IRON AND STEEL

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The longest economic expansion in U.S. history, exactly 10 years or 120 months, ended, and a recession began in March 2001 (National Bureau of Economic Research, 2002§¹). U.S. apparent steel consumption, an indicator of economic growth, decreased in 2001 to 107 million metric tons (Mt), the lowest amount since 1995, from a peak of 120 Mt in 2000. Worker productivity increased by only 1.9% during 2001, lower than the 3.3% gain for 2000 (Washington Times, 2002). World and regional economic performance showed weakness similar to that of the United States. Growth in world economic output decreased to 2.6% per year in 2001, while growth in world trade declined sharply to 2.7% per year in 2001 from 12.4% in 2000 (Mining Journal, 2002). The European Union's (EU) economic growth declined to a 1.8% per year rate in 2001 from 3.4% per year in 2000.

During the past 4 years, a flood of allegedly unfairly traded imports entered U.S. markets as a result of steelmaking overcapacity worldwide, declining foreign steel demand, the collapse of the Russian and Asian economies, and the appreciation of the U.S. dollar by 37% during 5 years. When the United States became the most important market for the world's excess steel production, domestic mills could not compete because import prices reached record lows in real dollar terms in 2001 and few U.S. steel companies were able to make a profit. Since 2000, 15 steel plants with 22 Mt of capacity—17% of the country's total capacity—have been closed or idled (United Steel Workers of America, 2002§). U.S. steelmaking employment declined by 15% since January 1998. Nearly 21,000 of the 34,300 total steel jobs lost were lost during 2001. The economic cost of the large number of former workers on company-funded pensions and healthcare programs contributed to the lack of profits experienced by most companies.

In June, the U.S. Government proposed aid for the suffering domestic steelmaking industry, including (1) reduction in domestic and foreign excess capacity, (2) elimination of foreign state subsidies to foreign steelmakers, and (3) an investigation of low-priced imports by the U.S. Department of Commerce, U.S. International Trade Commission (ITC) under section 201 of the 1974 Trade Act (Steel Times International, 2002).

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

¹References that include a section twist (§) are found in the Internet References Cited section.

Federal Government policy, the U.S. Geological Survey reported all data on iron and steel in metric units unless otherwise noted.

Environment

The U.S. Environmental Protection Agency (EPA) announced that it would develop a rule to require industrial facilities, including steel plants, built between 1962 and 1977 to install technology to limit the release of pollutants, such as sulfur dioxide, nitrogen oxide, and particulate matter (Bourge, 2001). Plants to be covered under this Clean Air Act rule would be those emitting more than 227 metric tons (t) of smogcausing agents that affect visibility in 156 national parks and wilderness areas.

The EPA issued an opinion clarifying that drop-out box slag (DOBS) generated at electric arc furnaces (EAF) is not covered under the hazardous waste listing "K061" for EAF dust (Guerry, 2001). Prior to this opinion, most of the 73,000 metric tons per year (t/yr) of DOBS generated had been managed as a hazardous waste for a total cost to the industry of more than \$10 million per year. This ruling would substantially reduce compliance costs and liabilities for EAF steelmakers.

Brownfields are abandoned, idled, or underused industrial and commercial sites where expansion or redevelopment is complicated by real or perceived environmental contamination that can add cost, time, or uncertainty to a redevelopment project (Envirotools, 2001§). About 130,000 to 450,000 contaminated or abandoned commercial and industrial sites are in the United States, and the cost of cleaning U.S. brownfields may be as much as \$650 billion. Legislation, supported by the steel and scrap industries, the Institute of Scrap Recycling Industries, and numerous other groups, designed to encourage development of brownfield sites as well as reform related Federal and State programs passed both houses of Congress during 2001. The legislation was expected to be signed into law during 2002.

Scientific Certification Systems, an independent certification organization, conducted a life cycle study in order to determine the environmental savings associated with annual steel production from a single North American steel mill (American Iron and Steel Institute, 2002b§). Some of the savings during 1 year are as follows: enough energy is saved to light 3.6 million homes, reductions in sulfur dioxide releases are equal to the emissions associated with heating 12 million Northeast homes, and solid waste reductions are equal to the amount of garbage generated by 4 million Americans.

The American Iron and Steel Institute (2002a§) reviewed the cost to mitigate environmental impacts by the U.S. steel industry. Environmental expenditures have amounted to more

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than \$8 billion during 25 years. In a typical year, more than 15% of capital spending is for environmental facilities. Costs to operate and maintain environmental facilities amount to between \$10 and \$20 per metric ton of steel produced, which exceeds industry profits even in prosperous years. These and other expenditures were beneficial to the environment. From 1975 to 1998, the amount of energy required to produce a ton of steel decreased by almost 45%, while the discharge of air and water pollutants was reduced by more than 90%. More than 95% of the water used for steel production and processing is recycled. Most hazardous wastes once generated by the steel industry are now being recycled for recovery for beneficial reuse.

Production

Production of raw steel in the United States decreased to 90.1 Mt from 102 Mt in 2000 (table 1). The AISI estimated raw steel production capability to be 114 Mt, down from 118 Mt in 2000. Production represented 79.2% of estimated capability compared with 86.1% in 2000.

