RECYCLING—NONFERROUS METALS

By Staff

Introduction[1]

Recycling, a significant factor in the supply of many of the key metals used in our society, provides environmental benefits in terms of energy savings, reduced volumes of waste, and reduced emissions associated with the energy savings. The estimated value of nonferrous metals recycled domestically in 1995 was about $11.5-$12.0 billion. Recycling is an increasingly important component of economic activity in the United States. Table 1 shows salient U.S. recycling statistics for selected metals. Table 1 also shows salient U.S. apparent supply and recycling statistics for selected metals.

The U.S. Geological Survey (USGS) provides information and analysis on more than 100 raw and/or processed minerals. Collected data are assessed by commodity specialists, and information is disseminated to government, industry, and academia through consultative services and more than 100 periodical publications. This publication examines and reports on minerals and materials trends as well as environmental aspects of minerals use.

Because of the increasing importance of recycling to domestic metal supply and the intense public interest, this separate chapter on nonferrous metal recycling was restarted as part of the Annual Review series in 1991 after a 40-year hiatus. A separate chapter on iron and steel scrap already had been part of this series for many years. The focus of this chapter is on aluminum, copper, lead, tin, and zinc recycling.

Aluminum[2]

Metal recovered from both new and old scrap reached a historic high of approximately 3.2 million metric tons in 1995, according to data derived by the U.S. Geological Survey from its "Aluminum Scrap" survey. Of the 88 companies and/or plants to which monthly or annual survey requests were sent, 70 responded, representing 88% of the total scrap consumed shown in table 3.

According to figures released by the Aluminum Association Inc., the Can Manufacturers Institute, and the Institute of Scrap Recycling Industries Inc., 62.7 billion aluminum beverage cans were recycled in the United States during 1995. The recycling rate, based on the number of cans shipped during the year, was 62.2%, a modest decrease from the 65.4% recycling rate in 1994. According to the organizations' joint press release, aluminum beverage cans produced domestically in 1995 had an average 51.3% post-consumer recycled content, the highest percentage recycled content of all recyclable packaging materials.

Alreco Metals announced the closure and filing for Chapter 11 bankruptcy protection of its secondary smelter in Benton Harbor, MI. The smelter reportedly had a casting alloy production capacity of 5,400 to 5,900 tons per month, the fifth largest supplier in the country.[3]

IMCO Recycling Inc. announced several acquisitions and expansion programs during the year that increased the company's total recycling capacity to about 820,000 tons (1.8 billion pounds) per year of scrap. The company announced plans to upgrade and expand its Loudon, TN, aluminum used beverage can (UBC) recycling plant to an annual capacity of 81,600 tons (180 million pounds). IMCO also announced the acquisition of Ravenswood Aluminum Corp.'s 68,000-ton-per-year (150-million-pound-per-year) aluminum UBC recycling plant in Bedford, IN. IMCO announced the purchase of Alumar Associates, Inc., which owned Metal Mark, an operator of four aluminum scrap processing plants that serviced the automotive industry. Later in the year, IMCO and Alchem Aluminum Inc. announced plans to build a new secondary aluminum smelter in the Midwest to supply metal for the automotive market. The $10-million plant, scheduled to open at the end of 1996, had a planned annual capacity of 68,000 tons (150 million pounds).[4]

Alcan Aluminum Corp. announced the completion of expansions at its Oswego, NY, aluminum UBC recycling plant. The plant is now capable of melting more than 5 billion UBC's per year.[5]

IMCO announced plans to construct a facility adjacent to its Morgantown, KY, recycling plant to recover aluminum metal from salt cake, a byproduct of recycling. IMCO also announced that it was developing a new process to recover salts from the salt cake. The process reportedly would derive a fertilizer, with the test name "K-Soil," from the salt cake.[6] *(See tables 2, 3, and 4.)*

The London Metal Exchange (LME) reported that aluminum alloy ingot at its U.S. warehouses at yearend 1995 totaled about 30,900 tons, a dramatic increase from the 1,100 tons of alloy held at yearend 1994.

Prices.—Purchase prices for aluminum scrap, as quoted by American Metal Market (AMM), followed the trend of primary ingot prices and closed the year at significantly lower levels than those at the beginning of the year. The yearend price ranges for selected types of aluminum scrap were as follows: mixed low-copper-content aluminum clips, 55 to 56 cents per pound; old sheet and cast, 49.5 to 50.5 cents per pound; and clean, dry aluminum turnings, 49.5 to 50.5 cents per pound. Prices for aluminum UBC's also trended downward during the year. Aluminum producers' buying price range for processed and delivered UBC's, as quoted by AMM, began the year at 70 to 72

cents per pound. The price range at the end of the year was 58 to 60 cents per pound.

The yearend indicator prices, as published by AMM, for selected secondary aluminum ingots also decreased compared with those of 1994 and were as follows: alloy 380 (1% zinc content), 82.06 cents per pound; alloy 360 (0.6% copper content), 86.43 cents per pound; alloy 413 (0.6% copper content), 86.39 cents per pound; and alloy 319, 84.83 cents per pound. Metals Week published an annual average U.S. price of 80.5 cents per pound for A-380 alloy (3% zinc content). The average annual LME cash price for a similar aluminum 380 alloy was 75.1 cents per pound.

Foreign Trade.—Exports of aluminum scrap in all three categories increased significantly in 1995. Japan, Hong Kong, and Taiwan, in decreasing order of shipments, accounted for almost two-thirds of total scrap exports.

Imports for consumption continued to increase. Canada and Mexico remained the major shipping countries to the United States, supplying more than three-fourths of the total aluminum scrap imports in 1995. *(See tables 5 and 6.)*

World Review.—According to preliminary estimates published by the World Bureau of Metal Statistics in June 1996, world production of secondary aluminum increased to 6.6 million tons in 1995 from the revised 1994 production figure of 6.4 million tons.

Aluminum Can Recycling Europe (Acre) reported that European recycling of aluminum UBC's reached 35% (83,000 tons) in 1995 compared with 30% in 1994. Recycling rates vary widely among the 16 countries covered by the 1995 data, ranging from 10% in the Benelux countries and 14% in France and Spain to 85% in Switzerland and 91% in Sweden. Acre executives predicted that the European aluminum can recycling rate would surpass 50% by the year 2000. Of the European beverage can market, aluminum accounted for 16.3 billion cans, approximately 55% of the market in 1995.[7]

Aluminum can recycling in Japan reached a record high of 65.7% during the last business year, according to the Japan Aluminium Can Recycling Assn. Approximately 10.5 billion cans (equivalent to 174,000 tons of metal) were recycled, a 4.6% increase on the 1994 recycling rate of 61.1%. According to data recently released by one of Japan's leading canmakers, aluminum cans accounted for only 34% of the total food and beverage packaging market in Japan in 1994.[8]

Outlook

The domestic and world secondary aluminum industries are expected to continue to expand. The growth in the use of aluminum beverage containers is continuing and helping to expand the aluminum recycling industry around the world. Increased use of cast aluminum, a major market for secondary aluminum ingot, and other aluminum products by the automotive industry is also encouraging the expansion of the secondary aluminum industry. Growing markets and the increased sensitivity of the public to the issue of waste management have combined to foster the development and expansion of aluminum recycling around the world.

Copper and Copper Alloy Scrap[9]

Annual Review.—Estimated world production of secondary refined copper rose in 1995 by almost 200,000 tons, or 11%, to a record high level of 1.9 million tons, and accounted for about 16% of global refined production. World refined copper production rose by about 500,000 tons, to a record high 11.7 million tons. Secondary refined production in the United States declined for the second consecutive year following the closure of Southwire Co.'s Gaston, SC, secondary smelter and refinery at yearend 1994. High operating costs and the large additional capital investment needed to comply with environmental regulations were cited by the company as the reasons for closure.

Following a sharp decline in reported world inventories of refined copper in 1994, world production and consumption of refined copper were nearly in balance in 1995. Inventories held on the LME and the New York Commodity Exchange (Comex) were down only a nominal 20,000 tons in 1995, after having fallen by more than 300,000 tons, or 51%, in 1994. However, owing to the severe drawdown in inventories in 1994, copper availability remained tight and average annual refined prices were at record high levels. The U.S. producer price traded within a $0.25 per pound range and averaged $1.38 for the year. Though their discount to refined metal increased with increasing prices, average annual scrap prices also rose to record high levels. The United States' share of the world totals declined slightly, but the United States retained its position as both the largest producer and consumer of refined copper, accounting for 19% and 22%, respectively, of world totals. Domestic consumption of refined copper declined by more than 5% from the record high level in 1994, yet remained 7% above the 1993 level. The annual growth rate for domestic copper consumption since 1991 has averaged more than 5.6%.

In 1995, copper recovered from all old and new refined or remelted scrap comprised 39% of total U.S. copper supply and had an equivalent refined value of $4.0 billion. (*See tables 7-16.*) Conversion of old scrap to alloys and refined copper declined for the third consecutive year, falling by 58,000 tons, but contributed 442,000 tons of copper to the market, a quantity equivalent to about 17% of U.S. apparent consumption. The decline reflects closure of the Gaston smelter, a major consumer of old scrap.

Purchased new scrap, derived from fabricating operations, yielded 874,000 tons of copper, up 47,000 tons from that of 1994, and accounted for 66% of copper recovered from all scrap. Consumption of new scrap has trended upward over the past 4 years, increasing by almost 200,000 tons, or 28%, since 1991. This large increase in new scrap consumption reflects the increased domestic consumption of mill products, which, according to the Copper Development Association Inc., rose by almost 20% over the 1991 to 1994 period, before declining about 2% in 1995. Despite the decline in refined copper consumption and mill product shipments in 1995, consumption

of new scrap increased owing to the time lag between scrap generation and scrap consumption and because high refined copper prices encouraged increased recycling. About 76% of the copper contained in new scrap was consumed at brass mills.

