IRON AND STEEL

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As 1999 ended, the United States continued its remarkable economic growth and prosperity. The end of the first quarter of 1991 marked the beginning of the current 105-month period of economic growth, during which U.S. industry, including the steel and steel scrap recycling sectors, has successfully met the challenges of high domestic demand and global competition. During the past decade, the U.S. steel industry had become a competitive low-cost producer of high-quality steel by eliminating less efficient capacity, reducing excessive employment, and investing in capital improvements that have tripled productivity.

Asian economic problems, initiated by the financial crisis of 1997, continued to adversely affect the U.S. steel industry during 1999. Declining Asian demand for steel and ferrous scrap, excess steel-producing capacity, and unusually low steel prices brought about major export activity of steel from Asia to the United States. This low-priced steel, welcomed by consumers, caused U.S. steelmakers to complain about foreign government policies designed to protect local steel producers. Domestic mills eventually reduced steel production, and operating income declined significantly. The domestic steel industry found relief during 1999 after the U.S. International Trade Commission imposed penalties against foreign suppliers for violating laws governing fair trade practices. In August, the U.S. Administration introduced its Steel Action Program under which the United States would conduct bilateral discussions with countries that have contributed significantly to the steel import surge, to ensure fair trade, market-based production, and compliance with international trading rules. Imports declined during 1999 from record levels in 1998, but demand for steel by a robust economy continued to exceed the capacity of domestic mills, and steelmakers imported record quantities of semifinished steel to supplement their production. As much as 23 million metric tons (Mt) have been estimated as required to meet domestic demand annually (Bagsarian, 2000).

Data regarding U.S. production of iron and steel and shipments of steel mill products were reported by the American Iron and Steel Institute (AISI). These data can be regarded as representing 100% of the raw steel producers in the United States. World production of iron and steel is reported by the International Iron and Steel Institute (IISI) and by foreign government agencies. Consistent with international usage and Federal Government policy, the U.S. Geological Survey reported all data on iron and steel in metric units, unless otherwise noted.

Environment

The Office of Solid Waste in the U.S. Environmental Protection Agency (EPA) has been preparing a list of persistent, bioaccumulative, and toxic substances that will be branded among “the worst chemicals in the world” and become the focus of significant regulatory attention over the next several years (Green, 2000). Of immediate importance to the steel industry are the lead, mercury, and cadmium, although it is expected that more metals will be added to the list. The Steel Manufacturers Association and the Specialty Steel Industry of North America are working with the EPA to identify appropriate scientific ways to assess the hazards and risks posed by metals.

Twenty environmental advocacy groups warned of the poor environmental records of foreign steel producers who were exporting steel products to the United States in excessive amounts (Steel Recycling Institute, Environmental advocacy groups call for restrictions on foreign steel, press release, accessed May 16, 2000, at URL http://www.recycle-steel.org/press/pr/ 01.18.99.html). These groups asserted that the significant replacement of domestic steelmaking by inefficient steel companies abroad has serious global environmental implications, specifically with respect to emissions and energy consumption. The auto industry expected applications for aluminum in 1999 to increase by more than 5%—one of the biggest gains for aluminum in the auto market to date (American Metal Market Online, More aluminum in 1999 autos, Metals in Motion ‘99, accessed March 17, 2000, at URL http://www.amm.com/REF/HOT/ MM9901.htm). More aluminum has been used primarily in place of iron. In its drive to promote even more aluminum in automobiles, light trucks, and sport utility vehicles, the aluminum industry claims that lighter weight vehicles will burn less fuel during their lifetimes and emit fewer harmful emissions, including carbon dioxide (Steel Recycling Institute, MIT study finds aluminum-intensive vehicles fall short of environmental claims, press release, accessed May 16, 2000, at URL http://www.recycle-steel.org/press/pr/05.25.99.html). The aluminum industry has claimed that a 1-ton increase in the use of aluminum in vehicles in place of steel would reduce carbon dioxide emissions by 20 metric tons (t) over the life of an average vehicle. To test this assertion, the Materials Systems Laboratory (MSL) of the Massachusetts Institute of Technology considered carbon dioxide emitted when generating electricity,

producing aluminum, the time required to offset the initial atmospheric burden, and created during vehicle production, versus any environmental benefits derived from the use of aluminum. The MSL found that compared to the UltraLight Steel Auto Body (ALSAB), 32 to 38 years of driving aluminum-intensive vehicles would need to pass to offset the amount of carbon dioxide put into the atmosphere by the production of the aluminum needed to build those vehicles. Use of aluminum sheet in particular, compared to steel, not only adds a significantly higher initial carbon dioxide atmospheric burden, but it is more expensive and more difficult to form, assemble, repair, and recycle than steel. The ALSAB is the result of an intensive multiphase study by a consortium of 35 leading steel producers from 18 countries to demonstrate steel's capability to reduce substantially the weight of a vehicle's body structure while ensuring safety with improved comfort and driving performance at affordable cost.

Production

Production of raw steel in the United States decreased slightly to 97.4 Mt from 98.6 Mt in 1998 (table 1). AISI estimated raw steel production capability to be 128.2 Mt, up from 125.3 Mt (revised) in 1998. Production represented 83.8% of estimated capability, compared with 86.8% in 1998.

Integrated steel producers smelted iron ores to liquid iron in blast furnaces and used basic oxygen furnaces to refine this iron with some scrap to produce raw liquid steel. The basic oxygen process was used to make 52.4 Mt of steel (American Iron and Steel Institute, 1999, p. 74). The use of this process declined slightly to 53.8% of total steel production in 1999 from 54.9% in 1998. The integrated steel industry in the United States consisted of 15 companies operating ironmaking and steelmaking facilities at 23 locations. Several of these companies also operated nonintegrated plants and/or other steelmaking facilities at the same locations.

