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IRON ORE

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Iron Ore

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U.S. iron ore production decreased slightly to 54.0 million metric tons (Mt) in 2012 from 54.7 Mt in 2011. Reported consumption (iron ore and agglomerates) increased slightly to 46.9 Mt in 2012 from 46.3 Mt in 2011 (table 1). World iron ore production, by gross weight of the final mine product regardless of iron content, remained nearly unchanged at 2.93 billion metric tons (Gt) in 2012, with the average iron content increasing slightly, from that in 2011. China was the leading producer of iron ore accounting for 45% of gross iron ore production (about 28% by metal content), followed by Australia, Brazil, and India (table 14). These four countries accounted for about 81% of global iron ore production by gross weight.

Iron ore is the basic raw material for producing steel, a metal critical to the economies of all industrialized nations. In the United States, low-grade iron ore is concentrated to reach, on average, the 62% or greater iron (Fe) content benchmark required globally for steel production. The concentrates can then be agglomerated using binders to create iron ore pellets for more efficient melting in blast furnaces. Almost 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 can then be transferred to basic oxygen furnaces (BOF) for the removal of residual carbon and conversion to steel.

Minimills use electric arc furnaces (EAF) to produce steel from alternative forms of iron and recycled steel scrap. Steel scrap is an important supplement to iron ore in steelmaking. Direct reduced iron (DRI), also known as sponge iron, may be used in conjunction with scrap as an alternative EAF feed. DRI is created by chemically reducing iron ore in a rotary hearth furnace to 90% to 94% Fe. Iron nuggets, a form of pig iron containing greater than 95% Fe, and reduced slag, may also be used as feedstock for EAF steel production.

Two iron oxides—hematite (Fe_2O_3) and magnetite (Fe_3O_4)—are the primary ore minerals of iron 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% Fe, 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 are becoming increasingly economical to process as a primary source of iron.

Iron ore may be used for non-steel applications including iron oxide pigments, crushed road base material, heavy media separation, radiation shielding, ballast, coal washing, cement clinker production, and other specialty applications. These applications represent a relatively small portion of iron ore consumption and some applications require costly beneficiation to create high-grade products. Data for these applications are not included in U.S. Geological Survey (USGS) production, shipping, or consumption tables for iron ore.

Blast furnaces in the United States consumed 40.6 Mt of iron ore pellets in 2012, an increase of 3.4% from that in 2011. Steelmaking furnaces consumed a total of 46.9 Mt of direct-shipping ore and sintered products in 2012, a slight increase from that in 2011 (table 6).

Materials consumed for steel production included 5.4 Mt of fluxes (fluorspar, limestone, lime, and other fluxes) and 9.6 Mt of coke. Imported iron ore supplemented domestically produced iron ore in the production of pig iron, which was used along with imported pig iron and scrap to produce raw steel. Pig iron produced in the United States in 2012 increased by 6% to 35.3 Mt, from 33.3 Mt in 2011.

Raw steel production in the United States increased to 88.7 Mt in 2012 from 86.4 Mt in 2011. Raw steel produced using BOFs increased to 40.0 Mt in 2012, from 37.8 Mt in 2011, and raw steel produced using EAFs increased to 57.8 Mt in 2012 from 57.4 Mt in 2011. The United States imported 9.2 Mt of iron (including pig iron, sponge iron, and cast iron) and ferroalloy products in 2012, an increase from 8.2 Mt in 2011, and exported 405,000 metric tons (t) of iron and steel products in 2012, a decrease from 467,000 t in 2011. In 2012, U.S. net exports (exports minus imports) of pig iron, sponge iron, and scrap were 10.8 Mt, a decrease from 14.3 Mt in 2011 and 13.6 Mt in 2010.

Integrated steel mills in the United States produced steel from iron ore and imported pig iron and semi-finished steel; minimills produced steel from DRI and scrap. In 2012, the minimill sector of the steel industry accounted for 59% of U.S. raw steel production (American Iron and Steel Institute, 2013, p. 37–38, 51, 72, 77, 79–80).

Legislation and Government Programs

The Minnesota tax rate for taconite production increased in 2012 to $2.465 per taxable long ton of concentrates from $2.412 in 2011. The taxable tonnage for 2012 was based on the average tonnage produced in 2010–12. The taconite production tax rate was determined as a function of percentage change in the Gross Domestic Product Implicit Price Deflator from the fourth quarter of the second preceding year to the fourth quarter of the preceding year multiplied by the prior year's rate (Minnesota Department of Revenue, 2013, p. 5–6).

In 2012, the Michigan legislature enacted comprehensive tax reform bills designed to spur growth in the State's mining industry. Personal property tax burdens for large-scale manufacturers' property will phase out beginning in 2016, and new severance taxes will be offset by a property tax credit once mining has begun. The bills were designed to ease upfront costs for new miners and would base taxes on mining revenues as opposed to the size of the ore body (Michigan.gov, 2012).

A "Low-Grade Hematite Credit" was offered by the Michigan Department of Treasury in 2012 equal to $1 per long ton of low-grade hematite pellets produced domestically for pig iron and steel production (Michigan Department of the Treasury, 2012).

Production

The USGS developed the U.S. iron ore data shown in tables 1 through 4 through an annual "Iron Ore" survey, which was sent to mines that provide iron ore for steel production. This information was supplemented by employment data, tax records, and mine inspection reports. Steel plant data were compiled by the American Iron and Steel Institute (AISI). In 2012, domestic iron ore production was 54.0 Mt, slightly less than the 54.7 Mt produced in 2011. Domestic iron ore supply (production minus exports) met 91% of domestic demand in 2012.

Indiana.—Reynolds, IN, was selected as the site of Magnetation LLC's (Grand Rapids, MN) new pelletizing plant. The plant was expected to become operational by the end of 2014, at a projected capital investment of $300 to $350 million. It was expected to use existing railways and highways and produce 3 Mt of iron ore pellets per year (Magnetation LLC, 2012). Magnetation also planned to build two hematite reclamation plants alongside their existing plants and infrastructure near Coleraine, MN, for an additional $120 million investment.

In 2012, Iron Dynamics (a subsidiary of Steel Dynamics colocated in Butler, IN) produced 226,000 t of hot-briquetted iron, of which 208,000 t was converted directly into liquid pig iron. Production of liquid pig iron, a product that supplements scrap as feed for electric arc furnaces, began in 2011 (Steel Dynamics, Inc., 2013, p. 17–18).

Minnesota.—Minnesota produced approximately 77% of the iron ore used for steel-making in the United States in 2012; a majority of this output was pellet production. Almost all of the production came from open pits on the Mesabi Iron Range and from reworked tailings. Minnesota's taxable production of taconite ore shipped from mines (unless otherwise noted) by operating company was as follows: Minorca Mine (ArcelorMittal S.A., Luxembourg, Luxembourg) produced 2.82 Mt of flux pellets (containing less than 2% flux) and 59,400 t of pellet chips; Hibbing Taconite Co. [joint venture of ArcelorMittal (62.3%), Cliffs Natural Resources Inc. (Cleveland, OH) (23%), and U.S. Steel Canada (Ontario, Canada) (14.7%)] produced 8.06 Mt; United Taconite Co., LLC (Cliffs Natural Resources Inc.) produced 5.21 Mt; Northshore Mining Co. (Cliffs Natural Resources Inc.) produced 5.68 Mt; Magnetation LLC produced 272,000 t of natural ore from its Plant One and 388,000 t from its Plant Two; Mining Resources LLC produced 63,700 t of natural ore from 345,000 t of iron ore tailings; and United States Steel Corp. (U.S. Steel) (Pittsburgh, PA) produced 5.14 Mt from its Keetac Mine (Keewatin Taconite Co.) operation and 13.4 Mt from its Minntac operation (Austin, 2012, p. 8–9).

