IRON ORE

By William S. Kirk

Iron ore is essential to the economy and national security of the United States. As the basic raw material from which iron and steel is made, its supply is critical to any industrial country. Scrap is used as a supplement in steelmaking, but is limited as a major feed material because there is a limited quantity of high-quality scrap.

It was a good year for the domestic iron ore industry although consumption rose only slightly. Production and shipments also rose from 1993 levels. The increases were attributed to a 2.8% increase in crude steel production. Australia and Brazil continued to be the leading exporters of iron ore with a combined total of close to 60% of the world total.

Production

U.S. production data for iron ore are developed by the U.S. Bureau of Mines from two separate, voluntary surveys of domestic operations. The annual "Iron Ore" survey (1066-A) provides the basic data used in this report. Of 27 addressees to whom the 1066-A form was sent, 8 were inactive. The 19 others represent 100% of total production shown in tables 1 through 4. In past years, production for nonrespondents to the annual survey was estimated from monthly surveys (1066-M), from railroad reports, or from reported production levels in prior years. This information may be supplemented by employment data, mine inspection reports, and information from consumers. The American Iron Ore Association (AIOA) provided data on ore shipments from loading docks on the upper Great Lakes as well as receipts at transfer docks and furnace yards nationwide. The dock and steel plant data were compiled jointly by AIOA and the American Iron and Steel Institute (AISI).

Strikes closed four mines in Minnesota and Michigan in 1993. One of them, National Steel Pellet Co. (NPSC), remained closed though much of 1994. After being closed for nearly a year and following lengthy negotiations, National opened on August 29. Many of the company's conditions for reopening the plant centered on the reduction of production costs. Although the labor contract at Eveleth Mines expired simultaneously with those of the other producers, August 1, 1993, its workers stayed on the job, working under the terms of the expired contract. Eveleth workers, by a 517-46 vote, ratified a labor contract on February 1, 1994, retroactive to early January.

Although iron ore was produced by 16 companies, 9 of them accounted for 98.8% of all domestic production. The 16 companies operated 16 mining operations, 10 concentration plants, and 10 pelletizing plants. Of the 16 mining operations, 15 were open pit and 1 was an underground operation. Virtually all ore was concentrated before shipment, and 98.6% was pelletized.

Combined United States and Canadian production represented about 9.5% of the world output of usable ore in 1994. At least 50 countries mined crude ore during the year. The leading producer was Brazil, which accounted for 24.4% of world output in terms of metal content, followed by Australia with 18.1%. Trends in world mine production since 1990 are shown on a country basis in table 17.

Domestic iron ore production, at 58.4 million metric tons (Mmt), was 4.9% higher than that of the previous year. Productivity for usable ore in the Lake Superior District improved as usual. Eleven mines produced ore for the iron and steel industry, while the remainder shipped ore mainly to cement plants. An average of 3.3 mt of crude ore was mined in 1994 for each mt of usable ore produced. This does not include the quantity of waste rock or overburden removed. When the quantity of crude ore is added to that of overburden and waste rock, the ratio of total materials moved to usable ore produced was 5.6:1. Low-grade ores of the taconite type mined in Michigan and Minnesota accounted for 99.7% of total crude ore production. U.S. production of pellets totaled 57.5 Mmt. The average iron content of usable ore produced was 63.0%.

Michigan.—Michigan accounted for 23.8% of the national output of usable ore in 1994. All of the State's production was from the Empire and Tilden Mines near Ishpeming in Marquette County and nearly all was pelletized. Both mining ventures are managed by Cleveland Cliffs Inc.'s (Cliffs) Cleveland-Cliffs Iron subsidiary.

Cliffs increased its ownership interest, effective January 1, in the Tilden Magnetite Partnership from 33.3% to 40%. This was part of a restructuring and simplification of the operating agreement covering the Tilden Mine near Ishpeming, MI. The interests of the other two partners were reduced, with Algoma Steel Inc. changing from 50% to 45% and Stelco Inc. from 16.7% to 15%. In the new agreement, tonnage entitlements and cost-sharing were based on a 6.1-million-metric-ton-per-year (Mmt/a) target normal production level replacing the former 4 Mmt/a.

Minnesota.—Minnesota produced 75.4% of the national output of usable ore in 1994. All of the State's production came from open pit mines on the Mesabi Range. Production of pellets totaled 43.8 Mmt.

Cyprus Amax Minerals Co. sold its iron ore operation, Cyprus Northshore Mining Corp., to Cleveland-Cliffs Inc. on September 30. Specifically, Cliffs Minnesota Minerals Co., a subsidiary of Cliffs, purchased Cyprus Northshore Mining Corp. and Cyprus Silver Bay Power Corp. The mining operation was renamed Northshore Mining Co., and its power subsidiary was renamed Silver Bay Power Co. The principal assets acquired were 4.0 million tons per year (mt/a) of active iron ore pellet capacity supported by 6.0 mt/a of concentrate capacity, a 115-megawatt power generation plant, all at the E. W. Davis pelletizing plant near Silver Bay, MN, and leases on an estimated 1.2 billion tons of reserves, at the Peter Mitchell Mine, near Babbitt, MN, on the eastern Mesabi Iron Range.

Eveleth Mines reopened one of its two pellet production lines. The number one line, which last operated in 1990, resumed operations on or about May 23d. The line had a production capacity of 2 Mmt/a; the other has a capacity of 4 Mmt/a.

Auburn Minerals LLC reopened the Auburn Mine, north of Eveleth, MN, and made its first ore shipment on August 9th. Auburn Minerals was a joint venture between Premier Aggregates Inc., of Virginia, MN, and Edward Kraemer & Sons Inc., of Plain, WI.

Missouri.—The Pea Ridge Iron Ore Co. produced iron oxide powder at its mining complex near Sullivan, MO. The company has the only active underground iron mine in the country. In January 1991, the company ceased pellet production and began concentrating on specialty iron oxide products, which had

formerly been coproducts.

Consumption

Data on consumption and stocks of iron ore and agglomerates at iron and steel plants were provided by the AIOA. Data on consumption of iron ore for nonsteel end uses were compiled from information gathered from other Bureau surveys. Virtually all iron ore (>98%) is consumed by the steel industry.

Iron ore consumption in 1994 rose by less than 1%. Demand failed to match increases in the apparent supply and net shipments of steel mill products because the source of material for much of the increases was imports of semifinished steel. The apparent supply of steel mill products rose 17.3%, while net shipments rose 9.1%. Net imports of semifinished steel were 9.1% greater than in 1993. Crude steel production, on the other hand, rose by only 2.8% and pig iron production, the most direct indicator of iron ore consumption, grew by only 2.5%.