Minimills and specialty mills are nonintegrated steel producers. Minimills produce a limited product line. These plants always incorporate electric arc furnaces to melt low-cost raw materials (usually scrap), continuous casting machines, and a hot-rolling mill that are often closely coupled to the casting operation. Specialty mills include producers of stainless, alloy-electrical, and tool steel; high-temperature alloys; forged ingots; and other low-volume steel products. The nonintegrated sector of the industry, more than 65 companies having more than 90 steelmaking plants, used the EAF steelmaking process to produce 45.1 Mt, an increase of more than 1% compared with that of 1998, and accounted for 46.2% of total steelmaking (American Iron and Steel Institute, 1999, p. 74).

Raw liquid steel is mostly cast into semifinished products in continuous casting machines. Only 4.0% of U.S. production was cast in ingot form and subsequently rolled into semifinished forms; this represented a percentage decrease of more than 9% compared with that of 1998. Continuous casting production was 93.4 Mt, or 95.9% of total steel production, compared with 94.2 Mt, or 95.5%, in 1998 (American Iron and Steel Institute, 1999, p. 75).

Consumption

Steel mill products are produced at a steel mill either by forging or rolling into forms normally delivered for fabrication or use. Some companies purchase semifinished steel mill products from other steel companies and use them to produce finished steel products. To avoid double counting steel mill product shipments under these circumstances, steel mills identify any shipments of steel mill products to other companies that are reporters of steel mill product shipments. The accumulated shipments of all companies less the shipments to other reporting companies are identified as "net" shipments.

The 6-year trend of steadily increasing net shipments of steel products to satisfy domestic demand ended in 1998 but resumed its upward course in 1999 (American Iron and Steel Institute, 1999, p. 26). Shipments of steel mill products by U.S. companies increased by 3.7%, to 96.3 Mt. Export shipments by AISI reporting companies decreased to 4.9 Mt from 5.0 Mt in 1998 (American Iron and Steel Institute, 1999, p. 45). Shipments to domestic customers increased by 3.7% during 1999 (American Iron and Steel Institute, 1999, p. 3). Shipments of construction and contractors' products, the largest single end-use market, increased 21%. Automotive product shipments increased by 5.9%. Oil and gas, mining, quarrying, and lumbering industries shipments decreased by 17%. Shipments of industrial and agricultural machinery, equipment, and tools decreased 17%. Steel service center shipments, appliance shipments, and containers, packaging, and shipping material shipments were unchanged.

Prices

The Bureau of Labor Statistics Producer Price Index for steel mill products was down by 7.5% to 105.3 from 113.8 in 1998 (1982 base=100) (Bureau of Labor Statistics, Producer Price Index-Commodities, accessed July 21, 2000, at URL http://stats.bls.gov/ppiihome.htm). The index declined steadily from about 115 during the last half of 1998 to a low of 104.6 in May 1999 and then stabilized at about 105 during the remainder of the year.

Foreign Trade

Exports of steel mill products decreased to 4.9 Mt from 5.0 Mt in 1998 (American Iron and Steel Institute, 1999, p. 46). Canada again received the largest amount of U.S. exported steel, 3.2 Mt, up from 3.0 Mt in 1998. Mexico was again in second place, receiving 1.1 Mt, essentially the same as during 1998. Imports of steel mill products decreased by 14% to 32.4 Mt from 37.7 Mt in 1998. Brazil, Canada, the European Union (EU), Japan, the Republic of Korea, Mexico, and Russia were major sources of steel mill product imports.

Despite rising domestic steel mill capacity, imports of steel mill products during 1999 have more than doubled since 1991 and imports of semifinished steel have nearly quadrupled. Domestic producers have been unable to keep up with demand for semifinished products and finished steel, and an

unfavorable currency exchange rate has made foreign steel prices much more competitive. Although U.S. steelmakers have viewed imported finished steel as competing directly with domestic products, imports of semifinished products have not been perceived as rivals. This dichotomy is based on the need for imported semifinished steel to make up for the domestic shortage of hot-metal capacity to satisfy the U.S. market demand for finished steel mill products.

From 1992 through 1994, total imports of semifinished steel, comprising mostly billets, blooms, ingots, and slabs for rolling, trended upward. These were believed to have been imported by U.S. steel companies to supplement steelmaking capacity and by companies that do not produce raw steel. This rising trend ended temporarily in 1995, and imports declined by 35% to 4.7 Mt from the 1994 high of about 7.2 Mt. During 1996, imports resumed their upward trend, increasing to 6.8 Mt, only to decline to 5.7 Mt during 1997 and then to rise to a peak of 7.8 Mt in 1999.

Imports of semifinished steel by steel companies must be taken into consideration in evaluating apparent consumption (supply) of steel mill products in the United States and the share of the market represented by imported steel. To avoid double counting the imported semifinished steel and the products produced from it, the amount of semifinished steel consumed by companies that also produced raw steel must be subtracted from domestic consumption. Between 1993 and 1998, annual imports were estimated to be 2.5 Mt to 6.1 Mt. Prior to 1993, the annual amount was less than 0.2 Mt. By taking the imported semifinished steel into consideration, the share of the U.S. steel market represented by imported steel was an estimated 28% in 1999 compared with 32% (revised) in 1998.