Cliffs Natural Resources Inc. (Cliffs) reported that in 2012 the North American operations Empire, Hibbing Taconite, Northshore, Tilden, and United Taconite Mines in the United States and Bloom Lake and Wabush Mines in Canada produced a combined 38 Mt. Cliffs' share of the total production was 22.5 Mt from United States' operations and 8.5 Mt from Canada's operations, essentially equal to that of 2011. Overall, Cliffs' iron ore sales revenue decreased in 2012 by 27% from that of 2011, to $3.44 billion (Cliffs Natural Resources Inc., 2013, p. 8, 64–66).

U.S. Steel continued with plans to expand pelletizing capacity at its Keetac Mine to 9.6 Mt from 6 Mt at an anticipated cost of $820 million. Final permitting was completed in December 2011. U.S. Steel was considering investing in alternative energy technologies for iron and steel-making production, including gas-based, direct-reduced iron and electric arc furnace steelmaking (United States Steel Corp., 2013, p. 13–14).

Mining Resources, LLC (Chisholm, MN) [joint venture of Steel Dynamics, Inc. (Fort Wayne, IN) (80%) and Magnetation, Inc. (20%)] began operating in the fourth quarter of 2012 and full production capacity was expected to be reached during the first half of 2013. Mining Resources mined tailings basins or stockpiles and shipped concentrates to Mesabi Nugget Delaware LLC's (Aurora, MN) iron nugget production facility. Mesabi Nugget produced and shipped 169,000 t of iron nuggets (average 97% Fe) in 2012, 160,000 t in 2011, and 67,000 t in 2010, with annual production expected to reach 500,000 t using the ITmk3® iron nugget production process. During a 6-week outage, Mesabi Nugget began projects that were expected to increase volume and improve product quality following its completion in the first half of 2013. Mesabi Mining, LLC, a planned iron ore mine colocated with Mesabi Nugget, was still undergoing permitting at the end of 2012 (Steel Dynamics, Inc., 2013, p. 17–18).

According to a study by the University of Minnesota Duluth's Labovitz School of Business and Economics published in 2012, Minnesota's iron ore industry was responsible for an annual economic contribution in excess of $3 billion. A 2012 report indicated that mining, processing, and shipping were directly responsible for 11,500 jobs in the State and accounted for 5% of the State's economy and 30% of northeastern Minnesota's gross regional product in 2010 (Steel Guru, 2013).

Utah.—In 2012, CML Metals Corp. produced a combined 1.44 Mt of direct-shipping ore (up to 54% Fe) and concentrates (up to 67% Fe) in 2012, an 11% increase from 1.29 Mt produced in 2011. Sales in 2012 totaled $158 million, at an average of $110 per ton, a 32% increase in sales from 2011 (Boden and others, 2013). An onsite concentrator was opened in 2012 providing 1.8 million metric tons per year (Mt/yr) of concentrate (67% Fe) production capacity.

The redeveloped Comstock/Mountain Lion Mine was reopened in 2010 as CML Metals Corp., a subsidiary of CML Holdings (Strack, 2013). National Instrument 43–101-compliant resources were estimated to be 28.4 Mt averaging 48.6% Fe and stockpiles of 8.2 Mt at 33.9% Fe (Palladon Ventures Ltd., 2009).

Environment

The U.S. Environmental Protection Agency (EPA) considered imposing tighter limits on nitrogen oxide (NO_x) and sulfur dioxide emissions and other airborne pollutants for taconite plants as part of the National Emission Standards for Hazardous Air Pollutants specific to Integrated Iron and Steel

Manufacturing. Tighter emissions restrictions for the industry were proposed in order to reduce haze and other contaminants found in national parks, specifically those within close proximity to northeastern Minnesota. Following a 7-year study, the Minnesota Pollution Control Agency concluded that six of Minnesota's taconite plants contributed to more hazy days than a nearby coal-fired powerplant. The study also concluded that the largest taconite plant in the area contributed, on average, to haze every other day. The EPA-proposed limits could require taconite plants to use the best available retrofit technology such as a low-NO_x burner designed to reduce nitrogen emissions, within 5 years. Minnesota's plan was for plants to use current best practices and operate furnaces efficiently and cleanly (Hemphill, 2012).

On January 15, 2013, the EPA issued a Federal Implementation Plan and established compliance requirements for six taconite facilities in Minnesota and one in Michigan. The plan included a requirement to install and operate continuous air monitoring systems and set NO_x emission limits based on cost-effective measures. The final rule went into effect on January 2, 2013 (U.S. Environmental Protection Agency, 2013).

In March 2012, the EPA released updated rules and procedures for reporting greenhouse gas emissions at integrated iron and steel facilities emitting more than 25,000 t of greenhouse gases per year (U.S. Environmental Protection Agency, 2012b). In September, the EPA released a report outlining technologies specific to reducing greenhouse gases associated with the iron and steel industry (U.S. Environmental Protection Agency, 2012a).

Consumption

Pig iron production was 35.3 Mt in 2012, a 6.1% increase relative to that in 2011 (American Iron and Steel Institute, 2013, p. 77). Raw steel production using BOF technology, which had decreased in 2009 to the lowest level in more than a decade, continued to increase in 2012, reaching 40.0 Mt, 5.8% more than that in 2011. Electric arc furnaces increased raw steel production slightly from that in 2011 to 57.8 Mt in 2012 (American Iron and Steel Institute, 2013, p. 72).

In 2012, U.S. consumption of iron ore, including agglomerates, reported to the AISI by producers of iron and steel totaled 46.9 Mt, including 40.6 Mt of pellets; 5.6 Mt of sinter, briquettes, and other products; and 0.5 Mt of direct-shipping ore (table 6). Of the ore consumed, 89% was domestic production; 8.1%, imports from Canada; and 2.8%, imports from other countries (table 9).

With the exception of iron oxides and cement clinker, USGS surveys do not include production or consumption of iron ore for miscellaneous, non-steel end uses. Iron ore consumed in the production of clinker for cement was estimated at 670,000 t in 2012 (U.S. Geological Survey, 2014, table 6). In 2012, U.S. imports for consumption of iron oxides, natural and synthetic, were 151,000 t and finished pigments sold totaled 48,400 tons (Tanner, 2013, table 1).

The United States produced no DRI from 2009 until 2011. In 2011 and 2012, Iron Dynamics produced and directly consumed 230,000 t and 226,000 t of hot-briquetted iron (HBI), respectively, of which 86% and 92%, respectively, were converted directly into liquid pig iron. The iron was consumed along with scrap steel in the mill's electric arc furnace (Steel Dynamics, Inc., 2013, p. 17–18). Iron Dynamics was estimated to have 0.5 Mt/yr DRI production capacity (Midrex Technologies, Inc., 2013, p. 13).

Transportation

The Lake Carriers' Association (LCA) reported that iron ore shipments on the Great Lakes were 45.2 Mt in 2012, a decrease of 4.3% compared with those in 2011 (Lake Carriers' Association, 2013). As is typically the case, monthly fluctuations in shipments, production, sales, and stocks of iron ore in Minnesota and Michigan from December through April were attributed to the closing and reopening of the Soo Locks at Sault Ste. Marie, MI, as well as to freezing lake surfaces requiring U.S. Coast Guard ice breakers to open shipping channels. The locks were closed by the U.S. Army Corps of Engineers for seasonal maintenance in March 2012. The LCA began maintenance on repair facilities and shipyards on the Great Lakes in December 2012 to ensure continuous operation during the upcoming shipping season. Investments were estimated to be as much as $3 million per vessel. Most of the construction was expected to take place after January 15 and last through early March (Lake Carriers' Association, 2012).

