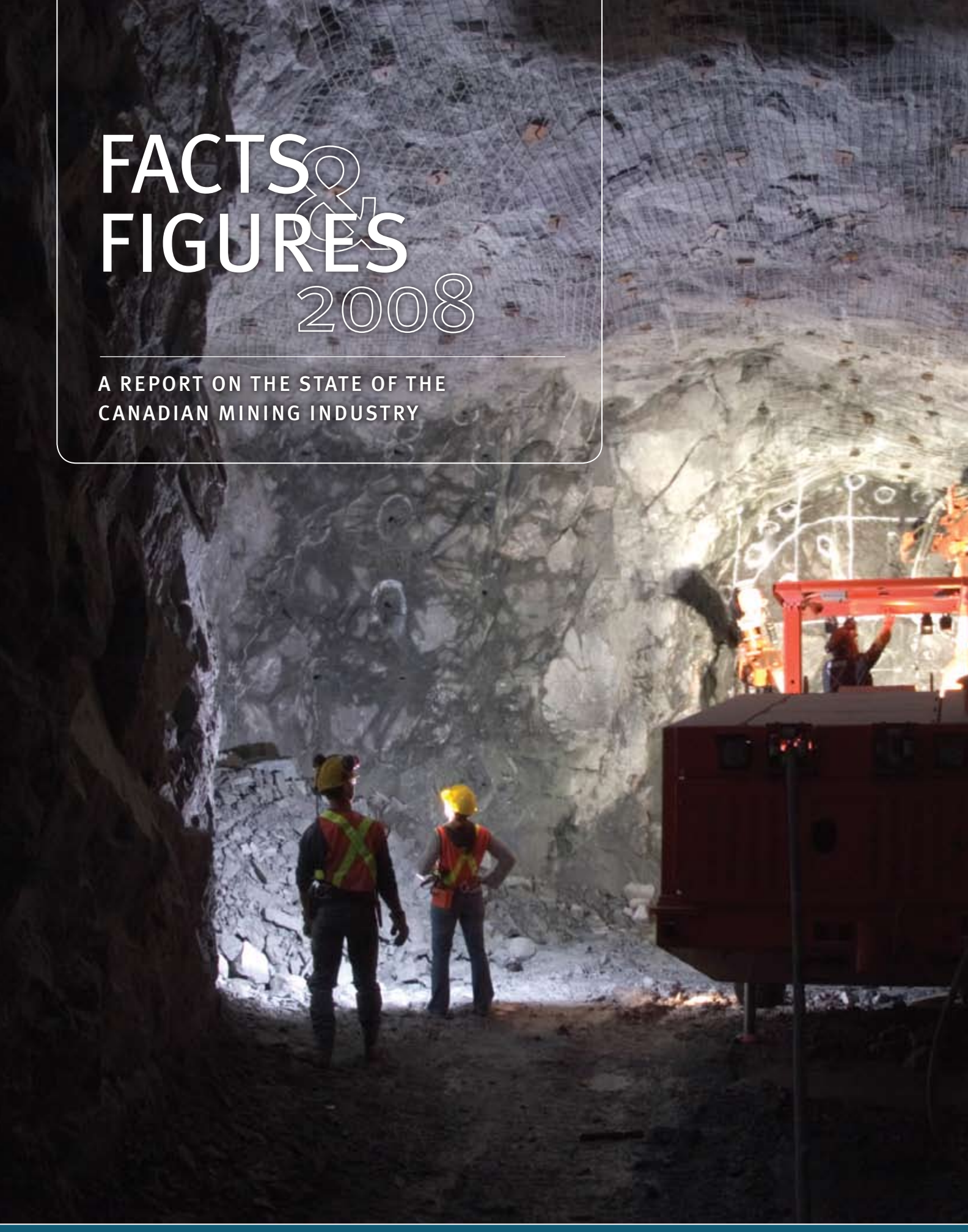
FACTS & FIGURES 2008

A REPORT ON THE STATE OF THE CANADIAN MINING INDUSTRY



The Mining Association of Canada
L'Association minière du Canada

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THE MINING ASSOCIATION OF CANADA

The Mining Association of Canada (MAC) is the national organization of the Canadian mining industry. It comprises companies engaged in mineral exploration, mining, smelting, refining and semi-fabrication. Member companies account for the majority of Canada's output of metals and major industrial materials.

The Association's functions are to promote the interests of the industry nationally and internationally, to work with governments on policies affecting minerals, to inform the public and to promote cooperation between member firms to solve common problems. MAC works closely with provincial and territorial mining associations and other industries, as well as with environmental and community groups across Canada and internationally.

DATA AND SOURCES

This annual report reflects currently available data, most of it for 2007, though with some data also from 2008 and 2006. A number of statistical differences occurred in 2002, reflecting a change from Standard Industrial Classification (SIC) statistics to the North American Industrial Classification System (NAICS). The value figures are generally expressed in Canadian dollars except as indicated otherwise.

Author:
Paul Stothart, Vice-President, Economic Affairs, Mining Association of Canada

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The Canadian Mining Industry—Activities and Key Issues

The mining industry is an important contributor to Canada's economic strength. The industry employs 363,000 Canadians in mineral extraction and in the value-added smelting, fabrication and manufacturing areas. The industry's $42 billion contribution to Canada's gross domestic product includes $10 billion in mineral extraction and $32 billion in mineral processing and manufacturing.

Internationally, Canada is one of the world's leading mining countries and ranks among the largest producers of minerals and metals. The industry accounts for 19% of annual Canadian goods exports. Key exports include iron and steel, aluminum, nickel, copper, gold, uranium, coal, potash, zinc, diamonds and iron ore. Exports of these products ranged from $1.9 billion to $14.5 billion in 2007. Consequently, an estimated 70% of Canadian port volumes and 55% of rail freight revenues are generated by the mining industry. As well, some 3034 suppliers provide expertise to the industry, including hundreds of engineering firms, environmental firms, and legal and financial firms. Canada was the leading destination for global exploration spending in 2007, receiving 19% of world spending, followed by Australia at 12% and the United States at 7%.

While the industry is important at the local community level, it also contributes to the economy of Canada's larger cities. Toronto is the world's leading city for mining finance—the TSX handled 80% of worldwide mining equity transactions in 2007. Vancouver is home to the world's leading cluster of exploration companies, while Montreal houses important aluminum and iron ore companies. Edmonton has become a global centre for oil sands expertise and Saskatoon for uranium and potash. Mining is also the largest private-sector employer of Aboriginal Canadians and stands to offer increased opportunity to this segment.

Mining and its related industries are important contributors to federal, provincial and territorial coffers. According to a recent study for MAC, the industry paid $8.15 billion in taxes and royalties to federal and provincial/territorial governments in 2006. Including the fourth stage of activity would add a further amount of around $2.5 billion. These payments increased significantly in 2006 and have likely continued to increase in 2007.

Average weekly wages and salaries in the mining industry were $1213 in 2007—a level that was 30%, 29%, 24% and 22% higher than that of workers in the construction, manufacturing, forestry and finance sectors respectively. This gap has widened over the past year, reflecting the industry's relatively buoyant price and profitability situation.

Canadian mining companies are active investors in research and development—companies invested a total of $538 million

in 2006. Statistics Canada reports that some 4600 R&D employees work in the mining and minerals industry, higher than totals for the agri-food, oil and gas, electrical equipment and automotive sectors, and close to the level of the aerospace and pharmaceutical sectors.

KEY ISSUES FACING THE CANADIAN MINING INDUSTRY

The mining industry is enjoying a prosperous period. Exploration levels are high and global metal prices are at or near historically high levels. Economic growth in China, India and elsewhere suggests that this demand and price situation will continue through the medium-term. China bought over 25% of the world's base metals in 2007 versus 5% in the 1980s, yet the penetration of metals-intensive products in the country remains relatively low.

Though times are good, Canadian policymakers and businesses should not be complacent in the face of a buoyant market. As detailed in the main report, the industry faces mounting production costs as well as a number of other challenges that threaten Canada's ability to seize international opportunities. These include the following:

1. Investing in Geoscience and Strengthening Canada's Mineral Reserves

Investment by the federal and provincial governments in geoscience has declined by one-half since 1988, with the result that important Canadian regions remain poorly mapped. Canada's reserves of base and precious metals have also declined significantly—generally by 50–80%—over the past quarter-century. Unless new and effective exploration is undertaken, reserves of key minerals will remain at critically low levels thereby weakening the case for investing in value-added facilities.

In early 2008, the federal government announced the Geo-mapping for Energy and Minerals (GEM) program, a five-year, $100 million re-investment in geological mapping that will also spark enhanced provincial spending. Being able to invest exploration dollars in areas where high-quality geoscience information is available improves the likelihood of finding commercial-scale mineral resources. GEM is a positive development for the long-term prosperity of the industry and its employees and suppliers.

2. Improved Tax Treatment in Niche Areas

The Canadian mining industry receives reasonably competitive tax treatment. This will improve further as the positive announcement of October 2007—to phase corporate income tax rates to 15% by 2012—is implemented. An important remaining component that could be improved upon is the tax treatment accorded to investment in mineral exploration at depth within existing underground workings. Encouraging greater business investment in this area could help address the declining reserves challenge.

3. Regulations and Targets for Air Pollutants and Greenhouse Gas Emissions

Canada's clean air regulatory agenda, encompassing air pollutants and greenhouse gas emissions, is at serious risk of becoming over-complicated by the plethora of emerging federal and provincial targets, regimes, processes and reporting requirements. It is essential that Canada's proposed targets for air pollutants and greenhouse gas emissions be achievable and that the regulatory system be efficient and effective, without duplication between jurisdictions.

4. Other Social–Environmental Challenges

Mineral extraction and processing involves an intrusion upon the landscape in the form of access roads, excavations, and tailings management facilities, among other components. These actions represent encounters between humans and the environment—and the attendant need for companies to manage community relations, Aboriginal engagement, water management, and other key aspects. For its part, government must manage project review processes in an open and efficient manner.

5. Need for Human Resources and Skills

The industry faces a serious human resource challenge in the coming decade—an estimated 9200 new workers will be needed per year to meet anticipated Canadian production targets. This comes at a time when the skilled core of the industry, including 65% of geoscientists, will reach retirement age. This is a more pronounced reality in mining than in other sectors, as the industry traditionally attracts fewer females, youth and minorities. Addressing this challenge will require a significant and coordinated effort by the industry and all levels of government in Canada.

6. Need for Strategic Infrastructure Investments

The mining industry is the largest customer for Canada's transportation sector—as such it is important that the transport system move products to market efficiently and at competitive prices. Transportation infrastructure must be modern and in some cases, such as northern Canada and the Pacific Gateway, there is need for significant government investment. Strategic investments can also serve to open up new regions for development—for example it is estimated that a power line into northern BC could attract $3.5 billion in mining investment.

7. Increased International Turbulence

In the context of strong mineral prices, the governments of many countries (Ecuador, Mongolia, Zambia, Argentina, Venezuela, Kyrgyzstan and others) are aiming to capture a larger share of the overall mining revenue streams, in some cases through revoking agreements. The Canadian government can help mitigate the risks associated with business investment abroad by negotiating bilateral investment treaties, double-taxation agreements, and free trade agreements. For their part, global companies must continue to invest in the legal and financial protections that they need to operate successfully in turbulent times.

Mining Sector Contribution to the Canadian Economy

The mining and mineral manufacturing sector, generically known as the "mining industry," is comprised of mineral exploration, mining and quarry industries, primary metals, fabricated metal products and non-metallic mineral products industries. At its core, the industry encompasses metal, non-metal and coal mines, oil-sands mining operations, and manufacturing capacity in the form of smelters, refineries and fabrication facilities.