Regarding the reporting of imports and exports, "fabricated steel products" are produced from steel mill products, but do not include products that incorporate steel products with other materials. Examples of fabricated steel products are fabricated structural steel and steel fasteners. "Other iron and steel products" refer to products that are not produced from steel mill products. Examples of other iron and steel products include iron or steel castings and direct reduced iron (DRI).

The year 1997 was the first time the AISI reported an indirect steel trade surplus since AISI began tracking the measurement in 1984. The measurement (comprising imports minus exports of steel-containing products by world areas and steel-consuming markets, expressed in metric tons of steel) accounts for virtually all products made with steel, such as automobiles, machine tools, and appliances. According to AISI, this surplus of 1.1 Mt, when compared with the 1986 indirect steel-trade deficit of 8.4 Mt, confirmed that in 1997 U.S. manufacturers was among the world's most competitive producers of high-quality steel-containing goods. This surplus was followed by 2 years of deficits—1.2 Mt and 4.7 Mt in 1998 and 1999, respectively.

World Review

World production of pig iron totaled about 541 Mt, slightly less than that of 1997 (table 10). In Asia, China continued to be the leading producer of pig iron in the world, producing more than 125 Mt, a 6% increase from that of 1998. Japan and the United States followed with 68 MT and 46 Mt, respectively. The Republic of Korea's production increased slightly. Russia and Ukraine were the only major pig iron producers in the Commonwealth of Independent States (CIS). Production in Russia increased by nearly 15% since 1998 and was the highest in the past 5 years. During 1999, Ukrainian production continued a rising 4-year trend. In North America, the only major producer of pig iron was the United States, where production was 4% less than that of 1998. In South America, the only major pig iron producer was Brazil, producing about 25 Mt. Germany was the top producer in the EU with a 7% decrease to about 28 Mt. India's production was similar to that of 1998.

DRI production worldwide was about 38.5 Mt, a 4.6% increase from that of 1998, and a 24% increase compared with that of 1995 (table 10). The leading technology was the Midrex process, followed by the HYL I and the HYL III processes. Because of the demand for charge materials and the growth of thin-slab casting, interest in DRI by steel producers continued to increase. The leading producer was Mexico, followed by India, Venezuela, and Iran (table 10). World capacity for DRI production was estimated to be more than 44 Mt per year (Midrex Direct Reduction Corp., 1999). Additional DRI capacity of nearly 7 Mt was under construction in Egypt, India, Iran, the Republic of Korea, Russia, Trinidad and Tobago, and Venezuela.

World production of crude steel was about 786 Mt, a slight increase from the 776 Mt (revised) produced during 1998 (table 11). As in previous years, production varied widely among major regions of the world. Asian countries produced about 39% of the world's steel; the EU, 20%; and North America, 17%. During 1999, China was again the world's leading steel producer, reaching 124 Mt, a gain of nearly 9% compared with that of 1998. In descending order, the leading producers behind China were the United States, Japan, Russia, Germany, and the Republic of Korea. These six countries accounted for about one-half of the world production. The combined steel production of the eight steel-producing countries in the CIS was almost 83 Mt, an increase of nearly 14% compared with that of 1998. Russia and Ukraine remained the top producers. Russia reversed a 4-year downward production trend by increasing steel production nearly 14% over that of 1998, while Ukrainian production also increased 14%.

Outlook

The current business expansion has been unique for its longevity and vitality. Government and industry economists expect the expansion to continue in North America through 2000 although more slowly during the following years (AISE Steel Technology, 2000). The continuing growth of productivity at the mature stage of the business cycle is the most important reason for the sustained momentum of the expansion. Solid recovery is projected in European, most Asian, and several Latin American economies (Stundza, Tom,

Buyers will pay a lot more this year, Purchasing Online, accessed March 16, 2000, at URL http://www.manufacturing.net/magazine/archives/2000/pur0210.00/021metal.htm).

The economic turmoil of the past 2 years appears as little more than a minor blip to the IISI (Christmas, 1999). In fact, the IISI overestimated the decline of apparent steel consumption for several countries and of the world. For 2000, the IISI forecast increasing world steel consumption of about 2.9% from that of 1999. Apparent consumption in the United States will increase about 1%. The IISI also forecast increasing apparent consumption in Brazil by 9.7%; the Republic of Korea, 7.8%; China, 4%; the EU, 3.4%; the CIS, 2.6%; and other Europe, 6.1%. Consumption will decrease in Japan by 1.6%. The IISI also predicted that by 2005, apparent consumption will increase over that of 2000 in China, 7%; other Europe, 7%; the CIS, 5%; Japan, 4%; the EU, 2%; and North America, 2%.

The Organization for Economic Cooperation and Development (OECD) forecasts increases in apparent steel consumption in Russia, 20%; the Republic of Korea, 10%; Brazil, 8%; the EU, 5%; Japan, 3%; Canada, 2%; and 29 OECD member nations, 2%, in 2000 (Burgert, 1999; Organization for Economic Cooperation and Development, news release, Steel Market Developments in 2000, accessed July 31, 2000, at URL http://www.oecdwash.org/PRESS/PRESRELS/2000/news2000-050.htm). It also forecast an average annual steel capacity growth of less than 1% and a capacity utilization rate of 78% through 2000 in OECD countries.