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 47.3 Mt of steel (American Iron and Steel Institute, 2001, p. 74). The use of this process declined slightly to 52.6% of total steel production in 2001 from 53.0% in 2000. The integrated steel industry in the United States consisted of 13 companies operating ironmaking and steelmaking facilities at 19 locations (Iron and Steelmaker, 2001). 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 that use EAFs to melt low-cost raw materials (usually scrap). They also employ continuous casting machines and hotrolling mills 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, 79 companies having 116 steelmaking plants, used the EAF steelmaking process to produce 42.7 Mt of steel, a decrease of nearly 11% compared with that of 2000, and accounted for 47% of total steelmaking (American Iron and Steel Institute, 2001, p. 74; Iron and Steelmaker, 2001).²

Raw liquid steel is mostly cast into semifinished products in continuous casting machines. Only 2.8% of U.S. production was cast in ingot form and subsequently rolled into semifinished forms; this represented a decrease of 31% compared with that of 2000. Continuous casting production was 87.5 Mt, or 97.2% of total steel production, compared with 98.1 Mt, or 96.4%, in 2000 (American Iron and Steel Institute, 2001, 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, resumed its upward course in 1999 and 2000, and declined in 2001 to its lowest level since 1995 (American Iron and Steel Institute, 2001, p. 27). Shipments of steel mill products by U.S. companies decreased by 9.3% to 89.7 Mt compared with those of 2000. Export shipments by AISI reporting companies decreased to 5.6 Mt from 5.9 Mt in 2000 (American Iron and Steel Institute, 2001, p. 46). Shipments to domestic customers decreased by 9.3% during 2000 (American Iron and Steel Institute, 2001, p. 30). Shipments of construction and contractors' products, the largest single end-use market, increased by 6.2%. Automotive product shipments decreased by 12.5%. Oil and gas, mining, quarrying, and lumbering industries shipments decreased by nearly 6%. Shipments of industrial and agricultural machinery, equipment, and tools decreased by 22%. Steel service center shipments, appliance shipments, and containers, packaging, and shipping material shipments decreased by 10%.

The U.S. apparent supply of steel mill products decreased to 107 Mt from 120 Mt in 2000. As reported by the U.S. Census Bureau, iron castings shipments totaled an estimated 9.9 Mt for 1999 (the most recent data available) and 9.9 Mt (revised) for 1998. Steel castings shipments (including investment castings) totaled 1.2 Mt in 1999, the same as in 1998.

Transportation

CSX Transportation (CSXT), the largest railroad east of the Mississippi River, has been operating 6,400 kilometers of track since its partial acquisition of Conrail, Inc., in June 1999. The railroad system is the main form of transportation of ferrous scrap to steel mills. After CSXT and Norfolk Southern Corp. agreed to split Conrail in 1997, customers, such as the steel scrap industry, experienced considerable deterioration of service based mostly on the railroads' difficulty in integrating the computer systems of the merged railroads. By April 2001, CSXT reported that the company's performance was better than at any time since the company was formed in 1980, as measured by average train velocity and on time destination arrival (Bagsarian, 2001).

Prices

The U.S. Department of Commerce Bureau of Labor Statistics producer price index for steel mill products was down by 6.5% to 101.3 from 108.4 in 2000 (1982 base=100) (U.S. Department of Commerce, Bureau of Labor Statistics, 2002§). The index decreased steadily to a low of 99.1 in December from a January high of 103.8.

Foreign Trade

Exports of steel mill products decreased to 5.6 Mt from 5.9

²Revised June 5, 2003.

Mt in 2000 (American Iron and Steel Institute, 2001, p. 46). Canada again received the largest amount of U.S. exported steel, 3.4 Mt, down from 3.8 Mt in 2000. Mexico was again in second place, receiving 1.4 Mt, up from 1.3 Mt in 2000. Imports of steel mill products decreased by 21% to 27.3 Mt from 34.4 Mt in 2000 (American Iron and Steel Institute, 2001, p. 56). Brazil, Canada, the EU, Japan, the Republic of Korea, Mexico, and Russia were major sources of steel mill product imports.

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, imports were estimated to range between 2.5 million metric tons per year (Mt/yr) and 7.8 Mt/yr. Prior to 1993, the amount was less than 0.2 Mt/yr. Taking the imported semifinished steel into consideration, the share of the U.S. steel market represented by imported steel was an estimated 26% in 2001 compared with 29% in 2000.

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" refers 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).

World Review

World production of pig iron totaled about 581 Mt, 1.6% greater than that of 2000 (table 10). In Asia, China continued to be the leading producer of pig iron in the world, producing more than 145 Mt, a 12% increase from that of 2000. Japan and the United States followed with 79 Mt and 42 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 had increased by 29% since 1998 and was the highest in the past 5 years. During 2001, Ukrainian production continued a rising 5-year trend. In North America, the only major producer of pig iron was the United States, where production decreased by 12% from that of 2000. In South America, the only major pig iron producer was Brazil, producing nearly 28 Mt. Germany was the top producer in the EU, producing 2.7% less than that in 2000. India's production increased by 2.7% from that of 2000.