The products of this industry help build the highways, electrical and communications networks, housing, automobiles, consumer electronics and other products and infrastructure essential to modern life. These are just a few consumer applications that rely on mining products:

- Batteries – cadmium, lithium, cobalt
- Circuitry – gold, copper, aluminum, steel, lithium, titanium, silver, cobalt, tin, lead, zinc
- Computer/TV screens – silicon, boron, lead, barium, strontium, phosphorus, indium
- Cosmetics and jewellery – iron oxide, kaolin, zinc, titanium dioxide, gold, diamonds
- Electricity – coal, uranium
- Eyeglasses – limestone, feldspar, soda ash
- Leather clothing – borax, chromium, zirconium, aluminum, titanium oxide
- Musical instruments – copper, silver, steel, nickel, brass, cobalt, copper, iron, aluminum
- Sports equipment and helmets – graphite, aluminum, titanium, calcium carbonate, sulphur
- Sun protection – zinc oxide
- Vehicles and tires – steel, copper, zinc, barium, graphite, sulphur, bromine, iodine

The mining sector reaches into our everyday life and its opportunities, environmental challenges, investments and needs are inseparable from those of broader society. As a result of mining's innovation and investment activities, Canada has benefited from low-cost mineral and metal products, product innovations, good jobs, greater wealth and responsible stewardship of natural resources.

The cleaner products and technologies of today and tomorrow are not possible without metals and minerals as the building blocks. Hybrid vehicles for example draw

energy from nickel hydride batteries. Catalytic converters require cerium and palladium. Water purification systems rely on nickel and a host of rare earth elements. Cleaner energy sources, whether nuclear, solar, wind or hydrogen, all use a range of minerals and metals in the equipment and processes.

CONTRIBUTION TO CANADIAN GDP

The Canadian economy has experienced a decade-plus of strong growth, low inflation and low interest rates, with gross domestic product (GDP) growing at around 3% annually. The economy passed the one trillion dollar threshold in 2003 and reached $1.2 trillion in 2007. Over the past 20 years, the value of minerals and metals to Canada's economy has remained relatively stable at 3.5% to 4.5% of the country's GDP.

Figure 1 presents the breakdown of Canada's gross domestic product. The mining industry in this table is grouped with oil and gas extraction, and the combined extractive industry contributed $58.3 billion to Canada's GDP in 2007, or approximately 4.8% of the national total. By this measure, the industry is ten times larger than the forestry sector and three times larger than the agricultural sector.

The actual contribution of the mining and mineral manufacturing sector is more usefully detailed in Figure 2, where the industry is divided into four stages: extraction of minerals; smelting and refining of these minerals into primary metals; processing of non-metallic mineral products; and fabrication of primary metal products. The total output of these four stages amounted to $41.9 billion in 2007. In comparison, the oil and gas extraction sector contributed $43.2 billion in GDP (although an estimated $16 billion of this relates to oil sands extraction, which could also be logically classified under mineral extraction).

- Stage I includes the primary mineral extraction and production activities of mining and concentrating. These can be divided into metal mining, non-metal mining and coal. *Stage I contributed $9.7 billion to Canada's GDP in 2007.*

FACT:
The products of this industry help build the highways, electrical and communications networks, housing, automobiles, consumer electronics and other products and infrastructure essential to modern life.

FIGURE 1: CANADA'S GROSS DOMESTIC PRODUCT, BY INDUSTRY, 1999–2007

($MILLIONS)	1999	2000	2001	2002	2003	2004	2005	2006	2007
All industries	974,405	1,026,242	1,040,943	1,068,765	1,091,378	1,126,802	1,160,024	1,193,905	1,223,853
Agriculture	18,465	18,009	16,204	14,630	16,910	18,658	19,535	19,263	19,075
Fishing, hunting and trapping	956	985	1,085	1,118	1,138	1,175	1,052	1,069	1,146
Forestry and logging	5,302	5,632	5,676	5,893	5,756	6,182	6,168	5,896	5,277
Support activities for mining and oil & gas	3,665	4,825	5,274	4,987	5,571	5,804	6,635	6,543	5,483
Mining and oil & gas extraction	**50,000**	**51,519**	**51,236**	**53,488**	**54,979**	**55,849**	**56,044**	**57,174**	**58,323**
Manufacturing	171,923	188,925	181,084	182,736	181,349	185,504	188,478	186,631	184,782
Construction	49,053	51,757	55,542	57,775	59,871	63,592	68,527	74,087	76,884
Transportation and warehousing	46,603	48,921	50,176	50,066	50,270	51,960	53,802	55,501	56,379
Information and cultural industries	31,617	34,007	36,498	38,229	39,631	40,232	41,848	43,147	44,203
Electric power, gas and water utilities	28,982	29,050	27,384	28,883	29,057	29,131	30,550	30,128	31,170
Trade, wholesale	49,396	52,519	53,438	55,226	57,767	60,283	63,879	68,383	71,357
Trade, retail	49,437	52,579	55,234	58,483	60,515	62,870	65,132	69,015	72,915
Finance and insurance	58,032	60,978	62,802	63,630	64,820	68,217	70,088	73,872	77,947
Real estate and rental and leasing	117,997	121,899	126,782	131,410	134,681	138,725	143,597	148,027	153,270
Community, business and personal services	233,167	243,367	249,339	256,105	262,549	270,631	277,045	285,749	293,618
Public administration	56,674	57,968	59,705	61,523	63,314	64,355	65,309	66,758	67,901

Sources: Statistics Canada, CANSIM Table 379-0027 and Catalogue 15-001-XIE, May 2008

FIGURE 2: GROSS DOMESTIC PRODUCT – MINING AND MINERAL MANUFACTURING, 1999–2007

($MILLIONS)	1999	2000	2001	2002	2003	2004	2005	2006	2007
Metal mines	4,285	4,567	4,301	4,113	4,003	3,899	3,930	3,992	3,995
Non-metal mines	3,122	3,057	3,276	3,388	4,091	4,369	4,296	4,143	4,881
Coal mines	1,118	1,185	1,321	1,057	794	994	991	885	980
Total Mineral Extractions	**8,546**	**8,825**	**8,876**	**8,559**	**8,856**	**9,150**	**9,126**	**8,992**	**9,676**
Primary metal manufacturing	10,028	10,882	10,663	11,087	10,897	11,562	11,832	11,940	11,688
Fabricated metal product manufacturing	11,447	14,201	13,734	14,062	13,711	13,515	14,031	14,066	14,464
Non-metallic mineral product manufacturing	4,346	4,779	4,994	5,096	5,375	5,454	5,585	5,777	6,072
Total Mineral Manufacturing	**25,821**	**29,862**	**29,391**	**30,245**	**29,983**	**30,531**	**31,448**	**31,783**	**32,224**
Total Mining & Mineral Manufacturing	**34,367**	**38,687**	**38,267**	**38,804**	**38,839**	**39,681**	**40,574**	**40,775**	**41,900**

Sources: Statistics Canada, CANSIM Table 379-0027 and Catalogue 15-001-XIE

- Stage II captures metal production, including the smelting, refining, rolling, extruding, alloying and casting of primary metals such as copper, nickel, aluminum and steel. *Stage II contributed $11.7 billion to Canada's GDP in 2007.*
- Stage III captures non-metallic mineral processing industries such as abrasives, gypsum, lime, cement, glass and ceramics. *Stage III contributed $6.1 billion to Canada's GDP in 2007.*
- Stage IV includes the metal fabrication industries, such as forging, stamping and heat-treating activities that produce reinforcing bars, fabricated wire, cutlery, tools and hardware. *Stage IV contributed $14.5 billion to Canada's GDP in 2007.*

All segments of the mining and mineral manufacturing sector have experienced stable to strong growth over the past nine years. *See Section 3.0 The Money: Reserves, Prices, Financing, Exploration and Investments for more about this issue.*

INDUSTRY IMPACTS IN CANADIAN PROVINCES AND TERRITORIES

The geographic distribution of Canadian clusters of mining expertise is illustrated in Figure 3 and detailed in Annex 1. The Canadian mining industry continues to be an economic backbone of Canada's regional and rural economies, creating jobs and economic growth in more than 115 communities across Canada. As well, approximately

FIGURE 3: CANADIAN MINING INDUSTRY CLUSTERS

Source: Natural Resources Canada

1200 Aboriginal communities are located within 200 kilometres of producing mines and exploration properties, creating an important source of economic opportunity.

As of January 2008, there were 766 mining establishments in Canada, including 63 in metals and 703 in non-metals (see Annex 2 for details). The non-metals sector is dominated by sand and gravel quarries (384), stone quarries (195) and peat mines (69)—these tend to be relatively small in size and local in focus. Quebec has the largest number of metal mines, with 22, followed by Ontario with 16 and BC with 9.

Canadian mineral production was valued at $40.4 billion in 2007, of which $10.7 billion or 26% was generated in Ontario. Saskatchewan, British Columbia and Quebec each had mineral production amounting to around 14% of Canada's total (Figure 4). The Saskatchewan share has grown since 1997 due to the increased market price of uranium and potash.

The Northwest Territories' share increased from 2.8% in 1997 to 3.7% in 2007, reflecting the territory's importance as a diamond producer (although this share decreased during the past year). Newfoundland and Labrador showed the greatest increase over the past decade, climbing to fifth at 12.4% of Canadian production. This growth has taken place in the past two years, since the Vale Inco nickel-copper mine opened at Voisey's Bay in Labrador. New Brunswick, Nova Scotia, Alberta (oil sands mined production is not included in this data), the Yukon and PEI all experienced a decline in production value between 1997 and 2007.

As detailed in Figure 5, mineral exploration expenditures by province tell a slightly different story. Ontario remains the top province, capturing 20% of exploration and deposit appraisal spending, followed by Nunavut at 17%, BC at 16%, Quebec at 15% and Saskatchewan at 9%. Canada's three northern territories together received 28% of total Canadian exploration spending in 2007. This is seven times their share of production value and reflects the global interest in their mineral potential. The three territories attracted a total of $825 million in exploration and appraisal spending in 2007, up from $475 million in 2006 and $160 million in 2003.

Ontario is the top region in investment in mine complex development, receiving $1.1 billion or 22% of the Canadian total in 2007. Other provinces with significant shares include NWT and Saskatchewan at 18% each, Quebec at 15% and BC at 14%.

On a commodity basis (see Annex 3), the top three jurisdictions for gold production in 2007 were Ontario, Quebec and British Columbia. The top three copper producers were British Columbia, Ontario and Newfoundland and Labrador. In both cases, the three provinces account for about 85–90% of production value. Gold mines were redeveloped for production during

FIGURE 4: VALUE OF CANADIAN MINERAL PRODUCTION,[1] BY PROVINCE AND TERRITORY, 1997 AND 2007[p]

	1997 ($000)	1997 (%)	1997 RANK	2007 ($000)	2007 %	2007 RANK
Ontario	5,536,141	28.6	1	10,675,117	26.4	1
Saskatchewan	2,214,208	11.4	4	5,831,555	14.4	2
British Columbia	3,046,937	15.7	3	5,671,586	14.0	3
Quebec	3,437,046	17.7	2	5,515,783	13.7	4
Newfoundland & Labrador	1,008,273	5.2	7	5,019,640	12.4	5
Manitoba	1,020,573	5.3	6	2,493,455	6.2	6
Alberta	1,031,656	5.3	5	1,716,423	4.3	7
New Brunswick	953,071	4.9	8	1,569,239	3.9	8
Northwest Territories	548,768	2.8	9	1,492,885	3.7	9
Nova Scotia	378,005	2.0	10	300,000	0.7	10
Yukon Territory	203,632	1.1	11	53,179	0.1	11
Nunavut	–	–	–	32,431	0.1	12
Prince Edward Island	3,410	…	12	4,089	…	13
CANADA	**19,381,721**	**100.0**		**40,375,382**	**100.0**	

p Preliminary – Nil … amount too small to be expressed

1. Includes coal, but excludes crude petroleum and natural gas.

Sources: Natural Resources Canada; Statistics Canada

FIGURE 5: TOTAL CAPITAL EXPENDITURES ($) FOR MINERAL RESOURCE DEVELOPMENT, BY PROVINCE AND TERRITORY, 2007[p]

	EXPLORATION	DEPOSIT APPRAISAL	MINE COMPLEX DEVELOPMENT	TOTAL EXPENDITURES
Newfoundland and Labrador	124,097,617	25,844,572	98,339,059	248,281,248
Prince Edward Island	–	–	–	–
Nova Scotia	10,218,640	12,702,442	29,618,920	52,540,002
New Brunswick	32,612,615	1,370,606	168,459,905	202,443,126
Quebec	354,655,796	102,746,886	761,079,803	1,218,482,485
Ontario	312,532,427	268,992,084	1,128,230,183	1,709,754,694
Manitoba	80,840,728	38,216,627	164,968,597	284,025,952
Saskatchewan	267,482,049	10,531,767	910,411,067	1,188,424,883
Alberta	6,737,767	5,024,014	153,985,187	165,746,968
British Columbia	312,502,817	175,162,693	719,425,321	1,207,090,831
Yukon	98,446,579	47,532,168	75,620,000	221,598,747
Northwest Territories	123,015,849	57,573,780	921,594,990	1,102,184,619
Nunavut	221,437,908	276,580,839	9,100,000	507,118,747
CANADA	**1,944,580,793**	**1,022,278,478**	**5,140,833,032**	**8,107,692,303**

p Preliminary – Nil

Source: Natural Resources Canada, based on the Federal-Provincial-Territorial Surveys of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures

2007 at Lamaque and Fabie Bay mines in Quebec and at QR mine in BC. Ontario, Newfoundland and Labrador, Manitoba and Quebec produced all of Canada's nickel. The opening of the Voisey's Bay mine in Newfoundland and Labrador in 2006 moved the province to second place in its first year of nickel production. Newfoundland and Labrador and Quebec produced over 99% of Canada's iron ore in 2007, while the NWT produced 98% of Canada's diamonds.