According to Forster (1999), EAF will be the primary steel production method in the world by 2010 because inefficient integrated mills will be closed in favor of minimills that are more energy efficient and pollution free and will cost less to build and operate. The Technology Committee of the IISI reported results of a study begun in 1997 in which steelmakers, research and development establishments, consultants, equipment manufacturers and raw material suppliers in the EAF steelmaking sector were questioned about the evolution of the EAF to 2010. EAF steel production is forecast to grow a modest growth of 1% per year to 40% of the total. Basic oxygen furnace production will increase only 1% per year while declining to 50% of total production with open hearth steelmaking accounting for the remaining 10%. Scrap is expected to remain the predominant raw material for the EAF with consumption increasing by 12% by 2010. Continuous charging of scrap is expected to increase as will scrap preheating. DRI/HBI production will increase as will continuous charging and hot charging of these iron materials. Tapping weight will increase as tap to tap times, energy consumption, and pollutants decrease.

In the United States during 1999, most of the blast furnace producers of sheet steel lost money, while minimills were able to largely offset lower prices with cost reductions. AK Steel Corp. was the only U.S. integrated producer to report a profit. Two of the most profitable minimills were working on major advances in steel technology—a direct reduction process that will deliver liquid iron to the EAF and strip casting. Although domestic steelmakers are expected to profit over the long run by satisfying increasing demand for steel products through technical innovation, a threat to their future well-being, as seen by some observers, is the increased likelihood of tighter environmental restrictions which will require a level of spending that may force consolidation and the demise of weaker steel companies unable to raise the necessary capital (Best, Waldo, and Frazer, Denise, A peek at the steel industry in the new millennium, AMM Online, accessed March 17, 2000, at URLhttp://www.amm.com/subscrib/2000/jan/special/0101-4.htm).

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TABLE 1
SALIENT IRON AND STEEL STATISTICS 1/

(Thousand metric tons)

	1995	1996	1997	1998	1999
United States:					
Pig iron:					
Production 2/	50,900	49,400	49,600	48,200	46,300
Exports 3/	56	60	86	87	91
Imports for consumption 3/	2,360	2,660	3,150	5,140	4,990
Direct-reduced iron:					
Production 4/	460	450	510	1,600 r/	1,670
Exports 3/	5	3	8	5	3
Imports for consumption 3/	1,190	1,050	987	939	950
Raw steel production: 5/					
Carbon steel	84,000	84,900	87,000	88,000	87,600
Stainless steel	2,050	1,870	2,160	2,010	2,190
All other alloy steel	9,080	8,710	9,290	8,600	7,650
Total	95,200	95,500	98,500	98,600	97,400
Capability utilization, percent	93.3	90.7	89.4	86.8	83.8
Steel mill products:					
Net shipments 2/	88,400	91,500	96,000	92,900	96,300
Exports 5/	6,420	4,560	5,470	5,010	4,920
Imports 5/	22,100	26,500	28,300	37,700	32,400
Producer price index for steel mill products (1982=100.0) 6/	120.1	115.6	116.4	113.8	105.3
World production: 7/					
Pig iron	505,000 r/	521,000 r/	545,000 r/	539,000 r/	541,000
Direct-reduced iron 4/	31,100	33,100 r/	35,900 r/	36,800 r/	38,500
Raw steel	752,000 r/	751,000 r/	797,000 r/	776,000 r/	786,000

r/ Revised.

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

2/ Data from American Iron and Steel Institute (AISI).

3/ Data from U.S. Census Bureau.

4/ Data from Midrex Direct Reduction Corp., government, and companies.

5/ Raw steel is defined by AISI as steel in the first solid state after melting, suitable for rolling.

6/ Data from Bureau of Labor Statistics.

7/ Data from U.S. Geological Survey and International Iron and Steel Institute.

TABLE 2
MATERIALS CONSUMED IN BLAST FURNACES AND PIG IRON PRODUCED 1/

(Thousand metric tons)

Material	1998	1999
Iron oxides: 2/		
Ores	785	645
Pellets	62,800	59,400
Sinter 3/	10,600	10,900
Total	74,300	70,900
Scrap 4/	1,500	1,550
Coke 2/	19,800	18,700
Pig iron produced	48,200	46,300

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

2/ American Iron and Steel Institute.

3/ Includes sintered ore and pellet fines, dust, mill scale, and other revert iron-bearing materials; also some nodules.

4/ Mainly briquetted turnings and borings, shredded scrap, etc.; scrap produced at blast furnaces and remelt not included.

