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2019 Minerals Yearbook

IRON ORE [ADVANCE RELEASE]

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Iron Ore

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In 2019, U.S. iron ore production decreased by 5% to 46.9 million metric tons (Mt), gross weight, from 49.5 Mt in 2018 (table 1). In the United States, iron ore production, exports, and apparent consumption decreased, whereas stocks and imports increased. The United States ranked ninth globally in production of iron ore on the basis of usable ore and iron content (fig. 1, table 9).

Global iron ore production was 2.45 billion metric tons (Gt) of usable ore, containing an estimated 1.52 Gt of iron, virtually unchanged from 2.47 Gt of usable ore, containing 1.52 Gt of iron, in 2018 (table 9). Global iron ore production, on a usable ore basis, was led by Australia (919 Mt), Brazil (405 Mt), China (351 Mt), India (238 Mt), and Russia (97.5 Mt). Production from these countries, combined, accounted for 82% of global production (tables 8, 9). U.S. production of raw steel in 2019, according to the American Iron and Steel Institute (AISI), totaled 87.8 Mt, a slight increase from 86.6 Mt in 2018. World production of raw steel increased by 3% to 1.87 Gt in 2019 from 1.82 Gt in 2018. Global production of pig iron increased slightly to 1.28 Gt in 2019 from 1.25 Gt in 2018 (American Iron and Steel Institute, 2020, p. 100–104).

Iron ore is the primary raw material for producing steel, an alloy critical to the economies of all industrialized nations. Two iron oxides—hematite (Fe_2O_3) and magnetite (Fe_3O_4)—are the primary iron ore minerals found in the United States. The principal form of iron ore mined in the United States contains hematite and magnetite in varying proportions, averaging 25% to 30% iron (Fe) content, and occurs in hard, fine-grained, banded iron formations also known as taconite. Magnetite is the main iron oxide recovered during concentration, although hematite tailings have become an economic alternative source of primary iron.

In the United States, low-grade iron ore is concentrated to reach the on average 62.5%-Fe-or-greater benchmark required globally for steel production. The concentrates then can be agglomerated using binders to create iron ore pellets, which are more easily transported and more efficiently melted in blast furnaces. More than 98% of all domestic iron ore production is transformed into molten iron, also known as pig iron, in blast furnaces by removing residual oxygen. The pig iron then may be transferred to basic oxygen furnaces for the removal of residual carbon and conversion to steel.

Small-scale steel mills, also known as minimills, use electric arc furnaces (EAFs) to produce steel from iron metallics and recycled steel scrap. Iron metallics—cold pig iron, direct-reduced iron (DRI), hot-briquetted iron (HBI), and iron nuggets—are intermediate iron products that have become increasingly cost effective as supplements to lower grades of steel scrap when integrated into the EAF process. DRI, also known as sponge iron, is produced through solid-state reduction of iron ore to 90% to 94% Fe (about the same iron content as molten pig iron); however, DRI requires special handling owing to its high susceptibility to oxidation. HBI is a higher density, premium quality form of briquetted DRI with lower susceptibility to oxidation. Iron nuggets, also known as iron nodules, are the least reactive of the iron metallics and are a premium grade of pig iron, with an average of 97% to 99% Fe and almost no gangue.

Iron ore also may be used for nonsteel applications including ballast, cement clinker production, coal washing, crushed road base material, fertilizer, dense media separation, iron oxide pigments, ferrite magnets, oil and gas well drilling, radiation shielding, water treatment, and other specialty applications. These applications represent a relatively small portion of iron ore consumption. Some applications require costly beneficiation to create high-grade products. Data for these nonsteel applications are not included in the U.S. Geological Survey's (USGS's) tables for domestic iron ore consumption, exports, imports, production, shipments, or stocks, unless otherwise noted. With the exception of iron oxide pigments and cement clinker, USGS surveys do not include production or consumption of iron ore for nonsteel end uses.

This report includes information from surveys of domestic producers, government agency reports, company reports, and public information. Trade data in this report are from the U.S. Census Bureau. Labor statistics were based on data available from the Mine Safety and Health Administration. Percentages in the report were calculated using unrounded data and have been rounded to no more than three significant digits.

Legislation and Government Programs

Regulations, legislative initiatives, and monitoring of environmental issues regarding iron ore production continued as previously reported, with no significant changes in 2019. Environmental issues related to the production of iron ore include but are not limited to cross-state air pollution, effects of sulfate discharge on wild rice and associated changes to water-quality standards, greenhouse gas emissions, hazardous air pollutants, mercury discharge, regional haze, selenium discharge, sulfur dioxide and nitrogen dioxide emissions, and water conductivity as a measure of dissolved minerals (Cleveland-Cliffs Inc., 2020, p. 9–13).

Production

The USGS developed the U.S. iron ore data shown in tables 1 and 2 through an annual "Iron Ore" survey, which was sent to seven domestic mines and facilities that produced iron ore and three facilities that produced iron metallics for steel production, all of which responded. Company reports, employment data, mine inspection reports, and tax data

supplemented the survey data received. Information on the capacity, production, and reserves of individual operations in the United States is provided in table 3.

Louisiana.—Nucor Steel Louisiana LLC's 2.5-million-metric-ton-per-year (Mt/yr) DRI operation continued work on its Project 8000 initiative, which was started in 2018 to increase reliability and uptime. In 2019, the company completed several improvements to the process gas heater and reactor refractory during a 70-day outage from September through November, and still accomplished the second highest output year during its 7 years of operation (Nucor Corp., 2020, p. 19).