While it is perceived as bringing benefit primarily to rural, remote and northern communities, the mining industry also has strong links to major cities across Canada. Some of Canada's largest companies are located in urban centres such as Vancouver (Teck Cominco, Goldcorp), Saskatoon (Potash Corporation, Cameco), Winnipeg (HudBay), Toronto (Xstrata, Vale Inco, Barrick, Inmet) and Montreal (Alcan, IAMGold, Iron Ore Company, ArcelorMittal Mines).

Toronto is generally viewed as being the mining finance capital of the world. It is home to the Toronto Stock Exchange, more than 400 mining and exploration company offices, over 30 mining company head offices and several hundred mining suppliers, consulting firms and service providers.

Vancouver is the world's mining exploration centre with more than 850 mining and exploration company offices. In addition, more than 400 mining consultants and related suppliers are located in the greater Vancouver area.

Montreal is an important location for Alcan and its world-leading aluminum-related expertise. It also hosts significant mining research and development and education facilities. McGill University is home to

Canada's largest metallurgical/materials graduate school.

The emergence of the oil sands on a global scale over the past several years has sparked the growth of Edmonton as a hub of expertise in this area. Similarly, the strong growth in uranium and potash prices in recent years has highlighted the importance of Saskatoon as an international centre of expertise in these segments.

SUPPLIERS TO THE MINING INDUSTRY

The mining industry's impact extends beyond its significant direct GDP contribution. For example, the industry contributes approximately 55% of Canada's rail-freight revenues and some two-thirds of Canadian port tonnage. In this sense, organizations such as CN Rail, CP Rail, the Port of Montreal and the Port of Vancouver depend on a vibrant Canadian mining industry.

Global Infomine, a database analyst, reports that 3034 Canadian goods and services firms provide technical, legal, financial, accounting, environmental and other expertise to the mining industry as of 2008, including:

- 94 geotechnical consulting firms
- 233 environmental consulting firms
- 127 exploration consulting firms
- 108 legal and financial firms
- 65 education and training organizations
- 32 mineral processing contractors
- 65 crusher/conveyor equipment companies
- 89 laboratory and appliances equipment companies
- 223 mineral processing equipment companies
- 108 transportation companies

Ontario (1234), BC (873), Alberta (469), Quebec (366), Saskatchewan (80) and Manitoba (64) have the largest number of mining industry suppliers according to Global Infomine.

The federal government through Natural Resources Canada (NRCan) provides a higher estimated count, reporting 4000 companies in other sectors that supply the mining industry.

Supplier companies are essential to the introduction and dissemination of innovative technologies and ideas to the mining industry. NRCan notes that most goods and services demanded by mining companies are specialized technological and scientific products and that their employees are highly educated—an estimated 25% hold university degrees in engineering, geology, geophysics, geochemistry or related scientific disciplines.

As detailed in Section 3.0, the Canadian investment services sector is also a prominent supplier to the mining industry. During 2007, fully 35% of global mining capital and 80% of global financing transactions were handled through the Toronto Stock Exchange. It is estimated that several thousand Canadian brokers, analysts, exchange workers, consultants, trade finance experts and securities lawyers draw benefit from the strength of the mining industry.

TAXES AND OTHER MINING INDUSTRY PAYMENTS TO GOVERNMENTS

Figure 6 provides a summary of payments accruing to Canadian governments as a result of mining activity—notably the extraction, smelting and processing of minerals described in the first three stages of Figure 2. This data draws from a consulting study conducted for MAC in early 2008 by ENTRANS Policy Research Group and it reflects the most recently available data.

As shown, the industry, including oil sands mining, paid $8.15 billion to federal and provincial/territorial governments in 2006: approximately $2.3 billion in royalties, $4.0 billion in corporate income tax and $1.9 billion in personal income tax.

In terms of growth, Figure 6 indicates that these corporate income tax payments increased by 66% in 2006. This increase reflects strong growth in global mineral prices and the associated corporate profits. Given the continued strong mineral price increases of 2007, the industry's payments to governments in 2007 have likely continued to grow. This will be examined again in next year's *Facts & Figures*.

The above figures do not reflect the fourth stage of activity outlined in Figure 2 (fabricated metal product manufacturing) as it can be difficult to determine where to draw a boundary around the "mining

FACT:
Over 3000 Canadian goods and services firms provide technical, legal, financial, accounting, environmental and other expertise to the mining industry.

FIGURE 6: DIRECT REVENUES TO GOVERNMENTS FROM THE MINING INDUSTRY, 2002–2006

($MILLIONS)	2002	2003	2004	2005	2006	TOTAL
MINING INDUSTRY EXCLUDING OIL SANDS MINING						
Royalties and equivalent	430	440	560	785	762	2,977
Corporate income tax	1,085	1,049	1,572	1,810	2,816	8,332
Personal income tax	1,612	1,548	1,605	1,561	1,672	7,998
TOTAL	3,127	3,037	3,737	4,156	5,250	19,307
– of which federal	1,957	1,952	2,396	2,398	3,127	11,829
– of which provincial	1,170	1,085	1,342	1,758	2,123	7,478
MINING INDUSTRY INCLUDING OIL SANDS MINING						
Royalties and equivalent	492	554	1,061	1,376	2,325	5,808
Corporate income tax	1,381	1,772	1,943	2,393	3,964	11,453
Personal income tax	1,733	1,675	1,742	1,719	1,858	8,727
TOTAL	3,606	4,001	4,746	5,488	8,147	25,988
– of which federal	2,234	2,526	2,632	2,725	3,725	13,842
– of which provincial	1,372	1,475	2,114	2,763	4,422	12,146

Source: ENTRANS Policy Research Group study for Mining Association of Canada

industry." Some of the outputs of this fourth stage, such as cutlery, fixtures and boilers likely fall outside logical bounds. Including the fourth stage of activity within the above analysis would mean that the industry paid an additional amount of around $2.5 billion to governments in 2006, bringing the mining and mineral manufacturing industry total to $10.65 billion. It is estimated that 52% of this total accrues to the federal government and 48% to the provincial/territorial governments.

Given the integration of oil sands activities with conventional oil and gas activity, it can be difficult to derive separate payment data for oil sands. In its study, ENTRANS drew upon figures from the Canadian Association of Petroleum Producers and Alberta Department of Energy to arrive at an estimate of oil sands mining royalty payments of $1.56 billion to the Alberta government in 2006, up 165% from the previous year. This large increase reflects the fact that many of Canada's oil sands projects have repaid investors' initial capital spending and thus have entered a higher royalty bracket. (It is worth noting as well that the oil sands industry directed a further $1.96 billion during the year to the Alberta government in the form of land sales payments).

Beyond Alberta, the ENTRANS data suggests that Newfoundland and Labrador, New Brunswick, Manitoba, Saskatchewan and British Columbia all derive a significant portion of government revenues from the mining and mineral processing industry.

With respect to federal tax policy, the Canadian mining industry was pleased with the announcement in October 2007 that the federal corporate tax rate will decline from 21% at present to 15% by 2012. In an age of highly mobile capital, such a transition will serve to improve Canada's investment climate.

The industry was pleased as well with two technical clarifications that were made by the Canada Revenue Agency (CRA) during the past year. The CRA clarified the treatment of certain tangible expenses in underground mines and concluded that the expenses associated with consulting with Aboriginal and other groups on exploration projects are generally eligible for CEE/flow-through share treatment. The industry also welcomes the ongoing effort on the part of senior Finance Canada officials to reduce the paper burden associated with resource industry taxation filings.

Among the tax policy areas where improvements are needed, the Canadian industry is concerned that federal tax regulations work against on-site exploration spending. Expenses for new exploration at depth (within existing underground workings) are treated less attractively than similar greenfield exploration costs, thereby reducing the incentive for companies to explore in these expensive (yet potentially resource-rich) areas.

As well, the Canadian government's proposal to deny interest deductibility on funds borrowed to make direct investments abroad, as announced in Budget 2007, presents problems for the mining industry, as it does for other Canadian industries that operate with a global focus. The mining industry and MAC are encouraged that the government has deferred implementing this measure until January 2012, and that it has referred the issue to a technical committee for consultation and recommendations.

FACT:
Including the fourth stage of activity would bring the mining and mineral manufacturing industry total to $10.65 billion in payments to government. It is estimated that 52% of this total accrues to the federal government and 48% to the provincial/territorial governments.

Production, Processing and Transportation Activity of the Canadian Mining Industry

Canada's strength in mining rests on our ability to find, produce and process minerals competitively and to transport these products to domestic and international markets in an efficient manner. This is the base from which the industry can remain globally competitive and continue to strengthen its Canadian investments.

PRODUCTION OF KEY MINERALS

Canada is richly endowed with natural resources; our major deposits and recent discoveries are proof of a diversified mineral potential. Canada held its position as a leading mineral-producing nation in 2007 with production value estimated at $40.4 billion.

We rank among the top five countries in the production of 14 major minerals and metals. Canada ranks first globally in production of potash and uranium; second in nickel; third in cobalt, titanium concentrate, aluminum, magnesium and platinum-group metals; fourth in gypsum, asbestos and cadmium; and fifth in zinc, salt and molybdenum. Canada no longer holds a top-five position in the production of gold, silver, copper or lead. See Annex 4 for more details.

As described in Figure 7, Canadian metal production values reached an estimated $26.3 billion in 2007, up from $21.1 billion in 2006 and from $14.6 billion in 2005. The Canadian non-metals (industrial minerals) sector has grown at a steady pace since the mid-1990s, reaching a production value estimated at $11.3 billion in 2007. Potash and diamonds are the largest non-metal commodities in terms of production value in 2007, while cement is the leading structural material.

In the mineral fuels area, Canadian production of coal has been in the 62–65 million tonne range in recent years. Rising energy prices prompted a 46% (or $730 million) one-year increase in coal production value in 2005 and a further 26% increase in 2006. Higher prices in recent years have made possible the opening of new Canadian coal mines—for example, the Trend mine and Brule mine, both in BC, recently began new production.

The impact of higher mineral prices can also be seen in Annex 5. Higher world prices stimulated significant Canadian production value increases in nickel, zinc and copper in recent years. For example, nickel production value increased 182% in the past two years, while actual production volumes increased only 27%.

Nickel was Canada's top-valued mineral in 2007 (valued at $9.9 billion), followed by copper, potash, coal, uranium, iron ore, gold, zinc, cement and diamonds (Figure 8). These ten minerals and metals each had 2007 production values in excess of $1.4 billion and cumulatively represent $33 billion in value—83% of total Canadian mineral production value. Annex 5 illustrates that potash, uranium and nickel showed particular increases during 2007, while the value of diamond and zinc production declined slightly.

Diamonds

Canada has presented a particularly interesting story in diamonds over the past decade, progressing from zero production to the world's third-ranked diamond producer during this span. Canadian diamonds, presently all mined in the Northwest Territories and Nunavut, account for around 10% of global supply by weight and 14% of the global market by value. Canadian diamond exports totalled some $2 billion in 2007, versus zero exports in 1998. These exports are primarily sold to Antwerp and London for further processing.

