ARCHIVED - Iron Ore

Canadian Minerals Yearbook (CMY) - 2009

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HIGHLIGHTS

- Iron ore is one of Canada's single most important mineral products in terms of both tonnage and value. Canada's production is of great importance as a supplier to international markets.
- The global recession hit the steel industry by lowering demand from the construction, mechanical engineering, and transport vehicle industries, which affected the iron ore steel market. The World Steel Association had forecast a decline in steel use of almost 15% in 2009 and growth of 10.7% in 2010. The recovery seems not only to have been earlier, but was also stronger than expected, driven largely by government stimulus packages and recent inventory restocking.
- Canadian shipments of iron ore decreased 1.3% from 32.1 Mt in 2008 to 31.7 Mt in 2009. At the same time, total exports increased 10.9% from 28.1 Mt in 2008 to 31.1 Mt in 2009, while Canadian imports decreased by 63.9% from 9.4 Mt in 2008 to 3.4 Mt in 2009.
- Consolidated Thompson's Iron Ore Mines Ltd. has successfully developed the Bloom Lake project located in Quebec and, with the possible addition of Labrador Iron Mines Limited direct-shipping iron ore projects in western Labrador near Schefferville, Quebec, shipment figures will undoubtedly grow and modify Canada's current ninth-place ranking in the world production of iron ore.

INTRODUCTION

All steel production begins with iron ore mined from the earth. In general, ores containing a higher percentage of iron are more valuable. If ore has more than 54% iron, it is classified as a high-grade ore and requires no further beneficiation other than sizing. Ore grading less than 54% iron is considered low-grade and requires upgrading to become a marketable product. High-grade iron ore is marketed in two sizes. The first, which is ore greater than 8 mm in size, is called "lump ore." Ore that is less than 8 mm in size is called "fine ore."

Iron ore consists of rocks and minerals from which metallic iron can be economically extracted. The ore is usually rich in iron oxides and carbonates. The iron itself is usually found in the form of magnetite (Fe_3O_4), hematite (Fe_2O_3), gothite, limonite, or

siderite. Hematite is also known as "natural ore." In addition, iron ore is the raw material used to make pig iron, which is one of the main raw materials for making steel.

There are two aspects to iron ore demand: quantity and quality. Since the major tradeable commodity is in mineral rather than metallic form, there are many chemical and physical variants of iron ore. However, they all serve the same purpose: providing the iron component of steel (98%) and, to a lesser extent, they also have non-metallurgical uses (2%) as iron oxide in the production of pigments, electronics, heavy media, abrasives, and construction.

Steel production is the driving force for almost all iron ore demand. However, technological changes in iron ore mining through the production of finished steel have been major contributors in determining the quantities and properties of the iron ore demanded. There are two technologies used to produce steel: basic oxygen furnaces (BOF), which are charged with molten blast furnace iron and ferrous scrap at the integrated steel mills; and electric arc furnaces (EAF), which are charged with scrap and/or direct reduced iron (DRI) at the mini-mill plants.

Iron ore pelletizing (IOP) is the second largest user of bentonite after foundry sands. In standard IOP, iron ore is ground and then mixed with small amounts of bentonite. Bentonite binds the grains, allowing further processing (agglomeration) into balls or pellets by the tumbling and induration effect using straight grate processes. These are then sintered in rotary kilns to obtain a hard outer surface. About 25% of world iron ore output is pelletized. The other basic forms of iron ore used in metal production include lump ore prepared by crushing and screening, and sinter produced from natural or screened fines. Bentonite absorbs the water, functions as a binder, and enhances the strength of the pellets. On the downside, bentonite adds unwanted silica to the blast furnace, which increases the demand for flux and coke. The Canadian iron ore industry is largely supplied with bentonite from European producers.

In Brazil, some ore that contains practically no other minerals can grade as high as 68% iron. The crude ore that is mined in Canada typically grades between 30% and 44% iron. Therefore, Canadian mines crush and grind the ore and then use gravitational and magnetic concentration methods to produce concentrates with an iron content of about 65%. Depending on grain size, the concentrate is then shipped as is or is agglomerated into balls of about a centimetre in diameter and is fired to produce hard iron ore pellets. Steel companies use the pellets and charge them into blast furnaces where the minerals are reduced to metallic iron. Unpelletized concentrates are sintered before being charged to the blast furnace.

As noted above, the chemical composition of iron ore consists of oxygen and iron bonded together into molecules. The conversion to metallic iron involves smelting through a direct reduction process to remove the oxygen. Oxygen-iron bonds are strong. To dissociate the iron from the oxygen, a stronger elemental bond must be presented to attract the oxygen. At high temperatures, carbon bonds more strongly to iron than oxygen, and coal is therefore used as the preferred ingredient. Thus, the iron ore must be powdered and mixed with coke to be burnt in the smelting process. As carbon dioxide is generated in the simple combination process of chemically stripping oxygen from iron, the smelting of iron and carbon must be conducted in an oxygen-deficient environment to promote the burning of carbon to produce carbon monoxide (and not carbon dioxide).

CANADIAN PRODUCTION

Preliminary 2009 data for Canada (Table 1) show that iron ore shipments decreased slightly to 31.7 Mt from 32.1 Mt in 2008. Newfoundland and Labrador accounted for 54.2% of mine shipments, followed by Quebec (45.7%) and British Columbia (0.1%). At the same time, exports increased by 10.9% from 28.1 Mt in 2008 to 31.1 Mt in 2009. Canadian imports decreased by 63.9% from 9.4 Mt in 2008 to 3.4 Mt in 2009. Factors explaining the decreased imports include low demand from Canadian steel producers, currency valuations, and foreign ownership interests that may favour U.S. iron ore producers.

