

Iron Ore

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HIGHLIGHTS

- Iron ore is one of Canada's single most important mineral products in terms of both tonnage and value. Even though Canada may not be a major world producer of iron ore, it has great importance as a supplier to international markets. The Canadian industry is very sensitive to competition from U.S. mines in the North American market and to competition from countries that ship to the European market. Presently, iron ore mining is mainly done in the Labrador Trough area, a major geological belt extending through northern Quebec and Labrador.
- Iron ore markets are being deeply affected by the global recession that is expected to extend through 2009 and early 2010. Automotive and non-residential construction account for roughly 70% of steel use and these sectors are unlikely to improve until 2010-11.
- Canadian shipments of iron ore decreased 5.7% from 33.2 Mt in 2007 to 31.3 Mt in 2008. At the same time, exports decreased 0.4% from 28.2 Mt in 2007 to 28.1 Mt in 2008 while Canadian imports increased dramatically by 24.8% from 7.3 Mt in 2007 to 9.1 Mt in 2008.
- While the March 2008 IOC and Rio Tinto announcement of an \$800 million expansion program will be suspended for a four-week shut-down period in July 2009, Consolidated Thompson's plans to develop the Bloom Lake project in Quebec are ongoing. This \$500 million investment project is expected to commence operation in the second quarter of 2009.

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. Ores grading less than 54% iron are considered low-grade and require upgrading to become a marketable product. High-grade iron ores are 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 ores are usually rich in iron oxides and carbonates, and vary in colour from dark grey, bright yellow, and deep purple to rusty red. 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 (2%), they also have non-metallurgical uses 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 to 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 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 does 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 2008 data for Canada (Table 1) show that iron ore shipments decreased slightly to 31.3 Mt from 33.2 Mt in 2007. Newfoundland and Labrador accounted for 59.7% of mine shipments, followed by Quebec (40.1%) and British Columbia (0.2%). Canadian shipments of iron ore (source: Natural Resources Canada) decreased 5.7% from 33.2 Mt in 2007 to 31.3 Mt in 2008. At the same time, exports decreased by 0.4% from 28.2 Mt in 2007 to 28.1 Mt in 2008. Canadian imports increased dramatically by 24.8% from 7.3 Mt in 2007 to 9.1 Mt in 2008. Factors explaining the increased imports potentially include currency valuations and foreign ownership interests that may favour U.S. iron ore producers.

Preliminary data also indicate that Canadian iron ore shipments for 2008 were valued at almost \$2427 million, a very slight \$75.7 million decrease from \$2503 million in 2007.

Canada is highly dependent on the European steel industry as a consumer of product from its iron ore mines. Europe dominates Canada's concentrate sales and consumes almost one third of its pellet production. The United States is the second most important market and consumes mainly pellets. The balance is delivered to domestic and Asian markets. Canadian iron ore producers are the lowest operating cost¹ suppliers of concentrates and pellets to Lake Ontario and Lake Erie ports, and are cost-competitive at Lake Michigan ports and at Baltimore on the U.S. Eastern Seaboard. However, their competitiveness² diminishes with an increase in distance to service other markets. Iron ore trade in the Canada-U.S. market is predominantly for pellets. U.S. and Venezuelan producers are Canada's main competitors for the pellets market, while Brazil, Venezuela, and Australia are Canada's competitors for the concentrate market.

Canada's production in the Labrador Trough area comes from three mining operations owned by **Iron Ore Company of Canada (IOC)**, **Quebec Cartier Mining Company (QCM)**, and **Wabush Mines**. The remaining production comes from the by-product recovery of magnetite from two base-metal smelters' copper mine tailings near Merritt, British Columbia. The hardness of the ore varies from one deposit to another, and even within a single deposit. In general, the ore mined by Wabush is the softest, followed by QCM's ore. IOC's ore is considered the hardest. Canadian ores are thought to be harder than Brazilian and Australian ores, but are softer than South African, Indian, and U.S. ores. All Canadian iron ore open-pit operations are truck and shovel type. To improve the iron grade in Canadian operations, Canadian producers submit their ores to 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 ores.