During the year, 8 primary and 4 secondary smelters, 8 electrolytic and 6 fire refineries, and 14 electrowinning plants operated in the United States. However, by yearend, a primary smelter in Michigan, an electrolytic refinery and a rod mill in South Carolina, and a rod mill in Virginia had closed. Three of the electrolytic refineries, including the one in South Carolina, were dedicated facilities associated with secondary smelters and mostly processed anode derived from scrap; several other refineries that mainly processed primary anode, purchased or tolled some secondary anode. All the fire refineries processed copper scrap.

Copper was consumed, both as refined copper and as direct melt scrap, at about 35 brass mills, 15 wire rod mills, and 600 foundries, chemical plants, and miscellaneous consumers. Of the total copper recovered from copper-, aluminum-, nickel-, and zinc-based scrap, copper smelters and refiners recovered 28%; brass mills, 54%; brass and bronze ingot makers, 9%; and miscellaneous manufacturers, foundries, and chemical plants, 9%. Unalloyed scrap accounted for 50% of copper-based scrap consumed, as shown in table 11.

Market and Prices.—Copper scrap prices trended upward in 1995, for the second consecutive year, following the rise in refined copper prices. However, while the average producer price for refined copper rose about 27 cents per pound from the previous year, the refiners buying price for No. 2 scrap rose only about 20 cents per pound. Thus, the average margin between refined copper and No. 2 scrap widened from an average of 30 cents per pound in 1994 to 34 cents per pound in 1995. At the peak refined copper price in January, the No. 2 scrap discount reached 40 cents per pound.

While copper scrap prices correlate to the price of refined copper, the price paid for scrap at each level of processing must be sufficiently discounted to allow for all subsequent processing costs. Thus, a scrap collector who must perform such functions as sorting, shipping, chopping, baling, etc. will pay less for scrap than does the consumer of the scrap. Historically, because of these inherent costs associated with the initial collection and processing of scrap, low refined copper prices squeeze processing and profit margins and reduce the quantity of scrap that can be recovered economically. Higher scrap prices and increased scrap discounts or processing margins have encouraged both scrap availability and scrap consumption. This was true for 1995 at brass mills, major consumers of new scrap, whose product pricing is based on the contained metal value and a fabrication charge. Brass mills regularly adjust product prices to reflect the market price of refined metal.

Despite the increase in margins, however, consumption of old scrap consumed predominantly by secondary smelters and ingot makers, declined in 1994. Closure of the Gaston smelter and a weak market for alloy ingot, a product more than 75% dependant on scrap as a raw material, accounted for the reduced consumption. Also, intense competition from exporters may have limited the availability of certain scrap types. Yellow brass ingot prices (*See table 14*), which historically have traded at a premium to refined copper, averaged below the producer price for refined copper, reflecting the weakness in that market segment.

Foreign Trade.—Exports of both alloyed and unalloyed scrap rose significantly in 1994 for the third consecutive year, while imports of copper alloy scrap increased slightly. Consequently, net exports of scrap rose by about 50,000 tons in 1995 to almost 300,000 tons, up from about 100,000 tons in 1993. The United States was one of the largest international sources for copper scrap, followed by France, Germany, and the United Kingdom. Canada retained its position as the largest recipient of U.S. scrap exports, accounting for one-third of the total. U.S. exports of copper scrap have, on average, been increasing since the 1960's, when the Asian nations began to industrialize. In 1995, China, Hong Kong, Japan, Korea (South), Singapore, and Taiwan, combined, accounted for 41% and 54%, respectively, of U.S. unalloyed and alloyed scrap exports. Canada and Mexico were the leading sources for U.S. imports of copper and copper alloy scrap and accounted for 83% of imports in 1995. (*See tables 15 and 16*.)

Outlook

Over the next decade, new copper scrap will continue to be a premium material for the U.S. semifabricating industry, and its level of availability and the quantity recycled will be closely tied to the overall level of copper fabrication. However, improved manufacturing technology will continue to lower the scrap to product ratio and proportionally constrain supplies. As in 1995, high prices will increase short-term recycle rates. With the closure of the Gaston smelter, domestic recovery of copper from old scrap is expected to remain at or below the current level. Owing to the high cost of environmental compliance, no new secondary smelting capacity is anticipated in the near term. However, if it is assumed that most copper scrap entering into trade is old scrap destined for recovery, and that it is processed for recovery in the year of transit, then the apparent recovery of copper from domestic source old scrap over the past 4 years has closely paralleled price movements, declining slightly in 1993 to about 600,000 tons and increasing in 1994 and 1995 to 660,000 tons. Because of the inherent cost of scrap collection and processing, it is expected that the price sensitivity of the "apparent" recycling rate for old scrap will continue. Because scrap is usually a lower-cost alternative to primary metal, it will continue to be of great interest to Far Eastern countries as they expand their industries. The recovery of copper (old scrap) from the large and growing reservoir of copper products in use may be affected by the following factors: (1) competitive prices for primary metal, (2) increasing life of products, (3) available recovery technologies, (4) changing end-use patterns, and (5) environmental regulation. Regulations to limit the lead content of plumbing fixtures in potable water distribution systems could result in the land-filling of high-leaded brass scrap, absent new recovery technologies; leaded brass scrap is the prime feed

material to the ingot-making and foundry industries. The Basel convention, an international agreement on the transboundry movement of hazardous waste, could impede the international flow of copper scrap.

Lead[10]

Refined lead is a soft, heavy metal, one of the first metals used by humankind. Among the important characteristics of lead are its electrochemical energy storage capability, its good corrosion resistance, and its low melting point, the latter making it relatively easy to cast. The United States is the world's largest producer and consumer of refined lead, and domestic demand for lead, which is of about the same magnitude as the demand for zinc, is surpassed only by that for aluminum, copper, and iron.

Legislation and Government Programs.—On May 11, 1995, the Environmental Protection Agency (EPA) issued final modifications to its Universal Waste Rule, originally proposed on February 11, 1993. The hazardous waste management regulations covered under this rule govern the collection and management of certain widely generated wastes, including lead-acid batteries. EPA maintained certain exemptions for batteries in the final rule as they had existed in the original rule because of the current success with lead-acid battery recycling programs. Specifically, the exemptions pertained to persons who generate, transport, or collect spent lead-acid batteries, or who store them but do not regenerate them. The exemptions involved such items as proper labeling, storage time limits, employee training on waste handling, appropriate tracking of waste, and shipment and export requirements.[11]

In other EPA actions, a final rule on National Emission Standards for Hazardous Air Pollutants from Secondary Lead Smelting was issued June 23, 1995. This rulemaking affected secondary lead smelters that use blast, reverberatory, rotary, or electric furnaces to recover lead, primarily from used lead-acid automotive-type batteries. This EPA rule was issued pursuant to the Clean Air Act, as amended in 1990, and covered the emission of several chemicals identified in the Clean Air Act as hazardous air pollutants including, but not limited to, lead compounds, and certain other inorganic and organic compounds.[12]

Consumption.—Domestic demand patterns for lead have undergone significant change in recent years as a result of human health concerns related to lead exposure, and of Government actions taken to reduce that exposure. In 1972, dissipative uses of lead, particularly in gasoline additives, pigments, ammunition, and chemicals, coupled with other uses where the potential for human exposure exists, such as in packaging, solders, plumbing, and certain other construction materials, amounted to about 510,000 tons, or 38% of the reported consumption of lead. In 1985, these end uses represented 205,000 tons, 18% of consumption, and in 1995 only 140,000 tons, 9% of consumption. Lead consumed in lead-acid storage batteries grew accordingly during these years, from 660,000 tons, or 49% of lead consumption in 1972, to 840,000 tons, 73% of consumption in 1985, to 1.36 million tons, 85% of consumption in 1995. Consequently, the number of used batteries available for recycling also grew during this period. By 1995, the gross weight of lead-containing battery scrap processed at secondary smelters reached 1.06 million tons. *(See table 17.)*

Production.—In 1995, about 867,000 tons of lead were produced at secondary smelters from used lead-acid batteries. This was approximately 90% of the lead recovered from all forms of both old and new scrap, and 64% of the total production of lead from primary and secondary sources. The estimated value of the lead recovered from secondary sources in 1995 was $906 million. Domestic secondary production of lead increased by about 4% in 1995, and was nearly 90,000 tons above the level reached only 4 years earlier in 1991. *(See tables 1, 18, and 19.)*

Domestic data for secondary lead consumption and production in 1995 were developed by the USGS from a combined consumer and secondary producer survey sent to both monthly and annual respondents. Of the 212 consuming companies to which a survey request was sent, 150 responded, representing an estimated 90% of total U.S. lead consumption. Of the 23 companies producing secondary lead, exclusive of that produced from copper-based scrap, 20 responded, representing an estimated 90% of total refinery production of secondary lead. Production and consumption for the nonrespondents were estimated, using prior year responses as a basis.

In U.S. secondary lead industry actions during 1995, GNB Technologies Inc., Atlanta, GA, and Nova Pb Inc., Quebec, Canada, signed a multiyear agreement in early 1995 that formalized a long-standing toll processing relationship between the companies. Under the agreement, Nova will become GNB's recycling agent in the northeastern part of North America. GNB will collect and deliver spent lead-acid batteries to Nova's secondary lead smelter for processing, and Nova, in turn, will ship the recycled lead to GNB's battery-making plants in the United States. In other developments, GNB officially opened its new lead-acid battery recycling facility at Columbus, GA, in mid-June. The facility was designed to recycle about 9 million batteries annually, replacing an older plant located at the Columbus site that was capable of recycling only about one-fourth as many batteries.[13]

RSR Corp., Dallas, TX, announced in March that it had abandoned efforts to build a new secondary lead smelter in Aiken, SC. Local opposition to the project had existed because of environmental concerns. RSR indicated, however, that it was still committed to building a smelter in the southeastern United States, but specific plans on how to proceed had not yet been decided.[14] In late 1995, RSR further announced that it would increase secondary refined lead production capacity through modifications to two of its secondary lead smelters. Upgrades planned at the Indianapolis, IN, and Middletown, NY, plants would add a combined total of 48,000 tons of capacity annually to their facilities. Improvements at the Indianapolis plant, expected to be completed in early 1996, included the addition of a second electric-arc furnace, and another bag house and

scrubber unit. At the Middletown plant, a desulfurization unit was to be installed that produces sodium sulfate crystals in the secondary recovery processing scheme. The unit was expected to be in operation by July 1996.[15]

Quexco International, Dallas, TX, parent company of RSR Corp., completed the purchase in mid-December of the Rheinische Zinkgesellschaft (RZG) lead facilities owned by Metallgesellschaft AG, Frankfurt, Germany. RZG's operations included the Berzelius Stolberg primary lead smelter and a total of five secondary lead plants in Germany, France, and Austria. According to company officials, the European facilities would be operated independently of RSR's secondary lead operations in the United States.