Preliminary data also indicate that Canadian iron ore shipments for 2009 were valued at almost $3174 million, an $889.3 million decrease from the 2008 value of $4063 million.

Canada is highly dependent on the European steel industry as a consumer of product from its iron ore mines. In 2009, European and Asian countries dominated Canada's pellet and concentrate iron ore exports. The United States, as the second most important market, consumed mainly pellets. Iron ore trade in the Canada-U.S. market is predominantly for pellets. U.S. and Venezuelan producers are Canada's main competitors in the pellets market while Brazil, Venezuela, and Australia are its competitors in the concentrate market.

Canada's iron ore production in the Labrador Trough area comes from four mining operations owned individually by **Iron Ore Company of Canada** (IOC), **ArcelorMittal Mines Canada** (previously QCM), **Cliffs Natural Resources Inc.** (Wabush), and **Consolidated Thompson Iron Mines Ltd.** (CLM). The remaining production comes as a by-product from the recovery of magnetite from two base-metal smelters near Merritt, British Columbia. All Canadian iron ore open-pit operations are truck and shovel type. To improve the iron grade in Canadian operations, Canadian producers use a variety of beneficiation processes (e.g., the use of spirals, high- and low-intensity magnetic separators, and high-tension separators) to upgrade the iron content by extracting the silica content and other impurities from the ore.

The Labrador Trough contains world-class iron deposits that have been mined since 1954. This band extends for about 1100 km southeast of Ungava Bay through both Quebec and Labrador. Further south, it turns southwest past the Wabush and Mount Wright areas to within 300 km of the St. Lawrence River. The degree of metamorphism is variable, ranging from intense in the northern and southern portions to greenschist facies in the central portion. Several deposits of highly metamorphosed magnetite-specularite iron formation (medium- to fine-grained) are located west of Ungava Bay. North of Schefferville, several billion tonnes of taconite are outlined in fine-grained, cherty magnetite-iron formation. In the area from Wabush Lake to Mount Wright, a medium- to coarse-grained friable specularite-quartz iron forms several large deposits.

IOC is Canada's largest iron ore producer and a leading global supplier of iron ore pellets and concentrates. The company employs almost 1900 people in the provinces of Quebec and Newfoundland and Labrador. Owned by Rio Tinto (58.7%), Mitsubishi Corporation (26.2%), and the Labrador Iron Ore Royalty Income Fund (15.1%), IOC operates within the Rio Tinto Iron Ore group and maintains its head office in Montréal, Quebec. IOC's current mine and processing facilities located near Labrador City are known as the Carol project. The facilities began operation in 1962 and have produced more than 1 billion t of crude ore with an average iron content of 39%. The site still has a significant resource base available. Annual capacity at the Carol concentrator is 17 Mt of iron ore concentrate, of which 13 Mt can be pelletized and the balance is processed into various grades of concentrate products. After processing at the Labrador City operations, the pellets and concentrate are transported south 418 km on the IOC-owned and operated Quebec North Shore & Labrador (QNS&L) railway to the company's shipping terminal and year-round deep-water port in Sept-Îles, Quebec.

ArcelorMittal Mines Canada (previously Quebec Cartier Mining Company [QCM]) is one of Canada's leading suppliers of iron ore to steel markets around the world, generating some 40% of Canada's total production. The company produces about 19.3 Mt of iron ore concentrate and about 14.1 Mt of iron oxide pellets. As both a mining and primary processing company, it operates extensive facilities in Quebec with executive offices in Montréal and employs 2000 skilled workers. The company operates two large open-pit mines: one in Mount Wright, which is the largest of its kind in North America, and one in Fire Lake. The Mount Wright mining complex includes a concentrator and automated concentrate train-loading system. The site is linked by company rail to the Port-Cartier industrial complex, which comprises the pellet plant, storage areas, and port facilities.

In October 2009, Cliffs Natural Resources Inc. (Wabush mine) gained 100% ownership of the mine and concentrator in Wabush (Newfoundland and Labrador), plus a pellet plant and port in Pointe-Noire/Sept-Îles (Quebec). It acquired the shares of Wabush Resources Inc. held by ArcelorMittal Dofasco Inc. and the limited and general partnership interests in HLE Mining Limited Partnership owned by U.S. Steel Canada Inc. and its affiliate. Cliffs Natural Resources (Canadian operation) employs roughly 990 workers. The company produces four grades of pellets – two standard and two fluxed – and is a supplier of high- and low-manganese concentrates to the sinter market. Shipments of its iron ore are done via the QNS&L railway from Wabush to Pointe-Noire. The mine has an estimated annual capacity of 6.0 Mt.

Consolidated Thompson Iron Mines Ltd. (CLM) is moving from being a builder to an operator of a world-class iron ore mine. Despite the challenging economic conditions worldwide, CLM successfully raised the necessary funds to develop the Bloom Lake project in Quebec, located near Fermont. This project should have a capacity of 7 Mt/y of concentrate for 34 years. It has proven and probable reserves of 580 Mt. The total capital costs will be around $500 million. CLM completed a $92 million public offering in April 2009. In July 2009, it signed a US$240 million deal with the Chinese steelmaker Wuhan Iron and Steel Corp. (WISCO) for a 19.9% stake in CLM and interest in a partnership to own and develop the Bloom Lake property. WISCO agreed to acquire 4 Mt of concentrate per year at market value for the life of the mine (which is expected to last 30+ years, and potentially even longer). The mine, which has the potential of exceeding 1 billion t of ore containing 29-30% Fe, is located 400 km north of Sept-Îles and 8 km north of the Mount Wright iron mines. The ore will move south to Sept-Îles via the QNS&L railway for international shipment to China.