DRI production worldwide was about 40.6 Mt, a 3.5% decrease from that of 2000 and a 12% increase compared with that of 1996 (table 10). The leading technology was the Midrex process, followed by the HYL I and the HYL III processes. Because of a decrease in demand for charge materials, interest in DRI by steel producers declined for the first time since 1982. During 2001, 10.2 Mt of capacity was idle compared with 3.8 Mt in 2000. The leading producer of DRI was India, followed by Venezuela, India, Iran, and Mexico (table 10). World

capacity for DRI production was estimated to be nearly 48 Mt/yr (Midrex Direct Reduction Corp., 2001). Additional DRI capacity of 0.8 Mt was under construction in the Republic of Korea.

World production of crude steel exceeded 851 Mt, only a slight increase from the 849 Mt produced during 2000 (table 11). As in previous years, production varied widely among major regions of the world. Asian countries produced about 41% of the world's steel; the EU, 19%; and North America, 14%. During 2001, China was again the world's leading steel producer, exceeding 149 Mt, a gain of nearly 16% compared with that of 2000. In descending order, the leading producers behind China were Japan, the United States, Russia, Germany, and the Republic of Korea. These six countries accounted for 58% of world production. The combined steel production of the seven steel-producing countries in the CIS was nearly 100 Mt, about the same as during 2000. Russia and Ukraine remained the top producers, continuing to increase production over the recent lows of 1998 (table 11).

Outlook

In July, the IISI forecast an increase in world apparent consumption of finished steel products of 2.2%, or 50.4 Mt, during 2001 to 2003 for a total of 811 Mt in 2003 (International Iron and Steel Institute, 2002§). Consumption rose by 1.0% in 2001 to 768 Mt and is projected to rise by 2.0% to 784 Mt in 2002 and by 3.5% to 811 Mt in 2003. Consumption was expected to increase during 2001 to 2003 in China, by 11.5%; South America, 7.1%; the CIS, 6.3%; North America, 5.3%; and the EU, 2.1%. During late 2001, the IISI believed that there were signs that most regional economies, including that of the United States, were beginning to recover, and a strong U.S. recovery was projected for 2003. Global gross domestic product growth was estimated to be 1.5% in 2001, 1.5% in 2002, and 3.4% in 2003.

Although during the past 35 years, tens of millions of tons of steelmaking capacity had been eliminated in the United States, making U.S. operations much more efficient, a majority of observers believed that by the end of 2001 global overcapacity remained the basic cause of the depression of the world and U.S. steelmaking industries. Overcapacity in the world was estimated to be between 116 and 272 Mt (American Metal Market, 2002). It was becoming increasingly apparent that the health of the domestic steel industry might improve not by continuing to rely on antidumping trade laws, but by the consolidation of mills, especially the integrated mills and even, perhaps, the minimills (Robertson, 2000). Large companies formed by the consolidation of small companies, provided the latter are efficient, should be able to reduce overhead, achieve purchasing scale, eliminate unnecessary product duplication, and control pricing better while attracting investors to finance modernization. Only by closing inefficient operations, reducing costs, adopting the latest steelmaking technology, and improving return on invested capital will these new companies become competitive with foreign mills. The industry would also need to decide whether it wants to produce less raw steel than domestic demand requires and continue to import supplementary quantities of semifinished steel to emphasize downstream product lines (Berry, 2001). To some observers,

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relinquishing significant raw steelmaking capacity to foreign countries by closing down coke ovens and blast furnaces raises national security concerns.

On December 7, the ITC announced their trade relief recommendations and forwarded them to the administration (Kelley, 2001). All six commissioners agreed that serious injury had been done to the U.S. steelmaking industry by steel imports, and the industry would need a short period of relief in the form of tariffs and/or quota restrictions. Tariffs recommended were as high as 40% during as much as 4 years. The expectations were that tariffs would help prices move to long-term average levels and would reduce imports, and the tariff period would allow the industry adequate time to restructure itself (Lowrey, 2001).

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TABLE 1 SALIENT IRON AND STEEL STATISTICS 1/

(Thousand metric tons)

	1997	1998	1999	2000	2001
United States:					
Pig iron:					
Production 2/	49,600	48,200	46,300	47,900	42,100
Exports 3/	86	87	82	72	44
Imports for consumption 3/	3,150	5,140	4,990	4,970	4,370
Direct-reduced iron:					
Production 4/	510	1,600	1,670	1,560	1,200
Exports 3/	8	5	3	2	1
Imports for consumption 3/	987	939	950	1,090 r/	1,650
Raw steel production: 5/					
Carbon steel	87,000	88,000	87,600	92,500	82,400
Stainless steel	2,160	2,010	2,190	2,190	1,820
All other alloy steel	9,290	8,600	7,650	7,510	5,920
Total	98,500	98,600	97,400	102,000	90,100
Capability utilization, percent	89.4 r/	86.8 r/	83.8 r/	86.1 r/	79.2
Steel mill products:					
Net shipments 2/	96,000	92,900	96,300	98,900	89,700
Exports 3/	5,470	5,010	4,920	5,920	5,570
Imports 3/	28,300	37,700	32,400	34,400	27,300
Producer price index for steel mill					
products (1982=100.0) 6/	116.4	113.8	105.3	108.4	101.3
World production: 7/					
Pig iron	540,000	535,000 r/	538,000	572,000 r/	581,000
Direct-reduced iron 4/	36,200	37,200 r/	38,200 r/	42,100 r/	40,600
Raw steel	797,000	777,000 r/	789,000	849,000 r/	909,000

r/ Revised.