Exide Corp., Reading, PA, completed the purchase in September 1995 of the two secondary lead smelters owned by Schuylkill Metals Corp., Baton Rouge, LA. Exide had prepared an initial bid to purchase Schuylkill's approximately 100,000-ton-per-year-capacity facilities in January. The acquisition was described as part of Exide's vertical integration plans to increase the quantity of lead accessible in-house for its expanding lead-acid battery production operations. The company had acquired four battery production businesses in Europe during 1994.

Foreign Trade.—Exports of lead scrap in 1995 were about 105,000 tons, nearly 19% higher than in 1994, and were valued at approximately $31 million, about 27% greater than in 1994. Canada and the Republic of Korea received 91% and 6%, respectively, of the exports of lead scrap. Imports of lead scrap for the year totaled 75 tons worth $36,000. *(See table 20.)*

Outlook

According to industry analysts, the demand for lead in both original equipment and replacement lead-acid automotive batteries is expected to grow steadily in the United States over the next 5 years. By the year 2000, original equipment battery shipments are expected to have grown by about 10% from the 1995 level of 15.6 million units, or on average, 1.9% per year. During the same period, shipments of replacement batteries are expected to grow at an average rate of 3% per year from the 1995 level of 77.1 million units. Projected growth in the demand for replacement batteries is associated not only with the increase since 1990 in the total number of vehicles being used, but also with the decrease in battery life in these vehicles.

Total metal production from primary and secondary refineries in 1996 is expected to remain at about the level of 1995. A decline in primary refinery production, caused by the closure of one facility in midyear, is expected to be countered by an increase in secondary production. The supply of battery scrap and the available capacity at the smelters are sufficient to accommodate this increase.

The tighter world lead market of 1995 is likely to continue in 1996 and 1997 as world consumption increases while world production remains relatively stable. As in 1995, industry stocks are expected to decline in order to compensate for this shortfall. The extent of the shortfall in the industrialized world will be dependent, to some extent, on the supply of both primary and secondary lead available from developing countries.

Tin[16]

Tin is commonly used as a protective coating or as an alloying metal with one or more other metals. Refined metal in the form of ingots is generally the starting material for most uses of tin. The major uses and use sectors for tin are as follows: cans and containers, 30%; electrical, 20%; construction, 10%; and transportation, 10%; other uses account for the remaining 30%. Tinplate generally contains no scrap tin, but most other end-use items, especially solder and brass/bronze, use substantial quantities of tin scrap.

About 25% of the domestic supply of tin metal is recovered from scrap. In 1995, 11,082 tons of tin metal valued at an estimated $101 million was recovered from new and old tin scrap.

Old tin scrap is collected at hundreds of domestic scrap yards, at seven detinning plants, and at most municipal collection/recycling centers. New tin scrap is generated mainly in the tin mills at six steel plants, scores of canmaking facilities, numerous brass and bronze plants, and many soldermaking plants.

Detinning facilities are unique to the tin scrap industry, in that no other major metal industry has such large-scale facilities to remove plated metal. There are seven domestic detinning plants scattered across the country. Until about 1989, their feed material was limited almost entirely to tinplate scrap that originated in the tin mills of steel plants and in canmaking plants. Since 1989, using equipment that shreds tin cans, some of the facilities have acquired the capability of detinning used tin cans. Only from the detinning process does free metal see its way to the marketplace. All the alloy forms of tin are recycled within their own product-line industries and thus reappear as regenerated alloys. (*See tables 21 and 22.*)

Most tin scrap processing facilities are close to the tin-using industries and to densely populated areas. Most are in the Midwest and Northeast.

Domestic scrap data for tin are developed by the USGS from voluntary surveys of domestic industries. The smaller side of this industry is covered by a canvass sent to five detinning companies monthly. The larger side of the tin scrap industry, involving the alloys of tin, is covered largely by monthly surveys of the copper and lead scrap industries (tin's major coalloys) from which estimates are made for the tin content.

The former Steel Can Recycling Institute (SCRI) completed its second full year under its new name, the Steel Recycling Institute (SRI). The name change reflected a broadening of its mission to encompass not only steel cans (which had been its sole focus since its 1988 founding), but all steel products, ranging from appliances, to filing cabinets, to cars. Since SCRI's inception, the steel can recycling rate had grown from 15% in 1988 to 56% in 1995. The overall steel recycling rate has been over 60% for more than 20 years and currently stands at 66%. The SRI continued to maintain a program of having representatives in various regions of the United States work

with muncipalities, scrap dealers, and detinners to promote the recycling of tin cans. It continued to actively sponsor the recycling of aerosol steel cans, and announced that about 95 million Americans now have access to aerosol can recycling. More than 26,000 communities nationwide now actively recycle aerosol steel cans.

One of the major domestic detinners, Proler International Corp., announced the completion and startup of an addition to its Coolidge, AZ, plant. The addition has a capacity of 325 annual tons of tin, which is recovered from sludges and etchings from the electronics industry. The Coolidge plant was built in 1978 to recover tin from tinplate and tin cans. The expansion was part of a $5 million program to diversify the range of materials recycled. The expansion plant utilizes technology adapted from the detinning process to recycle tin-lead slimes and circuit board etchings from the electronics industry of Arizona and California. Proler produced secondary tin in a variety of forms, including anodes, ingots, and a tin "popcorn" (a high-surface area, high-grade tin product favored by the chemical industry).

AMG Resources Corp., a major domestic detinner based in Pittsburgh, PA, and Hoogovens Group BV, a major steel producer and tinplate manufacturer also active in detinning, based in the Netherlands, signed a joint-venture agreement to market detinning technologies as well as to build plants to process both industrial tinplate scrap and used steel cans. The two companies said they believed that as municipal recycling increases and the volume of post-consumer steel cans coming into the market grows, detinning would become increasingly important to meet the steel industry's needs for low-residual scrap. AMG officials noted that while both companies already operate detinning plants, they planned to cooperate in building and operating new detinning plants in central and eastern Europe and Asia. AMG Resources has four domestic detinning plants and also has detinning operations in Australia, Spain, and The United Kingdom. In addition to steelmaking plants, Hoogovens operates an array of scrap processing facilities in Belgium and the Netherlands.

World Review.—The United States, France, Germany, Japan, and the United Kingdom generally lead the world in tin recycling activity and innovation. Environmental pressures in those countries for the past 20 years have acted as a powerful incentive.

In contrast to the United States and Europe, where detinning has long been a substantial activity, Japanese industry does little or no detinning because it feels that the tin coating on tinplate has become so thin in the past 20 years that detinning is not cost effective.

Outlook

The near- and long-term outlook for tin recycling is positive, with modest growth expected, about 1% annually. Tin is a high-value industrial material. In the form of tinplate, one of its main uses, it is easily separated magnetically for recycling. Tin consumption is expected to grow about 1% annually. Scrap is expected to grow from 25% of total metal consumed in 1995 to 27% consumed annually by the year 2000. A major incentive is expected to be environmental legislation, mostly at the local and State level. If tin prices remain relatively high compared with prices of other major metals, the industry will have sufficient incentive to recycle this costly metal.

Zinc[17]

More than three-fourths of the zinc consumed domestically is in metallic form, with the rest in compound form. More than one-half of the metal is used to coat (galvanize) steel. Galvanized steel is used principally in the automotive and construction industries. Zinc compounds, of which the oxide is by far the most important, are used in the agricultural, chemical, paint, pharmaceutical, and rubber sectors of the economy.

Between 25% and 30% of world zinc is produced through secondary recovery. The main sources for secondary zinc are brass (32%), galvanizing residues (23%), diecasting scrap (16%), zinc sheet (10%), and flue dust from electric arc steel furnaces (EAF). In the United States, about one-fourth of the 1.46 million tons of zinc consumed annually by domestic industries is secondary zinc. In 1995, about 353,000 metric tons of secondary zinc, valued at $435 million, was recovered from refined metal, alloys, dusts, and chemicals. Scrap containing 55,935 tons of zinc, valued at $36.1 million, was exported in 1995, a 4% decline from that of 1994. Taiwan remained the largest importer of U.S. zinc scrap, with Canada and India following far behind. Imports of secondary zinc in 1995 declined by 18%, to 42,260 tons, valued at $19.7 million.

About 2% of recycled zinc was derived from new scrap, generated in galvanizing and diecasting plants, brass mills, and manufacturing facilities where basic zinc materials were consumed. New scrap consisted mostly of drosses, skims, furnace dust, residues, and clippings from the processing of galvanized steel sheet and strip, rolled zinc, and brass sheet. The other 20% of recycled zinc was obtained from old scrap, which consisted almost entirely of diecastings (mainly from scrapped automobiles), brass products, and rolled zinc articles such as gutters, roofing, and engraving plates. Recovery of zinc from the burning of tires for energy is small. Old zinc scrap for recycling was collected at hundreds of domestic scrap yards, numerous municipal collection centers, and at more than 200 automobile and appliance shredding operations.

In 1995, three primary and five secondary smelters processed old and new scrap, drosses, skims, and EAF dust into slab zinc, zinc alloys, and zinc dust. Seven other smelters produced zinc sulfate and other chemicals from these materials. Secondary brass and bronze were recycled at more than 500 secondary smelters, foundries, and ingot makers. Crude zinc oxide concentrates extracted from EAF dust were produced at four plants. The Zinc Corporation of America's plant in Monaca, PA, is by far the single largest processor of secondary zinc. Most of the other secondary zinc plants are in the eastern and midwestern United States.

