

## IRON ORE<sup>1</sup>

(Data in thousand metric tons, usable ore, unless otherwise noted)

**Domestic Production and Use:** In 2019, mines in Michigan and Minnesota shipped 98% of the usable iron ore products consumed in the steel industry in the United States with an estimated value of \$5.4 billion, an increase from \$4.6 billion in 2018. The remaining 2% of domestic iron ore was produced for nonsteel end uses. Seven open-pit iron ore mines (each with associated concentration and pelletizing plants), and three iron metallic plants—one direct-reduced iron (DRI) plant in Louisiana and two hot-briquetted iron (HBI) plants in Indiana and Texas—operated during the year to supply steelmaking raw materials. The United States was estimated to have produced 1.9% and consumed 2.0% of the world's iron ore output.

<b>Salient Statistics—United States:<sup>2</sup></b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019<sup>e</sup></b>
Production:					
Iron ore	46,100	41,800	47,900	49,500	48,000
Iron metallics	1,450	2,070	3,250	3,560	3,700
Shipments	43,500	46,600	46,900	50,400	50,000
Imports for consumption	4,550	3,010	3,710	3,810	5,100
Exports	7,500	8,710	10,600	13,000	13,000
Consumption:					
Reported	38,500	34,500	34,400	36,600	37,000
Apparent <sup>3</sup>	42,100	37,900	40,100	41,200	41,000
Value, U.S. dollars per metric ton	81.19	73.11	78.54	93.00	112.15
Stocks, mine, dock, and consuming plant, yearend, excluding byproduct ore	4,760	2,990	3,930	3,100	2,700
Employment, mine, concentrating and pelletizing plant, number	4,800	4,660	4,630	4,860	4,800
Net import reliance <sup>4</sup> as a percentage of apparent consumption (iron content of ore)	E	E	E	E	E

**Recycling:** None. See Iron and Steel Scrap.

**Import Sources (2015–18):** Brazil, 55%; Canada, 28%; Sweden, 6%, Chile, 4%; and other, 7%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–19</b>
Iron ores and concentrates:		
Concentrates	2601.11.0030	Free.
Coarse ores	2601.11.0060	Free.
Other ores	2601.11.0090	Free.
Pellets	2601.12.0030	Free.
Briquettes	2601.12.0060	Free.
Sinter	2601.12.0090	Free.
Roasted iron pyrites	2601.20.0000	Free.

**Depletion Allowance:** 15% (Domestic), 14% (Foreign).

**Government Stockpile:** None.

**Events, Trends, and Issues:** U.S. iron ore production was estimated to have decreased slightly in 2019 owing to a decrease in domestic pig iron production and raw steel production from basic oxygen furnaces. Total raw steel production was estimated to have increased to 87 million tons in 2019 from 86.6 million tons in 2018. The share of steel produced by basic oxygen furnaces, the process that uses iron ore, continued to decline from 37.3% in 2015 to an estimated 30% in 2019 owing to increased use of electric arc furnaces because of their energy efficiency, reduced environmental impacts, and the ready supply of scrap.

Overall, global prices trended upwards in 2019 and the annual average value of \$112.15 per ton was a 21% increase from \$93.00 per ton in 2018. Based on reported prices for iron ore fines (62% iron content) imported into China (cost and freight into Tianjin port), the highest monthly average price during the first 10 months of 2019 was \$120.24 per ton in July compared with the high of \$77.46 per ton in February 2018. The lowest monthly average price during the same period in 2019 was \$76.16 per ton in January compared with the low of \$64.56 per ton in July 2018. The prices trended upwards owing to an estimated 4% increase in raw steel production and a reduced supply of higher grade iron ore products, spurred partially by closures of pelletizing plants in Brazil.

Prepared by **Candice C. Tuck [(703) 648–4912, ctuck@usgs.gov]**

## IRON ORE

In August, one company completed a project at an iron-ore-processing facility in Minnesota enabling the plant to produce 3.5 million tons per year of direct-reduced-iron-grade pellets that will feed into a hot-briquetted plant under construction in Ohio, which was expected to open in mid-2020. Globally, iron ore production in 2019 was expected to increase by 5% from that of 2018, primarily owing to increased production in Australia, Brazil, China, and India.