Prices

In 2012, the average value of iron ore produced in the United States was $98.16 per metric ton, a decrease from $99.45 per metric ton in 2011. The average value of exported iron ore was $128.43 per metric ton, ranging from an average $68.55 per metric ton for coarse ores to $145.95 per metric ton for pellets (table 8). The average value of imported iron ore was $147.50 per metric ton, ranging from an average of $48.00 per metric ton for other agglomerates to $157.05 per metric ton for pellets (table 9).

The producer price index (PPI) for iron ore under North American Industry Classification System (NAICS) code 212210, which included crude, concentrates, agglomerates, and pellets increased from 199.2 in January 2012 (December 1997=100) to 204.5 in April, and then decreased to 178.7 at yearend. The 2012 average index of 190.0 was 6.3% greater than the average of 173.8 in 2011. The PPI measured the average change in the selling prices charged by domestic producers of iron ore over time (U.S. Bureau of Labor Statistics, 2013).

The average spot price of imported Australian iron ore fines at 62% Fe at the port of Tianjin, China, rose in April from $140.35 per metric ton in January to $147.65 per metric ton before steadily declining to $99.47 per metric ton in September. The price rose to $128.87 per metric ton at yearend because of global supply disruption, which included 1.6 Mt of production losses attributed to worker strikes at Sishen Mine, South Africa; 1 Mt of shipment losses from protests at the Carajas Mine, Brazil; and production losses owing to mining bans in Goa, India (Index Mundi, undated; Anglo American plc, 2012; Parra-Bernal, 2012; Shanker and Singh, 2012).

Foreign Trade

In 2012, U.S. net exports of iron ore totaled 6.1 Mt. Exports increased slightly, while imports decreased slightly compared with 2011. U.S. iron ore pellet exports accounted for 74% (8.3 Mt) of total exports. Of the exports, 57% were shipped to steel companies in Canada, 37% to China, and 6% to Spain (table 7). U.S. imports totaled 5.1 Mt, of which Canada accounted for 74% and Brazil accounted for 14%. Imports from the following countries increased: Argentina, 9%; Mexico, 74%; Peru, 214%; and United Kingdom, no prior-year imports. Imports from the following countries decreased: Chile, 37%; South Africa, 38%; Trinidad and Tobago, 11%; and Venezuela 73% (table 9).

World Industry Structure

Production.—World iron ore production based on gross weight (2.9 Gt) and iron content (1.39 Gt) increased slightly from that of 2011. Gross weight includes reporting by China of crude ore, rather than ore concentrate and direct-shipping ore. By iron content, China remained the leading iron ore producer (393 Mt of ore), followed by Australia (315 Mt), Brazil (257 Mt), and India (92 Mt). These four countries accounted for about 76% of the world production of iron ore (by iron content). In 2012, iron ore was produced in 42 countries, with production exceeding 1 Mt (by iron content), in 24 of those countries (table 14). World DRI production increased slightly to 74.0 Mt (Midrex Technologies, Inc., 2013).

Consumption.—Although not a direct measure, imports of iron ore and production of crude steel, DRI, and pig iron can be used as indicators as to whether global iron ore consumption will rise or fall. DRI and pig iron production are likely to be more direct indicators of iron ore consumption than crude steel production because, to a varying degree in each country, part of steel production comes from scrap consumption at minimills. World consumption of iron ore was estimated to have remained stable in 2012, owing to an increase in the production of pig iron (2.0%) and a decrease in the production of DRI (3.8%) compared with 2011.

World crude steel production increased to 1.53 Gt in 2012 from 1.51 Gt in 2011. In 2012, nine countries each produced more than 30 Mt of crude steel and, combined, accounted for more than 80% of world production. Of those countries, China produced about 26 Mt more crude steel in 2012 than in 2011; India produced 4.5 Mt more; the Republic of Korea, Russia, and Turkey had a combined production increase of 4.5 Mt; and Brazil, Germany, and Japan each had a production decrease of about 2 Mt. In 2012, crude steel produced in the United States increased 2.7% from that in 2011 to 88.6 Mt (United Nations Conference on Trade and Development, 2013, p. 136–138).

Trade.—Reported world iron ore imports rose by 4.9% to 1.17 Gt in 2012 compared with 2011. This continued the trend of year-over-year increases in imports during the past 11 years, with tapering increases over the past 3 years. Since 2002, four countries, China, Germany, Japan, and the Republic of Korea, have accounted for more than two-thirds of world iron ore imports, with their combined share increasing to 84% in 2012 from 62% in 2002. China's share more than tripled during this 10-year period to 64% from 21%. Germany's share decreased to 3.2% from 8.4%, Japan's share decreased to 11% from 24%, and the Republic of Korea's share decreased to 6% from 8% (United Nations Conference on Trade and Development, 2013, p. 121–122).

Reported world iron ore exports of 1.13 Gt increased slightly in 2012 compared with 2011. Six countries accounted for more than 84% of world iron ore exports. Australia was the source of 41% of iron ore exports; Brazil, 29%; South Africa, 4.8%; Ukraine, 3.1%; Canada, 3.0%; and India, 2.9% (United Nations Conference on Trade and Development, 2013, p. 119–120).

Exploration.—Companies continued to expand current mines and facilities, to develop mines, and to investigate new deposits. A survey conducted by Metals Economics Group found that total budgets for ferrous exploration, including iron ore, reached an estimated $2.9 billion in 2012, a 60% increase from $1.8 billion in 2011. Australia accounted for 45% of the iron ore exploration budget, followed by Brazil (14%), and Canada (7%). Raw Materials Group reported that iron ore was among the most important investment targets in 2012. Cliffs Natural Resources invested $73.3 million in global exploration activities in 2012, a 51% increase from $48.4 million in 2011 (Cliffs Natural Resources Inc., 2013, p. 9).

In 2012, funding for iron ore exploration accounted for a significant percentage of regional exploration budgets as follows: Africa (10%), Asia (10%), the Commonwealth of Independent States (8%), and Europe (7%). Applications by China, Nauru, Russia, and Tonga were approved by the International Seabed Authority for exploration of sulfides and iron ore in international areas of the deep-sea floor. Concentrations of metals are higher in ore deposits found in the seabed floor than in many onshore deposits. However, challenges to deep-sea mining are posed by environmental concerns, technological limitations, and costs (Wilburn and Stanley, 2013).

Mergers and Acquisitions.—In January 2012, the Chinese government announced it would promote mergers in the steel industry, among others, in an effort to create companies capable of competing with major producers. China's acquisitions focused on securing raw material supplies—Hebei Iron and Steel acquired a 25% stake in the Kami Project, managed by Alderon Iron Ore in the Labrador Trough near Wabush; the Hanlong Group planned to spend $1.4 billion to acquire the Mbalam project in Congo (Kinshasa) and Cameroon managed by Sundance Resources, although the acquisition has stalled; and Wuhan Iron and Steel announced it would seek to purchase resources in Australia, Brazil, Canada, and China in an effort to provide 100% of its own feedstock by 2018 (Grant, 2013).

World Review

Afghanistan.—Remote sensing data collected over Afghanistan since 2004 by the USGS and the U.S. Department of Defense's Task Force for Business and Stability Operations were compiled into a geologic map showing large mineral deposits, including large bands of iron ore. In July 2012, Afghanistan's Ministry of Mines opened bids for multiple iron ore project areas, which included the Hajigak deposit (Pellerin, 2012). According to a 2006 report published by the British

Geological Survey, the Hajigak deposit contains an estimated 110 Mt of iron ore at 62% Fe content (Afghanistan Ministry of Mines, 2006).