Processing.—Because of wide differences in the character

and content of zinc-bearing scrap, zinc recycling processes vary widely. Clean new scrap, mainly brass, rolled zinc clippings, and rejected diecastings, usually require only remelting before reuse. Zinc-containing metals are generally separated from other materials by physical means such as hand sorting, magnetic separation, and sink-floating. In the case of mixed nonferrous shredded metal scrap, zinc can be separated from other metals by selective melting in a sweat furnace. Zinc in galvanized scrap is largely recovered in furnace dust when the scrap is charged into a steelmaking furnace. However, a new commercial process has been developed to strip zinc from galvanized scrap. The process uses a caustic leach prior to recycling the substrate steel to the steelmaking process.

Almost all of the zinc in EAF dust is first recovered as an upgraded, impure zinc oxide product; however, several commercial EAF dust treatment plants are able to bypass the intermediate step and recover zinc metal directly. The most prevalent recovery method used for EAF dust is the Waelz process, yielding zinc oxide containing about 65% of zinc which is almost always shipped to a primary pyrometallurgical zinc smelter or electrolysis plant for refinement to metal.

Drosses, fragmentized diecastings, and mixed high-grade scrap are typically remelted, distilled, and recovered as metal, dust, or oxide. Sometimes, high-purity drosses are simply melted and reacted with various fluxes to release the metallic content. Often the recovered metal can be used directly as a galvanizing brightener or master alloy. Medium- and low-grade skims, oxidic dust, ash, and residues generally undergo an intermediate reduction-distillation-pyrometallurgical step to upgrade the zinc product before treatment. Or, they are leached with acid, alkaline, or ammoniacal solutions to extract zinc, which is subsequently recovered as a compound by crystallization, or as a salable chemical product retained in solution. For the most part, the zinc metal, alloys, and chemicals recovered from secondary materials are comparable in quality to those derived from primary materials.

Recovery efficiency is very high from simple remelting, but declines as the number of processing steps increases and, generally, as the zinc content of the scrap declines. Zinc recovery from most secondary processes ranges between 40% and 85%; however, oxides, slags, and residues resulting from initial secondary recovery processes may in turn be further recycled, resulting in increased recovery of zinc.

Products.—Zinc materials made from zinc-based scrap are slab, alloys, dust, and chemical compounds. Brass scrap is usually remelted and, with alloy adjustment, recast as brass. Zinc chloride and sulfate compounds are produced largely by acid leaching of zinc skims, drosses, and chemical residues. Impure zinc oxide products and zinc-bearing slags are sometimes used as trace element additives in fertilizers and animal feeds.

Prices.—Prices paid for scrap and other secondary materials are negotiated, often on the basis of a daily or average LME price for zinc metal. Prices depend on many factors, such as quality, quantity, grade, the presence of other components or elements, geographic location, and environmental difficulties in handling, transporting, or treating. In the case of EAF dust, the dust generator usually pays the dust processor a fee to recycle the material, which typically contains about 20% zinc. Daily, weekly, and monthly prices for common types of brass are published in American Metal Market, Metal Bulletin, and Metal Bulletin Monthly. Prices for U.S. Department of Defense scrap sales are determined by bids.

Outlook

Driven by public concern for the environment, domestic and world secondary zinc is expected to increase as a percentage of zinc consumed in the next decade. In response to tightening environmental requirements in the 1990's, the amount of EAF dust treated at secondary smelters rose from 6,000 tons in 1981 to 300,000 tons annually in the early 1990's, the latter tonnage yielding about 60,000 tons of zinc metal. However, this spectacular rate of increase may be slowed down by the EPA's ruling of May 1995, allowing dumping of EAF dust in the municipal landfills if it has been stabilized.

An increase in the recovery of zinc from galvanized steel is expected; several new processes for dezincing galvanized scrap have been developed and tested. Increased zinc recovery from energy-generating tire burning and from recycling of carbon-zinc and alkaline batteries appear to be other sources for near term gains in secondary zinc output. A long term possibility is the recycling of zinc from municipal incinerator dust and residues. The prospect for recovery equivalent to more than 40% of total zinc consumption is relatively poor because of the dissipative nature and the diversity of zinc uses. However, this may change if electric cars powered by zinc-air batteries become a reality.

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[1]Prepared by J. F. Papp, physical scientist, Minerals Information Team.

[2]Prepared by P. Plunkert, physical scientist, Minerals Information Team.

[3]Platt's Metals Week. US Secondary Aluminum Up on Alreco Bankruptcy. V. 66, No. 50, Dec. 18, 1995, pp. 8-9.

[4]Apotheker, S. IMCO Recycling: Aluminum Processor to the World. Resource Recycling, v. 14, No. 12, Dec. 1995, pp. 19-24.

[5]American Metal Market. Alcan Expands UBC Recycling. V. 103, No. 124, June 28, 1995, p. 10.

[6]_____. Imco Launches Plant Upgrade. V. 103, No. 48, Mar. 13, 1995, p. 8.

[7]_____. Europe UBC Recycling Surpasses Target Rate. V. 104, No. 151, Aug. 6, 1996, p. 10.

[8]Metal Bulletin Monthly. New Record For Japanese Aluminium Can Recycling. No. 309, Sept. 1996, p. 84.

[9]Prepared by D. L. Edelstein, physical scientist, Minerals Information Team.

[10]Prepared by G. R. Smith, physical scientist, Minerals Information Team.

[11]Federal Register. Universal Waste Rule (Hazardous Waste Management System; Modification of the Hazardous Waste Recycling Regulatory Program). (Environmental Protection Agency.) V.60, No. 91, May 11, 1995, pp. 25492-25551.

[12]———. National Emission Standards for Hazardous Air Pollutants From Secondary Lead Smelting. (Environmental Protection Agency.) V. 60, No. 121, June 23, 1995, pp. 32587-32601.

[13]Platt's Metals Week. N. American Lead Recyclers Form Alliance. V. 66, No. 9, Feb. 27, 1995, p. 3.

[14]Metal Bulletin. RSR Kills Aiken Lead Smelter Project. No. 7967, Mar. 30, 1995, p. 14.

[15]American Metal Market. RSR Plans to Boost Lead Output. V. 103, No. 218, Nov. 10, 1995, p. 1.

[16]Prepared by J. F. Carlin, Jr., physical scientist, Minerals Information Team.

[17]Prepared by J. Plachy, physical scientist, Minerals Information Team.

OTHER SOURCES OF INFORMATION

U.S. Geological Survey Publications

Mineral Commodity Summaries, annual.
Mineral Industry Surveys, monthly and annual.
Minerals Yearbook, annual.

Other Sources

ABMS Non-Ferrous Metal Data.
Aluminum Association Inc. Aluminum Statistical Review, annual.
American Metal Market (daily paper).
Battery Council International, special reports.
Brass and Bronze Ingotmakers Association.
Copper and Brass Fabricators Council, Inc.
CRU. Aluminum Metal Monitor (monthly).
Institute of Scrap Recycling Industries.
Lead and Zinc Statistics (monthly bulletin of the International Lead and Zinc Study Group).
Metal Bulletin (London).
Platt's Metals Week.
Resource Recycling.
Roskill Information Services Ltd. Zincscan.
U.S. Department of Commerce News.

TABLE 1
SALIENT U.S. RECYCLING STATISTICS FOR SELECTED METALS 1/

Year	Quantity (metric tons) New scrap 2/	Old scrap 3/	Recycled metal 4/	Apparent supply 5/	Percent recycled	Value (thousands) New scrap	Old scrap	Recycled metal	Apparent supply 6/
Aluminum: 7/									
1991	969,000	1,320,000	2,290,000	6,010,000	38	$1,270,000	$1,730,000	$3,000,000	$7,880,000
1992	1,140,000	1,610,000	2,760,000	6,870,000	40	1,450,000	2,040,000	3,500,000	8,710,000
1993	1,310,000	1,630,000	2,940,000	7,920,000	37	1,540,000	1,920,000	3,460,000	9,300,000
1994	1,580,000	1,500,000	3,090,000	8,460,000	36	2,480,000	2,360,000	4,840,000	13,300,000
1995	1,680,000	1,510,000	3,190,000	8,010,000	40	3,190,000	2,850,000	6,040,000	15,200,000
Copper: 8/									
1991	682,000	518,000	1,200,000	2,370,000	44.0	1,650,000	1,250,000	2,890,000	6,580,000
1992	723,000	555,000	1,280,000	3,030,000	42.2	1,710,000	1,310,000	3,030,000	7,170,000
1993	748,000	543,000	1,290,000	3,260,000	39.6	1,510,000	1,100,000	2,610,000	6,590,000
1994	827,000	500,000	1,330,000	3,510,000	37.9	2,030,000	1,230,000	3,250,000	8,580,000
1995	874,000	442,000	1,320,000	3,420,000	38.6	2,670,000	1,350,000	4,030,000	10,400,000
Lead: 9/									
1991	55,000	830,000	885,000	1,280,000	68.9	40,600	612,000	653,000	947,000
1992	55,400	861,000	916,000	1,330,000	69.1	42,900	666,000	709,000	1,030,000
1993	55,000	838,000	893,000	1,380,000	64.7	38,500	587,000	625,000	966,000
1994 r/	54,200	877,000	931,000	1,540,000	60.5	44,400	719,000	763,000	1,260,000
1995	46,400	926,000	972,000	1,580,000	61.5	43,300	863,000	906,000	1,470,000
Nickel: 10/									
1991	--	--	53,500	157,000	34.20	--	--	436,000	1,280,000
1992	--	--	55,900	159,000	35.10	--	--	391,000	1,120,000
1993	--	--	54,000	159,000	34.30	--	--	386,000	839,000
1994	NA	NA	58,600	164,000	35.60	NA	NA	371,000	1,040,000
1995	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tin: 11/									
1991	5,110	7,980	13,100	39,600	33	41,500	64,800	106,000	317,000
1992	4,890	8,850	13,700	37,300	37	43,400	78,400	122,000	331,000
1993	4,190 r/	6,950 r/	11,100 r/	43,300	26 r/	32,300 r/	53,500 r/	85,800 r/	334,000
1994 r/	4,290	7,380	11,700	41,900	28	34,800	59,900	94,800	340,000
1995	3,460	7,620	11,100	40,500	27	31,700	69,700	101,000	371,000
Zinc: 12/									
1991	233,000	119,000	353,000	1,170,000	30.3	271,000	138,000	410,000	1,360,000
1992	234,000	132,000	366,000	1,280,000	28.7	301,000	170,000	471,000	1,640,000
1993	246,000	109,000	355,000	1,370,000	26.0	250,000	111,000	361,000	1,400,000
1994	245,000 r/	116,000	361,000 r/	1,400,000 r/	25.9	208,000 r/	126,000	335,000 r/	1,510,000
1995	241,000	112,000	353,000	1,460,000	24.2	297,000	138,000	435,000	1,800,000

r/ Revised. NA Not available.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ New scrap is scrap that results from the manufacturing process, including metal and alloy production.

