S. imports of refined tin, which supplied most domestic tin requirements, declined by 16%. Imports of tin in all forms (ore and concentrate, metal, waste, and scrap) remained duty free (tables 7 and 8). Most of the tin metal imported from a variety of countries was held in U.S. warehouses by trading firms until sold to customers. Foreign-owned trading firms tended to dominate the marketing of imports. U.S. imports of refined tin were dominated by Peru. China, Bolivia, Brazil,

and Indonesia ranked next in importance. Tin exports were small compared with imports (table 6).

World Review

There were an unusually large number of news items and activities concerning tinplate in Europe during 2001. Europe remains the world's largest tin consumer market, and the tin can has a far greater share of the beverage container sector in Europe than it does in the United States. The Association of European Producers of Steel for Packaging (APEAL) is the leading proponent of expanding the steel container market in Europe. Based in Brussels, Belgium, APEAL is active in marketing, communications, and coordination of environmental issues (such as legislation and recycling). APEAL's membership is comprised of Europe's four major producers of steel for packaging: Aceralia Sidstahl Ibérica SA (Spain), Anglo-Dutch Corus Packaging Plus (United Kingdom and Netherlands), Rasselstein Hoesch GmbH (Germany), and Usinor Packaging (France). These four companies account for 90% of Western European steel production for packaging, representing an annual output of about 5 Mt. Among its recent research activities, APEAL carried out a survey in six European countries to establish consumer attitudes and perceptions regarding different packaging concepts for beverages.

European tinplate producers have raised objections to a planned revision of the European Commission's packaging directive due to their concerns that the revision would put an unfair recycling burden on the metal container industry. APEAL and the European Organization for Packaging and the Environment have been two of the most prominent organizations challenging the new plans. The revisions would likely call for overall packaging material recycling targets in each member State to be increased from 55% to 60%. And, for the first time, individual targets of at least 15% to 20% are proposed for each type of packaging material—the target for steel and aluminum may be as high as 70%. Opponents believe the new recycling targets for steel (tin cans) and aluminum may be too high and could lead to punitive costs. APEAL stated that a 60% tinplate recycling target was achievable but that it would take time to build the necessary infrastructure in each member State.

APEAL reported that a total of 1.67 Mt of tinplate packaging was recycled in 2000. This represented a 15% increase over the 1999 total of 1.45 Mt. Effectively, the statistics indicate that one out of every two steel cans sold in Europe was recycled. The major contributors to the increase were: Spain, up 33%; the United Kingdom, up 34%; and Italy, up from a 9.5% rate to a 26% rate. Despite the successes in Luxembourg (a 93% rate), Germany and Austria (80% each), and Belgium and Holland (77% each), APEAL believes Europe is unlikely to soon hit its target of a 50% recycling rate in every European Union (EU) country (Canning and Filling, 2001).

Australia.—Marlborough Resources NL Group moved to consolidate its purchase of a Western Metals Ltd. subsidiary

that owned the Ardlethan Tin Mine. Marlborough planned to rehabilitate the old tin project, which was closed down in 1986. Tailings dams at the site contain 8 Mt of tailings with a grade of 0.19% tin. Thus, 15,000 t of tin are contained in the tailings, with a current in-situ value of approximately \$90 million. Marlborough has conducted several detailed studies of the tailings and believes that recoveries of between 55% and 65% may be possible depending on the process used. The firm also will be conducting further test work on the site to determine the most economical process and equipment to maximize profitability from the treatment of the tailings. The company plans to return the retreated tailings to the original open cut. In addition to the tailings, there are significant alluvial tin resources on some of the 53 mineral tenements included with the acquisition. Marlborough indicated a possible restart of the mine by early 2002 (Tin International, 2001e).

BHP Ltd., an important steelmaker and tinplate producer, announced its intention to "spin off" its entire flat-rolled steel products business, including its tinplate operations. BHP recently merged with Billiton BV (Netherlands) and has begun to focus on minerals and petroleum. The anticipated "spin off" may go to BHP's share holders (Tin International, 2001b).

Bolivia.—Allied Deals Corp. (United Kingdom) announced substantial progress with its Vinto tin smelter and its Huanuni tin mine, both acquired in March 2000. The Huanuni tin mine is Allied's major focus, with the firm committed to investing \$10 million by March 2002. The first major investment at the mine will be to replace shaft mining with ramp mining. The ramp construction was scheduled to begin by 2002. At the time of the acquisition, head grades in the mine were around 4.5%. The second investment will be for modernization of the Huanuni mill. For much of 2000, the Huanuni operation was beset with civil unrest, including theft from the mine and attacks on employees. Allied reports that Huanuni's output has increased by 40% to 50% compared with when it was part of the Government's COMIBOL operation (Tin International, 2001a).