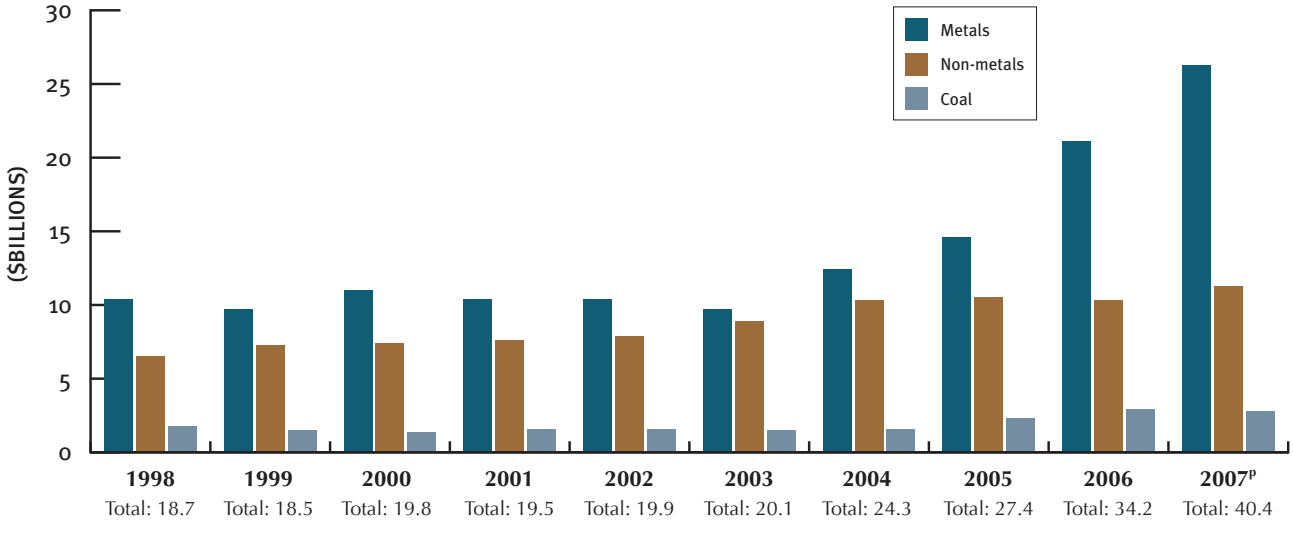
From 1998 to 2004, the Diavik and EKATI mines produced 38 million carats of high-quality diamonds worth $6 billion. The Diavik mine reached full production in 2004 and produces 7–8 million carats per year. Canadian diamond production quantity increased 38% through 2006 and 2007, although value actually decreased by 18% during these two years due to global price declines. Further production increases will be seen in 2008 as DeBeers' Snap Lake and Victor projects enter into full production—these two mines mark a culmination of a 40-year Canadian diamond exploration and development effort for DeBeers. Future potential may also exist in the northern territories, Quebec and in Saskatchewan, where the Fort à la Corne project is among the largest kimberlite fields in the world.

Uranium

Global demand for uranium has increased considerably in recent years, as countries embark on new nuclear energy programs or expand existing programs. This trend is reinforced by concern over air pollution and greenhouse gas emissions associated with fossil fuel combustion.

FACT:
Canada held its position as a leading mineral-producing nation in 2007 with production value estimated at $40.4 billion. We rank among the top five countries in the production of 14 major minerals and metals.

FIGURE 7: VALUE OF CANADIAN MINERAL PRODUCTION, 1998–2007



p Preliminary
Sources: Natural Resources Canada; Statistics Canada

FIGURE 8: CANADA'S TOP TEN MINERALS BY VALUE OF PRODUCTION, 1997 AND 2007

		1997		2007[p]	
	UNIT	QUANTITY (MILLIONS)	VALUE ($MILLIONS)	QUANTITY (MILLIONS)	VALUE ($MILLIONS)
Nickel	kg	181	1,776	245	9,902
Copper	kg	648	2,051	577	4,533
Potash (K20)	t	9	1,528	11	3,142
Coal	t	79	1,920	70	2,761
Uranium	kg	11	554	9	2,523
Iron ore	t	39	1,572	33	2,512
Gold	g	172	2,527	100	2,377
Zinc	kg	1,027	1,871	585	2,088
Cement	t	12	1,063	15	1,802
Diamonds	carats	–	–	17	1,445

p Preliminary – Nil

Sources: Natural Resources Canada; USGS; World Nonferrous Metal Statistics

It is estimated by Ux Consulting that 86 countries are planning to start or expand nuclear power programs by 2050. In the United States, 38 reactors have recently been granted licence extensions and 15 new reactors are anticipated by 2015. Strong growth is also projected in China, Russia, India and other large energy-consuming countries. The value of uranium produced in Canada increased by 82% in 2005, by 26% in 2006, and by a further 76% in 2007, reflecting the strengthened global price and supply/demand situation. This trend will likely continue as new reactor projects move toward completion (although improved reactor designs and spent fuel reprocessing could potentially moderate demand for uranium).

The McArthur River uranium mine in northern Saskatchewan is the world's largest and highest-grade deposit, with reserves of more than 215,000 tonnes of uranium oxide. McArthur River has an average ore grade of 21% and annual production of approximately 8200 tonnes of uranium oxide.

Oil Sands

The development of the western oil sands constitutes one of the world's most significant economic stories of the past decade. Technological advances and increases in crude oil prices from $20–$30 per barrel in the 1990s to $70 in 2007 and to $140 in 2008 have together reinforced the oil sands' economic viability and sustained its production growth from test-well quantities to volumes exceeding one million barrels per day. Oil sands development has increased wealth and economic activity in western Canada, creating 200,000 jobs that helped to offset job losses in Canada's manufacturing sector. The hub of oil sands activity in Fort McMurray, Alberta has grown from a population of 6000 in 1968 to around 80,000 in 2007.

Alberta's oil sands production is projected to increase from 1 million barrels per day (BPD) in 2006 to 4.7 million in 2025. Most output is exported to the United States although future customers may include Asian countries. Around $100 billion in investment is planned over the next 15 years, an estimated 40% of which is for mining projects where oil sands bitumen is extracted through mining (rather than being treated in-situ). This investment is reflected in several oil sands operations:

- **Suncor Energy –** began operation in 1967 and now produces 260,000 BPD. Ongoing expansion of the Voyageur project will double production by 2010–2012. An estimated 5 billion of the 14 billion barrel reserve base is recoverable by mining.
- **Syncrude –** in 1978 became the second commercial oil sands operation. Syncrude's $8 billion expansion completed in 2006 brought production to 350,000 BPD. A future expansion will increase production to 500,000 BPD by 2020, which could be sustained for 50 years.
- **Athabasca Oil Sands Project –** began production in 2003 and includes the Albian Sands mine/upgrader among its assets. Present output is 155,000 BPD, although a $10–13 billion investment in mine and treatment expansions is projected to take production to 770,000 BPD.
- **Fort Hills –** is investing $5 billion in a 170,000 BPD mine and extraction plant with an estimated life of 30–40 years. A subsequent $5 billion expansion would boost capacity to 190,000 BPD. A new upgrader to produce crude oil from the bitumen is also planned.
- **Northern Lights –** when completed in 2011, will produce around 100,000 BPD for an estimated 30 years. A related $3.6 billion upgrader near Edmonton is also proposed.
- **Kearl –** is a $5–8 billion mine joint venture with a projected initial capacity of 100,000 BPD by 2010 and expanding to 345,000 BPD by 2018.
- **Horizon –** is a $6.8 billion project with production expected to begin in 2008 at 110,000 BPD and subsequent phases bringing production to 232,000 BPD by 2012.

As detailed in Figure 9, synthetic crude oil accounted for around 19% of Canada's crude-oil-and-equivalent production (23% by value) in 2006, up from 14% a decade earlier. The absolute value of this production increase is considerable. Canada produced $2.9 billion in synthetic crude in 1996 and $14.8 billion in 2006. All of this production is from Alberta.

There remains considerable room for expansion of oil sands development in the medium and longer term. Alberta's oil sands deposits cover an area the size of Ireland and contain an estimated 2.5 trillion barrels of bitumen. Using existing technologies, this would yield about 300 billion barrels—larger than Saudi Arabia's 260 billion barrel reserves. According to the Alberta Energy Department, the lease agreements in place cover an estimated 20% of potential oil sands areas.

Rising labour costs and a shortage of skilled and unskilled labour may curtail investment in the oil sands in the medium term. By some measures, the cost of oil sands expansion has increased three-fold over the past five years. The cost of equipment and supplies has increased considerably and availability has tightened. Other measures, such as phasing out the federal accelerated capital cost allowance and increasing the

provincial royalty, could further constrain future expansion.

As discussed in Section 5.0, environmental issues surrounding oil sands development are also receiving greater public and political attention. Furthermore a shift toward greater in-situ treatment of bitumen means increased energy requirements and GHG emissions. The ability to manage these issues will affect the pace of future development. For example, Statoil's Chief Executive Officer noted in remarks to the World Petroleum Congress in July 2008 that uncertainty regarding Canada's climate change regulatory regime and the associated cost of carbon has prompted the company to delay its oil sands upgrader investment decision by two years. Officials in the United States, including the Democratic presidential nominee, have argued that high carbon produced fuels such as oil from oil sands should be disadvantaged for environmental reasons. Whether this becomes a significant trade issue remains to be seen—particularly given the US energy dependency on Canada and the fact that under long-term plans some 90% of oil refined in the US Midwest is projected to come from Canada.

MINERAL PROCESSING

Canada has a significant mineral-processing industry, with 38 nonferrous metal smelters and refineries operating in six provinces (Figure 10). Some of these facilities contain both a smelter and a refinery.

- British Columbia – 2 smelters, 1 smelter/refinery, 1 processing plant
- Alberta – 1 refinery
- Manitoba – 2 smelters/refineries
- Ontario – 3 smelters, 4 refineries, 4 smelters/refineries, 1 conversion facility
- Quebec – 13 smelters, 4 refineries, 1 smelter/refinery
- New Brunswick – 1 smelter

FACT:
Technological advances and increases in crude oil prices from $20 to $30 per barrel in the 1990s to $70 in 2007 and to $140 in 2008 have together reinforced the oil sands' economic viability and sustained its production growth from test-well quantities to volumes exceeding one million barrels per day.

FIGURE 9: CANADIAN PRODUCTION OF SYNTHETIC CRUDE OIL, BY QUANTITY AND VALUE, 1996–2006

	VOLUME (MILLIONS OF M^3)			VALUE ($BILLIONS)		
	SYNTHETIC CRUDE OIL	TOTAL CRUDE OIL	SYNTHETIC CRUDE AS % OF TOTAL	SYNTHETIC CRUDE OIL	TOTAL CRUDE OIL	SYNTHETIC CRUDE AS % OF TOTAL
ALBERTA						
1996	16.3	90.4	18.1	2.9	14.9	19.5
1997	16.8	94.0	17.9	2.9	13.9	20.8
1998	17.9	94.7	18.9	2.3	9.7	23.8
1999	18.8	89.1	21.1	3.2	13.7	23.7
2000	18.6	89.1	20.9	5.2	21.7	23.9
2001	20.3	89.3	22.7	5.0	17.7	28.2
2002	25.5	89.9	28.4	6.5	19.8	32.6
2003	25.0	95.3	26.3	6.8	22.2	30.5
2004	26.7	101.0	26.4	8.6	27.8	30.9
2005	22.0	98.9	22.2	9.2	33.3	27.7
2006	30.0	109.8	27.4	14.8	38.5	38.5
CANADA						
1996	16.3	117.6	13.9	3.0	19.0	15.2
1997	16.8	123.8	13.6	2.9	17.8	16.3
1998	17.9	128.4	13.9	2.3	12.9	17.9
1999	18.8	122.3	15.4	3.3	18.7	17.4
2000	18.6	127.8	14.6	5.2	30.5	17.0
2001	20.3	129.0	15.7	5.0	24.9	20.1
2002	25.5	137.0	18.6	6.5	30.0	21.6
2003	25.0	144.9	17.3	6.8	33.6	20.2
2004	26.7	149.2	17.9	8.6	40.6	21.1
2005	21.9	146.2	15.0	9.2	49.2	18.7
2006	30.1	161.4	18.7	14.8	63.6	23.3