Michigan.—The Tilden Mine, operated by Cleveland-Cliffs Inc., reported 7.8 Mt of pellet production, about the same as that in 2018 (table 2) (Cleveland-Cliffs Inc., 2020, p. 34).

Minnesota.—In Minnesota, six colocated open pit mines, concentrators, and pellet facilities were operational during 2019. In 2019, operations in Minnesota produced 39.1 Mt of salable iron ore, 6% less than the 41.7 Mt produced in 2018 (table 2). Nonoperational deposits in Minnesota's Mesabi Range, including the former LTV Corp.'s mine and the Buhl, Kinney, McKinley, and Sherman deposits, were estimated to contain approximately 1.5 Gt of high-grade iron ore. An additional 1 Gt of iron ore in tailings ponds and stockpiles was considered economically recoverable (Minnesota Department of Natural Resources, 2016).

In August 2019, Cleveland-Cliffs completed the transition of management and operation of the Hibbing Taconite Mine to the majority owner ArcelorMittal USA. Cleveland-Cliffs' fully owned Northshore Mine completed a multiyear upgrade to produce direct-reduction-grade pellets at a commercial scale, achieving a 3.5-Mt/yr production capacity for the higher grade pellets (Cleveland-Cliffs Inc., 2020, p. 34–35). U.S. Steel Corp. conducted a review of the Minntac Mine in 2019, which decreased reported reserves based on updated drilling information, leading to a new economic evaluation (U.S. Steel Corp., 2020, p. F-65).

Ohio.—In 2019, Cleveland-Cliffs continued construction of a 1.9-Mt/yr HBI plant at a brownfield site in Toledo, OH. The feedstock for the plant would be sourced from Cleveland-Cliffs mines, and products were expected to be sold to EAF partners throughout the Great Lakes region. The project was expected to be completed by midyear 2020 (Cleveland-Cliffs Inc., 2020, p. 1, 27).

Consumption

Steelmaking was responsible for the majority of iron ore consumption. It is estimated that producing 1.0 metric ton (t) of steel requires 1.3 t of iron ore pellets, 0.4 t of coking coal, and 0.3 t of steel scrap, as well as 6.0 million British thermal units of natural gas, using blast furnaces at normal operating conditions. In 2019, U.S. consumption of iron ore, by gross weight, reported by the American Iron and Steel Institute (2020, p. 79), totaled 34.8 Mt, including 29.3 Mt of pellets; 4.38 Mt of sinter, briquettes, nodules, and other products; and 1.16 Mt of direct-shipping ore (table 4).

The AISI estimated U.S. raw steel production capability in 2019 to be 110 Mt, a slight decrease from 111 Mt in 2018. In 2019, capability utilization was 79.8% compared with 78.2% in 2018. Integrated steel producers smelted iron ore to make liquid iron in blast furnaces and used basic oxygen furnaces (BOFs) to refine the liquid iron with some steel scrap to produce raw liquid steel. The BOF process was used to make 26.6 Mt of steel in the United States in 2019, a 4% decrease from 27.7 Mt in 2018. The use of this process decreased slightly to 30.2% of total steel production in 2019 from 32.0% in 2018 (American Iron and Steel Institute, 2020, p. 3, 70, 73).

World production of raw steel increased by 3% to 1.87 Gt in 2019 from 1.82 Gt in 2018. Global production of pig iron increased slightly to 1.28 Gt in 2019 from 1.25 Gt in 2018 (American Iron and Steel Institute, 2020, p. 100, 104).

Transportation

Domestically, iron ore was transported from mines to rail stations by heavy hauling trucks and by rail to port facilities on the Great Lakes or processing facilities in North America. From ports, the ore was transported by ship across the Great Lakes and (or) through the St. Lawrence Seaway to the Atlantic Ocean. Bulk iron ore products were transported primarily by freighter across the Great Lakes owing to cost-effective transportation rates. Although production remained relatively consistent throughout the year, sales, shipments, and stocks of iron ore in Minnesota and Michigan fluctuated seasonally as a result of the annual closing and reopening of the Soo Locks at Sault Ste. Marie, MI, as well as harsh weather conditions and frozen lake surfaces during winter months.

The Soo Locks, one of the four U.S. lock systems on the Great Lakes, was the primary passage for iron ore transported from iron mines in Minnesota's Mesabi Range to steel plants in the midwestern United States. In August 2019, the Lake Carriers Association reported an estimated loss of $1 billion in business revenue to the United States economy during the 2018–19 winter season owing to a lack of icebreaking ships operated by the United States Coast Guard and Canadian Coast Guard. The economic loss was estimated based on hours lost and delays experienced by its U.S.-flag shipping companies, including a potential 4 Mt of iron ore that might have been transported. In December, $75.3 million was allocated in the spending package for the U.S. Army Corps. Of Engineers, approved by the President of the United States, to begin the construction of a new lock within the Soo Locks system (Lake Carriers Association, 2019a, b). According to the U.S. Army Corps of Engineers, the construction of a second lock within the Soo Locks system would take approximately 7 to 10 years to complete at a total cost of $1 billion. The initial $75.3 million was intended to cover the first year of work (LaFond, 2019).

Prices

In 2019, the average unit value of iron ore in the United States was $92.94 per metric ton, essentially unchanged from $93.00 per metric ton in 2018 (table 1). The average unit value of exported iron ore was $87.12 per metric ton, a 15% increase from $75.59 in 2018. The average unit value of exports totaling more than 1,000 t to any single country ranged from $33.32 to

$93.79 per metric ton (table 5). In 2019, the average unit value of imported iron ore was $125.41 per metric ton, a 23% increase from the revised $101.93 per metric ton in 2018 (table 1). The average unit value of imports totaling more than 1,000 t from any single country ranged from $47.57 to $163.36 per metric ton (table 6).