The U.S. Department of Defense released a report indicating that a transnational railway system for transporting iron ore from Bamiyan, Afghanistan, to other points in Afghanistan would cost in excess of $54 billion due to mountainous terrain. Alternative rail lines allowing exports to be moved into neighboring Pakistan were expected to cost $45 billion. Countries that have purchased rights to mineral deposits in Afghanistan, including China and India, were expected to release similar cost analysis reports (Nissenbaum, 2012).

Australia.—Mining operations in Australia were hindered by a severe cyclone season. Atlas Iron Ltd. (Perth, Australia), which was increasing capacity to meet target exports of 46 Mt by 2015 (Ker, 2012), fell short of the 6 Mt of production expected in the June 2012 quarter; however, Atlas still showed a growth of 21% in year-over-year exports.

BHP Billiton Ltd. (Melbourne, Australia) produced 176 Mt of iron ore in 2012, an 18% increase from the 149 Mt produced in 2011. BHP Billiton's reported share of salable quantities of iron ore (wet) from its joint venture projects in the Pilbara region of Western Australia were as follows: Area C joint venture (85% owned), 42.7 Mt; Goldsworthy joint venture (85% owned), 1.0 Mt; Mount Newman joint venture and Jimblebar (85% owned), 49.5 Mt; and Yandi joint venture (85% owned), 56.4 Mt. The company's reported share of shipments from Pilbara was 35.5 Mt of lump and 115 Mt of fines (BHP Billiton Ltd., 2013b, p. 16).

Investments in BHP Billiton's integrated iron ore operations in Australia were expected to result in a minimum capacity of 220 Mt/yr of iron ore production. The Jimblebar Mine expansion project was expected to be completed by the fourth quarter of 2013. Following a $3.4 billion investment in rail links, mining equipment, rolling stocks, initial production was expected to be 35 Mt/yr of iron ore, expandable up to 55 Mt/yr. The Port Hedland Expansion Project received a $2.3 billion investment to develop two additional port berths, a car dumper, connecting conveyer routes, and associated rail works and rolling stock, with first production achieved in December 2012. Approval from the Minister of Transport and Port Hedland Port Authority allowed for development of two additional berths in the Inner Harbour, subject to State approvals, with Outer Harbour development deferred beyond the 5-year planning horizon.

BHP Billiton invested an additional $1.2 billion in Inner Harbour port blending facilities and rail yards to enable port blending, a reduction from the initial $1.7 billion budget which had included the South Stockyard. BHP Billiton also invested $822 million for the development of the Orebody 24 Mine, which was expected to have a capacity of 17 Mt/yr and included an ore crushing plant, train load-out facility, and rail spur. The Orebody 24 Mine was considered essential to sustaining production output from the company's Mt. Newman JV operations (BHP Billiton Ltd., 2013a, p. 34).

In August 2012, BHP Billiton announced a 35% decrease in profits and plans to scale back several major iron ore related projects, including the Olympic Dam project (Stewart, 2012).

In 2012, Rio Tinto's share of salable quantities of Australia's iron ore and pellets were as follows—Hamersley (100% owned), 126 Mt; Hope Downs (50% owned), 15.4 Mt; Robe River (53% owned), 32.7 Mt; Eastern Range (100% owned), 9.3 Mt; and Channar (60% owned), 6.6 Mt. Rio Tinto's share of total world mine production (Australian and Canadian operations) was 199 Mt, a 4% increase from 192 Mt in 2011 (Rio Tinto plc, 2013, p. 49).

Rio Tinto continued to expand its operations in Western Australia. The company committed $518 million for the reinstatement of its automated train program, scheduled for completion in 2015 and designed to be the first automated long-distance heavy-haul rail network, which would allow for additional capacity without substantial investment in additional trains. Two additional ore cars were added to each existing train in operation, allowing an increase in hauling capacity of 500,000 metric tons per year. The Junction South East Pit's fleet consisted of ten Autonomous Haulage System driverless trucks, capable of hauling 30 Mt/yr. Over the next 3 to 4 years, Rio Tinto planned to produce an additional 150 automated trucks to be used at the Hope Downs 4 and Nammuldi Mines.

Rio Tinto committed $2.2 billion to extend the life of the Nammuldi Mine by 14 years and $1.7 billion to extend the life of the Yandicoogina Mine through 2021 while increasing capacity to 56 Mt/yr. The Brockman 4 Mine phase 2 expansion was completed in 2012, increasing capacity to 40 Mt/yr, while plans to install a $1 billion wet plant at the site were canceled. Rio Tinto also planned to invest $4.7 billion to construct two additional berths at Cape Lambert and to increase rail capacity in the Pilbara and $570 million for the construction of a gas-fired power plant at Cape Lambert. (Rio Tinto plc, 2013, p. 30–31).

Fortescue Metals Group, LLC shipped 63.7 Mt of ore in 2012, owing partially to the full ramp up of the Christmas Creek Mine. The first phase of a port expansion for commissioning a third berth and second outloading circuit in Port Hedland raised outloading capacity to 115 Mt/yr. In early 2012, project costs for the Solomon Hub expansion project, an estimated $9 billion investment, increased by $500 million following changes to the design and scope of the Firetail Mine and Kings Mine projects. Expansion plans for the Firetail Mine were later revised to lower the production target of 155 Mt/yr to 115 Mt/yr, with the mine scheduled to ramp up by March 2013. The decision to complete the Kings Mine project was deferred pending improved market conditions (Fortescue Metals Group LLC, 2012a, p. 2–4; 2012b, p. 2; 2013, p. 2).

Centrex Metals Ltd. reported iron ore reserves at its Bungalow Hill site on the Eyre Peninsula of southern Australia to be approximately 4 Gt, three times larger than previously reported. Increased interest from Asian steel mill investors prompted Baotou Iron and Steel Group to purchase a 30% interest in the Bungalow Hill site (Grant, 2012).

Brazil.—In 2012, Vale S.A (Rio de Janeiro, Brazil) reported that its iron ore production decreased slightly to 320 Mt (including Vale's 50%-joint venture with BHP Billiton in Samarco) from 323 Mt in 2011. Vale's share of salable quantities of iron ore were as follows, in decreasing order of tonnage—Southeastern System, 116 Mt; Northern System,

107 Mt; Southern System, 80.3 Mt; Samarco, 10.9 Mt; and Midwestern System, 6.4 Mt. Vale's share of pellet production in 2012 increased to 55.6 Mt from 52.3 Mt in 2011, including its share in the pelletizing operations at Anyang (25%), Hispanobra (50.9%), Samarco (50%), Vale Oman Pelletizing Co. LLC (70%), and Zhuhai YPM (25%). The breakdown of salable quantities of iron ore pellets from 100%-owned Vale operations was 63.5% blast furnace pellets, with primary markets in Asia and Europe, and 34.7% direct reduction pellets, with primary markets in the Middle East, North Africa, and North America. Due to reduced demand, operations at the São Luis pellet plant and the Turbarão I and II pellet plants were suspended in October and November 2012, respectively (Vale S.A., 2013, p. 27–30).

Samarco Mineração S.A. (BHP Billiton) approved a $5.3 billion expansion to increase production capacity to 30.5 Mt/yr by adding a fourth pellet plant, a new concentrator, and a third slurry pipeline. Pellet production from the new plant was expected to start in the first half of 2014 (BHP Billiton Ltd., 2013a, p. 34). An $8.8 billion investment in Anglo American's Minas Rio Phase 1 Project was planned to increase production capacity to 26.5 Mt/yr by 2014 (Anglo American plc, 2013, p. 10).