Source: Statistics Canada

FIGURE 10: NON-FERROUS SMELTERS AND REFINERIES, JANUARY 2008

OPERATION	TYPE OF FACILITY	COMMODITIES
BRITISH COLUMBIA		
Alcan – Kitimat Smelter	Smelter	Aluminum
Metalex Products – Richmond Operations	Secondary smelter	Lead
Teck Cominco – Trail Complex	Smelter, refinery, plant	Zinc, lead, bismuth, cadmium, indium, germanium, precious metals, sulphur dioxide
Thompson Creek/Sojitz Moly – Endako Mines, Fraser Lake	Processing plant	Molybdenum
ALBERTA		
Sherritt International Corporation/General Nickel Company – Cobalt Refinery Company, Fort Saskatchewan	Refinery	Nickel, cobalt
MANITOBA		
CVRD Inco – Manitoba Operations, Thompson	Smelter, refinery	Nickel, cobalt
HudBay Minerals – Flin Flon Zinc Plant and Copper Smelter	Smelter, refinery	Zinc, copper, cadmium
ONTARIO		
Cameco Corporation – Conversion Facilities, Port Hope	Conversion facility	Uranium
Cameco Corporation – Refinery, Blind River	Refinery	Uranium
CVRD Inco – Copper Cliff Complex, Sudbury	Smelter, refinery, plant	Nickel, copper, precious metals, sulphur dioxide, selenium, platinum
CVRD Inco – Port Colborne Refinery	Refinery	Cobalt
Johnson Matthey – Brampton Operations	Smelter, refinery	Gold, silver
Royal Canadian Mint – Ottawa Refinery	Refinery	Gold
Tonolli Canada – Mississauga Operations	Secondary smelter, refinery	Lead
Wabash Alloys – Guelph Plant	Secondary smelter	Aluminum
Wabash Alloys – Mississauga Plant	Secondary smelter	Aluminum
WHX Corporation Subsidiary – Rexdale	Refinery	Precious metals
Xstrata – Kidd Metallurgical Division, Timmins	Smelter, refinery, plant	Copper, precious metals, zinc, indium, sulphur dioxide, sulfuric acid, cadmium
Xstrata – Sudbury Smelter	Smelter, plant	Nickel, copper, cobalt, sulphur dioxide, platinum group metals, gold, silver
QUEBEC		
Alcan – Alma Smelter	Smelter	Aluminum
Alcan – Arvida Smelter, Jonquière	Smelter	Aluminum
Alcoa – Baie-Comeau Smelter	Smelter	Aluminum
Alcan – Beauharnois	Smelter	Aluminum
Alcan – Grande-Baie Smelter	Smelter	Aluminum
Alcan – Laterrière Smelter	Smelter	Aluminum
Alcan – Shawinigan Smelter	Smelter	Aluminum
Alcan – Vaudreuil Alumina Refinery, Jonquière	Refinery	Alumina
Alcan and Partners – Alouette Smelter, Sept-Îles	Smelter	Aluminum
Alcoa – Deschambault Smelter	Smelter	Aluminum
Alcoa/Alcan – Bécancour Smelter	Smelter	Aluminum
Goldcorp/Kinross Gold – Sorel-Tracy Complex	Smelter	Titanium dioxide, iron
Limtech Lithium – Lithium Carbonate Refinery, Shawinigan	Refinery	Lithium carbonate
Nova Pb – Sainte-Catherine Operations	Refinery, secondary smelter	Lead
Xstrata/Noranda Fund – Canadian Electrolytic Zinc, Valleyfield	Refinery	Zinc, cadmium
Xstrata – CCR Refinery, Montréal-Est	Refinery	Copper, precious metals, selenium, tellurium
Xstrata – General Smelting Company of Canada, Lachine	Secondary smelter	Zinc, lead, antimony, tin
Xstrata – Horne Smelter	Smelter	Copper, liquid sulphur dioxide, sulfuric acid
NEW BRUNSWICK		
Xstrata – Brunswick Smelting Division, Belledune	Smelter	Lead, bismuth, precious metals

Source: Natural Resources Canada, Map K110

Canada's integrated smelters and refineries typically accompany development of a world-class mine, especially when it is inland without access to low-cost marine transport. As local ore reserves are depleted and production of base-metal concentrate declines, smelters and refineries are moving from integrated production toward more costly custom concentrates from other nations. Another trend is the switch toward using more secondary raw materials and scrap feed.

With the depletion of ore reserves across Canada (discussed in greater detail in Section 3.0) and our increased dependency on imported concentrates, the quantity and value of refined metal production has been irregular in recent years. Canadian production volumes of refined lead, aluminum, copper and zinc have remained steady or declined marginally over the past five years (Figure 11). Refined nickel production increased in 2006 and 2007 with the opening of the Voisey's Bay mine, after several years of marginal decline.

The ability to source raw material supplies from domestic mines remains an important influence on costs and hence profitability of Canadian refining and smelting operations. Exploration and domestic production are vital to obtaining reliable feedstock and to maintaining the competitiveness of the Canadian mineral processing industry—particularly in an age when China and other countries are expanding their processing capacity and competing fiercely for global raw material supplies.

TRANSPORTATION ACTIVITIES

Canada's transportation system is critically important to facilitating the flow of mined and refined products to markets in Canada and abroad. The Canadian mining industry is, by some measures, the single most important customer for the transportation sector. Minerals and fabricated mineral products provide significant tonnage for Canada's transportation system, particularly bulk commodities such as iron ore, coal, potash, gravel and sulphur.

Global shipping is dominated by container traffic. Containers can be stacked, handled by cranes and efficiently transferred between rail, truck and marine modes of transportation. In recent years, there has been a dramatic increase in container volumes bringing furniture, electronics,

FACT:
Canada's transportation system is critically important to facilitating the flow of mined and refined products to markets in Canada and abroad. The Canadian mining industry is, by some measures, the single most important customer for the transportation sector.

FIGURE 11: CANADIAN PRODUCTION OF SELECTED REFINED METALS, 2002–2007

(TONNES)	2002	2003	2004	2005	2006	2007[p]
Aluminum	2,708,910	2,791,915	2,592,160	2,894,204	3,051,128	3,082,625
Cadmium	1,706	1,759	1,880	1,727	2 ,090	1,388
Cobalt	4,303	3,851	4,673	4,618	4,555	4,883
Copper	494,522	454,866	526,955	515,223	500,463	453,453
Lead	251,560	223,434	241,169	230,237	250,464	236,965
Nickel	144,476	124,418	151,518	139,683	153,743	164,102
Zinc	793,410	761,199	805,438	724,035	824,464	802,103

p Preliminary

Sources: Natural Resources Canada; Statistics Canada

FIGURE 12: MINERALS AND MINERAL PRODUCTS TRANSPORTED BY CANADIAN RAILWAYS, 2000–2007

(MILLION TONNES)	2000	2001	2002	2003	2004	2005	2006	2007
Total revenue freight[1]	252.1	240.6	236.9	234.8	250.2	259.4	258.7	255.7
Total crude minerals	116.3	105.0	102.1	104.0	106.9	112.8	108.1	112.0
Total processed mineral products	24.9	26.3	28.5	26.3	26.7	26.7	27.8	27.7
Total crude & processed mineral products	141.2	131.4	130.6	130.3	33.7	139.5	136.0	139.8
Crude minerals and processed mineral products as a percentage of revenue freight	56.0	54.6	55.1	55.5	53.4	53.8	52.6	54.7

Note: Total crude minerals includes coal, but not oil and gas.

1. Revenue freight refers to a local or interline shipment from which earnings accrue to a carrier.

Source: Statistics Canada, Catalogue 52-001-XIE

clothing, building products and other products from Asia to Canada. This has created a surplus situation, where imported containers are full with products while those leaving Canada are not. There is an ongoing effort in Canada to adapt products so they can be containerized—some agri-food products for example are now being shipped in containers rather than in bulk. A similar trend may develop in the mining sector over the coming years.

A further impact of this supply-demand situation is that the cost of transportation from China to Canada is more expensive than the cost of cargo transportation in the opposite direction. This works against the business case for investing in China. Rising oil prices add a further variable to this equation. As noted in July 2008 by economist Jeff Rubin, the cost of shipping a container from Shanghai has increased from $2000 to $8000 over the past eight years and this will reach $15,000 if oil reaches $200 per barrel. Over the coming years, this variable has the potential to change global shipping patterns for all industry sectors.

Rail

In its annual *Transportation in Canada* publication, Transport Canada reports that the minerals and metals sector (coal, fertilizer, iron ore, ores and metals) accounted for 48% of the 282 million tonnes in commodity volumes carried by railroads in Canada in 2007. Among the next largest segments, grain accounted for 11%, forest products for 15% and chemicals for 5% of this volume.

According to Statistics Canada, over recent decades, shipments of crude and processed minerals transported by Canadian railways have represented approximately 55% of total rail revenue freight. As shown in Figure 12, these products amounted to 140 million tonnes in 2007—or 55% of total railroad revenue freight.

The Canadian freight rail system operates as a dual monopoly shared by Canadian National and Canadian Pacific. In many instances, communities are served by only one company, thereby offering shippers little competitive choice. The strike of CN rail conductors in February 2007 illustrates the importance of a competitive, efficient freight rail system. After less than one week of the strike, Canadian mine sites and processing operations were significantly affected in their ability to move raw material in and finished products out.

In May 2007, the federal government tabled changes to the *Canada Transportation Act* aimed at strengthening provisions that protect rail shippers from the potential abuse of market power by railways. The proposed measures aimed to find a competitive balance between the interests of shippers (lower rates, better service) and those of rail companies (higher rates and profitability). Of particular interest, the legislation strengthens the ability to arbitrate disputes over rail fees and ancillary charges. The Canadian mining industry and MAC supported the proposed legislative amendments. The changes received royal assent and became law in February 2008.

As follow-on to these legislative changes, the federal government will be undertaking a review of railway service levels. This will involve gathering data, assessing railway operational issues, consulting shippers on railway problems, and assessing practices in other sectors and jurisdictions. The ultimate intent of the review is to assess service by CN and CP, identify problems, examine best practices, and recommend commercial, regulatory or other remedies that would improve levels of service. MAC will monitor this issue over the next year and contribute information as appropriate.

Trucking

Automobiles and parts, machinery and equipment, base metals and related articles, plastics and chemicals, and agri-food products represent the largest volumes of products shipped internationally by truck. Trucks carried $180 billion worth of exports in 2007, of which $20 billion or 11.2% was base metals and articles of base metal. Of the $220 billion in imports shipped by truck, $18 billion (8.2%) was base metals and articles of base metal. Only small quantities of minerals, ores and concentrates are shipped by truck—around 0.4% of total truck exports and 0.3% of imports. There is no comparable information of sufficient detail to describe domestic truck shipments by sector.

Marine

The federal government's annual *Transportation in Canada* report lists total industrial exports sent via ship to the US at $19 billion in 2006, most of this being gasoline and crude petroleum. Marine imports from the US are relatively small—one-ninth the level of exports. In the mining sphere, Canada exported around $410 million worth of iron ore and $340 million in non-ferrous products and alloys via ship to the US, while importing $240 million worth of iron ore.

Canadian industrial exports by ship to overseas (non-US) countries totalled $50 billion in 2006, led by metals and alloys, grains and food, and wood products. Imports totalled $73 billion, led by crude oil, machinery, automobiles and appliances. In mining, Canada exported a significant value of non-ferrous products and alloys ($7 billion), non-ferrous metals ($2 billion), iron ore ($1.5 billion) and potash ($1 billion) via ship, while significant imports were seen in primary and fabricated iron and steel products ($3.2 billion), non-ferrous products and alloys ($2.3 billion), and non-ferrous metals ($1.1 billion).

The mining sector is an important contributor to the business volumes of the St. Lawrence Seaway. According to the Seaway Corporation's annual Traffic Report, shipments of iron ore and coal represented 35% of total Seaway traffic in 2007, while other mine products contributed a further 15%.

The mining sector is also an important customer at Canadian ports, typically accounting for 60–75% of commercial volumes handled at Canada's ports. Of the four primary marine shipping regions in Canada, mineral products are most important in the St. Lawrence and Great Lakes regions and least important in the Atlantic region. Coal is particularly important in the Pacific region as shipments move to Japan and other Asian markets. The Port of Montreal handles important volumes of iron ore, copper ore, gypsum and zinc ore each year—generally as inbound cargo arriving via ship and being transferred to rail or truck for distribution to the copper/zinc smelting and refining facilities in the region. Among mining products at the Port of Vancouver, coal accounts for 22% of the total volume handled by the port, fertilizers for 10%, and metals and minerals for an additional 11%.