- 1/ Data are rounded to three significant digits, except prices; may not add to totals shown.
- 2/ Data are from the American Iron and Steel Institute (AISI).
- 3/ Data are from the U.S. Census Bureau.
- 4/ Data are from the 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 are from the U.S. Department of Commerce Bureau of Labor Statistics.
- 7/ Data are from the U.S. Geological Survey and the International Iron and Steel Institute.

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

(Thousand metric tons)

Material	2000	2001
Iron oxides: 2/		
Ores	345	249
Pellets	61,800	55,200
Sinter 3/	10,600	9,090
Total	72,800	64,500
Scrap 4/	1,470	1,490
Coke 2/	19,200	17,100
Pig iron produced	47,900	42,100
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^{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, unless otherwise specified)

	Quanti	ty	Percenta	ıge
	2000	2001	2000	2001
Shipments by steel type:				
Carbon steel	92,100	83,700	93.1	93.3
Alloy steel	4,880	4,340	4.9	4.8
Stainless steel	1,930	1,670	1.9	1.9
Total	98,900	89,700	100.0	100.0
Steel mill products:	_			
Ingots, blooms, billets, slabs	1,220	783	1.24	0.87
Wire rods	4,420	3,010	4.47	3.35
Structural shapes-heavy	6,040	5,840	6.10	6.51
Steel piling	- · ·	398	0.00	0.44
Plates-cut lengths	5,100	4,790	5.16	5.34
Plates-in coils	2,990	3,190	3.02	3.55
Rails	593	454	0.60	0.51
Railroad accessories	- 144	132	0.15	0.15
Bars, hot-rolled	6,990	6,240	7.07	6.95
Bars, light-shaped	1,410	1,060	1.43	1.18
Bars, reinforcing	6,270	6,290	6.33	7.01
Bars, cold finished	1,580	1,300	1.60	1.45
Tool steel	41	28	0.04	0.03
Pipe and tubing-standard pipe	1,210	1,090	1.22	1.22
Pipe and tubing-oil country goods	1,620	1,600	1.64	1.78
Pipe and tubing-line pipe	885	1,190	0.89	1.33
Pipe and tubing-mechanical tubing	943	803	0.95	0.89
Pipe and tubing-pressure tubing	- 34	27	0.03	0.03
Pipe and tubing-stainless	15	19	0.02	0.02
Pipe and tubing-structural	136	113	0.14	0.13
Pipe for piling	36	32	0.04	0.04
Wire	526	615	0.53	0.69
Tin mill products-blackplate	285	190	0.29	0.21
Tin mill products-tinplate	2,290	2,010	2.31	2.24
Tin mill products-tin-free steel	739	621	0.75	0.69
Tin mill products-tin coated sheets	82	80	0.08	0.09
Sheets, hot-rolled	17,900	16,600	18.13	18.48
Sheets, cold-rolled	13,500	11,300	13.62	12.53
Sheets and strip, hot dip galvanized	13,500	13,000	13.64	14.44
Sheets and strip, electrogalvanized	3,170	2,730	3.21	3.04
Sheets and strip, other metallic coated	1,940	1,730	1.96	1.92
Sheets and strip, electrical	480	436	0.49	0.49
Strip, hot rolled	788	625	0.80	0.70
Strip, cold rolled	2,050	1,530	2.07	1.70
Total	98,900	89,700	100.00	100.00
Shipments by markets:				
Service centers and distributors	27,300	24,600	27.61	27.36
Construction	18,400	19,500	18.61	21.77
Automotive	14,600	12,800	14.73	14.21
Machinery	1,620	1,320	1.64	1.47
Containers	3,360	2,930	3.40	3.27
All others	33,600	28,600	34.02	31.92
Total	98,900	89,700	100.00	100.00

⁻⁻ Zero

Source: American Iron and Steel Institute.

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

 $\label{table 4} TABLE~4$ U.S. IMPORTS AND EXPORTS OF STEEL MILL PRODUCTS, BY COUNTRY 1/

(Thousand metric tons)

	200	00	200	2001		
Country	Imports	Exports	Imports	Exports		
Argentina	417	4	403	6		
Australia	737	5	623	4		
Brazil	3,280	16	2,820	19		
Canada	4,770	3,790	4,230	3,410		
China	1,350	24	691	39		
European Union	6,400	281	5,520	175		
Finland		1				
Japan	1,930	14	1,860	25		
Korea, Republic of	2,430	20	2,020	13		
Mexico	2,950	1,350	2,710	1,440		
Russia	1,370		1,540			
South Africa	585	3	473	4		
Sweden	175	1	190	2		
Taiwan	1,150	12	518	11		
Turkey	609		860			
Ukraine	1,410		461			
Venezuela	433	30	308	29		
Other	4,430	375	2,060	390		
Total	34,400	5,920	27,300	5,570		
7000	•					

⁻⁻ Zero.