3/ Old scrap is scrap that results from consumer products.

4/ Recycled metal is metal recovered from new plus old scrap.

5/ Apparent supply is production plus net imports plus stock changes. Production is primary production plus recycled metal. Net imports is imports minus exports. Apparent supply is calculated on a contained weight basis.

6/ Same as apparent supply defined above but calculated on a monetary value basis.

7/ Scrap quantity is the calculated metallic recovery from reported purchased new and old aluminum-based scrap, estimated for full industry coverage. Monetary value is estimated based on average U.S. market price for primary aluminum metal ingot.

8/ Monetary value of recovered copper for consumption is estimated as average annual refined copper prices.

9/ Lead processors are segregated by primary and secondary producers. This segregation permits inclusion of stocks changes for secondary producers. Monetary value of scrap and apparent supply estimated upon average quoted price of common lead.

10/ Nickel scrap is nickel contained in ferrous and nonferrous scrap receipts. Monetary value of scrap and apparent supply is estimated as average annual LME cash price of nickel cathode.

11/ Monetary value estimate based on Platt's Metals Week (PMW) Tin Composite price. Reevaluation of the tin canvass in 1991 resulted in a substantial lowering of estimated old scrap.

12/ Monetary value based on average annual U.S. metal price for North American special high grade zinc published in PMW.

TABLE 2
U.S. CONSUMPTION OF AND RECOVERY FROM PURCHASED NEW AND OLD ALUMINUM SCRAP 1/, BY CLASS 2/

(Metric tons)

Class	Consumption	Calculated recovery	
		Aluminum	Metallic
1994:			
Secondary smelters	1,150,000	888,000 r/	953,000 r/
Integrated aluminum companies	1,340,000	1,120,000	1,190,000
Independent mill fabricators	728,000	628,000	670,000
Foundries	103,000	83,700	90,100
Other consumers	10,900	10,900	10,900
Total	3,340,000	2,730,000	2,920,000 r/
Estimated full industry coverage	3,530,000	2,890,000 r/	3,090,000 r/
1995:			
Secondary smelters	1,300,000	978,000	1,050,000
Integrated aluminum companies	1,400,000	1,160,000	1,240,000
Independent mill fabricators	676,000	585,000	625,000
Foundries	102,000	84,000	90,300
Other consumers	10,800	9,570	9,600
Total	3,480,000	2,820,000	3,010,000
Estimated full industry coverage	3,690,000	2,980,000	3,190,000

r/ Revised.

1/ Excludes recovery from other than aluminum-base scrap.

2/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 3
U.S. STOCKS, RECEIPTS, AND CONSUMPTION OF PURCHASED NEW AND OLD ALUMINUM SCRAP 1/ AND SWEATED PIG IN 1995 2/

(Metric tons)

Class of consumer and type of scrap	Stocks, Jan. 1	Net receipts 3/	Consump-tion	Stocks, Dec. 31
Secondary smelters:				
New scrap:				
Solids	4,680 r/	179,000	177,000	7,090
Borings and turnings	5,030 r/	204,000	204,000	4,450
Dross and skimmings	3,000	209,000	208,000	3,730
Other 4/	4,850	205,000	207,000	2,730
Total	17,600 r/	797,000	796,000	18,000
Old scrap:				
Castings, sheet, clippings	17,000 r/	321,000	324,000	13,900
Aluminum-copper radiators	766 r/	10,300	10,200	894
Aluminum cans 5/	1,680	118,000	119,000	1,390
Other 6/	453	44,500	44,500	443
Total	19,900 r/	494,000	497,000	16,600
Sweated pig	504	6,250	4,340	2,410
Total secondary smelters	37,900 r/	1,300,000	1,300,000	37,000
Integrated aluminum companies, foundries, independent mill fabricators, other consumers:				
New scrap:				
Solids	19,600	779,000	783,000	15,600
Borings and turnings	365	31,300	31,600	27
Dross and skimmings	89	15,900	15,900	136
Other 4/	9,320	197,000	198,000	8,330
Total	29,400	1,020,000	1,030,000	24,100
Old scrap:				
Castings, sheet, clippings	9,080	328,000	329,000	8,020
Aluminum-copper radiators	372 r/	2,490	2,710	157
Aluminum cans	22,600	811,000	799,000	34,600
Other 6/	155	14,400	14,200	340
Total	32,300	1,160,000	1,150,000	43,200
Sweated pig	393	10,400	10,300	421
Total integrated aluminum companies, etc.	62,000	2,190,000	2,180,000	67,700
All scrap consumed:				
New scrap:				
Solids	24,300	958,000	959,000	22,700
Borings and turnings	5,390 r/	235,000	236,000	4,480
Dross and skimmings	3,090	225,000	224,000	3,860
Other 4/	14,200	402,000	405,000	11,100
Total	46,900 r/	1,820,000	1,820,000	42,100
Old scrap:				
Castings, sheet, clippings	26,100 r/	649,000	653,000	21,900
Aluminum-copper radiators	1,140 r/	12,800	12,900	1,050
Aluminum cans	24,300	930,000	918,000	36,000
Other 6/	608	58,900	58,700	783
Total	52,100 r/	1,650,000	1,640,000	59,800
Sweated pig	897	16,600	14,700	2,830
Total of all scrap consumed	100,000 r/	3,490,000	3,480,000	105,000

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes imported scrap. According to reporting companies, 13.4% of total receipts of aluminum-base scrap, or 467,000 metric tons, was received on toll arrangements.

3/ Includes inventory adjustment.

4/ Includes data on foil, can stock clippings, and other miscellaneous.

5/ Used beverage cans toll treated for primary producers are included in secondary smelter tabulation.

6/ Includes municipal wastes (includes litter) and fragmentized scrap (auto shredder).

TABLE 4
PRODUCTION AND SHIPMENTS OF SECONDARY ALUMINUM ALLOYS BY
INDEPENDENT SMELTERS IN THE UNITED STATES 1/

(Metric tons)

	1994		1995	
	Production	Net shipments 2/	Production	Net shipments 2/
Diecast alloys:				
13% Si, 360, etc. (0.6% Cu, maximum)	50,500	51,100 r/	49,600	49,700
380 and variations	561,000 r/	562,000 r/	570,000	569,000
Sand and permanent mold:				
95/5 Al-Si, 356, etc. (0.6% Cu, maximum)	84,700 r/	84,400 r/	12,900	12,500
No. 12 and variations	W	W	W	W
No. 319 and variations	73,600 r/	74,300 r/	86,400	85,600
F-132 alloy and variations	29,000	29,000	30,900	31,100
Al-Mg alloys	639	639	639	639
Al-Zn alloys	3,530	3,530	2,200	2,160
Al-Si alloys (0.6% to 2.0% Cu)	10,800	10,700	10,900	10,900
Al-Cu alloys (1.5% Si, maximum)	1,680	1,710	977	980
Al-Si-Cu-Ni alloys	1,180	1,230	1,060	1,060
Other	1,040 r/	1,070 r/	4,280	3,980
Wrought alloys: Extrusion billets	157,000 r/	158,000 r/	163,000	163,000
Miscellaneous:				
Steel deoxidation	--	--	--	--
Pure (97.0% Al)	--	--	--	--
Aluminum-base hardeners	93	93	5,380	4,610
Other 3/	35,700	35,000	39,600	38,500
Total	1,010,000 r/	1,010,000 r/	978,000	973,000
Less consumption of materials other than scrap:				
Primary aluminum	87,000 r/	--	41,800	--
Primary silicon	67,500	--	74,600	--
Other	6,260 r/	--	3,730	--
Net metallic recovery from aluminum scrap and sweated pig consumed in production of secondary aluminum ingot 4/	850,000 r/	XX	858,000	XX

r/ Revised. W Withheld to avoid disclosing company proprietary data; included with "Sand and permanent mold: Other."
XX Not applicable.
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes inventory adjustment.
3/ Includes other die-cast alloys and other miscellaneous.
4/ No allowance made for melt-loss of primary aluminum and alloying ingredients.