The average spot price of imported iron ore fines (62% Fe) at the port of Tianjin, China, was $93.85, a 35% increase from $69.75 in 2018. Throughout 2019, prices at the Port of Tianjin varied from a high of $120.24 in July to a low of $76.16 in January. The lowest average monthly spot market price in 2019—$76.16 per metric ton in January—was 18% higher than the lowest average monthly spot price of $64.56 per metric ton in July 2018. The highest average monthly spot market price in 2019—$120.24 per metric ton in July—was 55% higher than the highest average monthly spot price of $77.46 per metric ton in February 2018 (Index Mundi, undated).

Foreign Trade

U.S. iron ore exports in 2019 were 11.4 Mt, an 11% decrease from 12.7 Mt in 2018 (table 5). Pellets accounted for 96% (10.9 Mt) of total exports. Canada received 74% of total United States iron ore exports, followed by Japan with 22%. U.S. iron ore imports in 2019 were 3.98 Mt, a 5% increase from 3.81 Mt in 2018. Brazil supplied 55% of total United States iron ore imports, followed by Canada with 21% (table 6). Although imported iron ore supplemented domestically produced iron ore, the United States remained a net exporter in 2019 (tables 5, 6). Increases in imports of iron ore pellets in recent years were owing primarily to increases in domestic iron metallics production in the Gulf Coast States. While traditional iron ore pellets manufactured domestically were intended for integrated steel producers, iron metallics were supplied to the EAF market.

World Industry Structure

Global iron ore production was 2.45 Gt of usable ore, containing an estimated 1.52 Gt of iron, essentially unchanged from 2.47 Gt of usable ore, containing 1.52 Gt of iron, in 2018. Global iron ore production, on a usable ore basis, was led by Australia (919 Mt), Brazil (405 Mt), China (351 Mt), India (238 Mt), and Russia (97.5 Mt). Production from these countries, combined, accounted for 82% of global production (tables 8, 9).

Consumption.—Raw steel and pig iron production are significant indicators of iron ore consumption, as well as iron metallics, although on a smaller scale. World consumption of iron ore was estimated to be 2.05 Gt in 2019, an 8% decrease from an estimated 2.24 Gt in 2018, as indicated by decreases in production of raw steel, DRI, and pig iron (table 8). China was the leading producer of pig iron and raw steel and the Middle East and North Africa were thought to be the leading producers of DRI (American Iron and Steel Institute, 2020, p. 100–104).

Trade.—Global imports of iron ore totaled 1.47 Gt in 2019, a 5% decrease from the revised 1.54 Gt in 2017. Since 2006, China, Germany, Japan, and the Republic of Korea have accounted for more than two-thirds of global imports, with their combined share increasing to 84% in 2019 from 62% in 2002. China's share of global imports more than tripled during this 16-year period to 68% from 21%. Australia was the leading exporter of iron ore (54%), followed by Brazil (24%) (table 8).

World Review

Australia.—Production of iron ore in Australia was 919 Mt in 2019, a slight increase from 908 Mt in 2018 (table 8). Three iron-ore-mining companies in Australia—BHP Billiton Ltd., Fortescue Metals Group Ltd., and Rio Tinto Ltd.—were among the four leading iron ore producers in the world and accounted for most of the iron ore produced in Australia.

BHP Billiton's share of iron ore production from its joint ventures in Australia in fiscal year 2019, which ended June 30, 2019, was 238 Mt, essentially unchanged from that in fiscal year 2018. In 2019, BHP Billiton successfully tested live mine scheduling to improve performance for mine load and haul operations at Eastern Ridge, which was scheduled to be implemented across all operations in fiscal year 2020. BHP Billiton also continued work on the South Flank project. Completion of this project was expected in 2021 and would produce 80 Mt/yr to replace ore from the Yandi Joint Venture as it reached the end of its economic life (BHP Billiton Ltd., 2019, p. 14, 67, 263).

Fortescue Metals Group's iron ore shipments totaled 168 Mt in fiscal year 2019, a slight decrease from 170 Mt in fiscal year 2018. Fortescue Metals Group continued to develop its $2.6 billion Iron Bridge Magnetite Project that would produce 22 Mt/yr of 67%-Fe concentrates by midyear 2022 (Fortescue Metals Group Ltd., 2019, p. 1,4).

Rio Tinto's share of iron ore production at its operations in Australia was 271 Mt in 2019, a 3% decrease from that in 2018. In 2019, Rio Tinto announced a $749 million investment into the Western Turner Syncline Phase 2 project to produce high-quality ore, scheduled to begin production in 2021 (Rio Tinto Ltd., 2019, p. 41–43).

Brazil.—Production of iron ore in Brazil totaled 405 Mt in 2019, a 12% decrease from 460 Mt in 2018 (table 8). In 2019, Vale S.A., the leading iron ore producer in Brazil, produced 302 Mt, a 21% decrease from 2018. Pellet production also decreased to 41.8 Mt in 2019 from 55.3 Mt in 2018. In January 2019, the tailings dam failed at Vale's Córrego do Feijão Mine in Brumadinho, Minas Gerais State, which released residue downstream killing 270 people and causing significant property and environmental damage (Vale S.A., 2020, p. 2–12, 48–52).

BHP Billiton commissioned the new Santarem dam at the bottom of the Fundao Valley in 2019, part of the Degraded Area Recovery Plan to restore damage resulting from the Fundao dam failure at the Samarco Mine in 2015. The Samarco Mine remained closed through 2019. In 2019, the Government of Brazil announced a requirement for all upstream construction tailings dams to be decommissioned throughout the next decade (BHP Billiton Ltd., 2019, p. 76).