TABLE 3
DISTRIBUTION OF SHIPMENTS OF STEEL MILL PRODUCTS, BY STEEL TYPE, PRODUCT, AND MARKET 1/

	Thousand metric tons		Percent	
	1998	1999	1998	1999
Shipments by steel type:				
Carbon steel	85,700	89,500	92.3	92.9
Alloy steel	5,300	4,920	5.7	5.1
Stainless steel	1,850	1,890	2.0	2.0
Total	92,900	96,300	100.0	100.0
Steel mill products:				
Ingots, blooms, billets and slabs	1,900	1,020	2.04	1.06
Wire rods	4,650	4,750	5.00	4.94
Structural shapes-heavy	4,780	5,200	5.15	5.40
Steel piling	291	363	.31	.38
Plates-cut lengths	5,060	4,530	5.45	4.70
Plates-in coils	2,980	2,910	3.21	3.02
Rails	711	454	.77	.47
Railroad accessories	140	121	.15	.13
Bars, hot-rolled	7,430	7,160	8.00	7.44
Bars, light-shaped	2,250	2,140	2.42	2.22
Bars, reinforcing	5,360	5,940	5.77	6.16
Bars, cold finished	1,610	1,640	1.74	1.70
Tool steel	46	48	.05	.05
Pipe and tubing-standard pipe	1,220	1,140	1.31	1.18
Pipe and tubing-oil country goods	1,210	895	1.30	.93
Pipe and tubing-line pipe	1,260	1,230	1.36	1.27
Pipe and tubing-mechanical tubing	993	885	1.07	.92
Pipe and tubing-pressure tubing	35	20	.04	.02
Pipe and tubing-stainless	25	19	.03	.02
Pipe and tubing-structural	103	108	.11	.11
Pipe for piling	58	44	.06	.05
Wire	658	579	.71	.60
Tin mill products-blackplate	226	210	.24	.22
Tin mill products-tinplate	2,320	2,370	2.49	2.46
Tin mill products-tin-free steel	737	747	.79	.78
Tin mill products-tin coated sheets	89	90	.10	.09
Sheets, hot-rolled	14,300	16,900	15.35	17.60
Sheets, cold-rolled	12,000	12,700	12.87	13.17
Sheets, and strip hot dip galvanized	12,200	13,500	13.16	14.01
Sheets, and strip electrogalvanized	3,400	3,420	3.65	3.55
Sheets, and strip other metallic coated	1,960	1,910	2.01	1.98
Sheets, and strip electrical	532	510	.57	.53
Strip, hot rolled	811	890	.78	.92
Strip, cold rolled	1,620	1,860	1.75	1.93
Total	92,900	96,300	100.00	100.00
Shipments by markets:				
Service centers and distributors	25,200	25,500	27.10	26.45
Construction	13,900	16,700	14.93	17.35
Automotive	14,400	15,200	15.47	15.79
Machinery	1,950	1,560	2.10	1.62
Containers	3,470	3,490	3.74	3.62
All others	34,100	33,900	36.67	35.17
Total	92,900	96,300	100.00	100.00

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

Source: American Iron and Steel Institute.

TABLE 4
U.S. IMPORTS AND EXPORTS OF STEEL MILL PRODUCTS, BY COUNTRY 1/

(Thousand metric tons)

Country	1998		1999	
	Imports	Exports	Imports	Exports
Argentina	147	12	437	8
Australia	863	8	850	6
Brazil	2,480	15	3,440	10
Canada	4,460	2,990	4,570	3,230
China	573	14	698	24
European Union	6,540	202	6,010	201
Finland	188	1	222	1
Japan	6,100	11	2,780	9
Korea, Republic of	3,110	12	2,670	11
Mexico	2,870	1,080	3,190	1,050
Russia	4,780	--	1,140	--
South Africa	589	2	535	3
Sweden	217	2	183	2
Taiwan	446	9	876	8
Turkey	478	--	364	--
Ukraine	800	--	713	--
Venezuela	462	55	468	24
Other	2,550	595	3,260	333
Total	37,700	5,010	32,400	4,920

-- Zero.

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

Source: American Iron and Steel Institute.

TABLE 5
U.S. EXPORTS OF IRON AND STEEL PRODUCTS 1/

(Thousand metric tons)

	1998	1999
Steel mill products:		
Ingots, blooms, billets, slabs	212	125
Wire rods	67	63
Structural shapes-heavy	320	376
Steel piling	14	14
Plates-cut lengths	395	371
Plates-in coils	177	207
Rails-standard	51	14
Rails-other	12	10
Railroad accessories	18	12
Bars, hot-rolled	374	343
Bars, light-shaped	89	101
Bars, concrete reinforcing	129	116
Bars, cold-finished	96	99
Tool steel	10	12
Pipe and tubing-standard pipe	58	59
Pipe and tubing-oil country goods	222	142
Pipe and tubing-line pipe	454	173
Pipe and tubing-mechanical tubing	4	5
Pipe and tubing-stainless	28	27
Pipe and tubing-nonclassified	262	293
Pipe and tubing-structural	78	82
Pipe for piling	9	4
Wire	125	149
Tin mill products-blackplate	12	11
Tin mill products-tinplate	239	265
Tin mill products-tin-free steel	40	30
Sheets, hot-rolled	251	337
Sheets, cold-rolled	456	502
Sheets, and strip-hot-dip galvanized	184	252
Sheets, and strip-electrogalvanized	179	199
Sheets, and strip-other metallic coated	124	144
Sheets, and strip-electrical	71	74
Strip, hot-rolled	74	87
Strip, cold-rolled	170	223
Total	5,010	4,920
Fabricated steel products:		
Structural shapes-fabricated	286	263
Rails-used	33	26
Railroad products	53	63
Wire rope	14	13
Wire-stranded products	38	40
Wire-other products	17	18
Springs	109	110
Nails and staples	33	31
Fasteners	479	423
Chains and parts	26	24
Grinding balls	33	19
Pipe and tube fittings	37	32
Other 2/	51	56
Total	1,210	1,120
Grand total	6,220	6,040
Cast iron and steel products:		
Cast steel pipe fittings	37	32
Cast iron pipe and fittings	73	73
Cast steel rolls	16	15
Cast grinding balls	23	17
Granules-shot and grit	26	27
Other castings	48	39
Total	223	203

1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes shapes-cold formed, sashes and frames, fence and sign post, and architectural and ornamental work, and conduit.

Source: American Iron and Steel Institute.