Consumption of iron ore for ironmaking and steelmaking totaled 71.5 Mmt compared with 69.9 in 1993. Monthly consumption of pellets, direct-shipping ore, and merchant sinter by the industry averaged 5.96 Mmt.

U.S. production of hot metal and pig iron totaled 49.4 Mmt, a 2.5% increase from that of 1993. During 1994, the number of blast furnaces in operation ranged from 40 to 42.

Consumption of iron ore and all types of agglomerates reported to the AISI by integrated producers of iron and steel totaled 75.2 Mmt. This included 61.2 Mmt of pellets; 1.2 Mmt of sinter, briquettes, etc.; and 1.8 Mmt of natural coarse ore. Of the primary ore consumed, 79% was of domestic origin, 10% came from Canada, and 11% came from other countries. Other materials consumed in sintering plants included mill scale, flue dust, limestone and dolomite, slag and slag scrap, and coke breeze. Other iron-bearing materials charged to blast furnaces included steel-furnace slag, mill scale, and slag scrap.

The U.S. steel industry accounted for 98.7% of domestic iron ore consumption in 1994.

Prices

Most iron ore prices are negotiated between buyer and seller. About 80% of domestic ore is produced by captive mines (mines producing for company smelters) and therefore does not reach the open market. The average f.o.b. mine value of usable ore shipped in 1994 was $27.44 per ton, slightly higher than that of 1994. This average value was based primarily on producers' statements and should approximate the average commercial selling price less the cost of mine-to-market transportation.

Foreign Trade

U.S. exports of iron ore were 1.7% lower than those of 1993. Virtually all exports consisted of pellets and concentrates shipped via the Great Lakes to Canadian steel companies that are partners in U.S. taconite projects in Michigan and Minnesota. U.S. imports of iron ore rose 24.0% to 17.5 Mmt.

Net imports averaged 11.2 Mmt from 1989 through 1994, 1994 net imports were 12.5 Mmt, equivalent to 14.5% of U.S. ore consumption, up from 14.1% in 1993. Canada's share of imports was 57.7%; Brazil's was 20.7%.

World Review

At least 50 countries mined iron ore during the year, producing a total of 995 Mmt.

Australia was the leading exporter of iron ore, shipping 126.2 Mmt to world markets, followed closely by Brazil, which exported 125.0 Mmt. Together, the two countries accounted for 59.3% of exports in 1994. The next largest exporter was Canada, at 8.1%. Total exports were 422.5 Mmt, up from 397.2 Mmt in 1993. Australia's principal customer, Japan, accounted for about 45.4% of its exports with Asia as a whole accounting for 80.2%. Brazil's primary export customers were Western Europe (43.1%) and Asia (40.9%).

Australia.—The country continued to be the world's leading exporter of ore in 1994.

Hamersley Iron Pty. Ltd. opened its Marandoo Mine in October. The US$295 million mine in the central Pilbara region of Western Australia was expected to produce 8 Mmt of ore in 1995 and reach full capacity of 12 Mmt in 1996. The mine was linked by a 55-kilometer (34-mile) spur to Hamersley's main railway line to the coastal port of Dampier. Reserves reportedly were estimated at 370 Mmt with an iron content of 62.3%. Production was to be a mix of lump ore and fines with the ore being railed to Dampier for blending with ores from Hamersley's other operations.

Brazil.—Cia. Vale do Rio Doce (CVRD) completed a $25 million expansion of its Ponta de Madeira port in Maranhao State, increasing the shipping capacity from 35 to 50 Mmt/a of iron ore. The expansion enabled the port, which serves the Carajas Mine, to accommodate two large vessels at once.

Mineracoes Brasileiras Reunidas S.A. (MBR) MBR, the country's second largest iron ore producer after CVRD, inaugurated the expansion of its Pico do Itabirita Mine. The $240 million expansion increased the capacity of the mine in Minas Gerais State from 3.5 to 11 Mmt/a and increased MBR's total iron ore production capacity to 30 Mmt/a.

CVRD expanded its Ponta de Madeira port at Sao Luis by adding a second loading pier. This increased the loading capacity at the port from 35 to 50 Mmt/a.

S.A. Mineracao da Trindade (Samitri) completed an $80 million upgrade that enabled it to offer a new range of products and increase its production capacity. The main addition was a new concentrator in the State of Minas Gerais that allowed Samitri to pump as much as 1.4 Mmt/a of pellet feed into the slurry pipe of its subsidiary Samarco Minerales SA. This new tonnage was largely responsible for the rise in Samarco's capacity to 9.6 Mmt/a. The new concentrator also allowed the company to offer a new product to the direct reduced iron (DRI) market with an iron content of 68.1%. Much of the expansion work was done at the Corrego de Meio Mine, which was reopened in 1992. The 1.2 Mmt/a production from Corrego de Meio was used mainly for blending into Samitri's two new sinter feeds, one from the Morro Agudo Mine and the other from Algeria.

China.—Taiyuan Iron & Steel Co. opened a new iron mine. The Jianshan Mine, about 100 kilometers (km) (60 miles) west of Taiyuan, was expected to produce 4 Mmt/a of ore. Reserves were estimated at 158 Mmt.

Iran.—The National Iranian Steel Co. (Nisco) awarded a $100 million contract to a consortium of European firms to double the size of its Chogart Mine. The mine was producing 3 Mmt/a of lump ore grading about 56% iron. A new concentrator being installed at the mine was expected to produce 3.2 Mmt/a of concentrates grading 65% iron. A new mine, the Se Chahun, was being developed about 30 km (19 miles) away. After the concentrator was ready, ore from the new mine was to be railed to Chogart for processing. Reserves at Chogart were estimated at 70 Mmt of high-grade ore while Se Chahun reportedly had estimated reserves of 100 Mmt of medium-grade ore. The opening of the 5 Mmt/a Chador Malu Mine, which was expected in 1995, was delayed to 1997.

Mauritania.—Societe Nationale Industrielle et Miniere (SNIM) opened the M'Haoudat iron mine in northeast Mauritania.

Mexico.—Grupo Acero del Norte (GAN) reopened its Cerro de Mercado Mine in Durango after an 8-year shutdown. The company was expecting a production rate of 5,000 metric tons of iron ore per day.

Sweden.—Luossavaara Kiirunavaara AB (LKAB) was in the early stages of implementing a massive project to expand and

upgrade its Kiruna operation. Of the $550 million that LKAB was investing in its iron ore facilities, $500 million had been or was to be spent at Kiruna alone. These investments were intended to provide the state-owned mine with more production capacity and extend its life.

A major portion of the investments was for deepening the mine to construct a new main haulage level that was to extend the life of the mine a further 20 years by providing access to an additional 300 Mmt of ore. The company also was investing in a new concentrator for pellet feed production and a new pelletizing plant.