Source: American Iron and Steel Institute.

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

(Thousand metric tons)

	2000	2001
Steel mill products:		
Ingots, blooms, billets, slabs	102	127
Wire rods	58	41
Structural shapes-heavy	346	363
Steel piling	25	10
Plates-cut lengths	466	407
Plates-in coils	401	279
Rails-standard	28	66
Rails-other	- 6	6
Railroad accessories	15	14
Bars, hot-rolled	386	347
Bars, light-shaped	104	112
Bars, concrete reinforcing	117	114
Bars, cold-finished	118	101
Tool steel	9	24
Pipe and tubing, standard pipe		61
Pipe and tubing, oil country goods	157	217
Pipe and tubing, line pipe	161	169
Pipe and tubing, mechanical tubing	5	3
Pipe and tubing, stainless	37	35
Pipe and tubing, nonclassified	341	294
Pipe and tubing, structural	116	116
Pipe for piling	3	5
Wire	146	140
Tin mill products-blackplate	_ 5	2
Tin mill products-tinplate	289	226
Tin mill products-tin-free steel	47	24
Sheets, hot-rolled	448	447
Sheets, cold-rolled	638	547

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

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

(Thousand metric tons)

	2000	2001
Steel mill productsContinued:		
Sheets and strip, hot-dip galvanized	417	471
Sheets and strip, electrogalvanized	262	211
Sheets and strip, other metallic coated	155	161
Sheets and strip, electrical	60	82
Strip, hot-rolled	102	79
Strip, cold-rolled	278	270
Total	5,920	5,570
Fabricated steel products:		
Structural shapes-fabricated	244	283
Rails-used	- 33	19
Railroad products	48	32
Wire rope	14	11
Wire-stranded products	41	36
Wire-other products	51	19
Springs	96	79
Nails and staples	28	28
Fasteners	339	286
Chains and parts	27	22
Grinding balls	33	17
Pipe and tube fittings	- 33	35
Other 2/	61	56
Total	1,050	923
Grand total	6,970	6,500
Cast iron and steel products:	-	
Cast steel pipe fittings	- 33	35
Cast iron pipe and fittings	65	64
Cast steel rolls	18	8
Cast grinding balls	12	22
Granules-shot and grit	29	23
Other castings	45	39
Total	202	191

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

Source: American Iron and Steel Institute.

 ${\bf TABLE~6} \\ {\bf U.S.~IMPORTS~OF~MAJOR~IRON~AND~STEEL~PRODUCTS~1/}$

(Thousand metric tons)

7,760 2,700	5,840
2,700	,
,	
	2,730
1,760	894
182	144
897	854
1,410	649
249	215
1,580	1,330
319	162
1,520	1,600
373	315
162	142
1,160	1,040
653	828
	319 1,520 373 162 1,160

 $^{2/\}operatorname{Includes}$ shapes—cold formed, sashes and frames, fence and sign post, and architectural and ornamental work, and conduit.

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

(Thousand metric tons)

	2000	2001
Steel mill productsContinued:		
Pipe and tubing, mechanical tubing	510	451
Pipe and tubing, pressure tubing	51	72
Pipe and tubing, stainless	. 88	84
Pipe and tubing, nonclassified	25	25
Pipe and tubing, structural	476	408
Pipe for piling	34	19
Wire	669	623
Tin mill products-blackplate	131	134
Tin mill products-tinplate	359	343
Tin mill products-tin-free steel	167	147
Sheets, hot-rolled	5,360	2,190
Sheets, cold-rolled	2,630	2,790
Sheets and strip, hot-dip galvanized	1,590	1,340
Sheets and strip, electrogalvanized	236	159
Sheets and strip, other metallic coated	237	240
Sheets and strip, electrical	111	99
Strip, hot-rolled	59	55
Strip, cold-rolled	165	149
Total	34,400	27,300
Fabricated steel products:		
Structural shapes, fabricated	639	729
Rails, used	271	175
Railroad products	102	79
Wire rope	100	103
Wire-stranded products	179	184
Springs	523	422
Nails and staples	573	541
Fasteners	1,170	954
Chains and parts	99	95
Pipe and tube fittings	148	177
Other	436	466
Total	4,240	3,930
Grand total	38,700	31,200
Cast iron and steel products:		
Cast steel pipe fittings	148	177
Cast iron pipe and fittings	40	46
Other products	369	360
Total	557	583

 $^{1/\,\}mathrm{Data}$ 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	2000	2001
Semifinished	312,000	279,000
Plate	74,200	47,000
Sheet and strip	55,500	43,200
Bars and shapes	126,000	95,800
Wire and wire rods	102,000	83,000
Pipe and tube	87,700	84,200
Total	757,000	632,000

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

Source: American Iron and Steel Institute.