TABLE 6
U.S. IMPORTS OF MAJOR IRON AND STEEL PRODUCTS 1/

(Thousand metric tons)

	1998	1999
Steel mill products:		
Ingots, blooms, billets and slabs	6,150	7,780
Wire rods	2,150	2,510
Structural shapes-heavy	2,520	1,290
Steel piling	197	118
Plates-cut lengths	1,930	829
Plates-in coils	2,770	1,440
Rails and railroad accessories	306	258
Bars, hot-rolled	1,410	1,360
Bars, light-shaped	282	265
Bars, reinforcing	1,120	1,660
Bars, cold-finished	316	277
Tool steel	146	149
Pipe and tubing-standard pipe	829	777
Pipe and tubing-oil country goods	311	154
Pipe and tubing-line pipe	1,140	842
Pipe and tubing-mechanical tubing	443	399
Pipe and tubing-pressure tubing	61	47
Pipe and tubing-stainless	64	76
Pipe and tubing-nonclassified	14	25
Pipe and tubing-structural	454	431
Pipe for piling	21	19
Wire	633	670
Tin mill products-blackplate	159	151
Tin mill products-tinplate	291	447
Tin mill products-tin-free steel	146	186
Sheets, hot-rolled	7,750	4,500
Sheets, cold-rolled	3,710	3,100
Sheets, and strip-hot-dip galvanized	1,680	1,910
Sheets, and strip-electrogalvanized	164	171
Sheets, and strip-other metallic coated	123	209
Sheets, and strip-electrical	113	104
Strip, hot-rolled	87	73
Strip, cold-rolled	184	181
Total	37,700	32,400
Fabricated steel products:		
Structural shapes-fabricated	393	532
Rails-used	308	348
Railroad products	104	115
Wire rope	114	104
Wire-stranded products	147	172
Springs	419	517
Nails and staples	454	545
Fasteners	970	1,030
Chains and parts	106	95
Pipe and tube fittings	123	125
Other	344	439
Total	3,480	4,020
Grand total	41,100	36,400
Cast iron and steel products:		
Cast steel pipe fittings	123	125
Cast iron pipe and fittings	38	42
Other products	317	338
Total	478	505

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

Source: American Iron and Steel Institute.

TABLE 7
U.S. IMPORTS OF STAINLESS STEEL 1/

(Metric tons)

Product	1998	1999
Semifinished	162,000	313,000
Plate	121,000	68,100
Sheet and strip	416,000	72,500
Bars and shapes	105,000	86,800
Wire and wire rods	77,700	79,800
Pipe and tube	64,000	75,600
Total	947,000 r/	696,000

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

Source: American Iron and Steel Institute.

TABLE 8
U.S. SHIPMENTS OF IRON AND STEEL CASTINGS 1/

(Thousand metric tons)

	1998	1999
Ductile iron castings	4,070	NA
Gray iron castings	5,460	NA
Malleable iron castings	246	NA
Steel castings	1,200	NA
Steel investment castings	83	NA
Total	11,100	NA

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

Source: U.S. Census Bureau.

TABLE 9
COAL AND COKE AT COKE PLANTS 1/ 2/

(Thousand metric tons)

	1998	1999
Coal, consumption	25,600	25,500
Coke: 3/		
Production	18,200	18,200
Exports	1,020 r/	814
Imports	3,480	2,920
Consumption, apparent	20,900 r/	20,300

r/ Revised.
1/ Data are rounded to no more than three significant digits.
2/ Includes furnace and merchant coke plants.
3/ Coke production and consumption do not include breeze.

Source: Energy Information Administration, Quarterly Coal Report, DOE/EIA-0121(99/4Q).

TABLE 10
PIG IRON AND DIRECT-REDUCED IRON: WORLD PRODUCTION, BY COUNTRY 1/ 2/ 3/ 4/

(Thousand metric tons)

Country 5/	1995	1996	1997	1998	1999
Albania e/	10	10	10	10	10
Algeria e/	940 6/	800	700	700	500
Argentina:					
Pig iron	1,568	1,966	2,066	2,148 r/	2,010
Direct-reduced iron	1,328	1,422	1,501	1,538 r/	990
Australia	7,476	7,774	7,884	7,724	7,047
Austria	3,838	3,416	3,965	4,022	3,913
Belgium	9,199	8,628	8,077	8,730	8,472
Bosnia and Herzegovina e/	100	100	100	100	100
Brazil:					
Pig iron	2,521 r/	23,978 r/	25,013 r/	25,111 r/	25,060
Direct-reduced iron	288 r/	335 r/	323 r/	336 r/	400
Bulgaria	1,607	1,513	1,644	1,389 r/	1,130
Burma:					
Pig iron	1	1 r/	-- r/	2 e/	2
Direct-reduced iron	20	40 r/	40	40	40
Canada:					
Pig iron	8,464	8,638	8,670	8,937 r/	8,783
Direct-reduced iron	1,010	1,420	1,390	1,240	920
Chile	855	996 r/	941 r/	993 r/	1,033
China 7/	105,293	107,225	115,110	118,600	125,390
Colombia	282	274	322	256 r/	266
Czech Republic	5,289	4,898	5,195 r/	4,982 r/	4,022
Egypt:					
Pig iron e/	1,062 6/	1,050	1,000	1,300 r/	1,400
Direct-reduced iron	860	830	1,190	1,610 r/	1,670
Finland	2,242	2,457	2,779	2,914	2,954
France	12,860	12,108	13,424	13,603	13,854
Germany:					
Pig iron	29,828	30,012	30,939	30,162 r/	27,931
Direct-reduced iron	410	370	470 r/	450 r/	400
Hungary	1,515	1,496	1,141	1,258 r/	1,309
India:					
Pig iron	18,626	19,864	19,898 r/	20,194 r/	20,139
Direct-reduced iron	4,280	4,830	5,250	5,260 r/	5,220
Indonesia: Direct-reduced iron e/	1,860 6/	1,800	1,600	1,640 r/	1,740
Iran:					
Pig iron	1,532	1,867	2,053 r/	2,117 r/	2,112
Direct-reduced iron	3,301	3,778	4,380	3,690 r/	4,120
Italy	11,684	10,347	11,348	10,704	10,509
Japan	74,905	74,597	78,519	74,981	74,520
Kazakhstan	2,528	2,536	3,040 r/	2,594	3,438
Korea, North e/	500 r/	500 r/	500 r/	250 r/	250
Korea, Republic of	22,344	23,010	22,712	23,229 r/	23,329
Libya: Direct-reduced iron	970	862	990	1,200 r/	1,290 e/
Luxembourg 8/	1,028	829	437	--	--
Macedonia e/	20	20	-- r/	-- r/	--
Malaysia: Direct-reduced iron e/	1,090 6/	1,480 r/	1,720	910 r/	960
Mali	(9/)	--	--	--	--
Mexico:					
Pig iron	4,142	4,229	4,450	4,532	4,822
Direct-reduced iron	3,691	3,794	4,440	5,584	6,083
Morocco e/	15	15	15	15	15
Netherlands 8/	5,647	5,545	5,804	5,561	5,320
New Zealand	631	619 r/	534	609 r/	620
Nigeria: Direct-reduced iron e/	20 6/	20	--	--	--
Norway e/	70	70	70	70	60
Pakistan e/	1,100	1,500	1,400	1,500	1,500
Paraguay	103	104 r/	82 r/	66 r/	59
Peru:					
Pig iron	247 r/	273 r/	264 r/	283 r/	237
Direct-reduced iron	3 r/	22 r/	120 r/	110 r/	50
Poland	7,373	6,581	7,296 r/	6,128 r/	5,228