Brazil.—Mamore Mineracao, the country's largest tin mining company, announced that it expected to get approval for an \$80 million International Finance Corp. (IFC) loan needed to complete an expansion at its largest mine. Mamore (a subsidiary of the Paranapanema Group) plans to boost tin output to 14,300 t/yr by 2004 from 10,000 t/yr in 2000. Paranapanema has already invested \$40 million over the last few years to begin working the mountainous area of Rocha SA that contains tin ore. The location is near Mamore's Pitinga tin mine, once Brazil's largest, in the western Amazon region. Mamore has installed equipment at the site to separate and concentrate the tin, tantalum, and niobium ore. The IFC, a World Bank financial entity, has already completed an environmental inspection of the tin mine expansion project. Mamore also has installed small primary and secondary crushing machines at the mining site, as well as rod mills to reduce crushed tin, tantalum, and niobium ores to powders for making concentrate. It was expected that most of the IFC

financing would be for additional, larger crushing machines and two more rod mills. Mamore wants to begin working Rocha Sa because its Pitinga tin mine, where alluvial tin mining is underway, is near exhaustion. Tin concentrates from the Rocha Sa operation is sent to a Paranapanema refinery in southeastern Sao Paulo State; tantalum and niobium concentrates are sent to a recently purchased Paranapanema refinery in east-central Minas Gerais State (Platts Metals Week, 2001a).

China.—A Nandan County tin mine in Guangxi Province flooded in July, killing 80 workers. It touched off an investigation into possible management culpability, and quickly resulted in the closure of several other area tin mines. Government officials announced that the country's tin output was expected to be considerably lower in 2001 because of a tin concentrate shortage stemming from the reduced number of mines in Guangxi (Platts Metals Week, 2001d).

Later in the year, officials announced that they expected the mines in Nandan County to remain closed through 2002, due to evidence of failure to comply with State safety standards. Nandan County accounts for about 50% of China's tin mine output. Much of China's production was expected to come from Yunnan Tin Corp., which planned to produce 20,000 t to 25,000 t of tin ingot in 2002 (Platts Metals Week, 2001d).

Officials of Chenzhou City in Hunan Province announced the discovery of more tin reserves in its Qitianling deposit zone. Preliminary studies have shown the deposit to have at least 500,000 t of tin reserves, with the possibility of a further 1 Mt of reserves. Chenzhou City currently produces 3,000 t/yr to 5,000 t/yr of tin-in-concentrate (Platts Metals Week, 2001b).

The Government reported a 43% surge in tinplate imports to 397,000 t during 2000 compared with 278,000 t in 1999. The largest individual increase came from the United Kingdom. Western Europe as a whole exported 67,000 t to China in 2000, a 158% increase. Eight Chinese tinplate producers filed a petition with the Government seeking curbs on imports of tinplate. They complained that cheap imports were forcing down local prices. Their complaint cited more than 10 exporting countries in Europe, Australia, East Asia, and North America. Australia recorded a marked jump in the level of its tinplate sales into China, a rise of 160% to 52,000 t in 2000. Imports from the Commonwealth of Independent States reached 57,000 t in 2000, up 73% from the prior year, of which Russia accounted for 23,000 t. In terms of quantity, Japan was still the primary source of Chinese tinplate imports at 91,000 t. The Republic of Korea ranked next, at 63,000 t. Imports from Taiwan, the United States, South Africa and other countries increased from 27% to 75% over 1999. China's annual tinplate demand was estimated at 1 Mt by the eight firms that filed the petition. Domestic production capacity is 1.4 million metric tons per year (Mt/yr) (Metal Bulletin, 2001b).

China reduced its tin metal export quota for 2001 by 33% to 40,000 t. The reduction was larger than industry observers had expected. The reduction was instituted so that China's limited tin resources could supply future domestic demand.

The lower export quota was expected to suppress China's tin metal output in 2001. Smaller smelters in China were concerned, because the majority of quotas were awarded to large producers and traders (Platts Metals Week, 2001c).

Denmark.—The Government implemented a ban on the use of lead in a large number of products. The ban, the first of its kind in the world, was signed by the Minister for Environment and Energy in November 2000 and will affect products containing lead compounds such as plastic stabilizers, as well as metallic lead used for ballasts and weights. The decision, which also applies to cadmium, mercury, and nickel, was made despite opposition from a majority of the European Union's 15-member nations and was unsupported by European Commission studies. Tin is often an alloying component with the banned metals and may benefit as a substitute for them in some applications (Journal of Metals, 2001).

Egypt.—General Lithograph Egypt Co. announced that it was seeking financing to build a tinplate mill with a capacity of 100,000 t/yr near Cairo. USA Engineers and Consultants completed a feasibility study for the project in November 2000. Officials indicated that after the project is funded, the mill could be operating within 2 years. Egypt imports 55,000 t/yr of tinplate and total tinplate imports in the Middle East average 267,000 t/yr. Demand for tinplate in Egypt is growing at 25% per year (Platts Metals Week, 2001e).

France.—Europe's two largest steelmakers, Usinor SA (France) and Arbed SA (Belgium), and Aceralia SA (Spain), part of the Arbed Group, presented the framework of the new company they intend to create. The company would be one of the world's largest tin consumers and tinplate producers. A joint-press conference took place at Brussels rather than at any of the partners' headquarters, possibly to indicate the project's continental significance. The transnational aspect of the new company also showed in the choice of multilingual Luxembourg as headquarters for the "New Company" (NEWCO), which has become the working title for the proposed entity. The three partners' memorandum of understanding aims to form the world's largest steel group, employing 110,000 people producing 46 Mt/yr of crude steel. Its combined sales would be an estimated \$28 billion yearly. Usinor shareholders would hold 57% of the new firm. The new entity would have an annual steel output larger by far than that of the world's next two biggest steel producers: Nippon Steel Corp. (Japan) and POSCO (Republic of Korea) (American Metal Market, 2001c).