Canada.—Iron Ore of Canada [owned jointly by Labrador Iron Ore Royalty Income Fund (15.1%), Mitsubishi Corp. (26.18%), and Rio Tinto (58.72%)] produced 4.2 Mt of concentrates and 9.9 Mt of pellets (Labrador Iron Ore Royalty Corp., 2013, p. 5, 6). ArcelorMittal Mines Canada produced 15 Mt of concentrates and pellets at its Mont-Wright facility (ArcelorMittal S.A., 2013a, p. 14). Cliffs Natural Resources produced 68.5 Mt of pellets and concentrate from its Canadian operations—the Wabush Mine and Bloom Lake Mine (Cliffs Natural Resources Inc., 2013, p. 7).

ArcelorMittal S.A. sold a 15% stake in ArcelorMittal Mines Canada Inc. for $1.1 billion to Taiwan's China Steel Corp. and Republic of Korea's Posco. ArcelorMittal continued to invest in Canadian iron ore production. The company planned to double output at the Mont-Wright complex from 30 Mt/yr, and continued to develop the Mary River project (Baffin Island) in a joint venture with Nunavut Iron Ore Acquisition Inc. and the Mont-Reed and Fire Lake in the Labrador Trough. ArcelorMittal Mines Canada planned an expansion project to increase concentrator capacity to 24 Mt/yr, an 8 Mt/yr increase from current levels, by the second quarter of 2013 (ArcelorMittal S.A., 2013a, p. 13). Iron ore deposits in Quebec and Labrador were also being reviewed for development by Champion Iron Ore Mines Ltd., Alderon Iron Ore Corp., and a joint venture between Tata Steels Ltd. and New Millennium Capital Corp. (Donville and others, 2013).

In 2013, New Millennium Iron Corp. planned to begin production at its Direct Shipping Ore Project in Eastern Quebec and Labrador. Production in 2013 was expected to be 2 Mt, ramping up to 6 Mt/yr in 2015. In 2012, New Millennium entered into a joint venture with Tata Steel Minerals Canada Ltd. to develop a mine in the Timmins area of Newfoundland and Labrador; the expected cost was $563 million (American Metal Market, 2012).

Iron Ore Company of Canada announced plans to expand concentrator production capacity to 23 Mt/yr from 18 Mt/yr. The first stage, including a new primary ore crusher, a 6-kilometer (km) overland conveyor, and a fourth autonomous grinding line, was expected to reach full production in 2013. The second stage, which includes two new spiral lines on the gravity separation circuit and a new magnetite grinding and processing circuit, was expected to commissioned by yearend 2013 (Rio Tinto plc, 2013, p. 31).

Cliffs Natural Resources continued to develop the Bloom Lake Mine phase II expansion designed to maximize production and expand seaborne operations in Eastern Canada. Expansion plans have the potential to increase sales volumes and to reduce unit operating costs (Cliffs Natural Resources Inc., 2013, p. 22).

China.—Citing safety concerns, China's Transport Ministry blocked Vale SA's new class of dry-bulk cargo ships (Valemax ships) from entering China's ports. These ships were specifically designed to reduce costs and to carry larger loads of iron ore from processing plants in Brazil to consumers in China. The Export-Import Bank of China and the Bank of China Ltd. initially financed $1.3 billion to build 24 of the ships in China's shipyards (Murphy, 2012).

In July, production declined at the Araltobe Iron Ore Mine in northwest China's Xinjiang Uyghur Autonomous Region due to a landslide that halted mine operations for several weeks until the area could be stabilized. A typhoon also hampered mining operations at eight additional iron ore mines in the region (Petley, 2012).

Guinea.—Rio Tinto paid $501 million of an additional $1 billion investment in the Simandou Joint Venture (51% ownership) with Aluminum Corporation of China Ltd. (Chinalco) for design studies and long-lead items. An environmental assessment was submitted to the State mining company, Soguipami, and infrastructure from the project was declared "A Project of National Interest," which provided the required protection from development and acquisition of the land. Plans called for a 95 Mt/yr mine, a 650-km railway, and a deep-water port in conjunction with the Government of Guineau (Rio Tinto plc, 2013, p. 26).

BHP Billiton, which held a 41.3% interest in Nimba Mining Concession and four permitted areas, completed prefeasibility studies for development of the concession and infrastructure (BHP Billiton Ltd., 2013a, p. 34).

India.—Regulatory constraints and caps on production reduced production for India's largest iron ore producer, Sesa Goa Ltd., by nearly 24% to between 16 Mt and 17 Mt. Production caps were recommended by India's Central Empowered Committee to lessen the effects of mining on the environment in the States of Karnataka and Goa, where allegations of illegal mining were being investigated. Restrictions allowed for only 2.9 Mt to be mined from Karnataka, which resulted in a 76% decrease in annual profits for Sesa Goa (Kumar, 2012). Restrictions on mining in Goa and Karnataka were expected to reduce India's iron ore exports to 27 to 30 Mt in 2013 from an annual average of 100 Mt/yr (Mayenkar, 2013).

India's Supreme Court lifted bans on 18 mines in the State of Karnataka in early September, allowing nearly 5 Mt/yr of domestic production to resume (Serapio, 2012). The Central Empowered Committee of India announced in late September that after organizing the leases for iron ore mines into levels based on reported irregularities, 63 additional iron ore leases in Karnataka could resume production conditionally if they completed reclamation and compensated the State for ecological loss (Malhotra, 2012).

Liberia.—ArcelorMittal Liberia Ltd. approved the phase 2 expansion of its Liberian iron ore mines, which was expected to increase production capacity to 15 Mt/yr of iron ore concentrate by 2015. ArcelorMittal's Liberian operations produced 3.3 Mt of iron ore, an increase from 1.3 Mt in 2011 (ArcelorMittal S.A., 2013b, p. 14, 21).

BHP Billiton maintained a Mineral Development Agreement with the Government of Liberia, enabling it to explore and develop its iron ore mineral leases. Drilling continued on selected targets in held leases (BHP Billiton Ltd., 2013a, p. 34). Sesa Goa expected to produce 4 Mt/yr of iron ore beginning in early 2014 from its Liberian project (Mayenkar, 2013).

Oman.—Vale S.A. completed the maiden voyage of its second Valemax vessel to the Port of Sohar in Oman. Four Valemax 400,000-t dry-bulk cargo ships were expected to be in operation by the first quarter of 2013 with service to Oman (Maritime Activity Reports, Inc., 2012). Vale Oman Pelletizing Company, LLC began producing at full capacity in March 2012 (Vale S.A., 2013, p. 29).

Sierra Leone.—Estimated annual production for 2012 at African Minerals Ltd.'s (London, United Kingdom) Tonkolili iron ore project declined to 5 to 6 Mt, from 10 Mt, owing to severe weather. The company expected to resume production at a rate of 20 Mt/yr by June 2013 (Mining Journal, 2012).

South Africa.—Despite labor unrest, Kumba Iron Ore Ltd. (Guatend, South Africa) produced 43.1 Mt in 2012, a 4% increase from 2011, owing to the rampup of the Kolomela Mine. Strikes reduced South African output by 5 Mt from projections for 2012. During the third quarter of 2012, South Africa's National Union of Mineworkers agreed to open talks to end labor strikes; however, at yearend, no resolution had been achieved. Potential future projects at Kumba Iron Ore included 6-Mt/yr capacity increases at the Kolomela Expansion and Sishen Lower Grade Expansion (Anglo American plc, 2013, p. 1, 10; Stoddard, 2012).