Anglo American plc reported 23.1 Mt of iron ore production in 2019, an increase from 3.4 Mt in 2018 owing to optimization improvements undertaken in 2018 when operations were

suspended. Construction of the tailings dam was completed in August 2019, and the operating license was granted in December 2019 (Anglo American plc, 2019, p. 71).

China.—China produced 351 Mt of iron ore in 2019, a 5% increase from 335 Mt in 2018 (table 8). Increased demand from Chinese steel producers for high-grade iron ore blends (primarily originating from Australia and Brazil) was driven by stricter emissions requirements from the Government of China for domestic steel producers.

India.—Production of iron ore in India was 238 Mt, a 17% increase from 204 Mt in 2018 (table 8). In June, the government of the State of Chhattisgarh ordered the immediate cessation of all iron ore mining operations at the NMDC Ltd. complex in Dantewada following protests from local citizens asserting that the mining location, iron ore Deposit Number 13 in the Bailadila Hills, was a holy site. Officials announced that operations would be idled indefinitely while an investigation was conducted (Ghose, 2019). In the State of Odisha, more than 30 iron ore mining leases were set to expire in March 2020, affecting more than one-half of the region's production of iron ore and 10% of output in other States. Odisha produced 114 Mt of iron ore in 2019, more than one-half of India's production. Allowing the leases to lapse was predicted to have a significant effect on the price of domestic iron ore production, imports, and steel mill output, and thus to disrupt the steel mill supply chain (Thomas, 2019). In August, the State of Karnataka canceled the extension of a mining lease for NMDC Ltd.'s operations in the Donimalai Range and planned to auction the iron ore block immediately. Resources in the Donimalai Range were estimated to contain 143 Mt of iron ore with NMDC producing 7 Mt/yr (Kulkarni, 2019).

Outlook

Changes in the gross domestic product (GDP), the broadest measure of a nation's economic activity, may be considered an indicator of the health of the steelmaking and steel manufacturing industries, which influence iron ore production. The World Bank forecast global GDP growth for 2020 and 2021 at −5.2% and 4.2%, respectively. The World Bank estimated global GDP growth to be 2.4% in 2019 and reported it to be 3.0% in 2018. The rate of GDP growth for China is estimated to be 6.1% in 2019 and is projected to decrease to 1.0% in 2020 and increase to 6.9% in 2021 (World Bank, The, 2020, p. 4). The U.S. Federal Reserve Board reported U.S. GDP growth in 2019 was 2.3% and projections for GDP growth for the United States are −6.5% for 2020 and 5.0% for 2021 (Board of Governors of the Federal Reserve System, 2020). During the first quarter of 2020, the global coronavirus disease 2019 (COVID-19) pandemic was beginning to affect economic conditions globally, resulting in economic slowdowns and significant decreases in industrial activity, including contraction of iron ore mining and iron and steel production.

According to the World Steel Association (2020), global consumption of finished steel is expected to decrease by 6% from 1,770 Mt in 2019 to 1,650 Mt in 2020 and then increase by 4% to 1,720 Mt in 2021. In all regions, steel demand is projected to decrease owing to decreased manufacturing, automotive, and other steel end-use demands as a result of the global coronavirus disease 2019 (COVID-19) pandemic in 2020. In the United States, steel demand is expected to decrease by 8% in 2020 from that in 2019 and increase by 15% in 2021 from that in 2020. Infrastructure investment plans in the United States are not expected to contribute to an increase in steel demand in the short term, despite ongoing legislative efforts on infrastructure development. In developing countries, steel demand was expected to increase by 17% in 2020 and then increase by 8% in 2021, although the decrease in demand owing to impacts from the COVID-19 pandemic were expected to significantly alter forecasts for 2020. China's steel demand is forecast to increase by 1% in 2020 and remain flat in 2021, owing to a lack of investment and only mild stimulus in 2019, as well as the continued slowing in construction activity and decelerating growth in the automotive and home appliance sectors.

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TABLE 1
SALIENT IRON ORE STATISTICS[1]

(Thousand metric tons, gross weight, and thousand dollars, unless otherwise specified)

		2015	2016	2017	2018	2019
Iron ore, usable:						
United States:						
Production:						
Gross weight		46,100	41,800	47,900	49,500	46,900
Iron content		28,800	26,400	30,300	31,300	29,800
Shipments		43,500	46,600	46,900	50,400	47,000
Value:						
Minnesota:[2]						
Cost of mining	dollars per metric ton	11.86	11.59	10.81	11.79	13.30
Cost of beneficiation	do.	30.23	28.54	29.88	31.22	33.23
Average value of production	do.	76.68	70.55	78.43	90.57	90.62
United States:						
Reported value at mines[3]		3,750,000	3,050,000	3,760,000	4,600,000	4,370,000
Average unit value at mines	dollars per metric ton	81.19	73.11	78.54	93.00	92.94
Exports:						
Quantity		7,510 r	8,710	10,600	12,700 r	11,400
Value		611,000	574,000	766,000	961,000 r	989,000
Imports for consumption:						
Quantity		4,550	3,010	3,720 r	3,810	3,980
Value		455,000	241,000	356,000	388,000	499,000
Consumption:						
Apparent[4]		42,100	37,900	40,100	41,400 r	39,100
Reported[5]		38,500	34,500	34,400	36,600	34,800
Stocks, December 31		4,760	2,990	3,930	3,100	3,470
World, production		2,370,000 r	2,370,000	2,440,000	2,470,000 r	2,450,000
Iron metallics:[6]						
United States:						
Production:						
Quantity		1,450	2,070	3,250	3,560	3,660
Value[e, 7]		410,000	444,000	867,000	1,180,000	1,030,000
Exports:						
Quantity		61	195	1,010	1,050	959
Value		2,040	37,400	310,000	381,000	322,000
Imports for consumption:						
Quantity		1,870	1,790	3,820 r	3,700	3,340
Value		490,000	360,000	859,000 r	942,000	891,000
World, production		72,600	72,800	87,100	100,000	107,000

[e]Estimated. [r]Revised. do. Ditto.