India.—The Tinplate Company of India, part of the Tata Group, announced plans to eliminate bottlenecks in its operations so as to increase the capacity of the company's electrolytic tinning line from the current 90,000 t/yr to 125,000 t/yr. Tinplate is one of India's two tinplate producers; the other is Sail's Rourkela Steel Plant with a capacity of 150,000 t/yr. The combined production of both the plants was 129,000 t during 1999-2000, showing considerable underutilization. The producers complained of heavy tinplate imports, which totaled 138,000 t in 1999-2000 (Metal Bulletin, 2001i).

Indonesia.—Reports from Indonesia, the world's second largest tin producing country, highlighted various difficulties there in 2001. The country's largest tin producing organization, PT Timah, announced that it was facing a critical point concerning illegal mining on Bangka and Belitung Islands, where the bulk of the firm's tin mining operations are located. Timah stated that it has several courses of action to deal with the problem. It has already engaged local security and law enforcement agencies, and is assessing the possibility of litigation against those involved with the illegal mining. As a result of illegal mining and tin smelting, Timah claims to have paid higher compensation for its inland tin-in-concentrates this year. The company has also suffered from higher production costs and low world tin prices to such an extent that it has implemented a program of cost-cutting measures, delayed capital expenditures, and halted operations at all unprofitable mines and offshore dredges. Among Timah's 308 inland mining units, only 147 operated in 2001 (Metal Bulletin, 2001c).

According to one report, Timah also has temporarily suspended operations at 12 of its 21 offshore tin dredges. All 1,140 workers at the dredging operations have been temporarily laid off. Timah also announced the layoff of 3,750 workers, about 72% of its workforce, and planned to sell off some assets (Platts Metals Week, 2001i).

The Provincial Government of Bangka and Belitung Islands has agreed to ban exports of tin concentrates, to help PT Timah and PT Koba in their efforts to eliminate illegal mining. The agreement was drawn up by the so-called "Team of Eleven," a body comprising officials from PT Timah, PT Koba, the Bangka and Belitung Provincial Governments, and Bangka and Belitung's separate regency governments. Timah felt that the ban would allow it to continue smelting tin on Bangka Island. In the long term, the company may also build new smelting capacity, either on Kundur Island or close to its existing facilities on Bangka Island (Metal Bulletin, 2001j).

Timah also announced that, due to its current fiscal difficulties, consideration was being given to a proposed merger with Aneka Tambang, a diversified, vertically integrated mining company with gold and nickel as its main products. The merger was proposed by the Government of Indonesia. Both Timah and Aneka are partially Government owned (Platts Metal Week, 2001g).

Three other major tin producers joined forces with PT Timah and PT Koba Tin to rid the tin market of illegal mining: Murchison United NL, Minsur SA, and Yunnan Tin Corp. The five companies issued a joint statement calling on miners and smelters not to purchase tin ore from sources that may be illegal (American Metal Market, 2001a).

Tinplate producer PT Latinusa was considering plans to install an electro-chrome coating line at its works in Cilegon, West Java, with a capacity of 130,000 t/yr. If completed, this line would produce tin-free steel (TFS) and would replace an earlier project, announced in the late 1990s to construct a second tinplate line. That prior plan would have lifted overall tinplate capacity to 260,000 t/yr, but was abandoned in anticipation of faltering demand for tinplate in Indonesia.

Tinplate production in 2001 is expected to remain at the 2000 level of 100,000 t. Presently, all output is consumed domestically. Latinusa is 96% owned by Indonesia's Government-owned steel plant, PT Krakatau Steel, and several private firms account for the remaining 4% (Metal Bulletin, 2001d).

Herald Resources Ltd. (Australia), a gold mining and mineral exploration firm, announced encouraging results from a brief drilling program at the Batu Besi Prospect on Belitung Island, where moderate amounts of tin were discovered (Tin International, 2001d).

Japan.—Nippon Steel Corp. has long ranked as one of the world's largest steel producers and is also a major tinplate manufacturer and tin consumer. In Japan, pressures to eliminate or reduce lead in a variety of products is leading to increased demand for Nippon Steel's hot dip tin/zinc coatings and its tin-zinc alloy for electroplating. Motor vehicle manufacturers in Japan have shown increased interest in the use of tin-zinc coating for automobile fuel tanks as European Governments tighten controls on the use of lead-based fuel tank coatings. Nippon is one of four Japanese steel producers that make tinplate.

Nippon operates six electrofinning lines at three steel plants in Japan. The Yawata plant in Kyushu is the largest, operating three electrofinning lines; the Hirohata plant in Honshu has two lines; the Nagoya plant in central Tokai region has a single line. The three Nippon plants have a combined production capacity of about 50,000 t/yr (Tin International, 2001h).