TABLE 5
U.S. EXPORTS OF ALUMINUM SCRAP, BY COUNTRY 1/

Country	Remelt scrap ingot		Used beverage container scrap		Other aluminum waste and scrap		Total	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
1994:								
Belgium	--	--	--	--	37	$80	37	$80
Brazil	--	--	2	$6	628	862	631	868
Canada	--	--	64	70	57,900	61,100	57,900	61,200
China	415	$554	7	6	13,400	10,000	13,800	10,600
Finland	--	--	--	--	4,750	2,630	4,750	2,630
France	--	--	--	--	33	211	33	211
Germany	--	--	--	--	189	144	189	144
Hong Kong	1,240	1,720	--	--	17,900	20,300	19,200	22,000
Italy	--	--	--	--	146	160	146	160
Japan	33,100	45,700	66	73	72,100	84,500	105,000	130,000
Korea, Republic of	257	342	--	--	15,800	20,400	16,100	20,700
Mexico	4,910	7,430	286	451	18,800	22,600	24,000	30,500
Netherlands	52	47	--	--	160	342	212	389
Philippines	--	--	--	--	37	21	37	21
Taiwan	3,070	3,550	108	128	52,900	47,000	56,100	50,700
Thailand	1,200	2,050	--	--	321	551	1,530	2,610
United Kingdom	--	--	--	--	52	45	52	45
Other	818	1,330	33	84	6,540	13,200	7,390	14,600
Total	45,100	62,700	565	818	262,000	284,000	307,000	348,000
1995:								
Belgium	--	--	--	--	160	261	160	261
Brazil	--	--	--	--	331	618	331	618
Canada	--	--	3	3	50,800	58,900	50,800	58,900
China	590	949	71	111	34,600	37,100	35,200	38,200
Finland	--	--	--	--	2,040	750	2,040	750
France	57	64	6	5	396	606	458	675
Germany	6	18	(2/)	7	270	986	277	1,010
Hong Kong	2,960	4,790	166	260	72,700	109,000	75,800	114,000
Italy	--	--	6	30	449	706	455	736
Japan	61,300	89,500	999	1,170	71,900	103,000	134,000	194,000
Korea, Republic of	521	878	119	391	28,700	39,200	29,400	40,400
Mexico	1,160	1,540	1,170	1,120	12,300	17,400	14,700	20,100
Netherlands	9	5	--	--	336	642	345	648
Philippines	60	109	--	--	61	51	121	159
Taiwan	1,400	2,590	57	63	60,400	73,000	61,800	75,600
Thailand	4,310	9,130	--	--	202	403	4,520	9,540
United Kingdom	13	12	47	204	2,790	4,780	2,850	5,000
Other	2,200	4,830	181	247	13,900	23,100	16,300	28,200
Total	74,600	114,000	2,820	3,610	352,000	470,000	430,000	588,000

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF ALUMINUM SCRAP, BY COUNTRY 1/

Country	Remelt scrap ingot		Used beverage container scrap		Other aluminum waste and scrap		Total	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
1994:								
Australia	--	--	91	$124	908	$759	999	$883
Bahamas, The	--	--	--	--	417	124	417	124
Brazil	--	--	--	--	8	23	8	23
Canada	376	$471	27,900	29,500	186,000	218,000	214,000	248,000
China	--	--	13	15	91	121	104	136
Colombia	120	185	94	100	742	731	956	1,020
Germany	11,000	13,700	237	252	1,240	1,200	12,500	15,200
Guatemala	--	--	35	5	1,330	961	1,370	966
Honduras	--	--	102	132	140	141	242	272
Jamaica	--	--	9	19	691	429	699	448
Japan	35	87	439	553	304	399	779	1,040
Mexico	362	151	35,600	42,600	32,600	33,300	68,500	76,100
Netherlands	3,440	4,270	--	--	1,360	1,450	4,800	5,720
Panama	--	--	1,710	1,740	1,630	1,600	3,340	3,340
Russia	611	492	--	--	13,100	18,600	13,700	19,100
South Africa	--	--	--	--	495	170	495	170
Spain	512	583	42	28	61	46	616	658
Ukraine	--	--	--	--	190	147	190	147
United Kingdom	3,390	4,110	456	502	9,670	10,100	13,500	14,700
Venezuela	5,410	7,210	5,630	5,620	24,800	19,800	35,800	32,600
Other	1,280	1,430	3,740	4,020	11,500	9,750	16,600	15,200
Total	26,600	32,700	76,100	85,200	287,000	318,000	390,000	436,000
1995:								
Australia	--	--	625	1,040	306	460	931	1,500
Bahamas, The	53	59	6	4	588	187	647	250
Brazil	299	585	403	484	508	771	1,210	1,840
Canada	3,890	7,510	27,200	37,900	187,000	267,000	219,000	312,000
China	--	--	--	--	18	15	18	15
Colombia	753	1,160	1,580	1,880	2,000	3,190	4,330	6,220
Germany	6,260	10,700	--	--	844	1,070	7,100	11,800
Guatemala	21	27	330	191	1,340	1,960	1,690	2,180
Honduras	--	--	387	517	552	656	939	1,170
Jamaica	--	--	--	--	720	666	720	666
Japan	36	93	114	135	569	395	719	623
Mexico	4,040	4,910	51,500	69,700	51,300	55,400	107,000	130,000
Netherlands	353	603	40	49	518	728	911	1,380
Panama	--	--	2,000	2,060	1,870	2,040	3,870	4,100
Russia	1,470	2,160	--	--	9,220	16,500	10,700	18,700
South Africa	--	--	57	88	94	39	150	127
United Kingdom	577	951	96	140	7,700	10,400	8,370	11,500
Venezuela	1,480	2,230	7,820	8,690	16,900	17,400	26,200	28,300
Other	2,440	1,680	8,810	11,100	14,100	16,100	25,400	28,900
Total	21,700	32,700	101,000	134,000	297,000	395,000	419,000	562,000

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 7
COPPER RECOVERED FROM SCRAP PROCESSED IN THE UNITED STATES,
BY KIND OF SCRAP AND FORM OF RECOVERY 1/

(Metric tons)

	1994	1995
Kind of scrap:		
New scrap:		
Copper-base	792,000	837,000
Aluminum-base	35,100	37,100
Nickel-base	89	85
Zinc-base	--	--
Total	827,000	874,000
Old scrap:		
Copper-base	472,000	415,000
Aluminum-base	28,100	27,900
Nickel-base	14	33
Zinc-base	23	21
Total	500,000	442,000
Grand total	1,330,000	1,320,000
Form of recovery:		
As unalloyed copper:		
At electrolytic plants	269,000	215,000
At other plants	134,000	149,000
Total	403,000	364,000
In brass and bronze	861,000 r/	887,000
In alloy iron and steel	745 r/	756
In aluminum alloys	62,800	64,600
In other alloys	115	114
In chemical compounds	219	183
Total	924,000	953,000
Grand total	1,330,000	1,320,000

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 8
COPPER RECOVERED AS REFINED COPPER AND IN ALLOYS AND OTHER FORMS
FROM COPPER-BASE SCRAP PROCESSED IN THE UNITED STATES, BY TYPE OF OPERATION 1/

(Metric tons)

	From new scrap		From old scrap		Total	
Type of operation	1994	1995	1994	1995	1994	1995
Ingot makers	34,100 r/	34,700	93,800 r/	89200	128,000	124000
Refineries 2/	92,900	112,000	299,000	240000	392,000	352,000
Brass and wire-rod mills	639,000	664,000	46,900	49300	686,000	713000
Foundries and manufacturers	25,500 r/	26,700	32,700 r/	35500	58,200 r/	62200
Chemical plants	219	183	--	--	219	183
Total	792,000	837,000	472,000	414,000	1,260,000	1250000

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Electrolytically refined and fire-refined scrap based on source of material at smelter level.

TABLE 9
PRODUCTION OF SECONDARY COPPER AND COPPER-ALLOY PRODUCTS
IN THE UNITED STATES, BY ITEM PRODUCED FROM SCRAP 1/

(Metric tons)

Item produced from scrap	1994	1995
Unalloyed copper products:		
Electrolytically refined copper	269,000	215,000
Fire-refined copper	122,000	137,000
Copper powder	10,600	10,600
Copper castings	697	699
Total	403,000	364,000
Alloyed copper products:		
Brass and bronze ingots:		
Tin bronzes	14,800	11,900
Leaded red brass and semi-red brass	95,700 r/	96,500
High leaded tin bronze	11,300	12,400
Yellow brass	8,290	6,730
Manganese bronze	7,530 r/	7,480
Aluminum bronze	8,070	7,640
Nickel silver	3,080 r/	1,800
Silicon bronze and brass	7,630	5,280
Copper-base hardeners and master alloys	9,680	13,100
Miscellaneous	1,370 r/	8
Total	167,000	163,000
Brass mill and wire rod mill products	849,000	873,000
Brass and bronze castings	48,800 r/	52,900
Brass powder	342	530
Copper in chemical products	219	183
Grand total	1,470,000	1,450,000

r/ Revised.
1/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 10
COMPOSITION OF SECONDARY COPPER-ALLOY PRODUCTION IN THE UNITED STATES 1/

(Metric tons)

	Copper	Tin	Lead	Zinc	Nickel	Aluminum	Total
Brass and bronze ingot production: 2/							
1994	136,000 r/	4,850	8,320 r/	18,200	244	35	167,000
1995	132,000	5,130	8,800	17,100	232	29	163,000
Secondary metal content of brass mill products:							
1994	686,000	882	6,730	152,000	W	W	849,000
1995	713,000	833	6,680	150,000	W	W	873,000
Secondary metal content of brass and bronze castings:							
1994	43,600 r/	1,000	1,460	2,480	110	129 r/	48,800 r/
1995	47,300	1,130	1,610	2,530	136	150	52,900

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ About 96% from scrap and 4% from other than scrap in 1994 and in 1995.