The recent closure of Stelco's major steel operations in the Hamilton area has also affected Canadian demand for iron ore. United States Steel Corp. has idled indefinitely its Canadian steel operations. The company's Canadian arm received its iron ore directly through three sources: two sources in the United States and from the Wabush mine. The company has temporarily consolidated its steel production in Pennsylvania, Indiana, and Alabama. The Hamilton facility will likely remain shut if North American steel demand remains below 2008 levels.

CANADIAN DEVELOPMENTS

New Millennium Capital Corp. intends to develop the LabMag project in Newfoundland and Labrador, and the KéMag project in Quebec. Tata Steel Ltd. (Mumbai, India) entered into an agreement to acquire about 20% of New Millennium (Calgary, Alberta). The company is also nearing completion of its direct-shipping iron ore project. Tata Steel, the world's eighth largest steel corporation, owns 19.65% of New Millennium and is also its largest shareholder and strategic partner.

- The LabMag project, 80% owned by New Millennium and 20% owned by the Naskapi Nation of Kawawachikamach, contains 3.5 billion t of proven and probable reserves at a grade of 29.6% Fe, 1.0 billion t of measured and indicated resources at an average grade of 29.5% Fe, and 1.2 billion t of inferred resources at an average grade of 29.3% Fe. It will

have a production rate of 15.0 Mt/y of pellets, and its development timeline is subject to the KéMag project development. The LabMag project has an expected mine life of 65+ years.

- **KéMag**: This magnetite-rich taconite iron ore deposit located at Harris Lake, approximately 50 km from Schefferville, is a lateral extension of the LabMag project in Labrador. The project contains 2.1 billion t of proven and probable reserves at an average grade of 31.3% Fe, 0.3 billion t of measured and indicated resources at an average grade of 31. 3% Fe, and 1.0 billion t of inferred resources at an average grade of 31.2% Fe. It has an estimated capital cost of $4.0 billion and a mine life of 30+ years (potential of 45+ years) at a rate of 15 Mt/y of pellets and 7 Mt/y of concentrate. Shipment would be by slurry pipeline to Pointe-Noire, Quebec.
- New Millenium's direct-shipping iron ore project contains 64.1 Mt of proven and probable mineral reserves at an average grade of 58.8% Fe, 4.6 Mt of measured and indicated mineral reserves at an average grade of 58.9% Fe, 7.15 Mt of inferred resources at an average grade of 55.9% Fe, and approximately 40.0 Mt of historical resources that are not in compliance with NI 43-101. This project would have a production capacity of 6300-43 000 t/d over a five-year operating life.

Labrador Iron Mines Limited (LIM) has acquired interests in mineral claims and mineral licences containing an estimated 100 Mt of high-grade iron ore in northwestern Labrador. The company expects start-up of commercial production at its Schefferville iron ore mines in northern Quebec in 2010. This Schefferville area project involves the development of eight direct shipping iron ore deposits (see details below) in western Labrador near Schefferville, Quebec. The company's properties are located on the western margin of the Labrador Trough within the Province of Newfoundland and Labrador near Schefferville, Quebec. It has reached an agreement with the Sept-Îles Port Authority under which it will use the Pointe-Noire facilities to ship its iron ore products. LIM has agreed to a base-fee schedule with the Authority regarding wharfage fees for iron ore loading for its shipping operations beginning in mid-2010. LIM remains in negotiations with port operators regarding rail transportation, storage, reclaim, and ship-loading.

LIM plans mining in three phases: the James, Knob Lake, Redmond, and Houston deposits will be developed in the first phase of development, followed by the Astray and Sawyer Lake deposits in the second phase, and the Howse and Kivivic deposits in the third phase. The first-stage properties are located in close proximity to existing infrastructure. The new resource estimates for Houston, combined with the previously announced resource estimates for the James and Redmond deposits, bring the total measured and indicated (NI 43-101 compliant) resource for LIM's Stage 1 deposits to 25.71 Mt at a grade of 58.5% Fe.The company plans to commence iron ore production in mid-2010. It could produce between 0.5 and 0.7 Mt in its first year with an expectation of producing 2 Mt in the following year (2011) and adding an additional 1 Mt/y until a 6-Mt/y capacity is reached.

- The **James** deposit, at 8.1 Mt at a grade of 57.7% iron in the indicated category, represents an increase of 100% over the historical resource of 4.0 Mt.
- The **Knob Lake** deposit contains 3.7 Mt based on IOC's 1983 classification of measured and indicated reserves.
- The **Redmond** property comprises two discrete deposits known as Redmond 5 and Redmond 2B, located about 18 km southwest of Menihek and approximately 15 km by road south of the James deposit.
    - The **Redmond 5** deposit, at 2.1 Mt at a grade of 54.9% iron in the indicated category, represents an increase of 220% in mineral resources over the historical resource of 0.7 Mt.
    - The **Redmond 2B** deposit, at 0.85 Mt at a grade of 59.8% iron in the indicated category, represents a 45% increase in mineral resources over the historical resource of 0.6 Mt.
- The **Houston** deposit has an estimated 14.68 Mt at a grade of 59.3% iron in the measured and indicated categories, and 1.5 Mt of resources have been classified in the inferred category.