Kawasaki Steel Corp. and NKK Corp. announced plans to combine their entire operations by April 2003. Both companies are major tinplate producers and rank as important consumers of tin. The merger would create a new Japanese steel giant greater than the size of Nippon Steel Corp., itself the product of a merger in the early 1970s. Specifically, the merger would have a combined raw steel output of at least 34 Mt, topping Nippon Steel's 30 Mt. By October 2002, Kawasaki and NKK expect to establish a holding company under which several separate, wholly owned subsidiaries will be established to manage their steel, engineering, and services operations. Analysts believe there could be some rationalization of overlapping operations as well (Metal Bulletin, 2001e).

Nippon Steel Corp. and NKK Corp., the country's two leading tinplate producers, launched a campaign to promote consumption of beverages in tinplate cans in cities where their steel plants are located. The move follows a decline in Japan's tinplate consumption from 863,000 t in 1997 to 700,000 t in 1999, largely attributed to the growing popularity of PET bottles for drinks. NKK's two tin mills and its Fukuyama and Keihin steel plants have a combined annual capacity of 384,000 t of tinplate and 360,000 t of tin-free-steel (The Canmaker, 2001).

The Japan Steel Can Recycling Association reported that steel can recycling reached 84% in 2000. The rate was a record for Japan and represented a rise of 12% over the 1999 figure. Rates were about 50% a decade before. In 2000,

about 1.03 Mt of scrap steel cans were recovered. Approximately 94% of Japanese communities collect cans for recycling (Container Recycling Report, 2001).

Mitsui Mining and Smelting Co. has long been a leading tin user and solder maker. Established in 1950, Mitsui Mining was originally a mining company, which later began smelting metals including copper, gold, lead, and zinc. Now Mitsui produces solder powder and tin powder for many domestic and foreign electronics firms. Solder powder is used to make solder paste, a growing field due to increasing miniaturization in the electronics field. Currently, solder paste accounts for about 10% of the Japanese solder market, while the traditional solder bar and wire retain 90%.

About 10 companies produce solder powder and paste in Japan. Mitsui claims to be the second largest after market leader Showa Denko Corp. Mitsui produces solder powder and tin powder at its Kamioka plant in Gifu Prefecture in central Japan. The plant has the capacity to produce over 70 t per month of solder. About 98% of Mitsui's solder powder is produced using the centrifugal manufacturing technique. The remainder is produced using the gas atom method.

Nippon Mining and Metals Corp. (NMM) announced that it reached an agreement with the Republic of Korea's largest copper fabricator, Poongsan Corp., concerning the tinning of copper and brass strips. Under the agreement, Poongsan and NMM will form a 60%-40% joint-venture company called Poongsan-Nikko Tin Plating Corp. that will absorb all the copper and brass tinning operations at Poongsan's Ulsan Plant in Korea. Tinned brass strips are used mostly in connectors for electronics applications. East Asia demand for tinned brass strips is estimated to be 50,000 t/yr (Metal Bulletin, 2001h).

Kazakhstan.—The Narodny Bank of Kazakhstan announced plans to finance a new mining project to produce tin and rare metals. The proposed new mine would be at Sarymbet in central Kazakhstan. The Sarymbet Mining Company will have its concentrate toll-smelted by the Novosibirsk Tin Combine. Production was expected to be 2,500 t of tin-in-concentrate the first year, rising later to 5,500 t/yr (Tin International, 2001g).

Korea, Republic of.—POSCO, one of the world's major steel producers and a top tinplate maker, announced the start of a project to improve tinplate production at its Pohang Works. The project, which was due to be completed by March 2002, is intended to increase the maximum tinplate coil width to 1,220 millimeters (mm) from the present 1,016 mm. When the project is completed, POSCO will be able to increase its annual tinplate production capacity by 50,000 t to a total of 247,000 t. POSCO considered the project essential to meet the growing preference among can makers for wider tinplate coils (Tin International, 2001i).

Malaysia.—Recent decades have been a time of great change for Malaysia as the nation's ambition to join the ranks of Asia's "tiger" economies has produced impressive results. Formerly a producer of primary commodities, Malaysia has transformed its economy and developed a modern industrial base that includes electronics, petrochemicals, steel, and automobile manufacturing. The industrial progress and

economic development have had a major impact on Malaysia's tin mining industry. At the end of the 1970s, Malaysia was the world's largest tin producer with annual production exceeding 70,000 t. Current production, however, is only about 10% of former peak levels. In 2000, the country had 40 operating tin mines. Employment totaled 1,700 workers. Gravel pump tin mines are the largest producers of tin concentrates, with the 25 operating gravel pump mines in 2000 producing about 3,400 t or 54% of Malaysia's total concentrate output. The country's 12 opencast tin mines are the second source of concentrates, producing 1,300 t in 2000. The mineral industry accounted for less than 5% of gross domestic product (Tin International, 2001k).

Malaysia Mining Corp. announced that it plans to sell its remaining stakes in two international mining companies, Homestake Mining Co. (United States) and Hillgrove Gold Corp. (Australia). The firm had abandoned mining operations in its home country several years ago. It now focuses on power and public utility sectors in Malaysia. The company plans to change its name to reflect its current interests. The firm once had been a major tin producer (Metal Bulletin, 2001f).