Ukraine.—The Poltkij GOK combine bought a new crusher/conveyor system to increase the production capacity of its Komsomolsk Mine from 18 to 24 Mmt/a. The equipment was expected to be commissioned in the fall of 1995.

Venezuela.—CVG Ferrominera del Orinoco CA (Ferrominera) started its new 3.3 Mmt/a pellet plant at Puerto Ordaz.

Technology

LTV Steel Mining Co., Hoyt Lakes, MN, began operating a new $5.6 million super pocket in May. Pockets, devices used to transfer crude ore from haulage trucks to train cars, were an integral part of LTV's system of moving crude ore from its pits to its processing plant. The super pocket improved productivity by reducing the amount of time required for haulage trucks to dump their ore and to load the trains.

Outlook

At present consumption rates, known world iron reserves are sufficient to meet world demand well beyond the 21st century.

The domestic iron ore industry is totally dependent on the steel industry for sales. This dependence is not expected to change in the near future. Because of this relationship, the reader is referred to the outlook section in the "Iron and Steel" chapter. It is difficult for the United States to compete elsewhere in the world iron ore market because of the country's declining ore grades, the inland location of its mines, and high labor and energy costs. Only 8.1% of the iron ore produced from 1989 through 1994 was exported, with virtually all of it being pellets going to steelworks in Ontario.

For the near term, growth of the U.S. iron ore industry is tied to the growth of the integrated steelworks along the Great Lakes. The hope for the domestic iron ore industry is that one or more of the new direct processes will prove to be economic for lake producers. If this occurs, the domestic industry can supply the rapidly expanding mini-mill sector of the steel industry. Electric arc furnaces currently account for more than one-third of total crude steel production. Because of advances in steelmaking, steel products now require lower residual alloy content than can be readily achieved with scrap. This indicates a role for imported DRI in the coastal regions of the United States. The growth of gas-based DRI production capacity outside North America has been spectacular in recent years. Although a large part of this growth has occurred in Venezuela, the bulk of the construction has been spread evenly through a variety of countries that have surplus natural gas. It is too early to tell whether coal-based DRI production will be economically feasible in the United States. No matter how spectacular DRI growth is over the next decade, it will not be able to replace more than a fraction of the world's blast furnace production because of technological restrictions. The blast furnace is expected to remain the mainstay of the iron and steel industries in most developed countries over the next 25 years.

Since 1983, five areas or countries (China, Europe, the Former Soviet Union (FSU), Japan, and North America) have accounted for more than 80% of the world's pig iron production. In three of these (Europe, Japan and North America) pig iron production has remained virtually constant. In recent years, production has fallen considerably in the FSU and risen dramatically in China. Production also has increased substantially in other parts of asia, particularly Asia, India, Korea, and Taiwan. Even including Japan, Asia's share of world pig iron production rose from 29.9% in 1983 to 43.5% in 1994. This trend is expected to continue.

The increase in consumption in Asia is expected to benefit Australia, primarily. Australia and Brazil are the two leading exporters of iron ore; each accounts for about 30% of the world total, while the next closest exporter accounts for less than 10% of the world total. Of the two, Australia appears to be better positioned to take advantage of growth of iron ore consumption in Asia because of Australia's proximity and the consequent lower freight rates.

There was a trend in the international market away from sintering of iron ore toward pelletization. This was driven, in large part, by environmental considerations.

OTHER SOURCES OF INFORMATION

U.S. Bureau of Mines Publications

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Other Sources

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- Intergovernmental Group of Experts on Iron Ore.
- Trust Fund Project on Iron Ore Information.

U.S. Department of Energy, Energy Information Administration.

U.S. Department of Labor, Mine Safety and Health Administration.

U.S. Department of State, unclassified dispatches.

TABLE 1
SALIENT IRON ORE STATISTICS 1/

(Thousand metric tons and thousand dollars unless otherwise specified)

	1990	1991	1992	1993	1994
United States:					
Iron ore (usable, 2/ less than 5% manganese):					
Production	56,400	56,800	55,600	55,700	58,400
Shipments	57,000	56,800	55,600	56,300	57,600
Value	$1,570,000 r/	$1,530,000 r/	$1,550,000 r/	$1,510,000 r/	$1,580,000
Average value at mines, dollars per ton	$27.52 r/	$26.91 r/	$27.81 r/	$26.87 r/	$27.44
Exports	3,200	4,050	5,060	5,060	4,980
Value	$124,000	$156,000	$187,000	$167,000	$163,000
Imports for consumption	18,100	13,300	12,500	14,100	17,500
Value	$560,000	$437,000	$396,000	$419,000 r/	$499,000
Consumption (iron ore and agglomerates)	76,900	66,400	75,100	76,800	76,900
Stocks, Dec. 31:					
At mines, plants and loading docks 3/	4,800	4,850	3,780	2,500	2,750
At receiving docks 4/	2,270	2,980	2,980	2,290	2,230
At consuming plants	15,900	17,600	16,100	16,500	16,300
Total 5/	23,000	25,400	22,900	21,300	21,300
World: Production	983,000 r/	956,000	949,000 r/	983,000 r/	995,000 e/

e/ Estimated. r/ Revised.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Direct-shipping ore, concentrates, agglomerates, and byproduct ore.

3/ Excludes byproduct ore.

4/ Transfer and/or receiving docks of Lower Lake ports.

5/ Sum of stocks at mines, consuming plants, and U.S. docks.

TABLE 2
EMPLOYMENT AT IRON ORE MINES AND BENEFICIATING PLANTS, QUANTITY AND TENOR OF ORE PRODUCED, AND AVERAGE OUTPUT PER WORKER-HOUR IN THE UNITED STATES IN 1994, BY DISTRICT AND STATE 1/

District and State	Average number of employees	Worker-hours (thousands)	Production (thousand metric tons)				Average per worker-hour (metric tons)		
			Crude ore	Usable ore	Iron contained (in usable ore)	Iron content, natural (percent)	Crude ore	Usable ore	Iron contained
Lake Superior:									
Michigan	2,050	4,180	43,300	13,900	8,620	62.1	10.35	3.32	2.06
Minnesota	5,020	10,500	148,000	44,000	27,800	63.3	14.01	4.18	2.64
Total or average	7,070	14,700	191,000	57,900	36,500	63.0	12.97	3.93	2.48
Other States 2/	137	258	553	480	296	61.6	2.14	1.86	1.14
Grand total or average	7,200	15,000	192,000	58,400	36,800	63.0	12.79	3.90	2.45

1/ Data rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Includes California, Missouri, New Mexico, South Dakota, Texas, and Utah.