The Money: Reserves, Prices, Financing, Exploration and Investments

This section discusses the five principal financial and monetary aspects of the Canadian mining industry—namely, reserves, prices, financing, exploration and capital investment. The combination of accessible mineral reserves and global prices for these minerals allows companies the opportunity to be profitable. The availability of financing is necessary for companies to fund their exploration, resource appraisal and mine development programs. Capital investment in mines and processing facilities allows these minerals to be extracted and converted into valuable products.

CANADIAN RESERVES

As shown in Figure 13, there has been a significant decline in proven and probable Canadian mineral reserves over the past 25 years—in all major base metals. This long-term trend may have reached bottom in 2004–05, as modest increases have been seen in 2006.

The most dramatic decline over the past quarter-century—over 80%—was seen in lead, zinc, molybdenum and silver reserves, while copper and nickel declined by over half. Reserves of lead, zinc, silver, copper, nickel and molybdenum are all at or near their lowest levels since 1977 (see Annex 6). Gold reserves in 2005 were one-third lower than levels of a decade earlier.

On the positive side, exploration levels are higher than they have been for many years. Consistent exploration investment over an extended period, combined with the development of modern geological mapping data, has the potential to solve the reserves crisis. Without sustained and effective exploration, production will outstrip reserve additions, our smelters and refiners will be forced to rely increasingly on imported raw materials, and Canada's mineral and metals industry will be at serious competitive and strategic risk. The Government of Canada, in particular, must create a policy environment that fosters exploration spending and a strong, dynamic mining industry.

GLOBAL METAL PRICES

Global economic events and trends have a direct and daily impact upon mineral and metal prices. As price takers in the international marketplace, the Canadian mining industry is accustomed to fluctuations driven by world economic conditions and varying prices on terminal exchanges such as the London Metal Exchange.

In some respects, the global industry is still recovering from low prices and low exploration in the mid-to-late 1990s when the US dollar skyrocketed and investors pursued better returns in the information technology, telecom, biotechnology and pharmaceutical sectors. In Canada, mineral exploration expenditures were depressed throughout the 1990s and bottomed out in 2000. While prices and exploration levels have grown strongly since then, Canada continues to face a reserves crisis.

In 2007, the worldwide mining industry continued to benefit from strong global economic growth. The Canadian industry is responding to prices driven largely by the strength of China's economy. China imports over $100 billion in metals annually and presently buys around 25% of the world's base metals versus a 5% share in the 1980s. China accounted for 10% of world zinc consumption in 1996 (one-third of Europe's share); a decade later it accounted for 28% (versus 25% for Europe). China's demand for zinc will continue to increase—according to mineral analysts Brook Hunt, its zinc consumption will increase by 9.5% in 2008 and 8% in 2009. In nickel, as noted by the Nickel Institute, China accounted for 22% of world demand in 2007 versus an 11% market share in 2003. China accounted for 26% of world copper consumption in 2007, a portion which is expected to increase to 34% over the next four years. Given its rapid industrialization, it is felt that China is becoming increasingly decoupled from the United States, in that its appetite for commodities would not be significantly affected by a US recession.

The Chinese boom, a depreciated US dollar, aging infrastructure, industry consolidation and a dearth of new mining projects worldwide are combining to create strong mineral price fundamentals. With the more gradual emergence of India and the related demand for minerals and metals—perhaps over time on a scale comparable to China—the mining industry may enjoy an extended boom in the commodity price cycle (although there is no shortage of economists and analysts who predict that a general economic slowdown and continued high oil prices could lead to a decrease in global mineral prices).

Another predictor of an extended boom is that, while China is now the world's largest consumer of all major metals, its metal consumption per person is still low in comparison with developed Asian and Western economies. For example, while Chinese ownership of motor vehicles has climbed from a total of less than one million in 1990 to around 20 million at present, this is low on a per-capita basis compared to Europe and North America. China has an estimated two cars per one hundred people, versus around 76 cars for the US. Though not a definitive benchmark of national economic development, and while such gaps may never be totally closed, similar discrepancies nonetheless exist for many other measures.

Limited global mineral reserves, and the challenge of bringing new discoveries into commercial production, are other variables that support sustained high mineral prices in the short and medium term.

According to Scotiabank's commodity research analysts, other supply-side factors that could affect future mineral prices include growing resource nationalization in Latin America and moves by many governments

FACT:
There has been a significant decline in Canadian mineral reserves over the past 25 years in all major base metals.

FIGURE 13: CANADIAN RESERVES OF SELECTED METALS, 1980–2006

	COPPER (000 T)	NICKEL (000 T)	LEAD (000 T)	ZINC (000 T)	MOLY (000 T)	SILVER (T)	GOLD (T)
1980	16,714	8,348	9,637	27,742	551	33,804	826
1985	14,201	7,041	8,503	24,553	331	29,442	1,373
1990	11,261	5,776	5,643	17,847	198	20,102	1,542
1995	9,250	5,832	3,660	14,712	129	19,073	1,540
2000	7,419	4,782	1,315	8,876	97	13,919	1,142
2003	6,037	4,303	749	6,251	78	9,245	1,009
2004	5,546	3,846	667	5,299	80	6,568	801
2005	6,589	3,960	552	5,063	95	6,684	965
2006	6,923	3,940	737	6,055	101	6,873	1,032

Source: Natural Resources Canada, based on company reports and the federal-provincial/territorial survey of mines and concentrators

to increase royalty rates or otherwise share more directly in the "good times." It is unknown whether these international actions will increase or decrease in importance over the coming years. This issue is discussed in greater detail in Section 6.0.

Drawing on these fundamentals, many metal prices continued to trend upward in 2007. Copper prices grew 17%, gold 27%, lead 56%, and silver 11% (Figure 14). Aluminum, nickel and zinc prices fell over the course of 2007, though remain at much higher levels than in 2005.

- **Nickel** – Global demand, restricted supply and low stocks have generated strong price fundamentals. Nickel prices increased from US $3.10/lb in 2002 to $16.91 in 2007, a five-year growth of 445%. Global stockpiles fell during early 2007 as stainless steel needs continue to surge; as of March 2007, the LME nickel stocks amounted to less than one day of global consumption. Prices declined from these peak levels during the remainder of 2007 as new supply became available.
- **Zinc** – Zinc is used mainly to rustproof iron and steel. Global zinc prices lagged copper, nickel and precious metals by a couple years before beginning a price climb in late 2004, as stockpiles declined and world demand increased. At the time of a temporary closing of an Australian zinc plant in March 2006, HudBay Minerals released projections showing global zinc inventories hitting zero in fall 2006. As a result of general concerns about supply adequacy, zinc prices increased by 37% in early 2006. Zinc prices declined steadily during 2007 as concerns over the supply/demand imbalance diminished.
- **Gold** – Gold prices are largely driven by geo-political uncertainties such as the mounting US fiscal and trade deficits, the evolving situation in Iran and Iraq, and the impact of high fuel prices. Gold prices are at their highest level since the early 1980s. Global concerns about inflation and governments' ability to control it have had a continued buoyant effect on gold prices through 2008. China's recent announcement that it would increase petrol and diesel prices by 18% was a further influence in driving gold toward $900 per ounce in mid-2008.
- **Silver and Platinum-Group** – Silver prices reached a 25-year peak at year-end 2007 and it is anticipated that the creation of

FIGURE 14: METAL PRICES, 2001–2007

(VALUE IN US$)

	UNIT	2001	2002	2003	2004	2005	2006	2007	AVERAGE PRICE JANUARY 2007	AVERAGE PRICE DECEMBER 2007	% CHANGE THROUGH 2007
Aluminum, London Metal Exchange	¢/lb	66.46	61.23	64.92	77.82	86.10	116.55	119.65	127.38	108.01	-15.2
Copper, electrolytic cathode, COMEX	¢/lb	73.69	71.67	81.05	128.97	168.23	308.94	322.17	258.31	302.17	17.0
Gold, London final	$/troy oz	269.98	309.97	363.51	409.21	444.88	604.34	696.66	631.17	803.20	27.3
Lead, London Metal Exchange, cash	¢/lb	21.34	20.52	23.34	40.19	44.27	58.47	116.98	75.54	117.72	55.8
Nickel, New York dealer, cathode	$/lb	2.83	3.10	4.45	6.34	6.81	10.98	16.91	16.18	12.11	-25.2
Platinum, London PM fix	$/troy oz	546.17	539.81	691.86	845.21	896.89	1,141.67	1,304.80	1,148.41	1,484.94	29.3
Silver, Handy & Harman	$/troy oz	4.41	4.63	4.91	6.69	7.34	11.57	13.41	12.87	14.31	11.2
Tin, New York dealer	¢/lb	2.16	1.95	2.32	4.09	3.61	4.20	6.79	5.31	7.60	43.1
Zinc, London Metal Exchange, special high grade	¢/lb	41.27	35.31	37.75	47.51	62.66	145.15	147.03	171.74	106.70	-37.9

Sources: Natural Resources Canada; *Metals Week, COMEX Commodities Exchange*

exchange-traded funds could further drive silver demand and prices. Platinum-group metal prices increased by 29% over the course of 2007, closing at US $1485 per ounce. This represents a 175% increase over 2002 levels.

- **Copper** – Copper is a "bellwether commodity"; its demand is tied closely to economic growth. Copper demand and prices are being driven by increased demand for wire, computer chips, jewellery, electronics and vehicles. Supply-side issues also bode well for copper prices. Underinvestment in new copper-mine capacity during the price downturn of the 1990s means that refined supplies are likely insufficient to meet growing global demand. The rapid price increases of the past five years levelled off over the course of 2007.
- **Molybdenum** – Molybdenum enhances strength, wear and corrosion-resistance in steel and cast iron; two-thirds of production is used in such alloying applications. It has a high melting point and is consequently also used in light bulbs, dies and furnace parts. Prices averaged US $4.50/lb for many years before collapsing during the 2000 dot-com crash to $2. Prices climbed to $40–50 by May 2005 and settled at around $25 in 2006.
- **Uranium** – Spot prices for uranium reached US $99 in 2007, driven by increasing demand and production difficulties at a key Australian mine due to cyclones. Prices have declined during the first half of 2008 to a level of around $57. The Cigar Lake uranium project in northern Saskatchewan, despite delays and cost overruns associated with a major flood in October 2006, is scheduled to start production around 2010. Uranium price increases have also served to intensify exploration interest in other countries, including Argentina and Peru.
- **Iron Ore** – Iron ore prices are unique in that the global benchmark tends to be set through contractual agreements between lead suppliers and customers, rather than through global trading. As noted in *Mining Journal*, Vale, the world's largest iron ore producer, announced in May 2007 that it had agreed to raise the prices for iron ore fines sold to Arcelor Mittal by 9.5%, and for blast furnace pellets by 5.3%. Vale also aims to increase its iron ore production to 450 million tonnes per year by 2011. Its competitors Rio Tinto and BHP Billiton expect their production to reach 300 Mt by 2009 and 152 Mt by 2012 respectively.

The price growth in most metals and minerals over the past few years has contributed to record company profits and increased merger and acquisition activity. The acquisitions of Inco and Falconbridge by CVRD and Xstrata respectively in 2006, and of Alcan by Rio Tinto in 2007, were driven by views on how best to take advantage of mounting prices, limited supplies and the Chinese demand reality. As the number of large acquisition targets decreases, firms will also look toward mine development to fill supply gaps. As one example, Vale Inco continues to invest in the Goro mine in New Caledonia although cost estimates for the project have increased significantly in recent years, reaching some $3 billion.

FINANCING

The development and implementation of a successful exploration and capital investment program depends on a company's ability to raise capital. Canada has historically had a strong global presence in mining finance. Canadian firms are responsible for the largest share of exploration spending in Canada, the United States, Latin America, Central America, Europe and, most recently, Africa. This exploration strength, combined with the ability to turn properties into mining projects, has helped make Canada a world centre for mining finance.

Canadian Finance

The Toronto Stock Exchange (TSX) is home to the largest peer group of mining companies in the world. As of end-2007, the TSX listed 57% of the world's public mining companies. There were 1373 mining companies listed on the TSX exchange compared to 625 on the Australian exchange, 229 on London, 66 on the American Stock Exchange, 54 on Japan and 45 on the New York Stock Exchange. TSX mining stock trading more than doubled between 2005 and 2006—from $159 billion to $348 billion—and increased a further 29% in 2007 to $449 billion.