Malaysia Smelting Corp. (MSC) reportedly will buy Iluka Resources' 75% stake in Koba Tin (Indonesia) for up to \$20 million. MSC operates a custom tin smelter in Penang, Malaysia, with a refined metal capacity of 25,000 t/yr. The company indicated that synergies exist between the firm's domestic base of operations and the assets of Koba Tin which would allow for significant cost reductions (Metal Bulletin, 2001g). Also, MSC officials announced that the company's refined tin metal capacity will be increased to 38,000 t/yr from 26,000 t/yr (Platts Metals Week, 2002).

Nigeria.—British-based RBG Resources plc announced plans to form a tin-mining joint venture with Nigerian Mining Corp. (NMC). NMC said that more than 7,000 t of cassiterite and 3,000 t of columbite already had been produced from the deposit. RBG indicated that it had already started working with NMC on development of the property. RBG would contribute mining expertise as well as equipment and financing to the project in exchange for 100% of the ore produced (American Metal Market, 2002).

Portugal.—Murchison United Ltd. was chosen as the preferred bidder for Rio Tinto's 49% stake in Somincor, owner of the Neves Corvo copper/tin mine in Portugal. Murchison also negotiated with the Portuguese Government (owner of the remaining 51% share) for a further 17% stake that would give it control of the mine. Neves Corvo produced 1,200 t of tin-in-concentrate in 2000, when production was severely curtailed by mechanical and labor problems (CRU Tin Monitor, 2001).

Thailand.—PT Timah reportedly was considering the absorption of closed tin mines in Thailand if mandatory tin payments by miners were removed and if the Government proposed flat rate royalty replaced the current complicated eight-level structure. Only 30 tin mines out of 145 once working in Thailand are still active. Most were closed over the past decade due to high production costs. These mines are

primarily located in the Kanchanaburi, Phuket, and Phang Nga areas. Thailand's Mining Industry Council stated that the removal of compulsory payment would reduce production costs by as much as 10% (Platts Metals Week, 2001h).

The Department of Industry proposed to eliminate buffer stock fees and reduce royalty fees collected from the country's tin miners. The number of tin mining companies in Thailand totals fewer than 35, compared with more than 600 before 1985. Thailand's only tin smelter, Thailand Smelting and Refining Co. (Thaisarco) continues to rely mostly on imported tin ore. The smelter imported about 30,000 t of tin concentrates in 2000, mostly from Australia, Laos, and Peru. Of the 17,500 t of tin metal produced by Thaisarco in 2000, only 2,100 t came from domestically produced ore. However, Thai concentrates had an average grade of 72% tin compared with only 50% tin in the case of much of the imported ore. Only 4,500 t of Thaisarco's 2000 tin output was consumed domestically with the remainder exported mostly to Japan, the Netherlands, and the United States (American Metal Market, 2001d).

The Mining Industry Council proposed a new flat-rate royalty of 2.5% to 3% on tin mined to replace the existing eight-level royalty structure. The range of the current average royalty is 8.6% to 9.0% (Platts Metals Week, 2001f).

United Kingdom.—Baseresult Holdings Ltd. announced that it had completed its purchase of the South Crofty tin mine in Cornwall from South Crofty plc. The mine closed 3 years ago and subsequently was allowed to flood. The firm aimed for production of 2,000 t/yr of tin-in-concentrate within 2 years at a cost of less than \$4,000 per ton. Dewatering of the underground workings, flooded to within 200 meters of the surface, was expected by the end of 2002. The mill at the former Crofty milling operation at the defunct Wheal Jane tin mine nearby in Truro is to be relocated to South Crofty. Baseresult expected to employ 200 workers at the mine by the end of the second year of operation (Tin International, 2001j).

The Anglo-Dutch steel producer, Corus Group plc., announced plans to cut more than 3 Mt of iron and steelmaking capacity, close several mills and processing lines, and eliminate 6,000 employee positions in the United Kingdom (UK). Among its closures is the Ebbw Vale tin mill in Wales, which is set to shut down in 2002 with a loss of 780 jobs. Corus plans to increase tinplate production at its Trostre (Wales) and IJmuiden (Netherlands) tin mills by as much as 25% each to offset the loss of capacity at Ebbw Vale. Corus' tinplate capacity in the UK amounts to about 950,000 t/yr. Total Corus tinplate capacity is almost 2 Mt/yr, and Corus ranks as one of the world's major tin users. The decision to close Ebbw Vale was in response to excess tinplate capacity worldwide (Metal Bulletin, 2001k).

Zimbabwe.—Allied Mining Investments (AMI), a domestic firm, announced that it is seeking \$7.5 million to reopen the local Kamativi tin mine as a tantalum operation. The mine was closed and liquidated in 1994 because of depressed tin prices and low tin grades. AMI received permission from the Zimbabwe Government to buy the mine with the aim of concentrating on tantalum mine production rather than tin.