Baffinland Iron Mines Corporation (Baffinland) is proposing to develop the Mary River project on Baffin Island in Nunavut, 160 km south of Pond Inlet on northern Baffin Island. Deposit No. 1 at the Mary River site is believed to contain up to 200 Mt of iron ore graded at 65% Fe, which would be exploited over a period of 25+ years. The project is expected to be in production by 2011. In early 2009, Baffinland and the Qikiqtani Inuit Association announced that a Memorandum of Understanding (MOU) had been successfully negotiated concerning detailed provisions relating to a future Inuit Impact and Benefits Agreement.

Roche Bay plc owns one of the world's largest known undeveloped magnetite (iron ore) resources located at Roche Bay on the Melville Peninsula in Nunavut. In two families of deposits, referred to as the Eastern and Western deposits, Roche Bay has over 4 billion t of resources and over 460 Mt of drilled resources. On March 30, 2007, Roche Bay announced a joint venture with Advanced Explorations Inc. (AEI) of Toronto; the latter became the operator of the project, leaving Roche Bay as the holding company of the iron ore assets. Located close to a natural deep-water harbour, the Roche Bay deposit is one of the world's premium iron ore prospects. AEI's intent is to build an iron ore nugget plant in Roche Bay by using the ITmk3® process from Japan's Kobe Steel Ltd. to produce higher-grade pig iron nuggets. In 2008, AEI updated its business plan for the Roche Bay project, adding 357 Mt of inferred resources from the project's C-Zone. In the spring of 2009, AEI announced a preliminary economic assessment for the project indicating a potential US$2.76 billion net present value, a minimum mine life of 50 years, and a return on investment in three to five years.

Adriana Resources Inc. has signed an MOU to acquire a 100% interest in the Bedford Iron Prospect consisting of 94 mineral claims covering 2350 ha (307 km^2). The property, formerly held by IOC, is located within 3 km of the LabMag iron ore deposit and 12 km from the KéMag iron deposit (both held by New Millennium Capital Corp.). A 2008 feasibility study with a production target date after 2011 estimated a measured resource of 600 Mt of iron ore that could support a 30-Mt/y operation producing some 10 Mt of iron concentrate/pellets. The company also has an option to earn a 100% interest in the Lac Otelnuk iron project (a 192-km^2 property), which is located in Nunavik, Quebec, 170 km northeast of Schefferville. The first work program began in mid-2006 with construction of a camp to support a diamond drill program. Estimates for the Otelnuk deposit total 4.3 billion t at a grade of 29.1% Fe in the measured and indicated categories, and 2.0 billion t at a grade of 29.2% Fe in the inferred category.

Champion Minerals Inc. is a Canadian junior exploration company listed on the TSX Venture Exchange. Its iron ore properties are located in northwestern Labrador (the Attikamagen project, wholly owned) and northeastern Quebec (the Fermont property). On May 12, 2008, Champion closed a $1.5 million financing and signed a definitive option and joint-venture agreement with Labec Century Iron Ore Inc. (CIOI).

- **Attikamagen Project**: Champion Minerals Inc.'s Attikamagen Lake iron property comprises 532 mineral exploration claims totaling 139.7 km^2 in western Labrador and northeastern Quebec, located 15 km east-northeast of Schefferville, Quebec. The Attikamagen property hosts a significant Algoma-type iron formation characterized as massive hematite/magnetite iron oxides.
- **Fermont Property**: On May 27, 2008, Champion acquired up to a 70% interest in 15 iron-rich mineral concessions totaling 261.5 km^2 in the Fermont Iron District of northeastern Quebec from Fancamp Exploration Ltd. and The Sheridan Platinum Group Ltd. One of the properties (Moise Lake East) is adjacent, to the east, to ArcelorMittal Mines Canada's Mount Wright operation and southeast of Consolidated Thompson Iron Mines Ltd.'s Bloom Lake deposit (610 Mt grading 32.2% Fe).

Lion Energy Corp., of Vancouver, B.C., received an updated technical report on its El Sol iron ore property in the Red Lake district of northwestern Ontario that proves up a historical reserve from the late 1950s. Lion Energy has undertaken some initial work that included ground magnetic surveying and diamond drilling.

Alderon Resource Corp. is an exploration and development company with an iron ore project that should enter production in the near term. The Kamistiatusset (Kami) property is located next to the mining towns of Wabush, Labrador City, and Fermont in western Labrador. The property is also in close proximity to a road, railway, and hydro power. The Kami property currently contains three zones of iron ore: Rose Lake, Mart Lake, and Mills Lake. Based on drilling to date, the Rose and Mills zones may contain approximately 200-250 Mt with grades between 28% and 35% Fe. These grades are analogous to those at Consolidated Thompson's Bloom Lake deposit.

CANADA-U.S. MARKET[1]

Imports of iron ore products in the Canada-U.S. market are split 70% for agglomerates (i.e., pellets) and 30% for non-agglomerates (i.e., concentrates). American, Canadian, and Venezuelan producers are the main competitors in this pellet market, while Brazilian, Canadian, Venezuelan, and Australian producers battle for the concentrate market.

Canadian producers control major market shares in each of the consuming areas of the Canada-U.S. pellets market. However, they appear to have some difficulty in competing against U.S. pellets in the Great Lakes area. Although Canadian producers' free on board (f.o.b.) pellet costs are lower than those of their U.S. counterparts, the shipping distance to reach the market is greater and, in places, costlier. Canadian producers also control most of the market for concentrates in Canada and a major portion of the market in the U.S. Great Lakes area. However, competition is fierce in the concentrates market on the Eastern Seaboard and in the U.S. Gulf Coast areas where Brazil and Venezuela are regular suppliers.