[1]Table includes data available through August 26, 2020. Data are rounded to no more than three significant digits except values reported in dollars per metric ton; may not add to totals shown.

[2]As reported in the Minnesota Department of Revenue's annual Mining Tax Guide. Data not rounded.

[3]Value for iron ore as reported by mines, which may refer to price or value of shipments or production as sold on the open market or within the company.

[4]Defined as production plus imports minus exports plus adjustments for industry stock changes.

[5]Reported by the American Iron and Steel Institute as consumption of ore and agglomerated products in U.S. steel mills.

[6]Data for iron metallics may include cold pig iron, direct-reduced iron, hot-briquetted iron, iron nuggets, and solid sponge iron.

[7]Estimated based on average monthly prices of exports of direct-reduced iron from India.

TABLE 2
EMPLOYMENT AND PRODUCTION STATISTICS FOR IRON OPERATIONS IN THE UNITED STATES IN 2019, BY STATE[1]

(Thousand metric tons, unless otherwise specified)

District and State	Number of active operations	Number of employees[2]	Crude ore	Salable products		Average iron content (percent)
				Iron ore	Iron metallics	
Indiana	1	NA	--	--	259	NA
Louisiana	1	NA	--	--	1,600	NA
Michigan	1	893	22,700	7,800	--	60.9
Minnesota	6	4,070	135,000	39,100	--	64.1
Texas	1	NA	--	--	1,800 e	NA
Total or average	10	>4,960	158,000	46,900	3,660	63.6

[e]Estimated. NA Not available. -- Zero.

[1]Table includes data available through August 26, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Source: Mining Safety and Health Administration.

TABLE 3
IRON OPERATIONS IN THE UNITED STATES IN 2019[1]

(Million metric tons, unless otherwise specified)

State and operation	County	Operator	Primary product	Status	Capacity[2]	Production[2]	Reserves[3]
Indiana, Iron Dynamics, Inc.	DeKalb	Steel Dynamics, Inc.	Hot-briquetted iron	Active	0.3	0.3	(4)
Louisiana, Nucor Steel Louisiana LLC	Saint James Parish	Nucor Corp.	Direct-reduced iron	do.	2.5	NA	(4)
Michigan, Tilden Mine	Marquette	Cleveland-Cliffs Inc.	Iron ore pellets	do.	8.1	7.8	610
Minnesota:							
Hibbing Taconite Mine	Saint Louis	do.	do.	do.	8.1	7.6	120
Keetac Mine	Itasca	United States Steel Corp.	do.	do.	5.5	5.3	330
Minntac Mine	do.	do.	do.	do.	14.8	13.1	380
Minorca Mine	do.	ArcelorMittal S.A.	do.	do.	2.9	2.8	130
Northshore Mining	Saint Louis and Lake	Cleveland-Cliffs Inc.	do.	do.	6.1	5.3	830
United Taconite Mine	Saint Louis	do.	do.	do.	5.5	5.4	820
Texas, voestalpine Texas LLC	San Patricio	voestalpine Group	Hot-briquetted iron	do.	2.0	NA	(4)

do. Ditto. NA Not available.

[1]Table includes data available through August 26, 2020.

[2]As reported or calculated from data in company annual reports, oral communications, published online data, or U.S. Securities and Exchange Commission filings.

[3]Proven and probable reserves or equivalent, including those on owned and leased property, as reported in the company's annual public filing.

[4]Operator does not mine iron ore at this site and has no reserves.

TABLE 4
CONSUMPTION OF IRON ORE AT U.S. IRON AND STEEL PLANTS, BY TYPE OF PRODUCT[1]

(Thousand metric tons, gross weight)

Type of product	2018	2019
Blast furnaces:		
Pellets	30,800	29,300
Sinter[2]	4,530	4,380
Total	35,300	33,600
Steelmaking furnaces:		
Direct-shipping ore	1,160	1,160
Sinter[2]	159	--
Total	1,320	1,160
Grand total	36,600	34,800

-- Zero.

[1]Table includes data available through August 26, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes briquettes, nodules, and other forms.

Source: American Iron and Steel Institute.

TABLE 5
U.S. EXPORTS OF IRON ORE, BY COUNTRY OR LOCALITY AND TYPE OF PRODUCT[1, 2]

Country or locality and type of product	2018 Quantity (thousand metric tons)	2018 Value (thousands)	2018 Unit value[3] (dollars per metric ton)	2019 Quantity (thousand metric tons)	2019 Value (thousands)	2019 Unit value[3] (dollars per metric ton)
Country or locality:						
Austria	--	--	--	60	$5,570	92.77
Canada	9,790 r	$766,000 r	78.23 r	8,430	785,000	93.09
Germany	165	7,660	46.46	33	3,100	93.79
Japan	2,160	129,000	59.64	2,450	151,000	61.77
Mexico	590	57,500	97.51	84	6,250	74.43
Poland	--	--	--	43	1,530	35.63
Spain	--	--	--	80	29,700	(4)
Slovenia	--	--	--	41	1,370	33.32
United Kingdom	(5)	74	(4)	130	5,070	38.98
Other	3 r	645 r	(4) r	(5)	189	(4)
Total	12,700 r	961,000 r	75.59 r	11,400	989,000	87.12
Type of product:						
Coarse ores	(5)	28	(4)	(5)	9	(4)
Concentrates	68	10,000	146.04	200	43,300	(4)
Fine ores	1	293	(4)	31	1,810	58.52
Other agglomerates	230	9,150	39.83	233	8,190	35.15
Pellets	12,400 r	941,000 r	75.84 r	10,900	936,000	85.94
Total	12,700 r	961,000 r	75.59 r	11,400	989,000	87.12

[r]Revised. -- Zero.