Before its closure, Kamativi produced an average of 1,200 t/yr of tin-in-concentrate and about 60 t/yr of tantalum-in-concentrate (Metal Bulletin, 2001a).

Current Research

Tin Technology Ltd. (Uxbridge, England), the organization representing major tin producers, smelters, and consuming industries, signed a cooperative agreement with Yunnan Tin Corp., China's largest tin producer. The agreement commits the two parties to a number of initiatives including joint research projects, technology transfer, and market development in China (Tin International, 2001c).

In England, Oystertec Ltd., announced the development of a new pipe fitting that requires no soldered joints. The new unit fits over a pipe and is smaller and lighter than conventional fittings and eliminates the need for welding, soldering, compressing, or screwing. It can be applied to small plumbing and hydraulic pipes as well as large industrial pipe-works (Tin International, 2001f).

In Japan, Matsushita Electric Industrial Co. Ltd., best known for its "Panasonic" brand of consumer electronic and digital communications products, announced the development of an easy, efficient, and safe solder recycling process. Conventional processes use heat or high pressure to separate reusable solder from waste solder residue. In the new process, specially treated sesame seed waste is added to the melted compound solder residue of flow soldering machines to separate the reusable solder from the compound. The recycled pure solder can be formed into bars and used in the same way as solder made from virgin materials. There presently are three Japanese and four overseas patents on this new method (Soldering and Assembly Technology, 2002).

A new lanthanum-nickel-tin alloy with a high hydrogen storage capacity that does not decay over many charge-recharge cycles has been developed by the U.S. Department of Energy's Brookhaven National Laboratory in Upton, NY. The alloy is said to be relatively inexpensive and environmentally benign (Advanced Materials and Processes, 2001).

Outlook

Domestic demand for primary tin is expected to grow slowly in the next few years, at a rate of perhaps 1% annually. That rate could double in a few years, however, if new applications—especially those in which tin is substituted for toxic materials—find acceptance in the market place.

World tin reserves appear to be adequate to meet foreseeable demand. Secondary sources of tin are likely to remain an important component of tin supply, especially in the United States. The National Defense Stockpile sales are expected to continue in coming years and remain an important segment of domestic supply until the inventory is exhausted. Domestic tin needs will probably continue to be met primarily through imports.

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TABLE 1
SALIENT TIN STATISTICS 1/

(Metric tons of contained tin, unless otherwise specified)

	1997	1998	1999	2000	2001
United States:					
Production, secondary e/	12,400	16,300	16,400	15,700 r/	13,900
Exports, refined tin	4,660	5,020	6,770	6,640	4,350
Imports for consumption, refined tin	40,600	44,000	47,500	44,900	37,500
Consumption:					
Primary	36,200	37,100	38,000	38,100	34,200
Secondary	8,250	8,620	8,890	8,940	6,990
Stocks, yearend, U.S. industry	11,200	10,500	10,700	11,200 r/	14,800
Prices, average, cents per pound:					
New York market	264.45	261.38	254.54	254.92	211.48
Platts Metals Week composite	381.49	373.26	365.98	370.16	314.88
London	256.00	251.00	245.00	246.00	203.00
Kuala Lumpur	252.24	246.06	240.70	244.12	200.77
World production:					
Mine	217,000	207,000	216,000	244,000 r/	222,000 e/
Smelter:					
Primary	241,000 r/	238,000 r/	249,000 r/	271,000 r/	267,000 e/
Secondary	17,500	20,400	25,900	25,700 r/	23,400 e/
Undifferentiated	200	200	100	--	-- e/

e/ Estimated. r/ Revised. -- Zero.

1/ Data are rounded to no more than three significant digits.

TABLE 2
U.S. CONSUMPTION OF PRIMARY AND SECONDARY TIN 1/

(Metric tons of contained tin)

	2000	2001
Stocks, January 1 2/	8,910	9,650
Net receipts during year:		
Primary	41,400	55,900
Secondary	2,990	3,900
Scrap	6,050 r/	9,930
Total receipts	50,400	69,700
Total available	59,300	79,400
Tin consumed in manufactured products:		
Primary	38,100	34,200
Secondary	8,940	6,990
Total	47,000	41,200
Intercompany transactions in scrap	85	164
Total processed	47,100	41,400
Stocks, December 31 (total available less total processed)	12,200 r/	8,940

r/ Revised.

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

2/ Includes tin in transit in the United States.

TABLE 3
U.S. CONSUMPTION OF TIN, BY FINISHED PRODUCT 1/

(Metric tons of contained tin)

Product	2000			2001		
	Primary	Secondary	Total	Primary	Secondary	Total
Alloys (miscellaneous) 2/	W	W	W	W	W	W
Babbitt	1,510	152	1,660	770	W	770
Bar tin	714	W	714	570	W	570
Bronze and brass	1,450	1,900	3,360	1,240	1,550	2,790
Chemicals	8,040	W	8,040	7,590	W	7,590
Collapsible tubes and foil	W	W	W	W	W	W
Solder	12,600 r/	6,130	18,800	11,800	5,010	16,800
Tinning	1,200	W	1,200	1,040	31	1,070
Tinplate 3/	8,800	W	8,800	7,800	--	7,800
Tin powder	W	W	W	W	W	W
Type metal	W	W	W	W	W	W
White metal 4/	1,260	W	1,260	1,390	W	1,390
Other	2,460 r/	754	3,210 r/	2,000	391	2,390
Total	38,100	8,940	47,000	34,200	6,990	41,200

r/ Revised. W Withheld to avoid disclosing company proprietary data; included with "Other." -- Zero.