Outlook

Steel production in 2012 increased slightly, driven by continued growth in the construction sector in China, despite smaller economic growth in most industrialized countries. Crude steel production in China increased by only 3.7% in 2012, continuing the trend of smaller growth compared with 7.2% in 2011, 11.1% in 2010, and 14.6% in 2009, due in part to the completion of many development and infrastructure projects. The economy in China was expected to improve during the next 4 years, with construction industry growth projected to be more than 10% per year through 2016 owing to increased housing demand and large-scale urbanization (De Angelis, 2013).

During the past 5 years, despite forecasts indicating significant potential for oversupply from weak global demand, demand for iron ore has outpaced supply. In the near future, lower than expected growth in China and Africa may reduce demand. Implementation of large-scale plans to increase production, if completed, may create brief periods of oversupply. Competitive pricing strategies could eliminate junior miners and force older infrastructure, mines, and facilities to be abandoned, which would limit oversupply. Consolidation and procurement of junior miners' facilities could allow companies to absorb lower prices and limit decreases in revenue. Emerging markets in Africa may determine long-term iron ore pricing trends if growth can be sustained.

Following record-high prices in 2011, mine expansions and development projects were quickly announced during the first half of 2012 only to have significant cuts in expected revenue in the third quarter of 2012. Many large projects aimed at increasing production capacity were canceled, with a greater focus placed on investing in more efficient technologies and improved infrastructure. Reduced natural gas prices, slow global growth in steel consumption, and a renewed focus on efficiency are expected to spur interest in direct-reduced-iron technologies and alternative ironmaking processes through 2017.

Trends in the steel industry are provided in the "Outlook" section in the Iron and Steel chapter of the 2012 USGS Minerals Yearbook, volume I, Metals and Minerals.

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TABLE 1
SALIENT IRON ORE STATISTICS[1]

(Thousand metric tons and thousand dollars unless otherwise specified)

		2008	2009	2010	2011	2012
United States, iron ore, usable, less than 5% manganese:[2]						
Production		53,600	26,700	49,900	54,700	54,000 e
Shipments:						
Quantity		53,600	27,600	50,600	55,600	52,900 e
Value		3,770,000	2,560,000	5,000,000	5,530,000	5,190,000
Average value at mines	dollars per metric ton	70.43	92.76	98.79	99.45	98.16
Exports:						
Quantity		11,100	3,920	9,950	11,100	11,200
Value		1,240,000	356,000	1,090,000	1,330,000	1,440,000
Imports for consumption:						
Quantity		9,250	3,870	6,420	5,270	5,140
Value		918,000	376,000	703,000	841,000	758,000
Consumption, iron ore and agglomerates		51,900	31,000	42,300	46,300	46,900
Stocks, December 31, at mines, plants, and loading docks[3, 4]		4,070	5,060	3,470	3,260	3,110
Additional stocks, December 31:						
Crude ore at mines and plants[4]		947	580	734	978	1,140
Unagglomerated concentrates for pelletizing plants		1,320	896	949	1,120	1,260
World, production[5]		2,210,000 r	2,230,000 r	2,590,000	2,930,000 r	2,930,000

eEstimated. rRevised.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Direct-shipping ore, concentrates, agglomerates, and byproduct ore.

[3]Excludes byproduct ore.

[4]Crude ore stocks and unagglomerated concentrates for pelletizing plants removed. Marketable stocks only.

[5]Gross weight.

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 2012, BY DISTRICT AND STATE[1]

				Production				Average quantity per worker hour (metric tons)		
						Iron contained in usable ore				
District and State	Number of mines	Average number of employees	Worker hours (thousands)	Crude ore (thousand metric tons)	Usable ore (thousand metric tons)	(thousand metric tons)	(percent)	Crude ore	Usable ore	Iron contained
Lake Superior:										
Michigan[2]	2	1,390	3,100	36,500 e	10,800 e	6,600 e	61.1 e	11.79 e	3.49 e	2.13 e
Minnesota	8	3,970	8,310	143,000	41,800	26,400	63.2	17.15	5.03	3.18
Total or average	10	5,360	11,400	179,000 e	52,600 e	33,000 e	62.8 e	15.70 e	4.61 e	2.90 e
Utah	1	60	142	1,610	1,360	328	24.1	11.33	9.58	2.31
Grand total or average	11	5,420	11,600	181,000 e	54,000 e	33,400 e	61.8 e	15.64 e	4.68 e	2.89 e

eEstimated.

[1]Data are rounded to no more than three significant digits, except "Average quantity per worker hour, crude ore"; may not add to totals shown.

[2]Does not include professional or clerical workers at mines, or research laboratory workers.

TABLE 3
USABLE IRON ORE PRODUCED IN THE UNITED STATES IN 2012,
BY DISTRICT, STATE, AND TYPE OF PRODUCT[1, 2]

(Thousand metric tons)

District and State	Direct shipping ore	Concentrates	Sinter	Other agglomerates[3]	Total
Lake Superior:					
Michigan	--	--	--	10,800 e	10,800 e
Minnesota	--	291	140	41,400	41,800
Total	--	291	140	52,200 e	52,600 e
Utah	924	437	--	--	1,360
Grand total	924	729	140	52,200 e	54,000 e

eEstimated. -- Zero.
[1]Excludes ore containing 5% or more manganese.
[2]Data are rounded to no more than three significant digits; may not add to totals shown.
[3]Data may include pellet chips, screenings, and sinter.

TABLE 4
SHIPMENTS OF USABLE IRON ORE FROM MINES IN THE UNITED STATES IN 2012[1, 2]

District and State	Gross weight of ore shipped (thousand metric tons)				Average iron content, natural (percent)	Value (thousands)
	Concentrates	Sinter	Other agglomerates	Total		
Lake Superior:						
Michigan	--	--	10,800 e	10,800 e	61.1 e	W
Minnesota	291	106	41,300	41,700	63.2	W
Total reportable or average	291	106	52,100 e	52,500 e	62.8 e	$5,170,000
Utah	437	--	--	437	24.1	20,400
Grand total or average	729	106	52,100 e	52,900 e	61.8 e	5,190,000

eEstimated. W Withheld to avoid disclosing company proprietary data; included in "Total reportable or average." -- Zero.
[1]Includes byproduct ore. Excludes ore containing 5% or more manganese.
[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 5
IRON ORE-PRODUCING MINES IN THE UNITED STATES IN 2012

State and mine	County	Operator	Source of iron ore
Michigan:			
Empire	Marquette	Cliffs Natural Resources Inc.	Magnetite taconite ore.
Tilden	do.	do.	Hematite-magnetite taconite ore.
Minnesota:			
Hibbing Taconite	Saint Louis	do.	Magnetite taconite ore.
Keewatin Taconite	do.	United States Steel Corp.	Do.
Mesabi Chief Plant #1	do.	Magnetation, Inc.	Hematite tailings.
Mesabi Chief Plant #2	do.	do.	Do.
Mesabi Nugget Delaware LLC	do.	Mesabi Nugget Delaware LLC	Magnetite taconite ore.
Minntac	do.	United States Steel Corp.	Do.
Minorca	do.	ArcelorMittal S.A.	Do.
Northshore	do.	Cliffs Natural Resources Inc.	Do.
United Taconite	do.	do.	Do.
Utah, Comstock Mountain Lion Mine	Iron	CML Metals Corporation	Do.

Do., do. Ditto.