Iron ore consumers in the Great Lakes area can be supplied using three different routes: 1) using the Great Lakes system from U.S. producers located westward on the shores of Lake Superior; 2) using the St. Lawrence Seaway to transport Canadian and imported iron ore; and 3) using the Mississippi River to barge in imported iron ore, mostly from South America.

The main entry point for iron ore on the Eastern Seaboard is the Port of Sparrows Point located on the outskirts of Baltimore (northeast of Washington, D.C.). It serves as an unloading point for the area's steel producers and as a transfer point for iron ore heading by rail towards Pittsburgh and Great Lakes consumers.

As is the case for the Eastern Seaboard area, the Gulf Coast area is an entry point for suppliers to reach coastal consumers and those consumers located inland that can be reached by barging iron ore on navigable waters. For example, iron ore can be shipped to Chicago on the Mississippi River from New Orleans, or from Mobile, Alabama, up the Alabama River to Birmingham.

Large quantities of iron ore are carried on the Great Lakes and on the St. Lawrence Seaway for shipment to both domestic and foreign markets. Canada's Labrador Trough iron ore producers ship out of three ports located on Quebec's north shore, each one dedicated to an ore producer: Port-Cartier, Pointe-Noire, and Sept-Îles.

INTERNATIONAL TRADE DEVELOPMENTS[2]

Iron ore shipments on the Great Lakes from January 2009 through May 2009 were down 65% compared to the same time period in 2008 (source: Skillings 2009). This single statistic is a good indicator of the state of North America's iron ore mining industry as it adjusted to weak demand for its products. Every iron mine in North America reacted quickly to the economic downturn and the decline in steel production.

Preliminary data (Table 1) for 2009 show that Canada exported close to 31.1 Mt of iron ore (valued at $3360.6 million), of which 62.7% was pellets ($2323.3 million) and 37.3% was concentrates ($1037.3 million), for a 10.9% increase (3.1 Mt) in total exports from 2008 (28.1 Mt). Although exports of pellets decreased by almost 1.1 Mt (5.1%) from 20.6 Mt in 2008, exports of concentrates increased 55.0% (by 4.1 Mt) from 7.5 Mt in 2008.

Canada's principal 2009 export markets for pellets were China (22.4%), the United States (14.8%), Germany (12.2%), France (7.3%), and Singapore (7.0%), and for concentrates were China (28.3%), Germany (23.1%), and France (17.5%).

Preliminary data (Table 1) show that Canada imported 3102.6 Mt of iron ore in 2009 valued at $298.1 million, a decrease of almost 5970.8 Mt (65.8%). The bulk of the imported concentrates and pellets (99.2%) came from the United States. Total concentrate imports (mainly from the United States and Sweden) decreased by 66.3% (96 419 t) and pellet imports decreased by 65.8% (5.9 Mt), for a total decrease of 65.8% (or almost 6.0 Mt) from 9.1 Mt ($1069.8 million) in 2008.

North American integrated steel producers primarily use pellets in their operations to produce pig iron. Integrated steel producers in Europe and the Far East have generally used sinter (made from iron ore concentrates) combined with lesser amounts of coarse ore pellets.

PRICES

Iron ore is now the largest commodity market after oil, and analysts are expecting iron ore prices to increase by at least 40% with some even predicting 50% in 2010 (source: Skillings' March 2010 publication).

Pricing mechanisms have many subtleties and variations relating to costs, freight rates, quality factors, and exchange rates, but the underlying forces are still dictated by the balance between supply and demand.

Iron ore prices have historically been negotiated annually in closed-door talks between individual miners and their customers in Asia and Europe. Once one set of agreements/contracts were concluded, the other miners generally followed with similar arrangements (i.e., setting the "market price"). This arrangement goes back to the days when it was the Japanese who led the negotiations and everything was timed according to the end of their financial year. To some, this arrangement is a vestige of something that no longer exists.

Prices for fines are usually established first and are used as a benchmark for pellets and lump ore negotiations. Often, fines and lump or pellet premiums are established together as part of an overall package. Most iron ore prices were fixed annually under long-term sales contracts, although the spot market has become more important with the economic downturn. After some 40 years (source: *Metal Bulletin*, April 2010) of annual benchmark price negotiations between the main miners and steelmakers, a new quarterly pricing system has suddenly emerged from the big three ore exporters, and customers have little choice but to go along with it.

Vale SA and BHP Billiton Ltd., the world's two biggest iron ore exporters, signed shorter-term contracts to sell the key steelmaking ingredient, which won a 90% price increase for Rio de Janeiro-based Vale. The World Steel Association called for competition authorities around the globe to investigate the iron ore market after producers of the steelmaking raw material ended a system of annual pricing contracts. It commented in a statement: "There is now a very urgent need for competition authorities around the world to examine the market for iron ore and the market behaviour of the three companies who dominate the business" (source: Worldsteel, April 2010).

BHP Billiton has settled contract iron ore fines prices with many of its Asian customers for the June quarter reflecting a 99.7% increase (source: *Metal Bulletin*, April 2010). BHP offered to sell 62% Fe fines at $120.08/t f.o.b. Australia. This represents a $15 f.o.b. increase over Vale's pricing for the June quarter. Vale settled June quarter prices around 90% higher than last year, at $100-$110/t f.o.b. with Nippon Steel, JFE Steel, and Sumitomo Metal Industries (SMI), Japan's three largest steelmakers. "Taking current freight rates, [BHP's settlement] would result in Australian material coming in around $131.5 per tonne on a delivered Asia basis, a 22% discount to current spot levels." Spot iron ore was trading at $165-$169/t c.f.r. China for 63.5% Fe fines. BHP, which

announced a move away from yearly contracts, has also negotiated lump prices at $135/t, up 88% from last year. The company has paved the way for shorter-term contracts, with Vale securing quarterly prices and Rio Tinto expected to follow.

