

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

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

**Domestic Production and Use:** In 2016, mines in Michigan and Minnesota shipped 98% of the usable iron ore products in the United States—the remaining 2% of domestic iron ore was produced for nonsteel end uses—with an estimated value of \$3.4 billion. Nine iron ore mines (seven open pits and two reclamation operations) and two iron metallic plants, including direct-reduced iron (DRI) and iron nugget producers, operated during the year to supply steelmaking raw materials. Each open pit mine site included a concentration plant and a pelletizing plant. A stand-alone pelletizing plant in Indiana used iron ore fines from reclamation plants in Minnesota. The United States was estimated to have produced and consumed 2.0% of the world's iron ore output.

| <b>Salient Statistics<sup>2</sup>—United States:</b>                                   | <b>2012</b> | <b>2013</b> | <b>2014</b> | <b>2015</b> | <b>2016<sup>e</sup></b> |
|--|-------------|-------------|-------------|-------------|-------------------------|
| Production   |             |             |             |             |                         |
| Iron ore   | 54.7        | 52.8        | 56.1        | 46.1        | 40.8                    |
| Iron metallics   | 0.4         | 0.5         | 2.0         | 1.4         | 2.0                     |
| Shipments  | 53.9        | 53.4        | 55.0        | 43.5        | 43.5                    |
| Imports for consumption  | 5.2         | 3.2         | 5.1         | 4.6         | 5.2                     |
| Exports  | 11.2        | 11.0        | 12.1        | 7.5         | 6.6                     |
| Consumption:   |             |             |             |             |                         |
| Reported (ore and total agglomerate)   | 46.9        | 44.2        | 44.4        | 38.5        | 41.0                    |
| Apparent <sup>3</sup>  | 46.5        | 47.1        | 47.0        | 39.7        | 42.8                    |
| Value, U.S. dollars per metric ton   | 116.48      | 87.42       | 84.43       | 81.19       | 82.41                   |
| Stocks, mine, dock, and consuming plant, yearend, excluding byproduct ore              | 4.44        | 2.35        | 4.46        | 7.86        | 4.50                    |
| Employment, mine, concentrating and pelletizing plant, number                          | 5,420       | 5,644       | 6,273       | 4,802       | 3,589                   |
| Net import reliance <sup>4</sup> as a percentage of apparent consumption (iron in ore) | E           | E           | E           | E           | E                       |

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

**Import Sources (2012–15):** Canada, 60%; Brazil, 29%; and other, 11%.

| <b>Tariff: Item</b>         | <b>Number</b> | <b>Normal Trade Relations<br/>12–31–16</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 decreased in 2016 owing to decreases in steel produced from basic oxygen furnaces, which consume iron ore, and an overall decrease in U.S. steel production from 88.2 million tons in 2014 to 78.9 million tons in 2015 to an estimated 80 million tons in 2016. Continued increases in the share of steel produced from electric arc furnaces, which use steel scrap and DRI, offset steel production requiring iron ore. Despite modest increases in the price of seaborne iron ore during the year, major price declines in recent years have not been offset. In October 2016, the spot price for iron ore fines (62% iron content) imported into China (cost and freight into Tianjin port) was \$58.02 per ton, an increase from \$52.74 in October 2015, but still well below \$80.09 and \$132.57, prices seen in October 2014 and 2013, respectively.

During the year, six iron ore mines in the United States had either been idled, reduced production, or closed permanently. As of November, one open pit mine and its associated facilities in Minnesota remained indefinitely idled with no plans to reopen. In Michigan, an open pit mine and its associated facilities were permanently shut down at the end of August 2016. Two iron ore pellet operations and associated mines resumed operations in Minnesota during the year after being idled since the third quarter of 2015. One company, whose subsidiary operated four iron ore

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tailings reclamation facilities in Minnesota and one pellet plant in Indiana, was released from its contract with the subsidiary in bankruptcy court in October 2016. The ruling effectively shut down the remaining operations for the company, which had already idled three of its facilities in mid-year 2015 and early 2016, with no plans to reopen any facilities.

A 2.5-million-ton-per-year DRI plant was temporarily idled in January 2016; the plant underwent maintenance during the shutdown and was expected to reopen at a higher production rate. A 2-million-ton-per-year hot-briquetted iron facility in Texas commenced operations in late October 2016. Construction on a 7-million-ton-per-year iron ore project in Minnesota ceased after the operating company filed for bankruptcy. The company was estimated to owe \$140 million to the State of Minnesota and vendors, prompting the State to rescind mineral rights for the project; however, the bankruptcy court temporarily blocked the order, allowing the company until February 2017 to develop a financial plan to finish the project and pay its creditors.

Projects aimed at increasing production continued among the leading iron ore companies in Australia and Brazil, although production guidance for 2016 was reduced in the third quarter of 2016. In India, mining bans were lifted, prompting an increase in iron ore production. Imports of iron ore into China, the world's leading consumer, were forecast to decrease by 33 million tons in 2016. Following a 3% decrease in 2015, global steel consumption was forecast to increase slightly to 1,500 million tons in 2016 and 1,510 million tons in 2017.

**World Mine Production and Reserves:** Reserves for the United States, Australia, Canada, China, and South Africa were revised based on Government and industry information. In the United States, reserves were adjusted to reflect the closure of mines.

|                       | Mine production |                   |              |                   | Reserves <sup>5</sup> |              |
|-----------------------|-----------------|-------------------|--------------|-------------------|-----------------------|--------------|
|                       | Usable ore      |                   | Iron content |                   | Crude ore             | Iron content |
|                       | 2015            | 2016 <sup>e</sup> | 2015         | 2016 <sup>e</sup> |                       |              |
| United States         | 46              | 41                | 29           | 26                | 3,000                 | 790          |
| Australia             | 817             | 825               | 486          | 491               | 52,000                | 23,000       |
| Brazil                | 397             | 391               | 257          | 254               | 23,000                | 12,000       |
| Canada                | 46              | 48                | 28           | 29                | 6,000                 | 2,300        |
| China <sup>6</sup>    | 375             | 353               | 232          | 219               | 21,000                | 7,200        |
| India                 | 156             | 160               | 96           | 98                | 8,100                 | 5,200        |
| Iran                  | 27              | 26                | 13           | 11                | 2,700                 | 1,500        |
| Kazakhstan            | 21              | 21                | 12           | 12                | 2,500                 | 900          |
| Russia                | 101             | 100               | 61           | 60                | 25,000                | 14,000       |
| South Africa          | 73              | 60                | 46           | 38                | 1,200                 | 770          |
| Sweden                | 25              | 25                | 15           | 15                | 3,500                 | 2,200        |
| Ukraine               | 67              | 58                | 40           | 35                | 7,600                 | 2,300        |
| Other countries       | 132             | 120               | 82           | 75                | 18,000                | 9,500        |
| World total (rounded) | 2,280           | 2,230             | 1,400        | 1,360             | 170,000               | 82,000       |

**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.

<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>Salient statistics are for all forms of iron ore used in steelmaking, except iron metallica, which include direct-reduced iron, hot-briquetted iron, and iron nuggets. Iron metallica production is listed separately and based on nondomestic iron ore consumption.

<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>See [Appendix C](#) for resource and reserve definitions and information concerning data sources.

<sup>6</sup>Production reported for China in 2015 and 2016 were on a usable ore basis, with iron content calculated from the useable ore. Previously, crude ore production for China had been reported and footnoted as such.

<sup>7</sup>For Ukraine, reserves consist of the A+B categories of the former Soviet Union's reserves classification system.