Global finished steel demand was forecast by the World Steel Association<sup>5</sup> to increase by 3.9% in 2019 and 1.7% in 2020, as a result of real estate investment in China and 4.1% growth in emerging and developing economies in 2020. Steel demand among developed economies, except for China, was expected to remain the same or decrease slightly in 2019 despite growth in consumer and construction applications as potential and enacted trade policies impacted investments and exports among the manufacturing sector. Increased pressure on steel producers around the world to increase efficiency, reduce energy consumption, and meet environmental benchmarks continued the slow decline in use of low-grade iron ore and spurred investment in the production of iron metallica and high-grade iron ore products, such as pellets.

**World Mine Production and Reserves:** Reserves for Australia, Brazil, India, South Africa, and the United States were revised based on Government and industry sources.

	Mine production				Reserves <sup>6, 7</sup>	
	Usable ore		Iron content		Crude ore	Iron content
	2018	2019 <sup>e</sup>	2018	2019 <sup>e</sup>		
United States	49,500	48,000	31,300	31,000	3,000	1,000
Australia	900,000	930,000	557,000	580,000	<sup>8</sup> 48,000	<sup>8</sup> 23,000
Brazil	460,000	480,000	250,000	260,000	29,000	15,000
Canada	52,400	54,000	31,500	33,000	6,000	2,300
Chile	14,000	14,000	8,940	9,000	NA	NA
China	335,000	350,000	209,000	220,000	20,000	6,900
India	205,000	210,000	126,000	130,000	5,500	3,400
Iran	36,400	38,000	23,900	25,000	2,700	1,500
Kazakhstan	41,900	43,000	11,700	12,000	2,500	900
Mexico	22,300	23,000	14,000	14,000	NA	NA
Peru	14,200	15,000	9,530	10,000	NA	NA
Russia	96,100	99,000	56,700	59,000	25,000	14,000
South Africa	74,300	77,000	47,200	49,000	1,100	690
Sweden	35,800	37,000	22,200	23,000	1,300	600
Ukraine	60,300	62,000	37,700	39,000	<sup>9</sup> 6,500	<sup>9</sup> 2,300
Other countries	62,500	62,000	35,800	35,000	18,000	9,500
World total (rounded)	2,460,000	2,500,000	1,470,000	1,500,000	170,000	81,000

**World Resources:** U.S. resources are estimated to be 110 billion tons of iron ore containing about 27 billion tons of iron. U.S. resources are mainly low-grade taconite-type ores from the Lake Superior district that require beneficiation and agglomeration prior to commercial use. World resources are estimated to be greater than 800 billion tons of crude ore containing more than 230 billion tons of iron.

**Substitutes:** The only source of primary iron is iron ore, used directly as direct-shipping ore or converted to briquettes, concentrates, DRI, iron nuggets, pellets, or sinter. DRI, iron nuggets, and scrap are extensively used for steelmaking in electric arc furnaces and in iron and steel foundries. Technological advancements have been made, which allow hematite to be recovered from tailings basins and pelletized.

<sup>e</sup>Estimated. E Net exporter. NA Not available.

<sup>1</sup>Data are for iron ore used as a raw material in steelmaking unless otherwise noted. See also Iron and Steel and Iron and Steel Scrap.

<sup>2</sup>Except where noted, salient statistics are for all forms of iron ore used in steelmaking, and do not include iron metallica, which include DRI, hot-briquetted iron, and iron nuggets.

<sup>3</sup>Defined as production + imports – exports + adjustments for industry stock changes.

<sup>4</sup>Defined as imports – exports + adjustments for industry stock changes.

<sup>5</sup>World Steel Association, 2019, Short range outlook October 2019: Brussels, Belgium, World Steel Association press release, October 14, 6 p.

<sup>6</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>7</sup>Million metric tons.

<sup>8</sup>For Australia, Joint Ore Reserves Committee-compliant reserves were 24 billion tons for crude ore and 11 billion tons for iron content.

<sup>9</sup>For Ukraine, reserves consist of the A+B categories of the Soviet reserves classification system.