TABLE 3
CRUDE IRON ORE 1/ MINED IN THE UNITED STATES IN 1994,
BY DISTRICT, STATE, AND MINING METHOD 2/

(Thousand metric tons unless otherwise specified and exclusive of ore containing 5% or more manganese)

District and State	Number of mines	Open pit	Underground	Total quantity
Lake Superior:				
Michigan	2	43,300	--	43,300
Minnesota	9	148,000	--	148,000
Total	11	191,000	--	191,000
Other States:				
Missouri	1	--	545	545
Other 3/	7	183	--	183
Total	8	183	545	729
Grand total	19	191,000	545	192,000

1/ Excludes byproduct ore.
2/ Data rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
3/ Includes California, New Mexico, South Dakota, Texas, and Utah.

TABLE 4
USABLE IRON ORE PRODUCED IN THE UNITED STATES IN 1994, BY DISTRICT,
STATE, AND TYPE OF PRODUCT 1/

(Thousand metric tons and exclusive of ore containing 5% or more manganese)

District and State	Direct shipping ore	Concentrates	Agglomerates 2/	Total quantity
Lake Superior:				
Michigan	114	--	13,800	13,900
Minnesota	231	34	43,800	44,000
Total	345	34	57,500	57,900
Other States:				
Missouri	--	232	13	245
Other 3/	235	--	--	235
Total	235	232	13	480
Grand total	580	265	57,500	58,400

1/ Data rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
2/ Data may include pellet chips and screenings.
3/ Includes California, New Mexico, South Dakota, Texas, and Utah.

TABLE 5
SHIPMENTS OF USABLE IRON ORE 1/ FROM MINES IN THE UNITED STATES IN 1994 2/

(Exclusive of ore containing 5% or more manganese)

District and State	Gross weight of ore shipped (Thousand metric tons)				Average iron content, natural (percent)	Value (thousands)
	Direct shipping ore	Concentrates	Agglomerates	Total		
Lake Superior:						
Michigan	--	172	13,600	13,800	62.1	W
Minnesota	323	28	43,000	43,300	63.3	$1,160,000
Total reportable or average	323	200	56,500	57,100	63.0	1,160,000
Other States:						
Missouri	--	304	12	316	70.9	W
Other 3/	237	--	--	237	51.9	4,520
Total reportable or average 3/	237	304	12	553	64.7	4,520
Total withheld	--	--	--	--	--	419,000
Grand total or average	560	503	56,600	57,600	63.0	1,580,000

W Withheld to avoid disclosing company proprietary data; included in "Total withheld."
1/ Includes byproduct ore.
2/ Data rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
3/ Includes California, New Mexico, South Dakota, Texas, and Utah.

TABLE 6
CONSUMPTION OF IRON ORE 1/ AT U.S. IRON AND STEEL PLANTS 2/

(Thousand metric tons)

Year	Iron ore originating areas					
	U.S. ores		Canadian ores			
	Great Lakes	Other U.S.	Great Lakes	Other Canada	Foreign ores	Total
1993	54,900	515	--	6,180	8,310	69,900
1994	56,100	163	888	6,510	7,820	71,500

1/ Excludes dust, mill scale, and other revert iron-bearing materials added to sinter.
2/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

Source: American Iron Ore Association.

TABLE 7
CONSUMPTION OF IRON ORE AND AGGLOMERATES AT U.S. IRON AND STEEL PLANTS, BY TYPE OF PRODUCT 1/

(Thousand metric tons)

Type of product	1993	1994
Blast furnaces:		
Direct-shipping ore	1,960	1,820
Pellets	60,700	61,100
Sinter 2/	12,500	12,100
Total	75,100	75,100
Steelmaking furnaces:		
Direct-shipping ore	11	20
Pellets	61	65
Sinter 2/	4	19
Total	76	104
Grand total	75,200	75,200

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
2/ Includes briquettes, nodules, and other.

Source: American Iron and Steel Institute.

TABLE 8
U.S. CONSUMPTION OF IRON ORE AND AGGLOMERATES, BY END USE 1/

(Thousand metric tons and exclusive of ore containing 5% ore more manganese)

Year	Blast furnaces	Steel furnaces	Sintering plants 2/	Miscella-neous 3/	Subtotal integrated iron and steel plants 4/	Direct-reduced iron for steelmaking 5/	Nonsteel end uses 6/	Total
1993	63,900	76	5,790	86	69,900	441	1,130	71,500
1994	65,500	80	5,770	103	71,500	716	958	73,200

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
2/ Excludes dust, mill scale, and other revert iron-bearing materials.
3/ Sold to nonreporting companies or used for purposes not listed.
4/ Data from American Iron Ore Association.
5/ U.S. Bureau of Mines estimates based on production reports compiled by Midrex Corp.
6/ Includes iron ore consumed in production of cement and iron ore shipped for use in manufacturing paint, ferrites, heavy media, cattle feed, refractory and weighing materials, and for use in lead smelting. Data from U.S. Bureau of Mines surveys.

TABLE 9
U.S. EXPORTS OF IRON ORE AND AGGLOMERATES,
BY COUNTRY OF DESTINATION 1/

(Thousand metric tons and thousand dollars)

Country	1993		1994	
	Quantity	Value	Quantity	Value
Canada	5,040	165,000	4,970	162,000
India	(2/)	5	(2/)	5
Mexico	3	228	2	199
Venezuela	(2/)	8	(2/)	48
Other	15	1,170	2	86
Total	5,060	167,000	4,980	163,000

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 10
U.S. EXPORTS OF IRON ORE AND AGGLOMERATES, BY TYPE OF PRODUCT 1/

Type of product	1993			1994		
	Quantity (thousand metric tons)	Value (thousand dollars)	Unit value 2/ (dollars per ton)	Quantity (thousand metric tons)	Value (thousand dollars)	Unit value 2/ (dollars per ton)
Concentrates	8	300	37.50 r/	15	488	32.53
Coarse ores	1	53	53.00 r/	2	54	27.00
Fine ores	7	284	40.57 r/	67	1,000	14.99
Pellets	5,030	165,000	32.81	4,890	161,000	32.90
Briquettes	--	--	--	(3/)	13	43.55
Other agglomerates	13	1,090	84.00 r/	1	119	119.00
Roasted pyrites	1	99	99.00 r/	3	250	83.33
Total	5,060	167,000	32.98 4/	4,980	163,000	32.70 4/

r/ Revised.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits, except prices; may not add to totals shown.
2/ Unit values shown are calculated from unrounded data.
3/ Less than 1/2 unit.
4/ Weighted average calculated from unrounded data by dividing total value by total tonnage.

Source: Bureau of the Census.