TABLE 6
CONSUMPTION OF IRON ORE AT U.S. IRON AND STEEL PLANTS, BY TYPE OF PRODUCT[1]

(Thousand metric tons)

Type of product	2011	2012
Blast furnaces:		
Pellets	39,300	40,600
Sinter[2]	5,780	5,640
Total	45,100	46,300
Steelmaking furnaces:		
Direct-shipping ore	454	454
Sinter[2]	159	159
Total	613	613
Grand total	45,700	46,900

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes briquettes, nodules, and other.

Source: American Iron and Steel Institute.

TABLE 7
U.S. EXPORTS OF IRON ORE, BY COUNTRY OF DESTINATION[1, 2]

(Thousand metric tons and thousand dollars)

	2011		2012	
Country	Quantity	Value	Quantity	Value
Belgium	3	229	6	992
Canada	7,050	915,000	6,370	889,000
China	3,190	271,000	4,110	474,000
Colombia	16	1,110	(3)	249
France	430	80,400	--	--
Germany	81	15,100	3	830
Hong Kong	2	176	3	256
Japan	--	--	37	5,240
Mexico	51	5,850	641	65,400
Spain	187	35,000	(3)	3
Switzerland	46	2,740	--	--
Other	3 r	276 r	3	307
Total	11,100	1,330,000	11,200	1,440,000

rRevised. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes agglomerates.
[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8
U.S. EXPORTS OF IRON ORE, BY TYPE OF PRODUCT[1, 2]

	2011			2012		
Type of product	Quantity (thousand metric tons)	Value (thousands)	Unit value[3, 4] (dollars per metric ton)	Quantity (thousand metric tons)	Value (thousands)	Unit value[3, 4] (dollars per metric ton)
Concentrates	627	$41,200	65.74	1,330	$112,000	83.99
Coarse ores	1,740	109,000	62.37	1,330	90,800	68.55
Fine ores	208	15,500	74.60	247	25,500	103.40
Pellets	8,470	1,160,000	137.07	8,260	1,200,000	145.95
Briquettes	(5)	19	77.00	--	--	--
Other agglomerates	1	87	87.00	23	2,900	126.22
Roasted pyrites	3	233	77.67	3	299	99.67
Total	11,100	1,330,000	120.05	11,200	1,440,000	128.43

-- Zero.

[1]Data are rounded to no more than three significant digits, except "Unit value"; may not add to totals shown.

[2]Includes agglomerates.

[3]Unit values shown are calculated from unrounded data.

[4]Weighted average calculated from unrounded data by dividing total value by total tonnage.

[5]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9
U.S. IMPORTS OF IRON ORE, BY COUNTRY AND TYPE OF PRODUCT[1, 2]

Country and type of product	2011 Quantity (thousand metric tons)	2011 Value (thousands)	2011 Unit value[3, 4] (dollars per metric ton)	2012 Quantity (thousand metric tons)	2012 Value (thousands)	2012 Unit value[3, 4] (dollars per metric ton)
Country:						
Argentina	74	$11,000	149.30	81	$11,400	140.43
Brazil	562	81,600	145.19	739	94,700	128.09
Canada	3,910	617,000	157.88	3,810	587,000	154.15
Chile	165	28,300	171.70	104	15,500	148.86
Mexico	27	2,240	83.04	47	5,630	119.74
Peru	14	1,510	107.79	44	4,620	104.89
South Africa	147	28,800	196.14	91	11,300	124.62
Sweden	81	16,500	203.27	72	9,000	124.97
Trinidad and Tobago	8	3,650	455.63	--	--	--
United Kingdom	--	--	--	76	10,100	132.87
Venezuela	279	49,300	176.80	75	8,340	111.16
Other	5 r	459 r	91.80 r	5	507	101.40
Total	5,270	841,000	159.50	5,140	758,000	147.50
Type of product:						
Concentrates	796	124,000	155.93 r	862	99,600	115.52
Coarse ores	42	8,660	206.26	51	2,730	53.45
Fine ores	731	111,000	152.42	363	49,300	135.73
Pellets	3,650	587,000	160.58	3,860	606,000	157.05
Briquettes	12	3,960	329.83	--	--	--
Other agglomerates	34	5,890	173.26	(5)	115	48.00
Roasted pyrites	4	263	65.75	4	303	75.75
Total	5,270	841,000	159.50	5,140	758,000	147.50

rRevised. -- Zero.
[1]Data are rounded to no more than three significant digits, except "Unit value"; may not add to totals shown.
[2]Includes agglomerates.
[3]Unit values shown are calculated from unrounded data.
[4]Weighted average calculated from unrounded data by dividing total value by total tonnage.
[5]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 10
U.S. IMPORTS OF IRON ORE IN 2012, BY COUNTRY AND TYPE OF PRODUCT[1, 2]

(Thousand metric tons)

Country of origin	Concentrates	Coarse ores	Fine ores	Pellets	Briquettes and other agglomerates	Roasted pyrites	Total
Argentina	--	--	81	--	--	--	81
Brazil	411	--	44	284	--	--	739
Canada	260	37	11	3,500	(3)	(3)	3,810
Chile	96	7	--	--	--	--	103
Mexico	--	--	47	--	--	--	47
Peru	--	--	44	--	--	--	44
South Africa	52	--	39	--	--	--	91
Sweden	--	6	66	--	--	--	72
United Kingdom	--	--	--	76	--	--	76
Venezuela	42	--	33	--	--	--	75
Other	(3)	(3)	(3)	--	--	4	4
Total	862	51	363	3,860	(3)	4	5,140

-- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes agglomerates.
[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 11
AVERAGE UNIT VALUE FOR SELECTED IMPORTS OF IRON ORE IN 2012[1]

Type of product	Country of origin	Average unit value[2] (dollars per metric ton, gross weight)
Concentrates	Brazil	134.95
Do.	Canada	176.88
Pellets	do.	158.54

Do., do. Ditto.
[1]Includes agglomerates.
[2]Weighted averages of individual customs values.

Source: U.S. Census Bureau.

TABLE 12
U.S. IMPORTS OF IRON ORE, BY CUSTOMS DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

	2011		2012	
Customs district	Quantity	Value	Quantity	Value
Baltimore, MD	1,710	289,000	1,450	216,000
Buffalo, NY	(3)	2	--	--
Charleston, SC	--	--	(3)	21
Chicago, IL	675	102,000	689	72,700
Cleveland, OH	2,110	332,000	2,210	343,000
Detroit, MI	16	4,210	(3)	23
El Paso, TX	18	972	--	--
Houston-Galveston, TX	83	17,000	54	10,400
Laredo, TX	1	43	--	--
Los Angeles, CA	(3)	11	(3)	2
Mobile, AL	13	4,510	48	5,990
New Orleans, LA	616	86,600	618	107,000
New York, NY	(3)	23	(3)	44
Norfolk, VA	1	29	--	--
Ogdensburg, NY	1	237	(3)	31
Philadelphia, PA	4	263	4	292
Port Arthur, TX	--	--	27	618
San Francisco, CA	5	268	--	--
Seattle, WA	--	--	37	588
St. Albans, VT	1	565	1	127
Tampa, FL	15	3,190	3	1,240
Total	5,270	841,000	5,140	758,000

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes agglomerates.