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 iron formation is essentially folded and faulted along most of its length. 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 have been 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 formation is repeated by folding to form 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

Newfoundland and Labrador and Quebec. 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. In late 2008, London-based Rio announced a wide-ranging plan to minimize cost and cut its debt. Speculation is that some of its IOC interest could be sold to partners Mitsubishi Corporation and the Labrador Iron Ore Royalty Income Fund.

IOC's current mine and processing facilities located near Labrador City (a community of approximately 9000 in Newfoundland and Labrador) are known as the Carol project. The facilities began operation in 1962 and have produced more than one billion tonnes 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. The ores extracted are specular hematite and magnetite.

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. The trains can haul up to 24 000 t of ore in 265 cars stretching some 4 km in length.

On March 11, 2008, IOC and Rio Tinto announced the approval of \$500 million to increase IOC's annual production of iron ore concentrate to 22 Mt. The investment was to be the first phase of an expansion program that may see a 50% increase in production capability by 2011. Unfortunately, the present global situation forced the company to idle some production capacity and "suspend" a revised \$800 million expansion. IOC also announced plans to suspend all production for a four-week shut-down period in July 2009. No layoffs of permanent employees are being contemplated at this time.

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. ArcelorMittal Mines Canada 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 located in Montréal and employs 2000 skilled workers.

ArcelorMittal Mines Canada 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 an 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 for shipping. The ore extracted is specular hematite.

Cleveland Cliffs North American Mining Operations (Wabush Mines) operates a mine and concentrator in Wabush (Newfoundland and Labrador), and a pellet plant and port in Pointe-Noire/Sept-Îles (Quebec). Although Cleveland Cliffs Mining Co. only owns 26.8% of Wabush Mines, it is the operating company. Wabush Mines is also owned by Stelco Inc., which in turn is owned by U.S. Steel Corp. (44.6%) and Dofasco Inc. (28.6%). The ores extracted are specular hematite and magnetite. In late 2008, Cleveland Cliffs Inc. was renamed Cliffs Natural Resources.

Wabush Mines employs roughly 990 workers. It produces four grades of pellets – two standard and two fluxed – and is a supplier of high- and low-manganese concentrates to the sinter market. The company ships its iron ore via the QNS&L railway from Wabush to Pointe-Noire. The mine has an estimated annual capacity of 6.0 Mt. In early February 2009, Wabush Mines laid off 125 of its unionized workers and 30 non-unionized positions. One third of the work force is now officially unemployed. Production will be scaled back to 2.3 Mt in 2009 from 4.3 Mt in 2008.

The recent closure of Stelco's major steel operations in the Hamilton area also had an impact on the economy, affecting iron ore producers in Quebec and Labrador. 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 from the United States, and the third from the Wabush mine. United States Steel Corp. will temporarily consolidate 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 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 Capital Corp. (Calgary, Alberta).

- The **LabMag** project is 80% owned by New Millennium and 20% owned by the Naskapi Nation of Kawawachikamach, with proven and probable reserves of 3.5 billion t (5.74 billion t of total resources). It has a production rate of 15.0 Mt/y of pellets, and its development timeline is subject to the KéMag project development. It 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 has 3.35 billion t of magnetite resources, indicated resources of 1.35 billion t, and inferred resources of 992 Mt. It has an estimated capital cost of \$4.0 billion and 30 years of production

(potential of 45+ years) at a rate of 15 Mt/y of pellets and 7 Mt/y of concentrate. Shipment is by slurry pipeline to Pointe-Noire, Quebec.