There is a spot market in iron ore that tends to cover single-cargo sales not covered by longer-term contracts. It is used particularly when there has been an upturn in steel demand and integrated steelworks quickly expand output. It is generally lump and fine material, which can be used to increase blast furnace output in the short term, that is traded on the spot market. The price system for pellet feed has no worldwide unified standard. The negotiated Eastern Canadian, seaborne, and international prices for blast furnace pellets are usually settled annually between producers and their customers. In general, concentrate prices are about one half that of pellet prices.

OUTLOOK

The world's steel industry experienced a severe downturn due to reduced demand in the major steel-consuming markets, including automotive, aviation, construction, infrastructure, manufacturing, and many major consumer goods. The World Steel Association's view for 2010 is that world steel demand will grow faster than expected. The Association now expects steel use to rise by 10.7% to 1.241 billion t in 2010. Demand is expected to hit a historical high of 1.306 billion t in 2011. The recovery is not only earlier, but also stronger than expected. It was driven in large part by government stimulus packages and recent inventory restocking. The real concern will be how post-crisis macroeconomic policies deal with fiscal balancing and inflationary pressures (source: Worldsteel).

Proposals to increase contract prices in 2010 by at least 80% have not been welcomed by steelmakers. It is clear that the iron ore market is never going to be the same again, and the main cause of this change is China's seemingly unstoppable growth and resultant appetite for steel. However, Chinese banks have recently reduced lending to infrastructure projects, which could herald weaker steel demand in the coming months (source: *Metal Bulletin*, April 2010).

The North American steel market is making a slow climb towards recovery, but some hurdles loom in the near future with new capacity coming on line and continually rising input costs (source: *Metal Bulletin*, April 2010). The steel industry's growth is sustainable in developing countries, such as China, India, and Brazil, but no improvements in real demand are being seen in developed countries (source: Worldsteel). Non-Chinese effective steelmaking capacity will decline significantly in advanced countries over the next few years due to the collapse in steel demand. Indeed, apparent steel use in the NAFTA region fell by a whopping 37.4% in 2009 (-33.5% for Canada, -15.1% for Mexico, and -41.6% for the United States); the World Steel Association expects this to grow by an overall 23.5% in 2010 (23.9% for Canada, 10.9% for Mexico, and 26.5% for the United States), and by 7.2% in 2011 (7.5% for Canada, 5.9% for Mexico, and 7.5% for the United States), to 107.1 Mt in 2011 (12.7 Mt for Canada, 16.4 Mt for Mexico, and 78.1 Mt for the United States).

As mentioned previously, Canada is highly dependent on the European (e.g., France, Germany, Sweden) steel industry as a consumer of product from its iron ore mines; it is also dependent on exports to China. The short-term growth forecast for those countries' (source: Worldsteel) apparent steel use is as follows: France, 15.8% in 2010 and 6.2% in 2011; Germany, 15.1% in 2010 and 7.6% in 2011; Sweden, 9.8% in 2010 and 12.2% in 2011; and China, 6.7% in 2010 and 2.8% in 2011.

With Consolidated Thompson Iron Mines Ltd. now a new Canadian producer, and with the possible addition of Labrador Iron Mines Limited in 2010, shipment figures will undoubtedly grow and modify Canada's current world iron ore production ranking of ninth place (Table 2).

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[1] Source: *Iron Ore 2000 - Poised for the Next Century*, Natural Resources Canada (NRCan).

[2] Source: NRCan.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to the chapter entitled "Definitions and Valuation: Mineral Production, Shipments, and Trade." (2) Information in this review was current as of April 30, 2010. (3) This and other reviews, including previous editions, are available on the Internet at www.nrcan.gc.ca/minerals-metals/business-market/canadian-minerals-yearbook/4070.

Note to Readers

The intent of this document is to provide general information and to elicit discussion. It is not intended as a reference, guide or suggestion to be used in trading, investment, or other commercial activities. The author and Natural Resources Canada make no warranty of any kind with respect to the content and accept no liability, either incidental, consequential, financial or otherwise, arising from the use of this document.

TARIFFS

Description	Canada		EU	Japan

Item No.		MFN	GPT	United States	Canada	Conventional Rate (1)	WTO (2)
25.02	Unroasted iron pyrites	Free	Free	Free	Free	Free	Free
26.01	Iron ores and concentrates, including roasted iron pyrites						
2601.11	Iron ores and concentrates, other than roasted iron pyrites: non-agglomerated	Free	Free	Free	Free	Free	Free
2601.12	Iron ores and concentrates, other than roasted iron pyrites: agglomerated	Free	Free	Free	Free	Free	Free
2601.20	Roasted iron pyrites	Free	Free	Free	Free	Free	Free
26.10	Chromium ores and concentrates	Free	Free	Free	Free	Free	Free
26.14	Titanium ores and concentrates	Free	Free	Free	Free	Free	Free
2833.29	Sulphates; alums; peroxosulphates (persulphates): other sulphates: other	Free	Free	Free	Free	4.6-5.5%	Free-3.9%
72.03	Ferrous products obtained by direct reduction of iron ore and other spongy ferrous products, in lump, pellets or similar forms; iron having a minimum purity by weight of 99.94%, in lumps, pellets or similar forms						
7203.10	Ferrous products obtained by direct reduction of iron ore	Free	Free	Free	Free	Free	Free
7203.90	Other	Free	Free	Free	Free	Free	Free

Sources: Canadian *Customs Tariff*, effective January 2010, Canada Border Services Agency; *Harmonized Tariff Schedule of the United States,* 2010; *Official Journal of the European Union* (Tariff Information), October 31, 2009 edition; *Customs Tariff Schedules of Japan, 2010.*
GPT General Preferential Tariff; MNF Most Favoured Nation; WTO World Trade Organization.
(1) The customs duties applicable to imported goods originating in countries that are Contracting Parties to the General Agreement on Tariffs and Trade or with which the European Community has concluded agreements containing the most-favoured-nation tariff clause shall be the conventional duties shown in column 3 of the Schedule of Duties. (2) WTO rate is shown; lower tariff rates may apply circumstantially.