The TSX offers open access to equity capital for exploration and mine development; it is a global destination for financing international projects and offers broad expertise in mining, investment banking and securities law. Listing companies are required to meet stringent

FACT:
The Chinese boom, a depreciated US dollar, aging infrastructure, industry consolidation and a dearth of new mining projects worldwide are combining to create strong mineral price fundamentals.

scientific and technical disclosure standards known as National Instrument 43-101. This standard is being increasingly viewed as a global mining disclosure standard.

Toronto is also home to the TSX Venture Exchange, which provides emerging companies with efficient access to capital, while offering investors a regulated market for making venture investments. TSX Venture-listed companies are primarily active in the mining, oil and gas, manufacturing, technology and financial services sectors. The 1032 mining issuers listed on TSX Venture in 2007 were valued at $35 billion (double the 2005 figure) and represent around two-thirds of the venture exchange's total value. The TSX attracted 108 new listings to its Venture Exchange in 2007, raising $7.2 billion in equity; this compares with 47 new listings worth $4.8 billion the previous year. Exploration and development of properties relating to gold, copper, nickel, zinc, silver, diamonds, platinum-group metals, coal and uranium was advanced through the availability of this financing. It is interesting to note that 44 mining companies "graduated" from the venture exchange to the senior exchange in 2007.

Among senior companies, there are 341 mining issuers listed on the Toronto Stock Exchange, valued at $338 billion (versus $190 billion in 2005) and representing around one-fifth of the exchange's total value. Forty-eight of the TSX-listed mining companies have a market capitalization exceeding $1 billion, with Potash Corp, Barrick Gold, Goldcorp, Teck Cominco, Cameco, Agrium and Kinross heading the list. There were 78 new mining listings worth $11.8 billion financed on the senior TSX exchange in 2007.

International Perspective

The global mining industry completed 3183 public financings in 2007, raising $50.3 billion in equity. These are staggering figures—representing a doubling of the record-setting figures of the previous year.

As detailed in Figure 15, fully 80% of these financings were undertaken on the TSX, followed by the Australian exchange at 13% and the London exchange handling 6%. By value, the TSX handled 35%, London 20%, Shanghai 18% and Australia 16%. Most of the London exchange's mining market capitalization is due to three companies (BHP Billiton, Anglo and Rio Tinto).

The fact that 80% of all public financings were conducted on TSX reflects its strong appeal to both junior and senior business players. The ability of TSX Venture to handle equity financing in the $1 to $5 million range efficiently is unique to Canada. It is one reason why Canadian companies are world leaders in the exploration business.

Equity raised worldwide by the mining industry has increased dramatically in recent years, growing from US $3 billion in 2000 to almost US $10 billion in 2005 and $26.5 billion in 2006, before doubling to $50 billion in 2007 (Figure 16). According to HSBC Global Mining, the total market capitalization of the global mining industry grew by 54% in 2007. Among the world's three largest firms, BHP Billiton's market cap grew from approximately $110 billion to $190 billion, Rio Tinto's from $80 billion to $165 billion and Vale's from $70 billion to $150 billion during the year.

The Canadian mining industry has a strong international focus and this is also evident in the activities of the TSX (Figure 17). TSX-listed companies had 9987 mineral projects in progress worldwide in 2007, of which 51% were located inside Canada and 49% outside. The United States, South America, Mexico/Central America and Africa were home to 12%, 11%, 7% and 7% respectively of the mineral projects undertaken by TSX-listed companies.

Canada's continued status as a leading mining finance country over the long-term depends in part on the efficiency and competitiveness of our securities regulatory regime. As noted in federal Budget 2006, "Canadians would be best served by a common securities regulator that administers a single code, is responsive to regional needs, and has a governance structure that ensures broad provincial participation." It is unclear whether the follow-on consultations proposed in the budget have managed to overcome the entrenched interests that have hindered progress on this issue for so many years and that have left Canada with a system of 13 provincial/territorial regulators. Continuing with a balkanized approach will limit Canada's ability to be a leader in this global competition.

FIGURE 15: GLOBAL MINING EQUITY FINANCINGS IN 2007

(VALUE IN US$ MILLIONS)

EXCHANGE	FINANCINGS	%	VALUE	%
TSX – Toronto	2,552	80	17,572	35
LSE-AIM – London	187	6	9,883	20
ASX – Australia	410	13	8,240	16
Shanghai	2	–	9,285	18
NYSE – New York	2	–	2,585	5
Japan	1	–	1,478	3
HKGSE –Hong Kong	1	–	909	2
Other	28	1	311	1
Total	**3,183**	**100**	**50,263**	**100**

Source: Gamah International, December 2007, compiled by TSX Group

FIGURE 16: MINING EQUITY RAISED – ROLE OF TORONTO STOCK EXCHANGE, 2000–2007

(VALUE IN US$ BILLIONS)	2000	2001	2002	2003	2004	2005	2006	2007
Worldwide equity raised	3.1	3.5	8.4	9.6	8.8	9.7	26.5	50.3
Equity raised on TSX exchanges	1.1	1.0	2.2	4.1	4.1	4.0	10.1	17.6
Percent of worldwide total on TSX	36	28	26	43	47	41	38	35

Source: Gamah International, compiled by Toronto Stock Exchange

EXPLORATION

The objective of exploration is to locate large, high-grade reserves with minimal ground disturbance and disruption to the environment. New technologies, including GPS surveying information, airborne technologies and down-hole seismic imaging technologies are allowing exploration companies to locate new deposits not otherwise discoverable with traditional methods.

For the purpose of its annual survey, Natural Resources Canada categorizes exploration and development as follows:

- **Exploration expenditures:** Spending on activities up to and including the first delineation of a previously unknown mineral deposit.
- **Deposit appraisal expenditures:** Spending on activities that bring a delineated deposit to the stage of detailed knowledge required for a production feasibility study.
- **Mine complex development expenditures:** Spending on activities that increase ore reserves and/or that outline, block out and gain access to the ore, and prepare it for production on a mine property that is in production or committed to production.

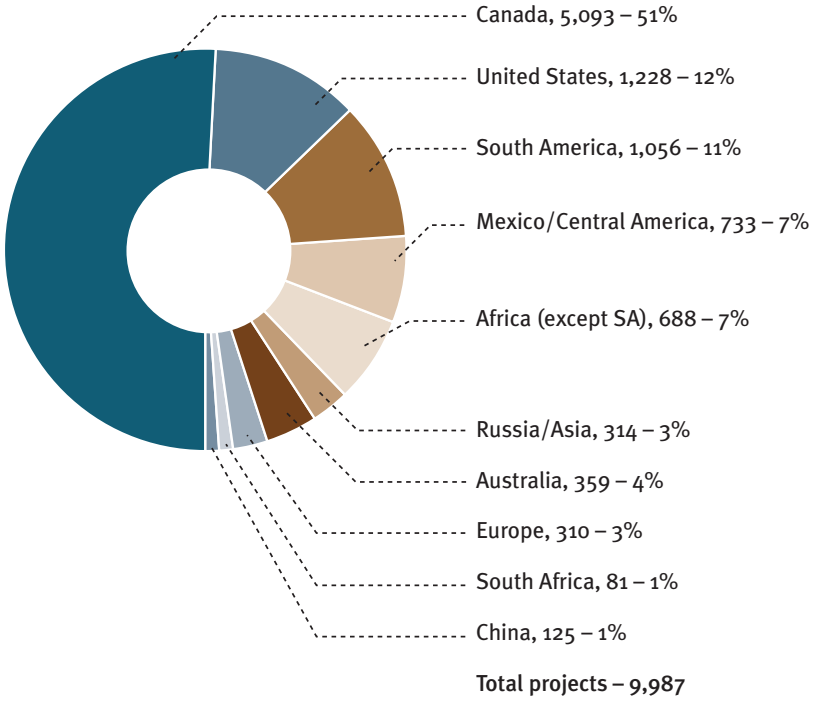
Exploration, like research and development, requires healthy levels of investment to ensure long-term success. Unless exploration spending is successful in replacing existing reserves, the value-added aspects of the mining industry will also diminish over time. This would have a strongly negative impact on Canada's national and regional economies.

Exploration and Deposit Appraisal in Canada

Exploration and deposit appraisal expenditures are a benchmark of the health of the mineral exploration sector and help predict Canada's future mineral production. The most recent estimate from Natural Resources Canada places exploration and deposit appraisal expenditures at $2.56 billion for 2007 (Figure 18), approximately double the level of 2005 and four times the level of 2003. As shown, expenditures are projected to increase a further 8% in 2008, to $2.77 billion.

FACT:
Equity raised worldwide by the mining industry has increased dramatically in recent years, growing from US $3 billion in 2000 to almost US $10 billion in 2005 and $26.5 billion in 2006, before doubling to $50 billion in 2007.

FIGURE 17: GEOGRAPHIC REACH OF TSX-LISTED COMPANIES, JANUARY 2008
(By location of mineral project)



Source: InfoMine, compiled by TSX, January 2008

Approximately 24% of Canadian exploration spending in 2007 focused on base metals, 36% on precious metals, 12% on diamonds and 14% on uranium (Figure 19). Diamonds funding claimed a considerably lower percentage than in 2001, and base metals share decreased slightly, although actual dollar expenditures have doubled in the case of diamonds and more than quadrupled in base metals. The portion attributed to precious metals and uranium has increased—the absolute amount being spent on uranium exploration in Canada has increased eighteen-fold over the past six years. Some 350 uranium exploration

FIGURE 18: MINERAL EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES, BY PROVINCE, 2002–2008

($MILLIONS)	2002	2003	2004	2005	2006	2007[p]	2008[i]
Newfoundland and Labrador	44.2	23.1	33.2	48.7	100.8	138.3	133.6
Prince Edward Island	–	–	–	–	–	–	–
Nova Scotia	3.4	6.4	9.1	6.5	11.0	22.8	19.2
New Brunswick	3.2	2.6	13.4	10.1	13.4	34.0	43.4
Quebec	111.2	134.0	227.2	205.1	295.1	429.9	463.6
Ontario	139.0	219.4	306.9	294.0	346.5	501.6	628.6
Manitoba	29.8	27.2	36.0	52.9	52.9	87.9	116.9
Saskatchewan	41.4	47.7	71.8	133.9	235.6	273.1	316.8
Alberta	5.6	4.9	6.3	6.6	18.7	11.3	21.0
British Columbia	39.2	62.5	151.9	218.1	344.2	428.0	437.2
Yukon	7.8	12.7	22.0	54.0	106.4	132.8	132.4
Northwest Territories	72.7	53.6	112.4	96.3	176.2	178.4	131.9
Nunavut	75.9	92.7	187.5	178.7	210.6	322.3	321.0
Total	**573.4**	**686.7**	**1,177.8**	**1,304.8**	**1,911.5**	**2,560.4**	**2,765.6**

p Preliminary i Intentions

Note: Figures include field work, overhead, engineering, feasibility studies, environment, and land access costs.

Source: Natural Resources Canada, based on the Federal-Provincial-Territorial Surveys of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures

projects are presently underway, primarily in Saskatchewan and Newfoundland and Labrador. Under the "other" category, spending on iron ore exploration increased to around $60 million in 2006, with a similar amount projected in 2007.

Junior companies' share of exploration investment has doubled over the past five years. They accounted for $1.7 billion in Canadian exploration in 2007 and a projected $1.8 billion in 2008 (Figure 20) —two-thirds of Canada's overall total. This reflects the success of federal and provincial flow-through share programs in stimulating investment by firms that can take advantage of these incentives. There is an interesting form of harmony between the juniors and majors, as the latter often acquire the properties or assets of the former. Ernst & Young noted in a July 2008 survey that the proceeds from Canadian Initial Public Offerings have fallen during 2008 (average $10 million per issue in 2007 versus $3.7 million in 2008) and that grassroots exploration companies are ripe for takeovers. The survey concluded that "near-development juniors are attractive to majors seeking to replenish reserves."

A strong majority—about 75%—of Canadian exploration spending occurs off-site in greenfield areas, rather than close to existing mine sites. As discussed in Section 1.0, there is a need for fiscal measures to encourage greater on-site exploration spending, as significant reserves may still exist in close proximity to existing mine sites.