Consolidated Thompson intends to develop the Bloom Lake project in Quebec, located near Fermont. This project represents an investment of nearly half a billion dollars and should begin operating in the second quarter of 2009 at a rate of 7 Mt/y of concentrate for 34 years. It has proven and probable reserves of 580 Mt. The company completed a \$92 million public issue financing in early 2009. In late 2008, it signed a deal with Chinese steelmaker Wuhan Iron and Steel Corp. (Wisco). The Chinese firm will invest US\$240 million for a 19.9% stake in Consolidated Thompson and take 25% or more of its output. Also, in the fall of 2008, Bloom Lake's environmental assessment filings were accepted. The mine is located 400 km north of Sept-Îles and 8 km north of the Mount Wright iron mines of ArcelorMittal Mines Canada (formerly Quebec Cartier Mining). Construction of the \$486 million open-pit mine and processing plant is well advanced, together with work on a rail spur to join the QNS&L railway terminus at Labrador City (a \$178 million investment). The ore will move south to Sept-Îles via the QNS&L railway, along with shipments from IOC and Wabush Mines, for international shipment to China. Wisco, a top Chinese steelmaker, is raising its annual capacity to 50 Mt from 30 Mt. Its sources of iron ore are mainly from Brazil and Australia.

Labrador Iron Mines Limited (LIM) was constituted by Articles of Amalgamation dated June 4, 2003, under the *Business Corporations Act* (Ontario) under the name Parys Mountain Mines Limited. The articles of Labrador Iron Mines Limited were amended on December 15, 2005, to change its corporate name to Labrador Iron Mines Limited. The registered office of LIM is located at Suite 1002, 111 Richmond Street West, Toronto, Ontario, Canada M5H 2G4. LIM is a wholly owned subsidiary of Labrador Iron plc, a company incorporated under the laws of the Isle of Man. Labrador Iron plc is a wholly owned subsidiary of Anglesey Mining plc, a public company incorporated under the laws of England and Wales with its shares listed on the London Stock Exchange under the trading symbol "AYM." LIM has no subsidiaries.

Through a wholly owned operating company (LIM), Labrador Iron Mines Holdings Limited (LIR) has acquired interests in mineral claims and mineral licences containing an estimated 100 Mt of high-grade iron ore in northwestern Labrador that was formerly part of the iron ore reserves and resources established by IOC prior to closure of its direct shipping operations in the Schefferville area some 20 years ago. The historical resource estimate made by IOC was roughly 88 Mt.

LIR was incorporated for the purposes of acquiring an interest in, exploring, developing, and commercially exploiting the iron ore deposits on properties located in and around the Labrador Trough in western Labrador near

Schefferville, Quebec. LIR announced in early 2009 that the start-up of commercial production at its Schefferville iron ore mines in northern Quebec will be delayed to 2010 pending further environmental information requests from Newfoundland and Labrador's Department of Environment and Conservation. All federal government evaluations have been finalized and no further information is being requested.

Baffinland Iron Mines Corporation (Baffinland) is proposing to develop the Mary River project on Baffin Island in Nunavut; it would produce 12 Mt/y of iron over 25 years. The leases are in good standing until August 2013. Baffinland Iron has spent more than \$400 million on the project so far, including \$195 million last year. In late 2008, Baffinland Iron sent three trial cargo shipments of high-grade lump ore from Mary River to blast furnaces in Germany and the Netherlands operated by Luxembourg-based ArcelorMittal SA and Germany's ThyssenKrupp AG. In early 2009, the Mary River project qualified for a German loan guarantee from the German government. The project is eligible in principle for a loan guarantee of US\$1.2 billion, but Baffinland has not yet made a formal application. The actual loan coverage amount will depend on negotiating with German steel mills 10-year off-take agreements for at least 40% of the annual output. Such an application with the German government will not be made until the Mary River project has undergone a due diligence process to assess the legal, economic, technical, and environmental risks.

In early 2009, Baffinland Iron Mines Corporation and the Qikiqtani Inuit Association announced that a Memorandum of Understanding (MOU) had been successfully negotiated concerning detailed provisions intended to form part of 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 iron ore assets rather than an operating mining exploration company. In early 2009, AEI was pleased to announce the final iron assay results from the 2008 drilling campaign. Follow-up precious metals sampling and metallurgical testing results are to be reported in the future.