TABLE 1. CANADA, IRON ORE PRODUCTION AND TRADE, 2007-09

		2007		2008		2009 (p)	
		(tonnes) (1)	($000)	(tonnes) (1)	($000)	(tonnes) (1)	($000)
PRODUCTION (mine shipments)							
	Newfoundland and Labrador	17 879 963	1 357 932	18 666 890	2 689 392	17 126 147	1 472 634
	Quebec	14 819 560	x	13 358 087	x	14 500 075	x
	British Columbia	74 653	x	76 729	x	72 564	x
	Total (2)	**32 774 176**	**2 502 500**	**32 101 706**	**4 063 452**	**31 698 786**	**3 174 185**
EXPORTS							

2502.00	Unroasted iron pyrites						
	Greece	4 864	34	1 952	12	–	–
	United States	–	–	20	13	–	–
	Total	**4 864**	**34**	**1 972**	**25**	–	–
2601.11	Iron ore concentrates, non-agglomerated						
	China	1 838 131	103 071	823 409	77 269	3 282 013	311 859
	Germany	3 052 923	204 319	2 417 458	231 250	2 673 463	235 927
	France	814 772	47 122	1 350 789	113 352	2 032 610	158 363
	Belgium	–	–	199 309	16 748	738 539	63 360
	Spain	135 583	7 932	65 190	7 133	718 101	62 499
	Netherlands	518 389	29 732	486 466	43 164	493 970	48 908
	Japan	588 991	38 755	533 344	55 207	454 816	41 029
	South Korea	279 949	14 378	145 865	7 503	351 101	36 043
	United Kingdom	1 133 250	71 367	656 553	49 725	290 214	27 605
	United States	745 779	27 979	628 148	47 342	244 692	24 469
	Other countries	527 497	35 430	170 898	16 923	308 471	27 273
	Total	**9 635 264**	**580 085**	**7 477 429**	**665 616**	**11 587 990**	**1 037 335**
2601.12	Iron ore, agglomerated						
	China	2 576 750	138 717	2 481 616	238 334	4 373 087	584 812
	United States	4 635 957	305 755	5 057 018	635 961	2 896 462	336 867
	Germany	2 823 237	235 958	4 854 310	632 682	2 372 593	228 763
	Singapore	–	–	–	–	1 367 083	165 937
	France	363 340	29 537	455 764	47 526	1 424 962	156 887
	United Kingdom	1 623 386	134 436	1 469 438	140 327	858 162	133 697
	Trinidad and Tobago	423 739	35 905	815 713	95 403	926 561	113 780
	Spain	219 175	17 696	312 981	33 859	886 851	102 894
	Italy	591 603	49 889	453 931	36 298	452 403	58 877
	Egypt	402 725	36 472	225 062	22 219	611 398	58 506
	Belgium	66 533	5 801	379 367	42 097	436 795	54 537
	Netherlands	576 734	48 195	356 467	35 561	377 164	50 795
	Other countries	4 226 515	318 127	3 716 451	449 630	2 535 807	276 905
	Total	**18 529 694**	**1 356 488**	**20 578 118**	**2 409 897**	**19 519 328**	**2 323 257**
2610.00	Chromium ores and concentrates						
	Chile	..	20	..	29	..	11
	Other countries	..	26	–	–	–	–

	Total	..	**46**	..	**29**	..	**11**
2614.00	Titanium ores and concentrates						
	United States	..	19 371	..	66 844	..	599
7203.10	Ferrous products obtained by direct reduction of iron ore and other spongy ferrous products, etc; ferrous products obtained by direct reduction of iron ore						
	Mexico	–	–	–	–	1	1
	India	109	127	–	–	–	–
	Spain	607	307	–	–	–	–
	United States	5 328	1 763	–	–	–	–
	Total	**6 044**	**2 197**	**–**	**–**	**1**	**1**
7203.90	Other spongy ferrous products, in lumps, pellets or similar forms; iron having a minimum purity by weight of 99.94%, in lumps, pellets or similar forms						
	India	258	265	42	22	–	–
	United States	337	120	150	51	–	–
	Vietnam	109	129	–	–	–	–
	Total	**704**	**514**	**192**	**73**	**–**	**–**
Total exports		**28 176 570**	**1 958 735**	**28 057 711**	**3 142 484**	**31 107 319**	**3 361 203**
IMPORTS							
2502.00	Unroasted iron pyrites						
	Italy	8 292	64	11 351	68	5 603	34
	United States	4 030	37	3 890	23	2 733	16
	China	31	6	19	6	668	4
	Peru	752	5	20	4	126	1
	Other countries	10	...	25	...	52	...
	Total	**13 115**	**112**	**15 305**	**101**	**9 182**	**55**
2601.11	Iron ore concentrates, non-agglomerated						
	United States	33 528	2 000	74 195	3 916	24 755	2 723
	Sweden	66	24	65 411	4 896	18 089	2 429
	South Africa	136	49	50	33	5 037	480
	Germany	..	2	29	8	783	71
	Other countries	207	34	5 648	801	250	16
	Total	**33 937**	**2 109**	**145 333**	**9 654**	**48 914**	**5 719**
2601.12	Iron ore, agglomerated						
	United States	7 235 010	616 851	8 928 027	1 060 150	3 053 466	292 369
	Venezuela	–	–	–	–	197	10
	Other countries	10	...	7	...	12	...