[1]Table includes data available through August 6, 2020. Data are rounded to no more than three significant digits, except unit values; may not add to totals shown.

[2]All countries and (or) localities receiving less than 1,000 metric tons of exports from the United States in 2019 included in "Country or locality: Other." Includes agglomerates; excludes roasted iron pyrites.

[3]Average calculated from unrounded data by dividing total value by total tonnage.

[4]Value thought to be erroneous based on individual country value(s) in excess of normal value range; included in totals.

[5]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 6

U.S. IMPORTS OF IRON ORE, BY COUNTRY OR LOCALITY, AND TYPE OF PRODUCT[1, 2]

Country or locality and type of product	2018 Quantity (thousand metric tons)	2018 Value (thousands)	2018 Unit value[3] (dollars per metric ton)	2019 Quantity (thousand metric tons)	2019 Value (thousands)	2019 Unit value[3] (dollars per metric ton)
Country or locality:						
Australia	42	$4,690	111.52	42	$1,180	(4)
Bahrain	--	--	--	68	9,000	132.28
Brazil	2,370	251,000	105.68	2,190	279,000	127.32
Canada	853	78,500	92.08	838	113,000	134.77
Chile	96	7,710	80.52	117	13,700	117.50
Greece	--	--	--	31	4,790	154.39
Mauritius	6	303	55.00	65	3,600	55.37
Peru	31	1,730	56.20	68	5,120	75.22
Russia	134	16,700	124.52	327	46,300	141.69
South Africa	62	6,350	101.87	72	9,160	127.19
Sweden	163	16,200	99.47	122	11,100	90.64
Turkey	--	--	--	28	1,330	47.57
Venezuela	16	2,610	165.01	11	1,800	163.36
Other	29 r	2,190 r	(4)	2	388	194.00
Total	3,810	388,000	101.93	3,980	499,000	125.41
Type of product:						
Coarse ores	13	1,220	94.26	10	1,120	112.30
Concentrates	1,090	69,300	63.64	924	78,200	84.62
Fine ores	229	19,900	86.93	225	19,900	88.63
Other agglomerates	(5)	5	39.93	5	211	42.20
Pellets	2,470	297,000	120.23	2,820	400,000	141.93
Total	3,810	388,000	101.93	3,980	499,000	125.41

rRevised. -- Zero.

[1]Table includes data available through August 6, 2020. Data are rounded to no more than three significant digits, except unit values; may not add to totals shown.

[2]All countries and (or) localities receiving less than 1,000 metric tons of exports from the United States in 2019 included in "Country or locality: Other." Includes agglomerates; excludes roasted iron pyrites.

[3]Average calculated from unrounded data by dividing total value by total tonnage.

[4]Value thought to be erroneous based on individual country value(s) in excess of normal value range; included in totals.

[5]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS OF IRON ORE, BY CUSTOMS DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

Customs district	2018		2019	
	Quantity	Value	Quantity	Value
Baltimore, MD	7	688	7	669
Buffalo, NY	(3)	142	(3)	16
Charleston, SC	--	--	(3)	33
Chicago, IL	924	52,400	582	46,600
Cleveland, OH	1	167	1	157
Columbia-Snake, OR	65	7,240	42	1,180
Dallas-Fort Worth, TX	(3)	4	--	--
Detroit, MI	17	1,240	--	--
Great Falls, MT	(3)	73	(3)	52
Houston-Galveston, TX	154 r	15,100	227	21,800
Los Angeles, CA	--	--	12	1,510
Mobile, AL	--	--	21	2,980
New Orleans, LA	2,620	309,000	3,070	423,000
New York City, NY	(3)	26	(3)	70
Ogdensburg, NY	(3)	45	--	--
Savannah, GA	--	--	(3)	2
St. Albans, VT	(3)	128	--	--
Tampa, FL	12	1,160	18	1,240
Total	3,810	388,000	3,980	499,000

[r]Revised. -- Zero.

[1]Table includes data available through August 6, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes agglomerates; excludes roasted iron pyrites.

[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8
SALIENT IRON STATISTICS FOR SELECTED COUNTRIES OR LOCALITIES[1]

(Million metric tons, gross weight)