Located proximal to a natural deep-water harbour, the Roche Bay deposit benefits from transportation efficiencies, possibly making it one of the world's premium iron ore prospects. In 2008, AEI updated its business plan for the Roche Bay project and is examining moving forward

from the traditional iron pellet operation to a granulated pig iron (nugget) business.

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 km²). The property, formerly held by IOC, is located within 3 km of the LabMag iron ore deposit and 12 km of the KéMag iron deposit (both held by New Millennium Capital Corp.) located 162 km north of Schefferville. Plans call for a feasibility study in 2008 with a production target some time after 2011 at a mining rate of over 30 Mt/y for 10 Mt/y of iron concentrate/pellet output for an estimated measured resource of 600 Mt.

Adriana also has an option to earn a 100% interest in the Lac Otelnuq iron project (a 192-km² property), which is located 165 km northeast of Schefferville and lies within the Labrador Trough in northern Quebec. The first work program began in mid-2006 with construction of a camp to support a diamond drill program. Using information from the 2007-08 drill program, the estimates resulted in 4.29 billion t of indicated mineral resources and an additional 1.97 billion t of inferred mineral resources based on a Davis Tube Weight Recovery cut-off grade of 18%. Adriana was pleased to say that the South Zone of Lac Otelnuq can now be considered a world-class iron deposit.

Champion Minerals Inc. is a Canadian junior exploration company publicly traded on the TSX Venture Exchange under the symbol CHM. Champion's headquarters are located in Toronto, Ontario, with an exploration office in Val-d'Or, Quebec. 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). CIOI is a member of the Century Iron Ore Group, which is based in the Far East and which has an extensive network, experience, and expertise in the international iron ore industry with a focus on developing iron ore resources targeted at supplying iron ore products to China.

- **Attikamagen Project:** Champion Minerals Inc.'s Attikamagen Lake iron property comprises 532 mineral exploration claims totaling 139.7 km² in western Labrador and northeastern Quebec, primarily 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. In 2008, Champion announced the start of its summer field exploration program at the company's wholly owned Attikamagen iron property.
- **Fermont Property:** On May 27, 2008, Champion acquired up to a 70% interest in 15 iron-rich mineral concessions totaling 261.5 km² in the Fermont Iron District of northeastern Quebec from Fancamp Explor-

ation Ltd. and The Sheridan Platinum Group Ltd. (collectively the "vendors"). One of the properties (Moise Lake East) is adjacent to the east of Quebec Cartier Mines' Mount Wright operation and southeast of Consolidated Thompson Iron Mines Limited's Bloom Lake deposit (610 Mt grading 32.2% iron).

CANADA-U.S. MARKET³

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 for the pellet import market, while Brazilian, Canadian, Venezuelan, and Australian producers battle for the concentrate import 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 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 more 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 in

Quebec's north shore, each one dedicated to an ore producer: Port-Cartier, Pointe-Noire, and Sept-Îles.

The St. Lawrence Seaway Authority levies tolls on all vessels that navigate the Canadian section of the Seaway. The St. Lawrence Seaway, which opened in 1959, extends for about 3770 km from the Strait of Belle Isle at the mouth of the Gulf of St. Lawrence to Duluth at the head of Lake Superior. However, the Seaway itself begins at Montréal, Quebec, at the St-Lambert lock. The total elevation change between Montréal and Lake Ontario is 68.8 m over a distance of 299 km. Under normal conditions, a vessel will navigate this distance in about 25 hours, going through seven locks in the process. Ships bound for Lake Erie and further westward have to use the Welland Canal to ascend the 100-m lift between Lake Ontario and Lake Erie. The Canal, operated by the St. Lawrence Seaway Authority, comprises eight locks, extends for 43.5 km, and takes about 12 hours to navigate.