	Total	**7 235 020**	**616 851**	**8 928 034**	**1 060 150**	**3 053 675**	**292 379**
2601.20	Roasted iron pyrites						
	United States	630	39	266	14	174	9
	Other countries	–	–	29	2	–	–
	Total	**630**	**39**	**295**	**16**	**174**	**9**
2610.00	Chromium ores and concentrates						
	South Africa	. .	4 470	. .	24 227	. .	2 694
	United States	. .	2 872	. .	2 836	. .	855
	Other countries	. .	479	. .	840	. .	50
	Total	**. .**	**7 821**	**. .**	**27 903**	**. .**	**3 599**
2614.00	Titanium ores and concentrates						
	Madagascar	. .	. . .	. .	. . .	. .	17 854
	Ukraine	. .	116	. .	120	. .	2 518
	Australia	. .	5 778	. .	18	. .	2 357
	Other countries	. .	841	. .	987	. .	158
	Total	**. .**	**6 735**	**. .**	**1 125**	**. .**	**22 887**
2833.29.00.10	Other sulphates: other: ferric sulphate						
	United States	46 692	4 356	35 497	3 588	33 764	4 188
	China	4 498	852	544	241	879	379
	Germany	38	19	51	37	118	73
	Finland	187	87	123	43	343	63
	Other countries	598	167	81	24	92	64
	Total	**52 013**	**5 481**	**36 296**	**3 933**	**35 196**	**4 767**
7203.10	Ferrous products obtained by direct reduction of iron ore and other spongy ferrous products, etc.; ferrous products obtained by direct reduction of iron ore						
	Trinidad and Tobago	156 478	36 077	257 194	96 458	250 138	51 858
	Venezuela	23 685	7 229	7 550	4 272	2 267	606
	Other countries	26 435	5 522	18 397	2 524	345	18
	Total	**206 598**	**48 828**	**283 141**	**103 254**	**252 750**	**52 482**
7203.90	Ferrous products obtained by direct reduction of iron ore and other spong ferrous products, other						
	China	81	54	113	75	172	117
	United States	56	40	2 303	958	32	22
	Other countries	6	3	22	17	5	4
	Total	**143**	**97**	**2 438**	**1 050**	**209**	**143**
Total imports		**7 541 456**	**688 073**	**9 410 842**	**1 207 186**	**3 400 100**	**382 040**

Sources: Natural Resources Canada; Statistics Canada.
– Nil; . . Not available; . . . Amount too small to be expressed; (p) Preliminary; x Confidential.
(1) Dry tonnes for production (shipments) by province or territory; natural weight for imports and exports. (2) Total iron ore shipments include shipments of by-product iron ore.

TABLE 2. IRON ORE WORLD PRODUCTION, GROSS WEIGHT, (1) BY COUNTRY, 2006 AND 2007 (r)

Country	2006 (tonnes)	2007 (tonnes)	Change (%)	Global Rank
China	601 000	707 000	17.64	1
Brazil	317 800	354 674	11.60	2
Australia	275 098	299 009	8.69	3
India	160 000	180 000	12.50	4
Russia	102 000	105 000	2.94	5
Ukraine	74 000	77 900	5.27	6
United States	52 700	52 500	-0.38	7
South Africa	41 326	42 083	1.83	8
Canada	33 543	33 158	-1.15	9
Iran	26 244	31 538	20.17	10
Sweden	23 300	24 700	6.01	11
Kazakhstan	22 263	23 834	7.06	12
Venezuela	23 000	23 000	–	13
Mexico	10 983	12 205	11.13	14
Mauritania	10 658	11 817	10.87	15
Chile	8 628	8 818	2.20	16
Peru	7 250	7 740	6.76	17
North Korea	5 040	5 130	1.79	18
Turkey	3 251	3 800	16.89	19
Slovakia	700	3 627	418.14	20
Bosnia and Herzegovina	3 440	3 500	1.74	21
Egypt	2 500	2 500	–	22
New Zealand	2 146	2 200	2.52	23
Austria	2 000	2 000	–	24
Algeria	2 340	1 982	–	25
Thailand	264	1 555	489.02	26
Greece	1 500	1 500	–	27
Vietnam	1 020	1 060	3.92	28

Malaysia	667	700	4.95	29
Colombia	644	624	-3.11	30
Norway	620	620	–	31
Germany	412	412	–	32
South Korea	227	291	28.19	33
Zimbabwe	104	100	-3.85	34
Tunisia	214	220	2.80	35
Pakistan	95	207	117.89	36
Nigeria	150	50	-66.67	37
Azerbaijan	11	17	54.55	38
Portugal	14	14	–	39
Kenya	12	12	–	40
United Kingdom	12	12	–	41
Romania	40	11	-72.50	42
Macedonia	10	10	–	43
Morroco	10	10	–	44
Indonesia	11	8	-27.27	45
Guatemala	7	7	–	46
Total	**1 817 254**	**2 027 155**	**11.55**	

Source: U.S. Geological Survey, 2007 review on iron ore.
– Nil; (r) Revised.
(1) Insofar as availability of sources permit, gross weight on this page represents the non-duplicative sum of marketable direct-shipping iron ores and iron ore 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 in which it was mined.

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