TABLE 11
CONSUMPTION AND YEAR ENDING STOCKS OF COPPER-BASE SCRAP 1/

(Metric tons, gross weight)

Scrap type and processor	1994		1995	
	Consumption	Stocks	Consumption	Stocks
No. 1 wire and heavy:				
Smelters, refiners and ingot makers	151,000	7,700 r/	161,000	9,080
Brass and wire-rod mills	329,000	NA	375,000	NA
Foundries and miscellaneous manufacturers	33,900	NA	36,000	NA
No. 2 mixed heavy and light:				
Smelters, refiners and ingot makers	311,000	10,900 r/	225,000	5,880
Brass and wire-rod mills	46,200	NA	33,400	NA
Foundries and miscellaneous manufacturers	4,150 r/	NA	3,690	NA
Total unalloyed scrap:				
Smelters, refiners and ingot makers	462,000	18,600 r/	386,000	15,000
Brass and wire-rod mills	375,000	13,900	408,000	11,600
Foundries and miscellaneous manufacturers	38,100	3,320	39,700	2,730
Red brass: 2/				
Smelters, refiners and ingot makers	40,700	2,600 r/	58,800	2,440
Brass mills	8,340	NA	7,410	NA
Foundries and miscellaneous manufacturers	13,300	NA	15,700	NA
Leaded yellow brass:				
Smelters, refiners and ingot makers	25,400	1,380 r/	26,100	1,270
Brass mills	354,000	NA	341,000	NA
Foundries and miscellaneous manufacturers	1,850	NA	1,520	NA
Yellow and low brass:				
All plants	73,600	1,010 r/	55,600	723
Cartridge cases and brass:				
All plants	61,100	NA	49,900	NA
Auto radiators:				
Smelters, refiners and ingot makers	64,700	1,430 r/	73,000	1,860
Foundries and miscellaneous manufacturers	6,270	NA	6,910	NA
Bronzes:				
Smelters, refiners and ingot makers	12,500	846 r/	11,700	821
Foundries and miscellaneous manufacturers	10,700	NA	13,300	NA
Nickel-copper alloys:				
All plants	21,900	291 r/	20,500	442
Low grade and residues:				
Smelters, refiners and ingot makers	81,400 r/	4,690 r/	92,600	2,460
Other alloy scrap: 3/				
Smelters, refiners and ingot makers	50,300	2,220 r/	39,700	1,600
Brass mills and miscellaneous manufacturers	6,880 r/	NA	6,140	NA
Total alloyed scrap:				
Smelters, refiners and ingot makers	317,000 r/	14,500 r/	310,000	11,600
Brass mills	488,000	34,700	478,000	29,900
Foundries and miscellaneous manufacturers	29,000	3,340	31,800	4,030
Total scrap:				
Smelters, refiners and ingot makers	779,000	33,100 r/	695,000	26,600
Brass and wire-rod mills	862,000	48,600	886,000	41,400
Foundries and miscellaneous manufacturers	67,000 r/	6,660	71,500	6,760

r/ Revised. NA Not available.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes composition turnings, silicon bronze, railroad car boxes, cocks and faucets, gilding metal, and commercial bronze.

3/ Includes refinery brass, beryllium copper, and aluminum bronze.

TABLE 12
CONSUMPTION OF PURCHASED COPPER-BASE SCRAP 1/ 2/

(Metric tons, gross weight)

Type of operation	From new scrap		From old scrap		Total	
	1994	1995	1994	1995	1994	1995
Ingot makers	45,600	46,400	139,000	136,000	185,000	182,000
Smelters and refineries	158,000	128,000	436,000	385,000	594,000	513,000
Brass and wire-rod mills	806,000	827,000	56,700	59,400	862,000	886,000
Foundries, etc.	29,500 r/	30,800	37,600 r/	40,600	67,000 r/	71,500
Total	1,040,000	1,030,000	669,000 r/	621,000	1,710,000	1,650,000

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Consumption at brass and wire-rod mills assumed equal to receipts.

TABLE 13
FOUNDRIES AND MISCELLANEOUS MANUFACTURERS CONSUMPTION
OF BRASS INGOT AND REFINED COPPER AND COPPER SCRAP
IN THE UNITED STATES 1/

(Metric tons)

Ingot type	1994	1995
Tin bronzes	30,900 r/	35,100
Leaded red brass and semi-red brass	71,800	68,500
Yellow, leaded and low brass 2/	8,130	7,310
Manganese bronze	4,330	4,220
Nickel silver 3/	1,050	1,230
Aluminum bronze	3,640 r/	3,790
Hardeners and master alloys 4/	2,650	1,980
Total brass ingot	122,000	122,000
Refined copper consumed	41,500	47,100
Copper scrap consumed	66,800	71,300

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes silicon bronze and brass.

3/ Includes copper nickel and nickel bronze and brass.

4/ Includes special alloys.

TABLE 14
AVERAGE PRICES FOR COPPER SCRAP AND ALLOY-INGOT, BY TYPE

(Cents per pound)

			Dealers' buying (New York)		Alloy-ingot (New York)	
Year	Brass mills No. 1 scrap	Refiners No. 2 scrap	No. 2 scrap	Red brass turnings and borings	No. 115 brass (85-5-5-5)	Yellow brass (405)
1994	100.83	85.15	69.83	47.45	121.5	118.54
1995	123.28	104.73	91.26	63.38	137.38	135.14

Source: American Metal Market.

TABLE 15
U.S. EXPORTS OF COPPER SCRAP, BY COUNTRY 1/

	Unalloyed copper scrap				Copper-alloy scrap			
	1994		1995		1994		1995	
Country or Territory	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Belgium	1,130	$1,330	2,730	$10,100	4,060	$9,550	3,030	$9,730
Canada	73,700	98,700	110,000	191,000	23,200	37,500	42,600	60,900
China	19,100	21,900	28,000	40,300	58,200	43,100	50,100	50,100
Germany	157	167	1,580	1,820	5,820	6,000	4,320	8,240
Hong Kong	13,700	12,900	31,400	47,900	10,100	7,590	30,900	41,000
India	1,830	1,700	7,020	7,520	59,700	42,000	42,500	48,900
Italy	445	818	823	1,790	3,810	5,480	934	1,510
Japan	19,700	39,100	20,000	64,800	14,600	47,100	16,700	34,600
Korea, Republic of	8,680	16,400	10,300	19,900	18,400	21,700	24,100	35,800
Mexico	177	194	6,470	11,000	1,320	2,400	1,710	3,050
Spain	--	--	--	--	6,100	975	633	815
Taiwan	1,420	2,090	1,680	2,490	4,040	3,870	3,730	4,910
Thailand	40	50	--	--	1,730	2,080	2,490	3,650
United Kingdom	41	61	338	510	1,380	3,040	2,810	5,620
Other	1,610 r/	2,020 r/	2,760	3,310	5,050 r/	7,650 r/	6,890	9,620
Total	142,000	197,000	223,000	403,000	218,000	240,000	233,000	319,000

r/ Revised.
1/ Data are rounded to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 16
U.S. IMPORTS FOR CONSUMPTION OF COPPER SCRAP, BY COUNTRY 1/

	Unalloyed copper scrap		Copper-alloy scrap		
Country or Territory	Quantity (metric tons)	Value 2/ (thousands)	Gross weight (metric tons)	Copper content e/ 3/ (metric tons)	Value (thousands)
1994	102,000	$160,000	58,400	42,000	$105,000
1995:					
Canada	41,700	82,200	36,600	26,300	76,300
Chile	66	217	9,270	6,680	27,400
Colombia	1,130	1,750	325	234	655
Dominican Republic	1,650	3,920	702	506	1,390
Ecuador	963	1,200	252	181	414
Guatemala	715	1,440	337	243	541
Honduras	786	1,020	67	48	122
Jamaica	100	165	775	558	1,250
Mexico	39,900	64,400	32,800	23,600	72,100
Panama	424	790	1,170	840	2,490
Taiwan	2,920	2,800	--	--	--
Venezuela	1,550	2,360	3,260	2,350	4,930
Other	3,220	5,890	2,530	1,820	4,210
Total	95,100	168,000	88,100	63,400	192,000

e/ Estimated.
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ C. i. f. value at U.S. Port.
3/ Under the Harmonized Tarriff System that was implemented Jan. 1989, copper content is no longer available. Content is estimated to be 72% of gross weight.

Source: Bureau of the Census.

TABLE 17
STOCKS AND CONSUMPTION OF NEW AND OLD LEAD SCRAP IN THE UNITED STATES, BY TYPE OF SCRAP 1/

(Metric tons, gross weight)

Type of scrap	Stocks, Jan. 1	Receipts	Consumption: New scrap	Consumption: Old scrap	Consumption: Total	Stocks, Dec. 31
1994:						
Smelters, refiners, others:						
Soft lead 2/	894	19,000 r/	--	19,400 r/	19,400 r/	551
Hard lead	W	9,750	--	9,590 r/	9,590 r/	W
Cable lead	W	2,260 r/	--	2,390	2,390	W
Battery-lead	31,300	1,020,000 r/	--	1,020,000 r/	1,020,000 r/	31,900 r/
Mixed common babbitt	61	W	--	W	W	W
Solder and tinny lead	W	W	--	W	W	W
Type metals	W	1,230	--	1,270	1,270	94
Drosses and residues	1,420	66,300	66,100 r/	--	66,100 r/	1,550
Other	15	W	--	W	W	W
Total	36,100	1,120,000 r/	66,100 r/	1,060,000 r/	1,120,000 r/	36,500 r/
1995:						
Smelters, refiners, others:						
Soft lead 2/	551	22,300	--	21,000	21,000	1,830
Hard lead	W	W	--	W	W	W
Cable lead	W	W	--	W	W	W
Battery-lead	31,900 r/	1,050,000	--	1,060,000	1,060,000	22,800
Mixed common babbitt	W	W	--	W	W	W
Solder and tinny lead	W	W	--	W	W	W
Type metals	94	1,090	--	1,040	1,040	W
Drosses and residues	1,550	55,000	55,600	--	55,600	961
Other	W	W	--	W	W	W
Total	36,500 r/	1,160,000	55,600	1,110,000	1,170,000	27,400

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes remelt lead from cable sheathing plus other soft lead scrap processing.