 ${\bf TABLE~8} \\ {\bf U.S.~SHIPMENTS~OF~IRON~AND~STEEL~CASTINGS~1/}$

(Thousand metric tons)

	2000	2001
Ductile iron castings	4,170 r/	3,770
Gray iron castings	5,090 r/	4,370
Malleable iron castings	169	122
Steel castings	881 r/	706
Steel investment castings	79 r/	64
Total	10,400 r/	9,030

r/ Revised.

Source: U.S. Census Bureau.

 $\label{eq:table 9} \text{COAL AND COKE AT COKE PLANTS 1/ 2/}$

(Thousand metric tons)

	2000	2001
Coal, consumption	26,600	23,700
Coke: 3/		
Production	19,100	17,200
Exports	1,040	970
Imports	3,430	2,120
Consumption, apparent	21,300	18,400

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

Source: Energy Information Administration, Quarterly Coal Report, DOE/EIA-0121 (2001/4Q).

TABLE 10 PIG IRON AND DIRECT-REDUCED IRON: WORLD PRODUCTION, BY COUNTRY 1/ 2/ 3/ 4/ $^{\prime}$

(Thousand metric tons)

1997	1998	1999	2000	2001
10	10	10	10	10
700	700	500	400 r/e/	400 e/
2,080	2,122	1,985	2,188	1,910 e/
1,496	1,538	989	1,420	1,280 e/
7,884	7,724	7,468	7,000 e/	7,200 e/
3,965	4,022	3,913	4,318	4,300
8,077	8,730	8,472	8,472	8,500
100	100	100	100	100
25,336 r/	25,447 r/	24,949 r/	28,135 r/	27,781
323	336	400	418	400 e/
1,644	1,389	1,130	1,220	1,200
6/	1,500	2	2	2
40 6/	40	40 e/	40	40
8,670	8,937	8,783	8,904	8,900 e/
1,390	1,240	920	1,130	1,100 e/
941	993	1,030 r/	1,024 r/	927
115,110	118,600	125,390	131,010	145,410
324 r/	256 r/	264	272 r/	318
5,195	4,982	4,022	4,621	4,500
	10 700 2,080 1,496 7,884 3,965 8,077 100 25,336 r/ 323 1,644 6/ 40 6/ 8,670 1,390 941 115,110 324 r/	10 10 700 700 2,080 2,122 1,496 1,538 7,884 7,724 3,965 4,022 8,077 8,730 100 100 25,336 r/ 25,447 r/ 323 336 1,644 1,389 6/ 1,500 40 6/ 40 8,670 8,937 1,390 1,240 941 993 115,110 118,600 324 r/ 256 r/	10 10 10 10 10 700 500 2,080 2,122 1,985 1,496 1,538 989 7,884 7,724 7,468 3,965 4,022 3,913 8,077 8,730 8,472 100 100 100 25,336 r/ 25,447 r/ 24,949 r/ 323 336 400 1,644 1,389 1,130 6/ 1,500 2 40 6/ 40 40 e/ 8,670 8,937 8,783 1,390 1,240 920 941 993 1,030 r/ 115,110 118,600 125,390 324 r/ 256 r/ 264	10 10 10 10 10 10 10 10 700 700 500 400 r/e/ 2,080 2,122 1,985 2,188 1,496 1,538 989 1,420 7,884 7,724 7,468 7,000 e/ 3,965 4,022 3,913 4,318 8,077 8,730 8,472 8,472 100 100 100 100 100 25,336 r/ 25,447 r/ 24,949 r/ 28,135 r/ 323 336 400 418 1,644 1,389 1,130 1,220 6/ 1,500 2 2 2 40 6/ 40 40 e/ 40 e/ 40 8,670 8,937 8,783 8,904 1,390 1,390 1,240 920 1,130 941 993 1,030 r/ 1,024 r/ 115,110 118,600 125,390 131,010 324 r/ 256 r/ 264 272 r/

 $^{1/\,\}text{Data}$ are rounded to no more than three significant digits; may not add to totals shown.

^{2/} Includes furnace and merchant coke plants.

^{3/} Coke production and consumption do not include breeze.

TABLE 10--Continued PIG IRON AND DIRECT-REDUCED IRON: WORLD PRODUCTION, BY COUNTRY 1/ 2/ 3/ 4/ $^{\prime}$

(Thousand metric tons)