INTERNATIONAL TRADE DEVELOPMENTS⁴

Preliminary data (Table 1) for 2008 show that Canada exported close to 28.1 Mt of iron ore (valued at \$3075.5 million), of which 73.3% was pellets (\$2409.9 million) and 26.7% was concentrates (\$665.6 million), for a 0.4% decrease (109 411 t) in total exports from 2007 (28.2 Mt). Although pellet exports increased by 2.0 Mt (11.1%) from 18.5 Mt in 2007, exports of concentrates decreased 22.4% (by 2.2 Mt) from 9.6 Mt in 2007.

Canada's principal export markets for pellets were the United States (24.6%), Germany (23.6%), China (12.1%), the United Kingdom (7.1%), and Trinidad and Tobago (4.0%), and for concentrates were Germany (32.3%), France (18.1%), China (11.0%), the United Kingdom (8.8%), and the United States (8.4%).

Preliminary data (Table 1) show that Canada imported 9073.4 Mt of iron ore in 2008 valued at \$1069.8 million, with the bulk of concentrates and pellets (99.2%) coming from the United States. Total concentrate imports (mainly from Sweden, the United States, and Mexico) increased by 328.2% (111.4 t) and pellet imports increased by 23.4% (1.7 Mt), for a total increase in imports of 24.8% (or 1.8 Mt) from 7.3 Mt valued at \$619.0 million in 2007.

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.

The World Steel Association (source: Worldsteel) reported 86 Mt produced in January 2009. This was 24% lower than the same month the previous year. All major steel-

producing countries except China showed a two-digit decrease in crude steel production.

PRICES

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 of the steel-making ingredient and their customers in Asia and Europe and, once one set of agreements/contracts is concluded, the other miners generally follow with similar arrangements (i.e., setting the "market price"). It seems 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. Now the majority of China's iron ore consumption comes either from domestic sources or from supplies outside benchmark basis contracts. The benchmark pricing system exists to provide price guidance for other settlements that are agreed to following the first annual price settlement. This is the basis of the benchmark pricing system. In North America, prices are negotiated under the conditions of the North American market (i.e., "Eastern Canada Pellet Price").

Prices for fines are usually established first and 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 are fixed annually under long-term sales contracts, although the spot market becomes more important during recessions. There is a spot market in iron ore that tends to cover single-cargo sales not covered by longer-term contracts. It is particularly used 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, sea-borne, 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 and China's steel industry is experiencing a severe downturn due to reduced demand in major steel-consuming markets, including automotive, aviation, construction, infrastructure, manufacturing, and many major consumer goods. Worldsteel's short-term outlook is that worldwide apparent steel use is expected to decline by

14.9% to 1018.6 Mt in 2009 following a 1.4% decline (1.197 Mt) in 2008. Optimistically, Worldsteel expects demand to stabilize in the latter part of 2009, leading to a mild recovery in 2010.

Within the North American Free Trade Agreement region, the United States is expected to show the largest decline in steel demand since the post-war period. U.S. apparent steel use is expected to fall by 36.6% in 2009. The uncertainty surrounding the economic outlook is inhibiting many producers from investing in expansions. Layoffs are expected to continue as the recession deepens, with the possibility of major industry restructuring. Under such a scenario, smaller mines and producers could be absorbed by the major world players, resulting in a further consolidation and integration of iron and global steel production.

In conclusion, the recession is deep and is expected to last throughout the 2009-10 period. Automotive and non-residential construction accounts for 70% of steel usage. These sectors are unlikely to improve in the immediate future and the iron ore market will most likely continue to be very tight until 2010-11.

ENDNOTES

¹ Operating costs include expenses in the form of materials, labour, energy, and transportation (rail or other). They do not include royalty payments, taxes, depreciation or interest costs, and fringe benefits or social cost. Costs are specified as f.o.b. (free on board vessel at sea port) or C&F (cost and freight per port destination). F.o.b. costs represent expenses associated with the following activities: mining, beneficiation, agglomeration (for pellets and sinter), transportation to port, and loading on board a vessel. C&F costs represent f.o.b. operating costs plus the freight charge to ship the ore to the client market. C&F costs are therefore specific to a port.