[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 13
U.S. IMPORTS OF PELLETS, BY COUNTRY[1]

(Thousand metric tons and thousand dollars)

	2011		2012	
Country	Quantity	Value	Quantity	Value
Brazil	244	33,600	284	40,700
Canada	3,410	553,000	3,500	555,000
United Kingdom	--	--	76	10,100
Total	3,650	587,000	3,860	606,000

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 14
IRON ORE: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

Country[5]	Gross weight[3]					Metal content[4]				
	2008	2009	2010	2011	2012[e]	2008	2009	2010	2011	2012[e]
Algeria	2,077	1,307	1,220 r	1,280 r	1,300	1,050	700	671 r	704 r	715
Australia[e]	342,000	394,000	433,000	488,000	521,000	209,000	228,000	271,000	277,000	315,000
Austria	2,033	2,002	2,069	2,207 r	2,200	650	641	662	706 r	704
Azerbaijan	28	--	58	214 r	230 6	14 e	--	33	114 r	122 6
Bosnia and Herzegovina	1,482	1,615	1,401	1,891 r	1,900	622	678	588	794 r	798
Brazil	350,707	298,528	372,120	398,131 r	398,150 p, 6	233,514	198,710	247,772	257,600 r	257,600 p, 6
Canada[7]	32,102	31,704	37,001	35,705 r	39,427 p, 6	20,300	20,000 e	23,300 e	22,500 r, e	24,900
Chile	9,316	8,242	9,130 r	12,625 r	17,330 6	5,670	5,006	5,852	7,747	9,429 6
China[e, 8]	824,000	880,000	1,070,000	1,330,000	1,310,000	270,000	280,000	332,000	412,000	393,000
Colombia	473	281	77	174	173 6	300	154 e	42 e	96 e	95
Egypt	178 r	195	256	250 r, e	250	89 r	98 r	128 r	125 r, e	125
Germany[9]	455	364	390	489 r	450	48	38	41	51 r	47
Greece[e, 10]	1,500	1,500	1,500	1,200	1,200	575	570	570	560	550
Guatemala	(11)	5	2	1 r	1	(11)	1	(11)	(11)	(11)
India[12]	213,033 r	217,155 r	210,006 r	177,256 r	143,710 6	136,341 r	138,979 r	134,404 r	113,444 r	91,974 6
Indonesia[e]	65	45 6	46 6	46	48	37	25	26	27	29
Iran[e, 13]	32,000	34,034 r, 6	35,000 r	35,000 r	37,000	15,000	16,000 r	16,500 r	16,500 r	17,500
Kazakhstan	21,486	22,281	24,229	24,813	25,998 6	12,200 e	12,700 e	13,800 e	14,100 e	14,800
Kenya[e]	1	7 r	11	11	11	(11)	4 r	7	7	7
Korea, North[e]	5,136 6	5,300	5,300	5,300	5,300	1,488 6	1,500	1,500	1,500	1,500
Korea, Republic of	366	455	513	542 r	500	205	274	308	320 r	300
Malaysia	982	1,470	3,466	7,696	8,000	560 e	838 e	1,970 r, e	4,380 e	4,500
Mauritania	11,296 r	10,524 r	11,534 r	11,160 r	12,000	7,340 r	6,840 r	7,500 r	7,250 r	7,200
Mexico[14]	11,688	11,677	13,998	14,482	14,500	7,013	7,007	8,400 e	7,722	7,750
Mongolia	1,387	1,379	3,203	5,678 r	7,561 6	888	883	2,050	3,600 r	4,760
Morocco	23 r	31	45	79 r	79	12 r	16	24 r	43 r	43
New Zealand[15]	2,020	2,092	2,439	2,357 r	2,400	1,200 e	1,200 e	1,400 e	1,300 e	1,320
Nigeria[e]	62 6	99 r	63 r	70 r	70	23	37 r	20 r	26 r	26
Norway	1,635 r	1,678 r	3,292 r	3,427 r	3,911 6	839 r	891 r	1,926 r	2,047 r	2,405 6
Pakistan[e, 16]	250	333 r, 6	418 r, 6	400 r	380	125	167 r	210 r	200 r	190
Peru	7,823	6,698	9,160	10,626 r	10,132 6	5,244	4,490	6,140	7,123 r	6,792 6
Portugal[e, 17]	14	14	14	14	14	10	10	10	10	10
Russia	99,900	92,000	95,900 r	104,000 r	105,000	57,800 e	53,200 e	56,581 r	61,360 r	64,000
Slovakia	392	--	--	--	--	133	--	--	--	--
South Africa[18]	48,983	55,313	58,709	58,057 r	63,000	30,800	34,800	36,900 r	36,500 r	40,500
Sweden	27,713 r	20,389 r	27,917 r	22,968 r	23,000	16,628 r	12,233 r	16,750 r	15,159 r	15,000
Thailand	2,029	1,401	970	970 r	970	855	800	485	485 r	485
Tunisia	211	151	181	171 r	175	110	79	94 r	79 r	87
Turkey	4,697	3,855 r	5,814 r	6,450 r	6,300	2,500 e	2,000 r, e	3,000 r, e	3,400 r, e	3,300
Ukraine	72,688	66,476	78,171	80,581	81,966 6	40,000 e	36,600 e	43,000 e	44,300 e	45,100

See footnotes at end of table.

TABLE 14—Continued
IRON ORE: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

Country[5]	Gross weight[3]					Metal content[4]				
	2008	2009	2010	2011	2012[e]	2008	2009	2010	2011	2012[e]
United Kingdom	(11)	--	--	--	--	(11)	--	--	--	--
United States	53,600	26,700	49,900	54,700	54,000	33,800	16,600	31,300	34,300	33,400
Venezuela[e]	20,650 [6]	24,100 [r]	22,200 [r]	27,000 [r]	27,000	13,423 [6]	15,200 [r]	14,000 [r]	17,000 [r]	17,000
Vietnam	2,588 [r]	3,593 [r]	3,721 [r]	4,168 [r]	4,170	1,372 [r]	1,905 [r]	1,972 [r]	2,209 [r]	2,210
Zimbabwe	3 [r]	--	--	--	--	1 [r]	--	--	--	--
Total	2,210,000 [r]	2,230,000 [r]	2,590,000	2,930,000 [r]	2,930,000	1,130,000	1,100,000 [r]	1,280,000 [r]	1,370,000 [r]	1,390,000

[e]Estimated. [p]Preliminary. [r]Revised. -- Zero.

[1]Estimated data and world totals are rounded to no more than three significant digits; may not add to totals shown.

[2]Table includes data available through July 21, 2014.

[3]Insofar as availability of sources permit, gross weight represents the nonduplicative sum of marketable direct-shipping ores and concentrates; iron 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.

[4]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. Geological Survey estimates: Azerbaijan, Kazakhstan, North Korea, and Ukraine.

[5]In addition to the countries listed, Uganda may also produce iron ore, but definitive information on output levels, if any, is not available.

[6]Reported figure.

[7]Series represented gross weight and metal content of usable iron ore (including byproduct ore) actually produced, natural weight.

[8]China's gross weight iron ore production figures are significantly higher than those of other countries, because China reports only crude ore production, with an average iron content of 33%, whereas other countries report production of usable ore.

[9]Iron ore is used domestically as an additive in cement and other construction materials but is of too low a grade to use in the steel industry.

[10]Nickeliferous iron ore.

[11]Less than ½ unit.

[12]India's iron ore production is based on fiscal years ending March 31 of that stated.

[13]Data are for year beginning March 21 of that stated.

[14]Gross weight calculated from reported iron content based on grade of 60% iron.

[15]Concentrates from titaniferous magnetite beach sands.

[16]Pakistan's iron ore production is based on fiscal years ending June 30 of that stated.

[17]Includes manganiferous iron ore.

[18]Includes magnetite ore as follows, in thousand metric tons: 2008—3,987; 2009—4,725; 2010—5,474; 2011—5,494 (revised); and 2012—7,400.