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

2/ Includes terne metal.

3/ Includes secondary pig tin and tin acquired in chemicals.

4/ Includes pewter, britannia metal, and jewelers' metal.

TABLE 4
U.S. INDUSTRY YEAREND TIN STOCKS 1/

(Metric tons)

	2000	2001
Plant raw materials:		
Pig tin:		
Virgin 2/	7,770 r/	10,800
Secondary	909 r/	1,020
In process 3/	946 r/	1,940
Total	9,620 r/	13,700
Additional pig tin:		
Jobbers-importers	1,240	1,050
Afloat to United States	340	40
Total	1,580	1,090
Grand total	11,200 r/	14,800

r/ Revised.

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

2/ Includes tin in transit in the United States.

3/ Data represent scrap only, tin content.

TABLE 5
U.S. STOCKS, RECEIPTS, AND CONSUMPTION OF NEW AND OLD SCRAP AND TIN RECOVERED,
BY TYPE OF SCRAP 1/

(Metric tons)

Type of scrap	Gross weight of scrap								
	Stocks, January 1	Receipts	Consumption			Stocks, December 31	Tin recovered e/		
			New	Old	Total		New	Old	Total
2000:									
Copper-base scrap									
Ingot makers	6,450	110,000 r/	28,000 r/	82,600	111,000 r/	6,170 r/	1,160 r/	3,120	4,270 r/
Brass mills 2/	--	123,000	123,000	--	123,000	--	1,650	--	1,650
Foundries and other plants	2,110	17,800 r/	W	W	18,100 r/	1,780 r/	W	431 r/	431 r/
Total	XX	XX	XX	XX	XX	XX	2,800 r/	3,550 r/	6,350 r/
Lead-base scrap	22,000	986,000 r/	50,700	935,000 r/	986,000 r/	22,100 r/	1,330	3,010 r/	4,340 r/
Tin-base scrap 3/	W	W	W	W	W	W	5,010 r/	W	5,010 r/
Grand total	XX	XX	XX	XX	XX	XX	9,140 r/	6,560 r/	15,700 r/
2001:									
Copper-base scrap									
Ingot makers	6,170	109,000	27,400	81,500	109,000	6,250	1,160	3,120	4,280
Brass mills 2/	--	140,000	140,000	--	140,000	--	1,690	--	1,690
Foundries and other plants	1,780	27,900	16,500	11,300	27,800	1,880	W	383	383
Total	XX	XX	XX	XX	XX	XX	2,850	3,510	6,350
Lead-base scrap	22,100	1,100,000	68,100	1,030,000	1,100,000	31,100	1,790	3,200	4,980
Tin-base scrap 3/	W	W	W	W	W	W	2,560	W	2,560
Grand total	XX	XX	XX	XX	XX	XX	7,190	6,700	13,900

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data. XX Not applicable. -- Zero.

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

2/ Consumption is assumed to be equal to receipts.

3/ Includes tinplate and other scrap recovered at detinning plants.

TABLE 6
U.S. EXPORTS OF TIN IN VARIOUS FORMS 1/

Year	Tinplate and terneplate		Ingots and pigs		Tin scrap and other tin-bearing material except tinplate scrap 2/	
	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
	2000	300,000	\$163,000	6,640	\$35,300	26,200
2001	233,000	123,000	4,350	21,200	27,500	33,200

1/ Data are rounded to no more than three significant digits.

2/ Includes rods, profiles, wire, powders, flakes, tubes, and pipes.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF TIN IN VARIOUS FORMS 1/

Year	Miscellaneous 2/ Value (thousands)	Dross, skimmings, scrap, residues, tin alloys, n.s.p.f.		Tinplate and terneplate		Tin compounds		Tinplate scrap	
		Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
2000	\$5,680	5,170	\$17,700	359,000	\$206,000	586	\$4,740	14,500	\$1,660
2001	2,940	5,920	10,900	344,000	199,000	375	3,180	5,900	1,040

1/ Data are rounded to no more than three significant digits.

2/ Includes tinfoil, tin powder, flitters, metallics, manufactures, n.s.p.f.

Source: U.S. Census Bureau.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF UNWROUGHT TIN METAL,
BY COUNTRY 1/

Country	2000		2001	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Australia	317	\$1,600	300	\$1,320
Belgium	74	502	46	419
Bolivia	6,330	35,600	6,040	28,800
Brazil	5,860	31,800	5,510	24,600
Canada	10	64	2	9
Chile	2,630	14,700	122	630
China	10,200	54,500	6,360	31,200
Hong Kong	397	2,330	20	101
Indonesia	5,320	29,100	3,880	17,500
Malaysia	214	1,180	674	2,860
Peru	12,800	69,200	14,000	64,100
Singapore	20	114	145	710
United Kingdom	514	2,340	118	596
Other	178	968	228	1,160
Total	44,900	244,000	37,500	174,000

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

Source: U.S. Census Bureau.