² Although a producer's operating cost f.o.b. is an important factor to assess its competitiveness, by itself it only provides the "defending competitiveness" of the producer or how the producer compares with other producers exporting to its domestic market. However, to assess a producer's "offensive competitiveness" or its

ability to compete with other producers for market shares other than domestic, operating costs C&F per market area are more useful. Ocean transportation costs increase with the distance traveled, but the rates for longer distances are only slightly more than for shorter distances. Internal transportation costs (rail and water) are much higher per tonne per kilometre than oceanic rates are.

³ Source: *Iron Ore 2000 - Poised for the Next Century*, Natural Resources Canada (NRCan).

⁴ Source: NRCan.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 58. (2) Information in this review was current as of April 2009. (3) This and other reviews, including previous editions, are available on the Internet at www.nrcan-rncan.gc.ca/mms-smm/busi-indu/cmy-amc/com-eng.htm.

NOTE TO READERS

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TARIFFS

Item No.	Description	Canada			United States		EU	Japan
		MFN	GPT	USA	Canada	Conventional Rate (1)	WTO (2)	
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	Free
2601.12	Iron ores and concentrates, other than roasted iron pyrites: agglomerated	Free	Free	Free	Free	Free	Free	Free

Sources: Canadian *Customs Tariff*, effective January 2009, Canada Border Services Agency; *Harmonized Tariff Schedule of the United States*, 2009; *Official Journal of the European Union* (Tariff Information), September 19, 2008 edition; *Customs Tariff Schedules of Japan*, 2009.

(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, 2006-08

Item No.	2006		2007		2008 (p)	
	(tonnes) (1)	(\$000)	(tonnes) (1)	(\$000)	(tonnes) (1)	(\$000)
PRODUCTION (mine shipments)						
Newfoundland and Labrador	19 795 965	1 494 695	17 879 963	1 357 932	18 668 287	1 452 852
Quebec	13 649 183	x	14 819 560	x	12 529 003	x
British Columbia	97 830	x	74 653	x	75 841	x
Total (2)	33 542 978	2 530 298	33 158 344	2 502 500	31 273 131	2 426 763
EXPORTS						
2601.11	Iron ore concentrates, non-agglomerated					
Germany	1 800 724	90 934	3 052 923	204 319	2 417 458	231 250
France	488 942	23 049	814 772	47 122	1 350 789	113 352
China	842 488	46 235	1 838 131	103 071	823 409	77 269
Japan	617 173	35 269	588 991	38 755	533 344	55 207
United Kingdom	1 447 257	72 495	1 133 250	71 367	656 553	49 725
United States	1 331 053	69 370	745 779	27 979	628 148	47 342
Netherlands	409 110	20 840	518 389	29 732	486 466	43 164
Belgium	—	—	—	—	199 309	16 748
Mexico	—	—	—	—	115 568	11 393
South Korea	147 596	7 219	279 949	14 378	145 865	7 503
Spain	67 726	3 639	135 583	7 932	65 190	7 133
Other countries	371 219	18 053	527 497	35 430	55 330	5 530
Total	7 523 288	387 103	9 635 264	580 085	7 477 429	665 616
2601.12	Iron ore, agglomerated					
United States	5 020 466	342 501	4 635 957	305 755	5 057 018	635 961
Germany	4 358 218	350 028	2 823 237	235 958	4 854 310	632 682
China	3 561 327	227 688	2 576 750	138 717	2 481 616	238 334
United Kingdom	1 495 916	126 700	1 623 386	134 436	1 469 438	140 327
Australia	1 181 054	97 526	951 888	78 507	759 578	115 331
Japan	716 864	47 210	1 199 859	74 251	812 227	102 995
Trinidad and Tobago	97 943	8 764	423 739	35 905	815 713	95 403
Saudi Arabia	—	—	151 323	12 470	488 185	65 562
Taiwan	935 006	74 228	1 062 060	86 729	502 198	54 050
France	381 726	33 142	363 340	29 537	455 764	47 526
Belgium	73 848	6 112	66 533	5 801	379 367	42 097
Venezuela	328 507	31 583	74 553	7 062	359 430	36 453
Italy	351 595	25 901	591 603	49 889	453 931	36 298
Netherlands	229 678	18 943	576 734	48 195	356 467	35 561
Spain	—	—	219 175	17 696	312 981	33 859
Egypt	459 289	44 164	402 725	36 472	225 062	22 219
Turkey	132 878	6 445	446 141	28 627	261 206	21 529
Other countries	716 657	68 014	340 691	30 481	533 627	53 710
Total	20 040 972	1 508 949	18 529 694	1 356 488	20 578 118	2 409 897
Total exports	27 564 260	1 896 052	28 164 958	1 936 573	28 055 547	3 075 513
IMPORTS						
2601.11	Iron ore concentrates, non-agglomerated					
Sweden	11	13	66	24	65 411	4 896
United States	40 963	1 808	33 528	2 000	74 195	3 916
Mexico	2	...	5 501	785
Other countries	1 330	124	341	85	226	57
Total	42 304	1 945	33 937	2 109	145 333	9 654
2601.12	Iron ore, agglomerated					
United States	7 509 056	661 766	7 235 010	616 851	8 928 027	1 060 150
Other countries	10	1	10	...	7	...
Total	7 509 066	661 767	7 235 020	616 851	8 928 034	1 060 150
Total imports	7 551 370	663 712	7 268 957	618 960	9 073 367	1 069 804