TABLE 11
U.S. IMPORTS OF IRON ORE AND AGGLOMERATES, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

Country	1993		1994	
	Quantity	Value	Quantity	Value
Australia	254	3,550	675	4,760
Brazil	2,870	63,000	3,610	74,900
Canada	7,440	243,000	10,100	318,000
Chile	68	1,240	134	2,480
Mauritania	206	3,750	124	2,100
Norway	2	69	16	663
Peru	1	57	(2/)	6
Sweden	60	1,970	45	1,430
Venezuela	3,170 r/	102,000 r/	2,780	94,200
Other	3	144	11	338
Total	14,100	419,000 r/	17,500	499,000

r/ Revised.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 12
U.S. IMPORTS OF IRON ORE AND AGGLOMERATES, BY TYPE OF PRODUCT 1/

Type of product	1993 Quantity (thousand metric tons)	1993 Value (thousand dollars)	1993 Unit value 2/ (dollars per ton)	1994 Quantity (thousand metric tons)	1994 Value (thousand dollars)	1994 Unit value 2/ (dollars per ton)
Concentrates	1,180	21,700	18.48	1,130	18,100	16.01
Coarse ores	134	3,740	27.90 r/	1,920	65,100	34.00
Fine ores	2,760	54,500	19.75	3,600	57,300	15.92
Pellets	9,790	333,000	34.00	9,880	331,000	33.46
Briquettes	--	--	--	114	8,310	72.90
Other agglomerates	213	6,260	29.40 r/	819	18,800	22.99
Roasted pyrites	3	150	50.00 r/	10	338	33.80
Total	14,100	419,000 r/	29.85 3/	17,500	499,000	28.54 3/

r/ Revised.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits, except prices; may not add to totals sho
2/ Unit values shown are calculated from unrounded data.
3/ Weighted average calculated from unrounded data by dividing total value by total tonnage.

Source: Bureau of the Census.

TABLE 13
U.S. IMPORTS OF IRON ORE AND AGGLOMERATES IN 1994,
BY COUNTRY AND TYPE OF PRODUCT 1/

(Thousand metric tons)

Country of origin	Concentrates	Coarse ores	Fine ores	Pellets	Other agglomerates	Roasted pyrites	Total
Australia	--	--	675	--	--	--	675
Brazil	218	412	2,620	263	98	--	3,610
Canada	912	241	65	8,330	525	(2/)	10,100
Chile	--	--	--	--	134	--	134
Mauritania	--	--	124	--	--	--	124
Sweden	--	--	--	--	45	--	45
Venezuela	--	1,260	117	1,290	114	--	2,780
Other	--	--	--	--	16	10	26
Total	1,130	1,920	3,600	9,880	933	10	17,500

1/ Data rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

TABLE 14
AVERAGE UNIT VALUE FOR SELECTED IMPORTS OF IRON ORE
AND AGGLOMERATES IN 1994

Type of product	Country of origin	Average unit value 1/ (dollars per metric ton gross weight)
Coarse ores	Venezuela	34.76
Fine ores	Brazil	17.41
Do.	Mauritania	16.95
Do.	Venezuela	26.04
Pellets	Brazil	34.50
Do.	Canada	33.91
Do.	Venezuela	30.29

1/ Weighted averages of individual Customs values.

Source: Bureau of the Census.

TABLE 15
U.S. IMPORTS OF IRON ORE AND AGGLOMERATES, BY CUSTOMS DISTRICT 1/

(Thousand metric tons and thousand dollars)

	1993		1994	
Customs district	Quantity	Value	Quantity	Value
Baltimore	3,200	87,400	4,480	106,000
Charleston	581	18,000	289	8,970
Chicago	2,010	41,300	2,290	46,300
Cleveland	603	17,400	1,040	33,600
Detroit	465	17,400	1,890	73,000
Houston-Galveston	38	968	38	1,140
Mobile	2,590	94,500	3,170	104,000
New Orleans	1,350 r/	32,300 r/	1,820	44,700
Philadelphia	3,240	110,000	2,450	80,900
Other	8	202	5	150
Total	14,100	419,000 r/	17,500	499,000

r/ Revised.
1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 16
U.S. IMPORTS OF PELLETS, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

	1993		1994	
Country	Quantity	Value	Quantity	Value
Brazil	442	14,200	263	9,090
Canada	6,380	221,000	8,330	283,000
Sweden	13	530	--	--
Venezuela	2,960	96,900	1,290	38,900
Total	9,790	333,000	9,880	331,000

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

Source: Bureau of the Census.

TABLE 17
IRON ORE, IRON ORE CONCENTRATES, AND IRON ORE AGGLOMERATES: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons)