	2018					2019						
	Production					Production					Reserves, yearend 2019	
Countries or localities	Ore	Metallics	Consumption[2]	Exports[3]	Imports[3]	Ore	Metallics	Consumption[2]	Exports[3]	Imports[3]	Crude ore	Iron content
Australia	908 r	--	7 r	835 r	1	919	--	7	838	--	48,000	23,000
Brazil	460	--	43 r	390	--	405	--	39	380 e	(4)	29,000	15,000
Canada	52	2	13 r	48	10	58	2	11	52	17	6,000	2,300
China	335	--	1,320 r	11 r	1,060 r	351	--	1,200	9 e	1,000 e	20,000	6,900
Germany	--	1	42 r	(4)	41	--	1 e	39	1	39	NA	NA
India	204 r	34 r	170 r	18	16	238	37	162	31	2	5,500	3,400
Iran	36	26	37	--	--	33	28	40	--	--	2,700	1,500
Japan	--	--	122 r	--	120 e	--	--	111	--	120 e	40	24
Kazakhstan	42	--	5 r	10	(4)	22	--	4	10	(4)	2,500	900
Korea, Republic of	(4)	--	78 r	(4) r	73	(4)	--	70	(4)	75	NA	NA
Mexico	22	6 e	15 r	(4)	3	11	6	14	(4)	3 e	NA	NA
Russia	96	8 e	93 r	19	8	98	8	86	22	8 e	25,000	14,000
South Africa	74	1	7 r	64	(4) r	72	1	7	67	1	1,300	600
Sweden	36	--	5	24	(4)	36	--	5	24 e	(4)	1,300	600
Ukraine	64 r	--	33 r	37	(4)	63	--	30	36 e	(4)	6,500	2,300
United States	50	3 r	41 r	13	4	47	4	38	11	4	3,000	1,000
Other	86 r	26 r	208 r	141 r	201 r	102	22	187	113	196 e	18,000	9,500
Total	2,470 r	106 r	2,240 r	1,570 r	1,540 r	2,460	107	2,050	1,560	1,470	170,000	81,000

eEstimated. rRevised. NA Not available. -- Zero.

[1]Table includes data available through August 6, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Calculation based on direct-reduced iron and pig iron production.

[3]Data, where available, are sourced from the United Nations COMTRADE Database. Estimates were made to supplement missing or erroneous data.

[4]Less than ½ unit.

TABLE 9
IRON ORE: WORLD PRODUCTION, BY COUNTRY OR LOCALITY[1]

(Thousand metric tons)

Country or locality	Usable ore					Iron content				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Algeria	944	826	497	706 r	777	500	438	263 r	374 r	412
Argentina	197	94	25	25 e	25 e	118	56	15	15 e	15 e
Australia	809,882	858,026	885,357	907,819 r	918,731	500,994	531,075	548,297	562,137 r	568,965
Austria	2,783	2,777	2,982	2,804	2,830	891	889	954	897	897
Azerbaijan	128	26	--	--	--	61	12	--	--	--
Bhutan	43	28	33	38 r	37	27	17	20	24 r	23
Bosnia and Herzegovina	2,123	1,752	1,622	1,380	1,450	1,330	1,090	1,010	863	906
Brazil	430,838	421,358	453,704	460,000	404,900	276,000 r	268,000 r	289,000 r	293,000 r	258,000
Canada	46,220	46,731	50,300	52,387	58,472	27,700 e	28,100 e	30,200 e	31,500 e	35,200 e
Chile	15,448	14,619	15,426	14,013	13,137	9,148	9,009	9,549	8,493 r	8,427
China	396,899	365,573	345,472	334,790	351,000	247,665	228,118	215,989	209,311	219,000
Colombia	902	716	713	572	650	541	429	428	344	391
Congo (Brazzaville)	--	--	--	40 e	70 e	--	--	--	26 e	46 e
Egypt	1,500	509	565	500	500	938	318	353	312	312
Germany, concentrate	468 r	--	--	--	--	--	--	--	--	--
Greece[2]	2,340	2,209	2,284	2,115 r	2,110 e	580	547	566	524 r	524 e
India	142,399	184,501	201,815	204,091 r	238,144	88,287	114,000	125,000	127,000 r	148,000
Indonesia, iron sand	3,056	2,574	1,967	1,321 r	3,450	1,710	1,440	1,100	661 r	1,730
Iran	48,427	45,890	33,967	36,435	33,093	31,800	30,100	22,200	23,900	21,700
Kazakhstan	37,270	35,794	38,728	41,877	21,967	11,566	10,101	10,812	11,728 r	6,150
Kenya	--	--	--	55 e	--	--	--	--	31 e	--
Korea, North	4,910	5,250	5,740	3,280 r	3,300 e	3,040	3,250	3,560	2,030 r	2,030 e
Korea, Republic of	445	445	311	383	342	249	249	174	214	192
Laos	235	115	250	99 r	100 e	146	71	155	62 r	60 e
Liberia	4,530	1,405	1,934	3,934	4,088	2,830	878	1,210	2,460	2,560
Malaysia	1,625	1,914	3,920	3,354	4,160	1,020	1,150	2,450	2,090	2,600
Mauritania	11,607	13,268	11,714	10,711	12,200	7,250	8,290	7,320	6,694	7,625
Mexico	21,400	19,200	18,600	22,300	11,300	13,462	12,090	11,713	14,021	7,141
Mongolia	6,061	4,936	7,695	6,225	8,572	3,637	2,960	4,620	3,740	5,140
Morocco	18	15	100	51 r	51 e	10	5	55	28 r	28 e
New Zealand, iron sand[2]	3,194	3,496	4,008 r	4,000 r	4,000	1,820	1,990	2,280 r	2,270 r	2,270
Nigeria	6	2	2 r	2 r	2	4	1	1 r	1 r	1
Norway	3,519	--	--	--	--	2,182	--	--	--	--
Pakistan	439	471	616	685 r	627	140	151	197	219 r	202
Peru	10,908	11,418	13,100 r, e	14,200 e	15,100 e	7,321	7,663	8,806	9,534	10,120
Philippines	107	17	--	--	--	68	11	--	--	--
Russia, concentrate	101,049	101,097	95,042 r	96,063	97,531	59,619	59,647	56,074 r	56,700	64,287
Sierra Leone	18,000	4,108	6,985	923	171	10,400	2,380	4,050	535	97
South Africa	72,806	66,456	74,857	74,264	72,430	46,000	43,000	47,600	47,200	41,200

See footnotes at end of table.