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**

Country	2006	2007 (e)	Change	Global Rank
	(tonnes)		(%)	
China	420 000	588 000	40.00	1
Brazil	281 430	318 000	12.99	2
Australia	261 855	275 042	5.04	3
India	140 000	160 000	14.29	4
Russia	96 764	102 000	5.41	5
Ukraine	68 570	74 000	7.92	6
United States	54 300	52 700	-2.95	7
South Africa	39 542	41 326	4.51	8
Canada	30 387	33 542	10.38	9
Sweden	23 300	23 300	-	10
Venezuela	20 000	23 000	15.00	11
Iran	19 000	20 000	5.26	12
Kazakhstan	16 470	18 600	12.93	13
Mauritania	10 752	11 155	3.75	14
Mexico	11 700	11 000	-5.98	15
Peru	6 810	7 250	6.46	16
North Korea	5 000	5 000	-	17
Turkey	4 000	4 000	-	18
Bosnia and Herzegovina	3 300	3 300	-	19
Egypt	2 600	2 500	-3.85	20
Algeria	1 536	2 339	-	21
New Zealand	2 270	2 300	1.32	22
Austria	2 000	2 000	-	23
Greece	1 500	1 500	-	24
Malaysia	950	1 000	5.26	25
Vietnam	700	710	1.43	26
Colombia	608	644	5.92	27
Norway	620	620	-	28
Germany	362	360	-0.55	29
Romania	300	300	-	30
Thailand	220	264	20.00	31
Slovakia	300	250	-16.67	32
South Korea	213	227	6.57	33
Zimbabwe	377	200	-46.95	34
Tunisia	206	200	-2.91	35
Nigeria	100	100	-	36
Pakistan	50	60	20.00	37
Indonesia	22	20	-9.09	38
Portugal	14	14	-	39
Azerbaijan	7	11	57.14	40
Macedonia	10	10	-	41
Morocco	10	10	-	42
Guatemala	11	7	-36.36	43
United Kingdom	1	1	-	44
Total	1 528 167	1 786 862	16.93	

Sources: Natural Resources Canada; U.S. Geological Survey, 2006 review on iron ore.
- Nil; (e) Estimated.

(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.