	Gross weight 4/					Metal content 5/				
Country 3/	1990	1991	1992	1993	1994 e/	1990	1991	1992	1993	1994 e/
Albania e/ 6/	930 7/	750	200 7/	150	--	410	350	88	85	--
Algeria	2,940	2,340	2,560	2,000 r/ e/	2,350	1,470	1,170 e/	1,250 e/	1,000 r/ e/	1,150
Argentina	992	259	6 r/	3 r/	3	681	171	4 r/	2 r/	2
Australia	111,000	117,000	112,000 r/	121,000	128,000 7/	69,800	68,700	69,800 r/	74,800	80,900
Austria	2,310 r/	2,130 r/	1,630	1,440 r/	1,660 7/	653	481	515 r/	452 r/	520
Azerbaijan	XX	XX	400	300 e/	200	XX	XX	220	165 r/	110
Bolivia	125	102	55	51 r/	48	79	72	35	32 r/	30
Bosnia and Herzegovina e/	XX	XX	500	250	200	XX	XX	150	100	70
Brazil	152,000	152,000 r/	146,000 r/	159,000 r/	166,000 7/	99,900 e/	99,900 r/ e/	96,100 r/ e/	105,000 r/ e/	109,000
Bulgaria	1,080	800 e/	800 e/	850 r/ e/	800	321	182	239 r/	180 e/	180
Canada 8/	34,900	36,400	32,700	30,500 r/	36,600 7/	22,000	22,900	21,500	20,000 e/	23,000
Chile	7,900	8,690	7,640 r/	6,520 r/	6,400	5,040 e/	5,820	5,120 r/	4,390 r/	4,300
China e/	168,000	176,000	198,000	235,000	240,000	50,500	52,800	59,300 r/	70,400 r/	72,100
Colombia	628	450 r/	674	545 r/	610 7/	283 e/	265 r/ e/	300	245 r/ e/	275
Croatia	XX	XX	-- r/	-- r/	--	XX	XX	-- r/	-- r/	--
Czech Republic	XX	XX	XX	-- r/	--	XX	XX	XX	-- r/	--
Czechoslovakia 9/	1,830	1,740	1,410	XX	XX	540	526 e/	412	XX	XX
Egypt	2,410	2,140	2,400	2,190 r/	2,100	1,500 e/	1,300 e/	1,260	1,450 e/	1,450
France	8,730	7,470	5,710	3,520	2,550	2,790	2,320 e/	1,700	1,060 r/	765
Germany: Western states	83	120	109	146 r/	140	12	17	15	20 r/	20
Greece 6/	2,110	2,020	1,500 e/	1,420 e/	1,350	861	815	610 e/	575 e/	550
Guatemala	6	5	1	3 e/	3	3	3	1	2 e/	2
India	53,700 r/	56,900 r/	54,900 r/	55,800 r/	57,000	34,400 r/	36,400 r/	35,100 r/	35,700 r/	36,500
Indonesia	145	173	288	341	335	84	100	145	198 r/	194
Iran 10/	3,240	4,890	5,650	9,870	8,690 7/	1,800 e/	2,700 e/	3,000 e/	4,800 e/	4,300
Japan	34	31	40	11 r/	3	21	19	24	6	2
Kazakhstan e/	XX	XX	17,300	13,000 r/	10,500	XX	XX	9,500 r/ 7/	7,200 r/	5,800
Korea, North e/	10,000	10,000	10,500	10,500	11,000	4,700	4,700	4,900	4,900	4,900
Korea, Republic of	298	222	222	219 r/	191 7/	180	134	134	122 r/	115
Liberia	4,050	1,100	1,740	-- e/	--	2,490 e/	710	1,000	-- e/	--
Macedonia e/	XX	XX	20,000	20,000	20,000	XX	XX	1	1	1
Malaysia	344	376	320	223	203 7/	210	229	195	136	124
Mauritania	11,600	10,200	8,200	9,300	9,000	6,800 e/	6,500 e/	5,330 e/	5,900 r/ e/	5,400
Mexico 11/	15,000	13,000	15,000	15,000 e/	15,000	7,110	6,600	7,240	7,550	7,540 7/
Morocco	148	99	83	66 r/	64 7/	90	60	51	41 r/ e/	39
New Zealand 12/	2,300	2,270	2,930	2,390 r/	1,100	1,300 e/	1,300 e/	1,300 e/	1,300 e/	600
Nigeria e/	374 7/	398 7/	400	400	400	180	200	200	200	200
Norway	2,080	2,210	2,150	2,160 r/	2,460 7/	1,350	1,440	1,400	1,360	1,300
Peru	3,310	3,590	2,770 r/	5,090 r/	6,500	2,150	2,330	1,850 r/	3,400 r/	5,900
Poland	2	(13/)	--	-- e/	--	1 e/	(13/) e/	--	-- e/	--
Portugal 14/	14 r/	16 r/	15 r/	16 r/ e/	16	5 r/	6 r/	5 r/	6 r/	6
Romania	2,000	1,400 e/	1,250	904	951	275	199	180	130	152
Russia	XX	XX	82,100 r/	76,100 r/	73,300	XX	XX	45,000 e/	42,000 r/ e/	40,000
Serbia and Montenegro	XX	XX	551 r/	106 r/	32	XX	XX	176 r/	34 r/	10
Slovakia e/	XX	XX	XX	1,300	1,300	XX	XX	XX	350	350
South Africa, Republic of 15/	30,300	29,100 r/	28,200	29,400	32,300 7/	19,700	18,900 r/	18,300	19,100 e/	20,700 7/
Spain 16/	3,030 e/	3,890 r/	2,970 r/	2,480 r/	2,500	1,440	1,740 r/	1,330 r/	1,110 r/	1,100
Sweden	19,900	19,300	19,300	18,700	19,700 7/	12,900	11,100	9,790	9,800 e/	10,000
Thailand	129	240	427	209 r/	300	71	132	235	115 r/	165
Tunisia	291	295	291	299 r/	240 7/	154 e/	156 e/	151 e/	153 r/ e/	129 7/
Turkey	4,920	5,340	5,920	6,510 r/	7,050	2,690	2,900 e/	3,200 e/	3,550 r/ e/	3,840
Ukraine e/	XX	XX	75,700 7/	65,000 r/	51,300	XX	XX	42,000 r/	35,000 r/	28,000
U.S.S.R. 17/	236,000	199,000	XX	XX	XX	132,000 e/	110,000 e/	XX	XX	XX
United Kingdom	55	59	31 r/	1 r/	1	13 r/	13	7 r/	1 r/	1
United States	56,400	56,800 r/	55,600	55,700	58,400 7/	35,700	35,800 r/	35,300	35,200 r/	36,800 7/
Venezuela	20,100	21,200	18,100	16,900	16,100 7/	13,100	13,800	11,800	11,000 e/	10,500
Yugoslavia e/ 18/	4,130 7/	2,570	XX	XX	XX	1,580	900	XX	XX	XX
Zambia 19/	-- r/	-- r/	-- r/	-- r/	--	-- r/	-- r/	-- r/	-- r/	--
Zimbabwe	1,260	1,140	1,180	375 e/	4	730 e/	660 e/	710 e/	225 e/	2
Total	983,000 r/	956,000	949,000 r/	983,000 r/	995,000	540,000	518,000 r/	498,000 r/	510,000 r/	519,000

See footnotes at end of table.

TABLE 17--Continued
IRON ORE, IRON ORE CONCENTRATES, AND IRON ORE AGGLOMERATES: WORLD PRODUCTION, BY COUNTRY 1/ 2/

e/ Estimated. r/ Revised. XX Not applicable.
1/ Previously published data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.
2/ Table includes data available through July 24,1995.
3/ In addition to the countries listed, Cuba and Vietnam may also produce iron ore, but definitive information on output levels, if any, is not available.
4/ Insofar as availability of sources permits, gross weight data in this table represent the nonduplicative sum of marketable direct-shipping iron ores, iron ore concentrates, and iron ore agglomerates produced by each of the listed countries. Concentrates and agglomerates produced from imported iron ores have been excluded under the assumption that the ore from which such materials are produced has been credited as marketable ore in the country where it was mined.
5/ Data represent actual reported weight of contained metal or are calculated from reported metal content. Estimated figures are based on latest available iron content reported, except for the following countries for which grades are U.S. Bureau of Mines estimates: Albania, Azerbaijan, Kazakstan, North Korea, and Ukraine.
6/ Nickeliferous iron ore.
7/ Reported figure.
8/ Series represent gross weight and metal content of usable iron ore (including byproduct ore) actually produced, natural weight.
9/ Dissolved Dec. 31, 1992.
10/ Data are for year beginning Mar. 21 of that stated.
11/ Gross weight calculated from reported iron content based on grade of 66% Fe.
12/ Concentrates from titaniferous magnetite beach sands.
13/ Less than 1/2 unit.
14/ Includes manganiferous iron ore.
15/ Includes magnetite ore as follows, in thousand metric tons: 1990--5,560 (revised); 1991--5,660; 1992--4,650; 1993--4,340; and 1994--3,460.
16/ Includes byproduct ore.
17/ Dissolved in Dec. 1991.
18/ Dissolved in Apr. 1992.
19/ Entry discontinued in 1993. Magnetite used as a mineral processing media only.