TABLE 9
TIN: WORLD MINE PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1997	1998	1999	2000	2001 e/
Australia	10,169	10,204	10,011 r/	9,146	9,602 3/
Bolivia	12,898	11,308	12,417	12,464	12,500
Brazil	19,065	14,238 r/	13,202 r/	13,773 r/	14,000
Burma 4/	335	221	149	212 r/	230
Burundi e/	15 r/	9 r/	18 r/	5 r/	5
Cameroon e/	-- r/	-- r/	-- r/	-- r/	--
China e/	67,500	70,100	80,100	99,400 r/	79,000
Congo (Kinshasa)	--	--	50 e/	50 e/	50
Indonesia	55,175	53,959	47,754	51,629 r/	51,000
Laos	717	627	404 r/	414 r/	400
Malaysia	5,065	5,754	7,340	6,307 3/	4,973 3/
Mexico	5	5	4	4 r/	5
Mongolia	10	40	--	--	--
Niger e/	10	10	20	22 r/ 3/	20
Nigeria e/ 5/	150	200	200	300	200
Peru	27,952	25,907 r/	30,618 r/	37,410	38,182 3/
Portugal	2,667	3,100	2,200	1,200 e/	1,200
Russia e/	7,500	4,500	4,500	5,000	4,500
Rwanda	258	260	243	287 r/	260 3/
Spain e/	2	2	2	3	2
Thailand	746	1,656	2,712	2,166 r/	2,522 3/
Uganda	2	1	(6/) r/	(6/) r/	1
United Kingdom	2,396	376	--	-- e/	--
Vietnam e/	4,800	4,500	4,500	4,500	3,500
Zimbabwe e/	10	1	1	1	5
Total	217,000	207,000	216,000	244,000 r/	222,000

e/ Estimated. r/ Revised. -- Zero.

1/ World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

2/ Table includes data available through July 18, 2002.

3/ Reported figure.

4/ Includes content of tin tungsten concentrate.

5/ Concentrate gross weight reported, estimated 62% Sn content.

6/ Less than 1/2 unit.

TABLE 10
TIN: WORLD SMELTER PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons)

Country	1997	1998	1999	2000 e/	2001 e/
Australia:					
Primary	605	655	600 r/	775 3/	1,171 3/
Secondary e/	300	300	300	300	300
Total e/	905	955	900 r/	1,080	1,470
Belgium, secondary e/	3,000	2,500	8,100	8,500	8,000
Bolivia, primary	16,853	11,102	11,166	9,353 3/	9,400
Brazil:					
Primary	17,525	17,500 e/	13,200	13,000 3/	13,700
Secondary e/	250	250	250	250	250
Total e/	17,800	17,800	13,500	13,200	14,000
Bulgaria, secondary	10	10 e/	10 e/	10	10
Burma, primary	228	31	32	30	30
China, primary e/	67,700	79,300	90,800	112,000 r/	92,000
Czech Republic, secondary e/	100	100	100	100	100
Denmark, secondary e/	100	100	100	100	100
Germany, primary and secondary e/	100	100	--	--	--
Greece, secondary e/	150	200	200	150	150
Indonesia, primary	52,658	53,401	49,105	46,432 r/ 3/	50,000
Japan, primary	507	500	568	593 3/	668 3/
Malaysia, primary	34,822	27,201	28,913	26,228 r/ 3/	32,566 3/
Mexico, primary	1,188	1,078	1,258	1,200 r/	1,200
Nigeria, primary	100	150	50 e/	50 r/	50
Norway, secondary e/	50	50	50	50	50
Peru, primary	27,953 r/	25,907 r/	30,618 r/	37,410 r/ 3/	38,182 3/
Portugal, primary and secondary e/	100	100	100	--	--
Russia: e/					
Primary	6,700	3,000	3,400	4,700	4,500
Secondary	1,000	500	400	500	500
Total	7,700	3,500	3,800	5,200	5,000
Spain: e/					
Primary	150	100	50	--	--
Secondary	50	50	50	25	25
Total	200	150	100	25	25
Thailand, primary	11,986	15,353	17,306	17,076 3/	21,357 3/
United Kingdom, secondary e/	100	50	--	--	--
United States, secondary	12,400	16,300	16,400	15,700 r/ 3/	13,900 3/
Vietnam, primary	2,400	2,400 e/	2,400 e/	2,400 3/	1,800
Grand total:	259,000 r/	258,000 r/	275,000 r/	297,000 r/	290,000
Of which:					
Primary	241,000 r/	238,000 r/	249,000 r/	271,000 r/	267,000
Secondary	17,500	20,400	25,900	25,700 r/	23,400
Undifferentiated	200	200	100	--	--

e/ Estimated. r/ Revised. -- 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/ Whenever possible, total output has been separated into primary (from ores and concentrates) and secondary (tin metal recovered from old scrap). This table reflects metal production at the first measurable stage of metal output. Table includes data available through July 18, 2002.

3/ Reported figure.