TABLE 18
SECONDARY METAL RECOVERED 1/ FROM LEAD AND TIN SCRAP IN THE UNITED STATES 2/

	Lead	Tin	Antimony	Other	Total
1994:					
Refined pig lead 3/	527,000 r/	--	(4/)	(4/)	527,000 r/
Refined pig tin 5/	--	W	W	--	W
Lead and tin alloys:					
Antimonial lead	371,000	733	8,480	W	380,000
Lead-base babbitt	(6/)	39	W	(4/)	39
Solder	(6/)	(6/)	(6/)	(6/)	(6/)
Type metal	827	41	114	(6/)	982
Other alloys, including cable lead	15,300	3,340	39	329 r/	19,000
Total	387,000	4,160	8,630	329 r/	400,000
Grand total	914,000 r/	4,160	8,630	329 r/	927,000 r/
1995:					
Refined pig lead 3/	588,000	--	--	--	588,000
Refined pig tin 5/	--	W	W	--	W
Lead and tin alloys:					
Antimonial lead	348,000	351	4,070	W	352,000
Lead-base babbitt	250	W	31	W	281
Solder	(6/)	(6/)	(6/)	(6/)	(6/)
Type metal	787	39	111	(6/)	937
Other alloys, including cable lead	18,100	4,240	95	265	22,700
Total	367,000	4,630	4,310	265	376,000
Grand total	955,000	4,630	4,310	265	964,000

r/ Revised. W Withheld to avoid disclosing company proprietary data.

1/ Most of the figures herein represent actual reported recovery of metal from scrap.

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Includes remelt lead.

4/ Revised to zero.

5/ Includes remelt tin.

6/ Included with "Other alloys, including cable lead" to avoid disclosing company proprietary data.

TABLE 19
LEAD RECOVERED FROM SCRAP PROCESSED IN THE UNITED STATES, BY KIND OF SCRAP AND FORM OF RECOVERY 1/

(Metric tons)

		1994	1995
Kind of scrap:			
New scrap:			
Lead-base		45,900 r/	38,600
Copper-base		8,290	7,840
Tin-base		--	--
Total		54,200 r/	46,400
Old scrap:			
Battery-lead		831,000 r/	867,000
All other lead-base		36,800 r/	48,900
Copper-base		8,390	9,230
Tin-base		--	--
Total		877,000 r/	926,000
Grand total		931,000 r/	972,000
Form of recovery:			
As soft lead		527,000 r/	588,000
In antimonial lead		371,000	348,000
In other lead alloys		16,100	19,200
In copper-base alloys		16,700	17,100
In tin-base alloys		1	1
Total		931,000 r/	972,000
Value 2/	thousands	$763,000 r/	$906,000

r/ Revised.
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Value based on average quoted price of common lead.

TABLE 20
U.S. EXPORTS AND IMPORTS FOR CONSUMPTION OF LEAD SCRAP, BY COUNTRY 1/

	1994		1995	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Exports:				
Scrap (gross weight):				
Antigua and Barbuda	91	$16	(2/)	$11
Belgium	22	64	33	106
Brazil	4,110	936	13	492
Canada	68,400	13,000	95,600	17,800
Cayman Islands	100	10	--	--
China	458	288	93	122
Costa Rica	558	208	--	--
Germany	15	119	47	610
Guatemala	38	131	(2/)	7
Hong Kong	49	19	83	80
India	941	156	407	104
Israel	(2/)	3	187	41
Jamaica	34	3	1	5
Japan	127	321	59	147
Korea, Republic of	9,440	6,070	6,110	6,860
Mexico	903	1,140	501	446
Panama	137	37	2	41
Russia	34	78	76	173
Singapore	782	292	(2/)	45
Taiwan	250	113	277	388
United Arab Emirates	268	27	--	--
United Kingdom	903	292	299	461
Venezuela	315	83	609	1,220
Other	121 r/	1,080 r/	107	1,890
Total	88,100	24,500	105,000	31,000
Imports:				
Reclaimed scrap, including ash and residues (lead content): 3/				
Canada	128	39	75	36
Other	16	9 r/	--	--
Total	144	48 r/	75	36

r/ Revised.
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.
3/ Also includes other lead-bearing materials containing greater than 10% by weight of copper, lead, or zinc (any one).

Source: Bureau of the Census.

TABLE 21
TIN RECOVERED FROM SCRAP PROCESSED IN
THE UNITED STATES, BY FORM OF RECOVERY 1/

(Metric tons unless otherwise specified)

Form of recovery	1994	1995
Tin metal 2/	W	W
Bronze and brass e/ 3/	10,900 r/	10,700
Lead and tin alloys:		
Antimonial lead	733	351
Babbitt	39 r/	W
Type metal	41	39
Other alloys 4/	W	W
Total	813 r/	390
Tin content of chemical products	W	W
Grand total	11,700 r/	11,100
Value (thousands) e/ 5/	$94,800 r/	$101,000

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data.
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes tin metal recovered at detinning and other plants.
3/ Includes tin recovered from copper-, lead-, and tin-base scrap.
4/ Includes foil, solder, terne metal, and cable lead.
5/ Based on Platt's Metals Week composite price.

TABLE 22
U.S. STOCKS, RECEIPTS, AND CONSUMPTION OF NEW AND OLD SCRAP AND TIN RECOVERED,
BY TYPE OF SCRAP 1/

(Metric tons)

	Gross weight of scrap								
	Stocks,		Consumption			Stocks,	Tin recovered e/ 2/		
Type of scrap	Jan. 1	Receipts	New	Old	Total	Dec. 31	New	Old	Total
1994:									
Copper-base scrap	6,190	129,000 r/	26,600	102,000 r/	129,000 r/	6,570	1,270	3,520	4,800
Brass mills 3/	--	55,600	47,400	W	47,400	--	802	W	802
Foundries and other plants	2,290	24,200	10,200	13,500	23,800	2,730	477	574	1,050
Total tin from copper-base scrap	XX	XX	XX	XX	XX	XX	2,550	4,100	6,650
Lead-base scrap	34,100	1,090,000 r/	66,100 r/	1,030,000 r/	1,090,000 r/	34,700 r/	1,740 r/	3,240 r/	4,970 r/
Tin-base scrap 4/	W	59	W	53	W	W	W	51	51
Grand total	XX	XX	XX	XX	XX	XX	4,290 r/	7,380 r/	11,700 r/
1995:									
Copper-base scrap	6,570	127,000	27,200	100,000	127,000	6,350	1,170	3,680	4,850
Brass mills 3/	--	40,500	40,500	--	40,500	--	833	--	833
Foundries and other plants	2,730	26,800	W	W	W	3,100	W	1,020	1,020
Total tin from copper-base scrap	XX	XX	XX	XX	XX	XX	2,010	4,690	6,700
Lead-base scrap	34,700 r/	944,000	55,600	898,000	953,000	25,600	1,460	2,870	4,330
Tin-base scrap 4/	W	55	W	54	W	W	W	52	52
Grand total	XX	XX	XX	XX	XX	XX	3,460	7,620	11,100

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data. XX Not applicable.
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Tin recovered from new and old copper-base scrap, brass mills, and foundries.
3/ Brass-mill stocks include home scrap, and purchased-scrap consumption is assumed equal to receipts; therefore, line does not balance.
4/ Includes tinplate and other scrap recovered at detinning plants; U.S. Geological Survey not at liberty to publish separately.

TABLE 23
STOCKS AND CONSUMPTION OF NEW AND OLD ZINC SCRAP IN THE UNITED STATES IN 1995, BY TYPE OF SCRAP 1/

(Metric tons, zinc content)

Type of scrap	Stocks, Jan. 1	Receipts	Consumption			Stocks, Dec. 31
			New scrap	Old scrap	Total	
Diecastings	W	4,280	--	4,220	4,220	W
Flue dust	4,380	8,830	4,660	4,640	9,290	W
Fragmentized diecastings	W	14,500	--	W	W	W
Galvanizer's dross	1,900 r/	68,000	66,600	--	66,600	W
Old zinc 2/	36 r/	W	--	W	W	22
Remelt die-cast slab	W	3,170	--	3,170	3,170	W
Remelt zinc 3/	W	W	W	--	W	20
Skimmings and ashes 4/	6,120 r/	29,700	29,400	--	29,400	6,460
Steelmaking dust	W	W	--	W	W	W
Other 5/	1,470 r/	63,000	666	76,700	77,300	8,900
Total	13,900 r/	191,000	101,000	88,700	190,000	15,400

r/ Revised. W Withheld to avoid disclosing company proprietary data; included with "Other."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes engraver's plates and rod and die scrap.
3/ Includes new clippings.
4/ Includes sal skimmings and die-cast skimmings.
5/ Includes chemical residues and solutions and electrogalvanizing anodes.

TABLE 24
PRODUCTION OF ZINC PRODUCTS FROM ZINC-BASE SCRAP IN THE UNITED STATES 1/

(Metric tons)

Products	1994	1995
Redistilled slab zinc	139,000	131,000
Other zinc metal products 2/	7,930 r/	6,470
Secondary zinc in chemical products	65,400 r/	61,500
Zinc dust	22,300	21,800

r/ Revised.
1/ Data are rounded to three significant digits.
2/ Includes electrogalvanizing anodes, remelt die-cast slab, and other metal alloys.

TABLE 25
ZINC RECOVERED FROM SCRAP PROCESSED IN THE UNITED STATES, BY KIND OF SCRAP AND FORM OF RECOVERY 1/

(Metric tons)

	1994	1995
Kind of scrap:		
New scrap:		
Zinc-base	96,400 r/	96,700
Copper-base	149,000	145,000
Magnesium-base	28	36
Total	245,000 r/	241,000
Old scrap:		
Zinc-base	90,000	85,700
Copper-base	25,200	25,500
Aluminum-base	707	711
Magnesium-base	43	43
Total	116,000	112,000
Grand total	361,000 r/	353,000
Form of recovery:		
Metal:		
Slab zinc	139,000	131,000
Zinc dust	22,300	21,800
Other 2/	3,050	2,660
Total	165,000 r/	155,000
In zinc-base alloys	W	W
In brass and bronze	128,000 r/	134,000
In other metal alloys	W	W
In chemical products:		
Zinc oxide (lead free)	36,800	33,600
Zinc sulfate	W	19,600
Zinc chloride	W	W
Miscellaneous	31,900 r/	10,700
Total	197,000 r/	198,000
Grand total	361,000 r/	353,000

r/ Revised. W Withheld to avoid disclosing company proprietary data, included with "Miscellaneous."

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes electrogalvanizing anodes and zinc content of slab made from remelt die-cast slab.