TABLE 18
SELECTED PRICES FOR IRON ORE IN THE JAPANESE MARKET

(F.o.b. shipping port basis. U.S. cents per dry long ton of iron unless otherwise specified)

Country and producer	Ore type	(April 1 - March 31) Fiscal Year 1993 r/	Fiscal Year 1994
Australia:			
Hamersley Iron Pty. Ltd. and Mount Newman Mining Co. Pty. Ltd.	Lump ore	35.34	33.26
Do.	Fines	28.35	25.66
Robe River Iron Associates	do.	23.87	20.41
Savage River Mines Ltd.	Pellets	39.45	39.45
Brazil:			
Cia. Nipo-Brasileira de Pelotizacao (Nibrasco)	do.	41.68	41.68
Cia. Vale do Rio Doce (Carajas)	Fines	25.92	23.51
Do.	Lump ore	29.99	28.22
Cia. Vale do Rio Doce (Itabira)	do.	26.32	24.77
Do.	Fines	25.42	23.01
Mineracoes Brasileiras Reunidas S.A.	do.	25.75	24.23
Do.	do.	25.91	23.45
Samarco Mineracâo S.A.	Pellet feed	21.35	19.33
Canada:			
Iron Ore Co. of Canada (Carol Lake)	Concentrates	24.65	22.31
Chile:			
Minera del Pacifico S.A. (El Algarrobo)	Pellets	38.85	38.85
Minera del Pacifico S.A. (El Romeral)	Fines	19.69	17.42
India:			
Minerals and Metals Trading Corp. (Bailadila)	Lump ore	34.08	32.07
Do.	Fines	27.23	24.64
Peru:			
Empresa Minera del Hierro del Peru S.A.	Pellets	(1/)	--
South Africa, Republic of: 2/			
South African Iron and Steel Industrial Corp. Ltd.	Lump ore	27.60	26.15
Do.	Fines	21.57	19.52

r/ Revised.
1/ No quotation published.
2/ Price per dry metric ton unit.

Source: Trust Fund Project on Iron Ore Information, Iron Ore 1994.

TABLE 19
IRON ORE: WORLD PELLETIZING CAPACITY, BY CONTINENT AND COUNTRY IN 1994

	Number			Rated capacity (million metric tons, gross weight)
	Sites	Plants 1/	Units	
North America:				
Canada	5	6	13	26.4
Mexico	5	6	6	9.5
United States	10	18	50	66.5
Total	20	30	69	102.4
South America:				
Argentina	1	1	4	1.0
Brazil	3	8	8	25.0
Chile	1	1	1	4.2
Peru	1	2	2	4.2
Venezuela	1	1	2	10.0
Total	7	13	17	44.4
Europe:				
Belgium - Luxembourg 2/	1	1	1	0.8
Czech Republic	1	1	1	0.2
Netherlands 2/	1	1	1	3.8
Norway 3/	2	3	3	3.2
Sweden	3	3	4	10.8
Turkey	1	1	1	1.3
Former U.S.S.R. 4/	7	13	NA	80.0
Yugoslavia 5/	1	1	1	0.6
Total	17	24	NA	100.7
Africa:				
Liberia 6/	1	1	1	3.0
Morocco 7/	1	1	1	0.8
Nigeria 2/	1	1	1	1.4
South Africa, Republic of	1	1	1	0.6
Total	4	4	4	5.8
Asia:				
Bahrain 2/	1	1	1	4.0
China 4/	4	4	NA	4.5
India 8/	1	1	1	3.0
Iran	1	1	1	2.5
Japan 2/	1	2	2	4.4
Total	8	9	NA	18.4
Oceania: Australia 9/	2	2	6	4.0
World total	58	82	NA	275.7

NA Not available.

1/ Staged additions are treated at some mining complexes as if they were separate plants. Site data exclude plants that have had no production since 1982. Plants that produced after 1979, but have been continuously idle since 1982, are cited in the footnotes because they could be reactivated at some reasonable cost.

2/ Pellets produced from imported direct-shipping ores and/or concentrates.

3/ The older of the two plants operated by A/S Sydvaranger at Kirkenes has been idle since 1986. In addition, the 0.50 Mmt-per-year plant operated by Norsk Jernverk at Mo-i-Rana was shut down in Jan. 1987 for an indefinite period, leaving only one plant in Norway on-line.

4/ Based on incomplete information.

5/ The Skopje plant operated by Rudnici i Zelezara was recently idled.

6/ Excludes the No. 1 pelletizing plant (capacity of 2.4 Mmt/yr) of the Bong Mining Co. The No. 1 plant has been idle since 1980.

7/ The Nador plant operated by Société d'Exploitation des Mines du Rif (SEFERIF) has been idle for several years.

8/ There is an additional plant with a capacity of 1.8 Mmt/yr at Mandovi in Goa, but it has been closed since 1982. The owner was planning to reopen the facility using high-grade blue dust from the Bellary Hospet area of Karnataka as feed.

9/ There is an additional plant with a capacity of 3.0 Mmt/yr at Dampier in Western Australia, but it has been closed since 1980.

Sources: Association of Iron Ore Exporting Countries (Geneva, Switzerland), Commodities Research Unit Ltd. (London, United Kingdom), International Iron and Steel Institute (Brussels, Belgium), Metal Bulletin Books Ltd. (Surrey, United Kingdom), United Nations Commission on Trade and Development (UNCTAD), UNCTAD Trust Fund Project on Iron Ore Information, and U.S. Bureau of Mines.