See footnotes at end of table.

TABLE 10--Continued
PIG IRON AND DIRECT-REDUCED IRON: WORLD PRODUCTION, BY COUNTRY 1/ 2/ 3/ 4/

(Thousand metric tons)

Country 5/	1995	1996	1997	1998	1999
Portugal	416	421	431	365	389
Qatar: Direct-reduced iron	630	632	570	706	670
Romania	4,203	4,025	4,557	4,541 r/	3,006
Russia:					
Pig iron	39,762	36,061	37,327	34,827	40,033
Direct-reduced iron	1,680	1,500	1,730 e/	1,550	1,880
Saudi Arabia: Direct-reduced iron	2,129	2,296	2,110 r/	2,268 r/	2,343
Serbia and Montenegro	108	535	907	826 r/	135
Slovakia	3,300	3,300 e/	3,072	2,756 r/	2,987
South Africa:					
Pig iron	7,137	6,876	6,192	5,650 r/	4,587
Direct-reduced iron	950	900	1,120 r/	1,070 r/	1,490
Spain	5,108	4,128	3,926	4,278	4,146
Sweden	3,020	3,255	3,060	3,373	3,212
Switzerland e/	100	100	100	100	100
Taiwan	6,056	6,050	8,870	9,374 r/	9,023
Trinidad and Tobago: Direct-reduced iron	1,039	954	1,140	1,073	1,379
Tunisia	152	145	153	118	178
Turkey	4,363	5,263 r/	5,567	5,286 r/	5,141
Ukraine	20,000	18,143	20,561	20,840	21,937
United Kingdom	12,238	12,830	13,057	12,574	12,399
United States:					
Pig iron	50,900	49,400	49,600	48,200	46,300
Direct-reduced iron	460	450	510	1,600 r/	1,670
Venezuela: Direct-reduced iron	5,099	5,380	5,258	4,926	5,171
Zimbabwe e/	209 6/	210	216 r/	217 r/	228
Grand total	536,000 r/	554,000 r/	581,000 r/	576,000 r/	580,000
Of which:					
Pig iron	505,000 r/	521,000 r/	545,000 r/	539,000 r/	541,000
Direct-reduced iron	31,100	33,100 r/	35,900 r/	36,800 r/	38,500

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/ Production is pig iron unless otherwise specified.

3/ Direct-reduced iron is obtained from ore by reduction of oxides to metal without melting.

4/ Table excludes ferroalloy production except where otherwise noted. Table includes data available through August 4, 2000.

5/ In addition to the countries listed, Vietnam has facilities to produce pig iron and may have produced limited quantities during 1995-98, but output is not reported and available information is inadequate to make reliable estimates of output levels.

6/ Reported figure.

7/ Figures reported by State Statistical Bureau that the Chinese Government considers as official statistical data.

8/ Includes blast furnace ferroalloys.

9/ Less than 1/2 unit.

TABLE 11
RAW STEEL: WORLD PRODUCTION, BY COUNTRY 1/ 2/ 3/

(Thousand metric tons)