Country 5/	1997	1998	1999	2000	2001
Egypt:	1 000	1 224 6/	700	700	700
Pig iron e/ Direct-reduced iron	1,000	1,334 6/ 1,610	1,670		
Finland	1,190 r/ 2,786	1,610 2,912 r/	1,670 2,954 r/	1,530 2,983	2,370 2,900
France	13,424	13,603	13,854	13,621	13,600
Germany:	13,424	13,003	13,634	13,021	13,000
Pig iron	30,939	30,162	27,931	30,846	30,000
Direct-reduced iron	470	450	400	400 e/	400
Hungary	1,141	1,258	1,309	1,340	1,300
India:	1,111	1,230	1,507	1,5 10	1,500
Pig iron	19,898	20,194	20,139	21,321	21,900
Direct-reduced iron	5,250	5,260	5,220	5,440	5,590
Indonesia, direct-reduced iron e/	1,600	1,640 r/	1,740 r/	1,820 r/	1,480
Iran:	,	,	,	,	,
Pig iron	2,053	2,087	2,147	2,202	2,200 e
Direct-reduced iron	4,380	3,690	4,120	4,740	5,000 e
Italy	11,348	10,704	10,509	11,223	11,000
Japan	78,519	74,981	74,520	81,071	78,836
Kazakhstan	3,040	2,594	3,438	4,000	3,911
Korea, North e/	500	250	250	250	250
Korea, Republic of	22,712	23,229	23,329	24,937	25,898
Libya, direct-reduced iron	990	1,010	1,330	1,500 e/	1,090
Luxembourg 8/	437				
Malaysia, direct-reduced iron e/	1,720	1,000 r/	1,000	1,260 r/	1,300
Mexico:					
Pig iron	4,450	4,532	4,808	4,856	4,500 e
Direct-reduced iron	4,440	5,584	6,070	5,589	4,500 e
Morocco e/	15	15	15	15	15
Netherlands 8/	5,804	5,561	5,320	4,969	5,000
New Zealand	534	609	620	600 e/	600 e
Norway e/	70	70	60	60	60
Pakistan e/	1,400	1,500	1,500	1,500	1,500
Paraguay	79	66 r/	61	82	72
Peru:					
Pig iron	264	283	197 r/	363 r/	333 e
Direct-reduced iron	120	110	50	80	80 e
Poland	7,296	6,128	6,128	6,492	6,500
Portugal	431	365	389	382	400
Qatar, direct-reduced iron	570	706	670	620	730
Romania	4,557	4,541	2,969	3,069 r/	3,000
Russia:	27 227	24.927	40.054	44.610	44.000
Pig iron Direct-reduced iron	37,327	34,827	40,854 1,880	44,618	44,980
Saudi Arabia, direct-reduced iron	1,730 e/ 2,110	1,550	2,343	2,000 r/ 3,090	1,900 2,880
	907	2,268 826	135	563	461
Serbia and Montenegro Slovakia	3,072	2,756	2,987	3,000 e/	3,000
South Africa:	3,072	2,730	2,967	3,000 6/	3,000
Pig iron	6,192	5,650	4,587	6,300 r/	5,800
Direct-reduced iron	1,120	1,070	1,260	1,530	1,560
Spain	3,926	4,278	4,146	4,059	4,000
Sweden	3,060	3,373	3,212	3,146	3,600
Switzerland e/	100	100	100	100	100
Taiwan	8,870	9,374	9,020	10,927	14,384
Trinidad and Tobago, direct-reduced iron	1,140	1,073	1,379	1,488 r/	2,197
Tunisia	153	123	178	196 r/	2,177 200 e
Γurkey	577	456	315	300	300 e
Ukraine	20,561	20,840	21,937	25,700	26,400
United Kingdom	13,057	12,574	12,399	10,891	9,900
United States:	-,/	·,-··	·)-	-,	-,,,,,,,,
Pig iron	49,600	48,200	46,300	47,900	42,100
Direct-reduced iron					,
Direct-reduced from			1,670	1,560	1.200
Venezuela, direct-reduced iron	510 5,608	1,600 5,424	1,670 5,071	1,560 6,401 r/	1,200 5,473

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

(Thousand metric tons)

Country 5/	1997	1998	1999	2000	2001
Grand total	577,000 r/	572,000	576,000	615,000 r/	622,000
Of which:					
Pig iron	540,000	535,000 r/	538,000	572,000 r/	581,000
Direct-reduced iron	36,200	37,200 r/	38,200 r/	42,100 r/	40,600

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

- 1/W 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 2, 2002.
- 5/ In addition to the countries listed, Vietnam has facilities to produce pig iron and may have produced limited quantities during 1997-2001, 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.

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

(Thousand metric tons)