FIGURE 1
U.S. IRON ORE PRODUCTION AND IMPORTS FOR CONSUMPTION

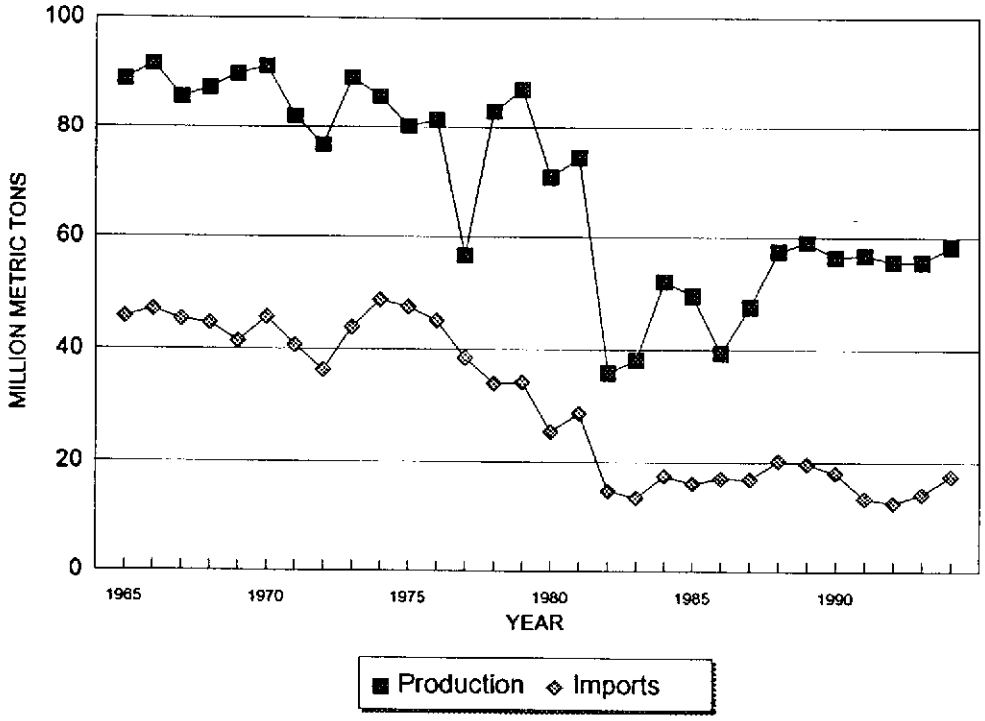


FIGURE 2
WORLD DIRECT-REDUCED IRON PRODUCTION

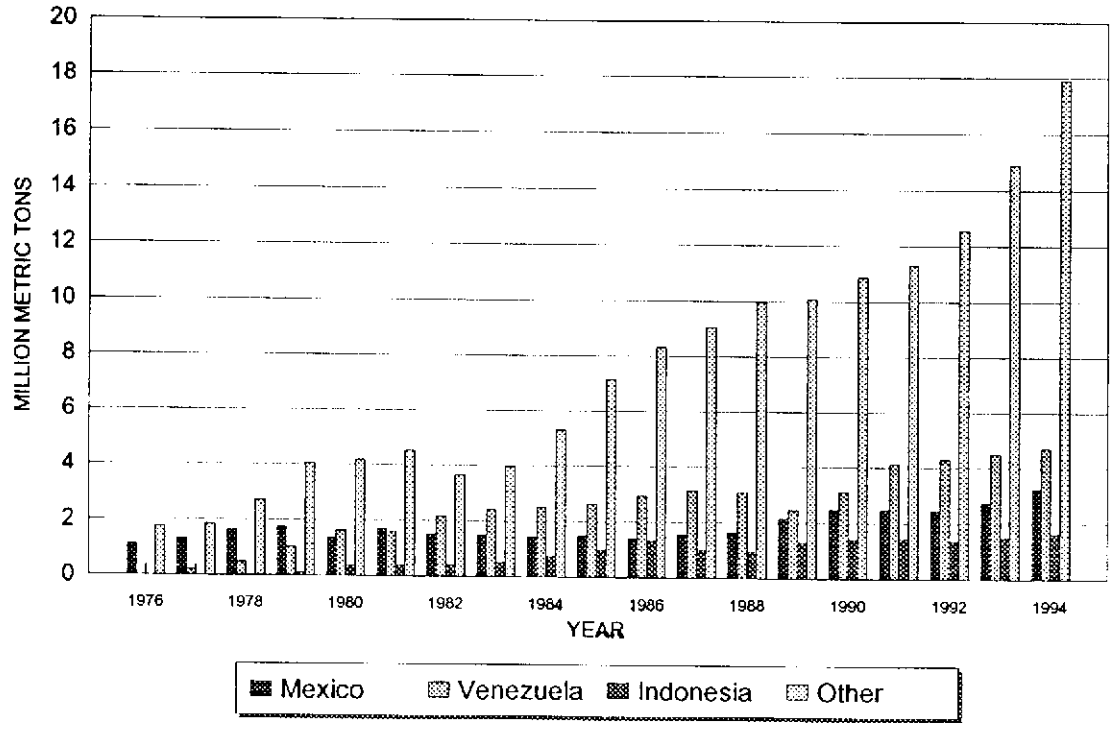
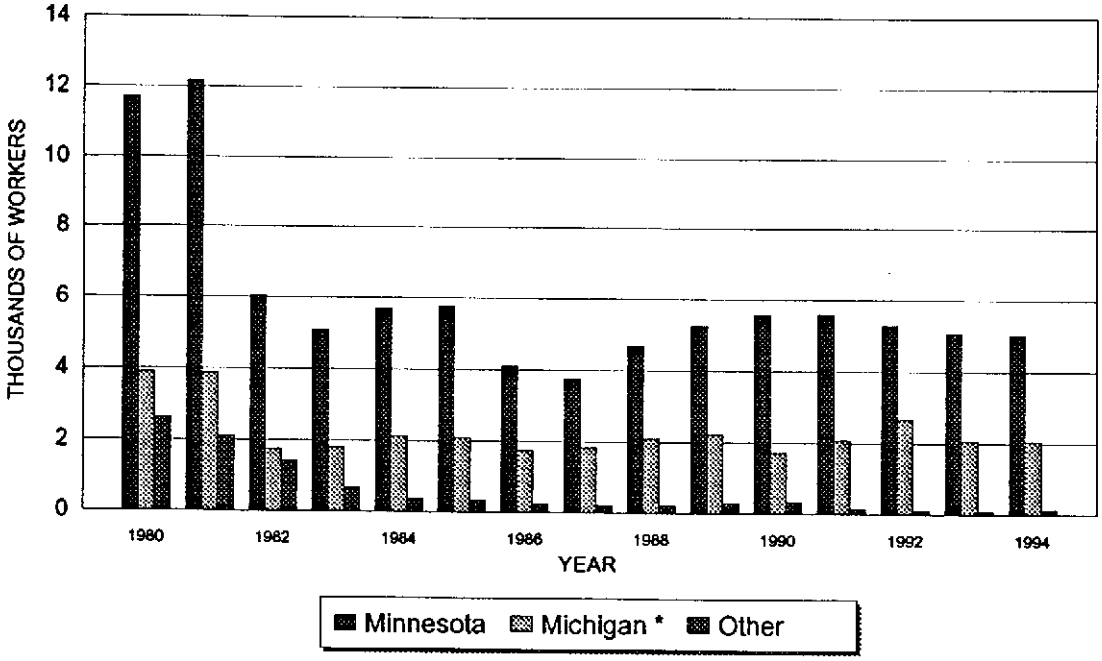


FIGURE 3
EMPLOYMENT AT IRON MINES AND BENEFICIATION PLANTS



* Includes workers in Wisconsin for years prior to 1984.

FIGURE 4
COMPARISON OF U.S. IRON ORE PRODUCTION WITH TOTAL PRODUCTION FOR THE