TABLE 9—Continued
IRON ORE: WORLD PRODUCTION, BY COUNTRY OR LOCALITY[1]

(Thousand metric tons)

Country or locality	Usable ore					Iron content				
	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Sweden	24,500	26,900	31,764	35,774	35,700	15,200	16,700	17,000 r	22,200	22,100
Thailand	16	--	(3) r	--	30	10	--	(3) r	--	19
Togo	72	60 e	60 e	60 e	60 e	22	18 e	18 e	18 e	18 e
Tunisia	285	285	240	300	300 e	178	178	150	188	188
Turkey	7,761	7,137	9,992	9,550	16,382	4,700	4,320	6,050	5,777	9,110
Uganda	9	2	2	11	--	6	1	2	7	--
Ukraine[4]	66,900	62,876	60,574	60,549 r	63,205	41,800	39,300	37,900	37,800 r	39,500
United States	46,100	41,800	47,900	49,500	46,900	28,800	26,400	30,300	31,300	29,800
Uruguay[5]	12	3	3	6 r	6 e	5	1	1	1	1 e
Venezuela	11,716	12,000	4,005	2,474	1,096	7,323	7,500	2,500	1,550	682
Vietnam	5,086	5,770	5,515	5,588 r	5,591	2,691	3,056	2,920	2,890	2,890
Total	2,370,000 r	2,370,000	2,440,000	2,470,000 r	2,450,000	1,460,000	1,460,000 r	1,500,000	1,520,000	1,520,000

eEstimated. rRevised. -- Zero.

[1]Table includes data available through August 19, 2020. All data are reported unless otherwise noted. Totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Production includes alternative iron ore source as follows: Greece (nickeliferous iron ore) and New Zealand (titaniferous magnetite beach sands).

[3]Less than ½ unit.

[4]Data revised to reflect change in Ukraine's geopolitical reporting areas.

[5]Production is based on fiscal year, with a starting date of April 1 of the year shown.

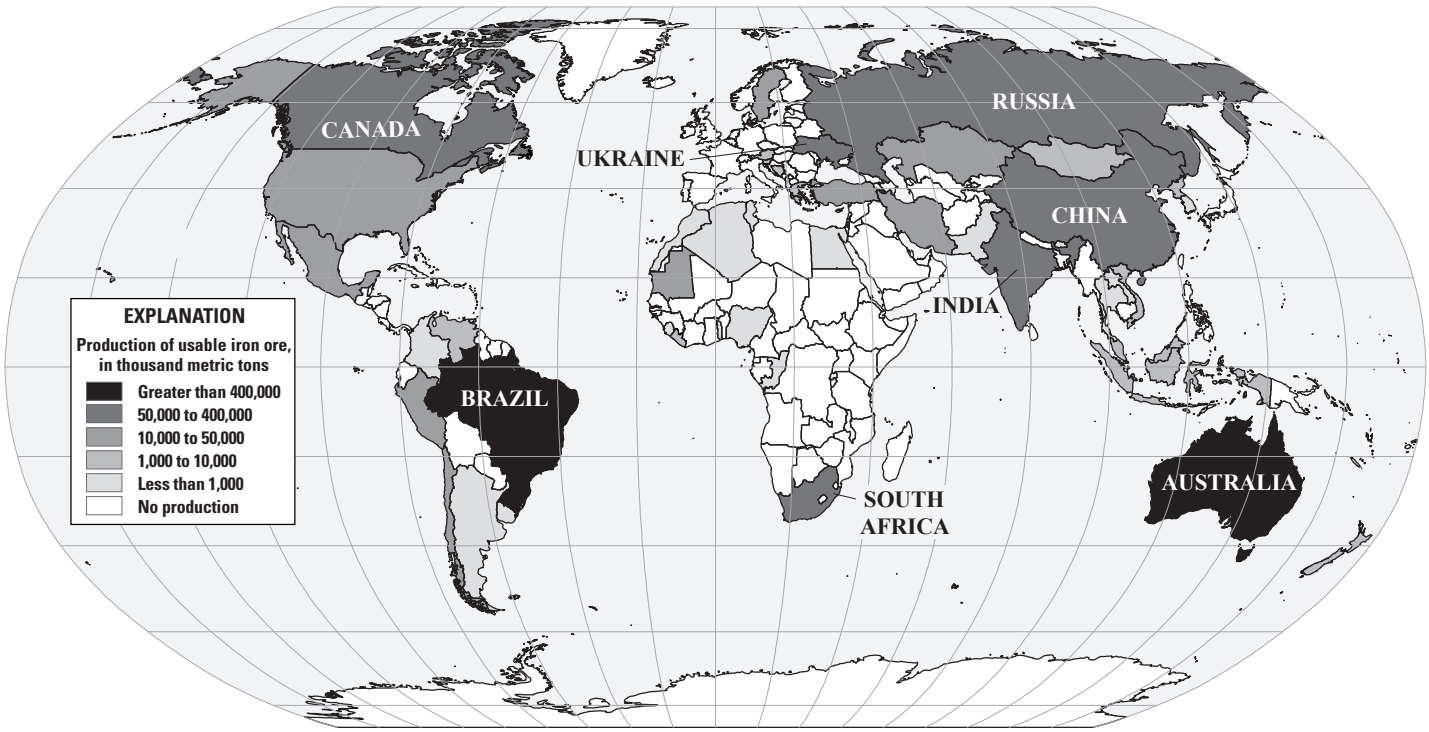

Figure 1. Global production of usable iron ore (gross weight) in 2019.