Country 4/	1997	1998	1999	2000	2001
Albania e/	20	15	15	5 r/	5
Algeria	427	400 e/	758 r/	842 r/	700 e/
Angola e/	9	9	9	9	9
Argentina	4,169	4,216	3,805	4,479 r/	4,107
Australia	8,769	8,798	8,158	7,812	7,600
Austria	5,196	5,298	5,213	5,725	5,800
Azerbaijan	25	8 r/e/	r/ 5/	r/ 5/	5/
Bangladesh e/ 6/	36	35	36	35	35
Belarus	1,220	1,412 r/	1,449 r/	1,623 r/	1,500
Belgium	10,738	11,427	10,972	11,637	12,000
Bosnia and Herzegovina e/	50 r/	50 r/	60 r/	77 r/	100
Brazil 7/	26,153	25,760	24,570 r/	27,300 r/	27,500 e/
Bulgaria	2,628	2,216	1,889 r/	2,017 r/	2,000
Burma e/	8/	24	24	24	24
Canada	15,554	15,930	16,300	16,500 e/	16,500 e/
Chile 7/	1,167	1,171	1,291	1,352	1,247
China 9/	108,940	115,590	124,260	128,500 r/	148,930
Colombia	734	636	534	660	637
Croatia	69	105	77	71 r/	58
Cuba	342	283	303	336	282
Czech Republic	6,495	6,498	5,613	6,216 r/	6,000
Denmark	787	790	748	783	790 e/
Dominican Republic	82	36	43	39 r/	
Ecuador	44	46	53	58 r/	61
Egypt	2,717	2,870	2,619	2,820 e/	2,800 e/
El Salvador	45	43	34	41	39
Finland	3,687	3,932	3,956	4,096	4,100 e/
France	19,773	20,126	20,211	20,980	20,000
Georgia	104	50 e/	70 r/	50 r/	50
Germany	45,009	44,046	42,056	46,376	46,000
Greece	1,016	1,109	951	1,056	1,000
Guatemala	146 r/	28 r/	80 r/	166 r/	192
Hong Kong e/	350	350	450	500	500
Hungary	1,829	1,821	1,813	1,871	1,900
India	23,748	23,480	24,269	26,924	27,300
Indonesia e/	3,800	2,700	2,890	3,010	3,000
Iran	6,322	5,608	6,277 r/	6,600	6,900 e/
Iraq e/	200	200	200	50 r/	50
Ireland	337	358	335	375	100
Israel	270 r/	280 r/	280 e/	270 r/e/	220 e/
Italy	25,537	25,798	24,964	26,544	26,000

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

(Thousand metric tons)

Country 4/	1997	1998	1999	2000	2001
Japan	104,545	93,548	94,192	106,444	102,866
Jordan e/	30 r/	30 r/	30 r/	30 r/	30
Kazakhstan	3,900	3,089	4,116	4,770	4,694
Kenya	33 e/	25 e/	r/	r/	
Korea, North e/	1,000	1,000	1,000	1,000	1,000
Korea, Republic of	42,554	39,896	41,042	43,107	43,852
Latvia	465	469	484	500	510 e/
Libya	897	925	945	1,055	1,100 e/
Luxembourg	2,580	2,592	2,477	2,571	2,500
Macedonia	50 r/	49 r/	49 r/	50 r/	50
Malaysia	2,962	1,921	2,200	2,430	2,500 e/
Mexico	14,218	14,182	15,243	15,586 r/	13,292
Moldova	810	718	796	909 r/	966
Morocco e/	5	5	5	5	5
Netherlands	6,640	6,379	6,075	5,667	6,000
New Zealand	680	756	744	765	770 e/
Nigeria e/		2			
Norway	570	644	611	620	630 e/
Pakistan	— 479	494	500 e/	500 e/	500 e/
Paraguay	66	56	56	77	67
Peru	607	631	559	749	750 e/
Philippines	950	880	530	530 e/	530 e/
Poland	11,585	9,915	8,853	10,498	11,000
Portugal	905	854	1,044	1,060	1,000
Qatar	616	646	629	729	730 e/
Romania	6,674	6,335	4,392	4,770	4,500
Russia	48,499	43,822	51,524	59,098	59,000
Saudi Arabia	2,539	2,356	2,610	2,973	2,700 e/
Serbia and Montenegro	979	949	226	682	598
Singapore e/	500	500	500	500	400
Slovakia	3,835	3,428	3,569	3,733 r/	3,500
Slovenia	373	405	405	519 r/	500
South Africa	8,311	7,506	6,830	8,481 r/	8,821
Spain	13,644	14,827	14,886	15,920	15,000
Sri Lanka e/	30	30	30	30	30
Sweden		5,062	5,075	5,227	5,300 e/
Switzerland	1,047	1,018	1,037	1,140	1,000
Syria e/		70	70	70	70
Taiwan	15,478	17,192	16,027	17,302	17,336
Thailand	2,101	1,814	1,547	2,100	2,100 e/
Trinidad and Tobago	736	777	729	2,100 741	668
Tunisia Tunisia		171	229	237	240 e/
Turkey	13,664	13,351	14,309	14,325	14,900 e/
Uganda e/	7 r/	7 r/	8 r/	7 8/	7
Ukraine	25,600	23,461	27,390	31,780	33,110
United Kingdom	18,528	17,066	16,634	15,022	15,000
United States	98,465	98,638	97,407	102,200	90,084
Uruguay		52	45	38	31
Uzbekistan	365	344	343 e/	420	460
Venezuela	3,987	3,553	3,261	3,835	3,814
Vietnam	314	306	308	306	310 e/
Zimbabwe e/	214	220 r/	255	258 r/	156
Total	797,000	777,000 r/	789,000	849,000 r/	851,000

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 2, 2002.

^{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/} Production appears to have sharply curtailed or to have ceased.

^{6/} Data for year ending June 30 of that stated.

^{7/} Excludes castings.

^{8/} Reported figure.

^{9/} Figures reported by State Statistical Bureau that Chinese Government considers as official statistical data.