Country 4/	1995	1996	1997	1998	1999
Albania e/	22	20	20	15	15
Algeria	827	620	427	400 e/	400 e/
Angola e/	9	9	9	9	9
Argentina	3,581	4,075	4,188 r/	4,210 r/	3,761
Australia	8,447	8,415	8,769	8,798	8,158
Austria	4,537	4,442	5,196	5,298	5,202
Azerbaijan	12	25	25	24 e/	25 e/
Bangladesh e/ 5/	36	37	36	35	36
Belarus	744	886 e/	1,220	1,299	1,345
Belgium	11,606	10,773	10,738	11,427 r/	10,972
Bosnia and Herzegovina e/	115	115	115	115	150
Brazil 6/	25,076	25,237 r/	26,153 r/	25,760 r/	24,996
Bulgaria	2,728	2,457	2,628	2,216 r/	1,846
Burma	20 r/	40 r/	-- r/	24 e/	24 e/
Canada	14,415	14,735	15,554	15,930 r/	16,300
Chile 6/	1,014	1,178	1,167	1,171 r/	1,288
China 7/	95,360	101,241	108,940	115,590 r/	124,260
Colombia	714	677	710	622 r/	523
Croatia	45	46	69	105 r/	77
Cuba	207	231	342	284	300
Czech Republic	6,746	6,257	6,495	6,498 r/	5,613
Denmark	654 e/	737	787	790 r/	748
Dominican Republic	--	6	64	36	31
Ecuador	35	20 r/	44	46 r/	53 e/
Egypt	2,642	2,618	2,717	2,800 r/	2,619
El Salvador	28 r/	41 r/	45	44 r/	39
Finland	3,176 r/	3,301	3,687	3,947	3,956
France	18,096	17,630	19,773	20,126 r/	20,211
Georgia	84 e/	85	104	100 e/	105 e/
Germany	42,051 r/	39,791	45,009 r/	44,046 r/	42,056
Greece	939	848	1,016	1,109	951
Hong Kong e/	350	350	350	350	450
Hungary	1,865	1,969	1,829	1,821 r/	1,813
India	22,800	23,753	23,748	23,480 r/	24,269
Indonesia e/	3,500	4,100 r/	3,800 r/	2,700 r/	2,800
Iran	4,696	5,415 r/	6,322	5,600 r/ e/	6,071
Iraq e/	300	300	200 r/	200 r/	800
Ireland	310	340	337	358	314
Israel e/	200 8/	203 8/	203	203	200
Italy	27,766	23,922	25,537	25,798 r/	24,964
Japan	101,640	98,801	104,545	93,548	94,195
Kazakhstan	2,963	3,142	3,900	3,089 r/	4,116
Kenya e/	20	30 r/	33 r/	25	25
Korea, North e/	1,500 r/	1,500 r/	1,000 r/	1,000 r/	1,000
Korea, Republic of	36,772	38,903	42,554	39,896	41,042
Latvia	279	293	465	465 r/	471
Libya	909	863 e/	897	874 r/	945
Luxembourg	3,079	2,501	2,580	2,592 r/	2,477
Macedonia	33	27	30 e/	-- r/	-- e/
Malaysia	2,450	3,216	2,962	1,903 r/	2,000
Mauritania e/	-- r/	-- r/	-- r/	-- r/	--
Mexico	12,147	13,172	14,254	14,213 r/	15,299
Moldova	663	646	810	718	796
Morocco e/	7	5	5	5	5
Netherlands	6,409	6,325 r/	6,640	6,379	6,075
New Zealand	842	680	680	756 r/	744
Nigeria e/	36	-- r/	--	2 r/	--
Norway	503	511	570 r/	644 r/	611
Pakistan	409	416	479 r/	494 r/	500 e/
Paraguay	95	96	66 r/	56	50

See footnotes at end of table.

TABLE 11--Continued
RAW STEEL: WORLD PRODUCTION, BY COUNTRY 1/ 2/ 3/

(Thousand metric tons)

Country 4/	1995	1996	1997	1998	1999
Peru	512 r/	678 r/	607 r/	631 r/	568
Philippines e/	923	920	950	950	900
Poland	11,890	10,433	11,585 r/	9,915 r/	8,770
Portugal	829	871	905	854	850 e/
Qatar	614	606 r/	608 r/	637 r/	629
Romania	6,555	6,083	6,674	6,335 r/	4,355
Russia	51,300	49,193	48,499	43,822	49,759
Saudi Arabia	2,451	2,683	2,539	2,356 r/	2,610
Serbia and Montenegro	180	679	979	949 r/	226
Singapore e/	500	500	500	500	500
Slovakia	3,975 r/	3,602 r/	3,835 r/	3,428 r/	3,569
Slovenia	407 r/	328 r/	373 r/	405 r/	405
South Africa	8,741	7,999	8,311	7,506 r/	6,925
Spain	13,937	12,036	13,644	14,400	14,000 e/
Sri Lanka e/	30	30	30	30	30
Sweden	4,926	4,910	5,147	5,168 r/	5,075
Switzerland e/	1,000	1,000	1,000	1,000	1,000
Syria e/	70	70	70	70	70
Taiwan	11,605	12,650	15,478	17,192 r/	16,027
Thailand	2,134	2,143	2,101 r/	1,619 r/	1,474
Trinidad and Tobago	738	695	736	781	729 e/
Tunisia	201	187	195	171 r/	229
Turkey	12,745	13,382	13,664	13,351 r/	14,309
Uganda e/	12	12	15	15	15
Ukraine	22,309	22,100	25,600	23,461 r/	26,757
United Kingdom	17,604	18,220	18,528	17,066	16,634
United States	95,200	95,500	98,500	98,600	97,400
Uruguay	40	34	39	52	47
Uzbekistan	352	444	365	344	343 e/
Venezuela	3,568	3,941	4,019	3,700	3,261
Vietnam	271	311	314	320 e/	450 e/
Zimbabwe e/	210	212	214 r/	212 r/	228
Total	752,000 r/	751,000 r/	797,000 r/	776,000 r/	786,000

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/ Steel formed in solid state after melting, suitable for further processing or sale; for some countries, includes material reported as "liquid steel," presumably measured in the molten state prior to cooling in any specific form.

3/ Table includes data available through August 4, 2000.

4/ In addition to the countries listed, Ghana and Mozambique are known to have steelmaking plants, but available information is inadequate to make reliable estimates of output levels.

5/ Data for year ending June 30 of that stated.

6/ Excludes castings.

7/ Figures reported by State Statistical Bureau that Chinese Government considers as official statistical data.

8/ Reported figure.