International Exploration

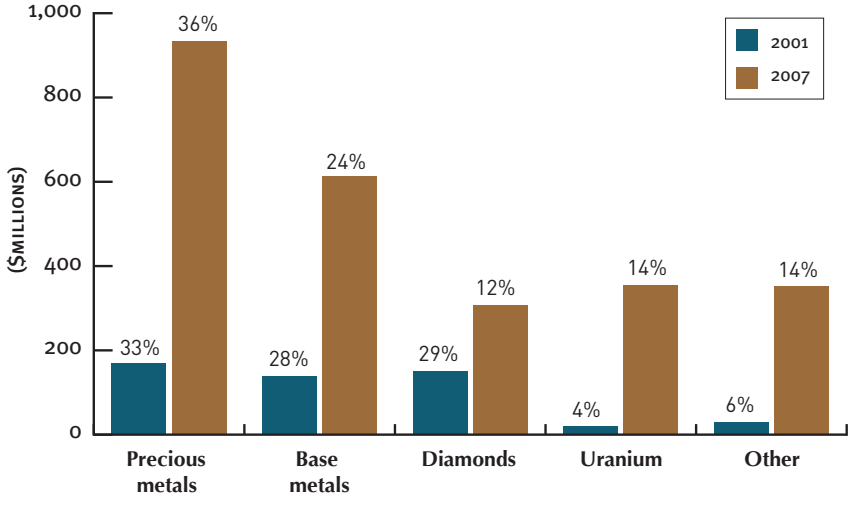
Globally, Canada has been the number one destination for mineral exploration investment for 16 of the past 30 years, dropping to number two in 1992. From 1992 to 2003, Australia was the primary destination for exploration, while Canada has retained the top position since 2004.

The Metals Economic Group (MEG) has tracked international mineral exploration activity since 1989. Its present figures are obtained through analysis of the exploration budgets of 1821 surveyed companies. The analysis indicates that worldwide investments have increased to US $10.5 billion in 2007, continuing a five-year, 425% rise since the bottom of the cycle in 2002 when $2 billion was invested. Uranium exploration is not included within these figures and would add a further $0.9 billion to the 2007 total.

MEG identified the ten countries that accounted for 69% of total global exploration investment in 2007 (Figure 21). The traditional big three—Canada, Australia and the United States—head the list, with Canada hosting 19% of total global exploration spending, Australia 12% and

FACT:
Mineral exploration expenditures in Canada reached $2.56 billion in 2007, approximately double the level of 2005 and four times the level of 2003.

FIGURE 19: CANADIAN EXPLORATION SPENDING, BY TARGET, 2001 AND 2007



Note: Figures include deposit appraisal.
Source: Natural Resources Canada, 2008

FIGURE 20: CANADIAN EXPLORATION SPENDING, BY TYPE OF COMPANY, 2003–2008

($MILLIONS)

TYPE OF COMPANY	2003	%	2004	%	2005	%	2006	%	2007[p]	%	2008[i]	%
Junior	284	41	600	51	801	61	1,238	65	1,709	67	1,773	64
Senior	403	59	578	49	504	39	674	35	852	33	992	36
Total	**687**	**100**	**1,178**	**100**	**1,305**	**100**	**1,912**	**100**	**2,560**	**100**	**2,766**	**100**

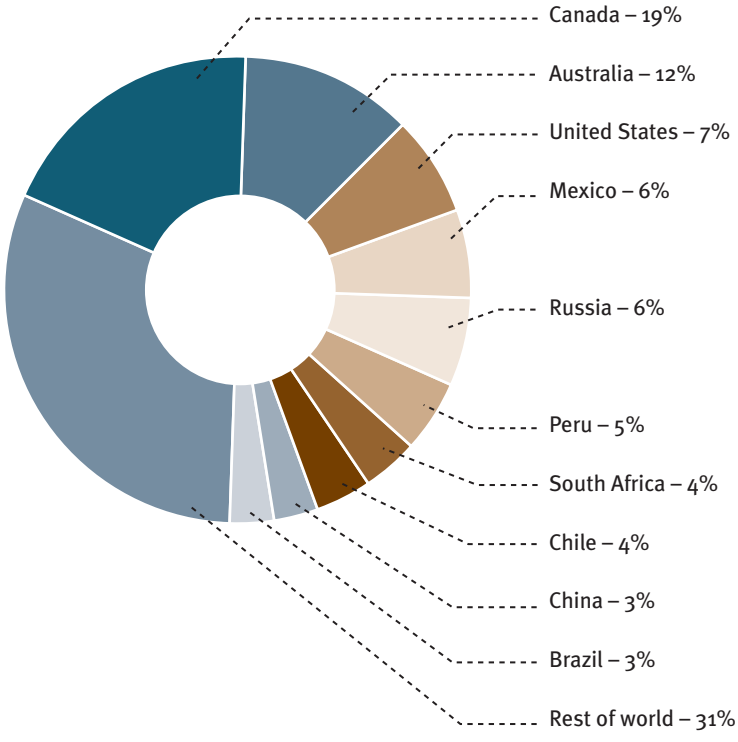
p Preliminary i Intentions

Note: Figures include field work, overhead, engineering, feasibility studies, environment, and land access costs.

Source: Natural Resources Canada, based on the Federal-Provincial-Territorial Surveys of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures

FIGURE 21: TOP TEN COUNTRIES BY EXPLORATION BUDGETS, 2007

(As % of worldwide exploration)



Source: Metals Economics Group, 2008

the United States 7%. Russia is fourth in the 2007 rankings, up from ninth in 2003 and fifteenth in 2001. Mexico, Peru, Chile and South Africa are also important destinations, each receiving approximately $400–$600 million in annual exploration investment. Chile, China and Brazil are attracting increasing market shares in recent years. In general, there has been an increase in the number of companies willing to explore in higher-risk countries—with greater risk traded off against the possibility of finding large-scale deposits. The issue of international investment and risk is discussed in Section 6.0.

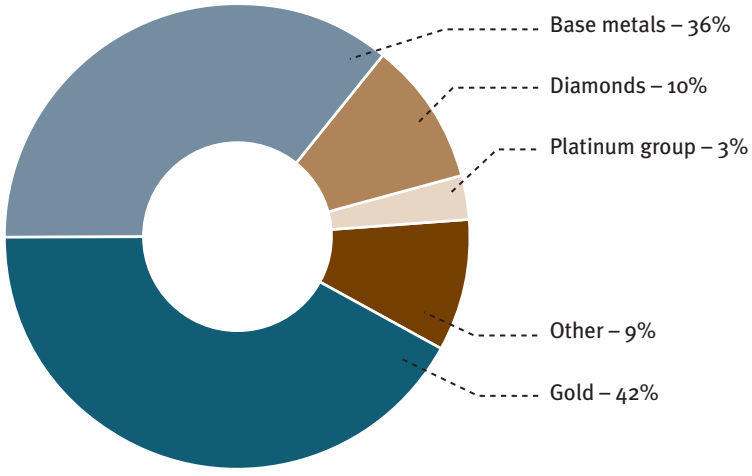
As indicated in Figure 22, gold exploration accounted for approximately 42% of worldwide exploration budgets in 2007, with the balance claimed by base metals (36%), diamonds (10%) and platinum-group metals (3%). This reflects a continued increase in the base metals share, of which copper allocations accounted for 58% in 2007. While its share of the global total has declined, the investment in gold exploration continues at record levels in response to price levels not seen since 1980. The diamond share of worldwide exploration spending has declined for five consecutive years. Africa and Canada have been the largest recipients of diamond exploration spending over the past decade, with each receiving around $2 billion. Silver, molybdenum, cobalt, potash, mineral sands and manganese are among the other important targets of exploration spending.

According to MEG, Canadian companies account for about 40% of global exploration spending, the largest share of any nation. While Canada remains the country of preferred exploration investment, it is estimated by Natural Resources Canada that some 800 Canadian companies are exploring outside Canada in over 100 countries.

Given that global exploration spending has increased so dramatically over the past five years, it is of concern that only a handful of major discoveries and projects will come into production over the next five years. The global community is still paying for the dearth of exploration spending of the 1990s and early 2000s, and any major new discoveries will require many years to be converted to producing mines. This concern—that the world's easiest reserves have been found—is further complicated by the fact that demand for services such as drilling and assaying, and rising input costs for geoscientists and fuel, have combined to "significantly increase the costs of exploration in the current cycle beyond that of overall inflation." In this sense, the actual rise in exploration activity on the ground has not paralleled the increase in budgets.

FIGURE 22: WORLDWIDE EXPLORATION SPENDING, BY TARGET, 2007

(As % of worldwide exploration)



Source: Metals Economics Group, 2008

FACT:
Capital spending pays for process and technology improvement; facility construction and modernization; new product lines; energy retrofits; smelter improvements; increased production rates; and the extension of production life.

CAPITAL INVESTMENT

Capital expenditure is a barometer of management and investor confidence in future market demand and existing production capacity. Capital spending pays for productivity-enhancing and cost-cutting measures such as process and technology improvement; facility construction, modernization and expansion; new product lines; mill improvements; energy retrofits and environmental improvements; smelter improvements; increased mine production rates; and the extension of production life. (Capital spending by governments and business can also serve to open up new regions for development. For example, a recent study by MacQuarrie engineering concluded that a power line into northern BC could attract $3.5 billion in mining investment.)

As detailed in Figure 23, capital investment in the mining industry totalled $9.2 billion in 2007 and is projected to reach $10.6 billion in 2008. This comprises spending through the four stages of the industry, although around 85–90% is invested in the first two stages—extraction and smelting/refining. At the mineral extraction stage, roughly 60% of capital spending is on construction and 40% on machinery and equipment, while at the smelting/refining stage only 15% of spending is on construction with the remainder directed toward machinery and equipment.

Repair expenditures are not included in Figure 23 and are not available from Statistics Canada for the most recent years. In 2006, they represented an additional $2 billion in spending at the mining extraction stage and $2.7 billion in the three mineral manufacturing stages. Combining this estimate with the above capital and exploration spending figures generates an estimated total amount of $16.5 billion in Canadian mineral development investment in 2007.

The largest capital investors in the metal mining sector in 2007 were nickel-copper mines at $990 million, followed by gold/silver mines at $986 million and copper-zinc mines at $705 million. The coal mining industry invested $329 million in capital spending, while the potash industry invested $552 million. Each of these figures has increased significantly over the preceding year.

Among the major Canadian mine developments of recent years, Aur Resources' Duck Pond metals mine (now owned by Teck Cominco) and Vale Inco's Voisey's Bay base metal mine both opened in Newfoundland and Labrador, Western Canadian Coal opened its Wolverine coal mine in BC, and Agnico-Eagle announced that it would build the LaRonde 2 gold mine in northern Quebec. In addition, six gold mines and two base metal mines reopened in Ontario, Quebec, BC and Manitoba.

FIGURE 23: CAPITAL EXPENDITURES IN THE CANADIAN MINING INDUSTRY, 2006–2008

($MILLIONS)	2006	2007	2008
Metal ore mineral extraction	2,618	3,494	4,629
Non-metallic mineral extraction	2,287	2,528	1,926
Coal mining	408	329	569
Stage 1 – Total Mineral Extraction	**5,313**	**6,351**	**7,124**
Stage 2 – Primary metal manufacturing	1,375	1,493	2,243
Stage 3 – Non-metallic mineral product manufacturing	758	644	524
Stage 4 – Fabricated metal product manufacturing	814	665	733
Total Mining and Mineral Manufacturing	**8,260**	**9,153**	**10,624**
Non-conventional oil extraction (oil sands)	12,228	15,988	19,662

Source: Statistics Canada, Catalogue 61-205

For 2007, new mines are expected to open in:

- British Columbia – Max molybdenum, Brule coal, Trend coal
- Yukon – Minto copper-gold-silver
- NWT – Snap Lake diamonds

In addition, seven mines are expected to be redeveloped for production in 2007, namely: Lamaque gold and Fabie Bay copper-zinc-gold-silver mines in Quebec; Caribou and Restigouche lead-zinc mines in New Brunswick; the Scotia lead-zinc mine in Nova Scotia; and the QR gold and Gibraltar copper mines in British Columbia.

Figure 23 also details the magnitude of capital investment in the oil sands, where spending has increased by 31% and 23% in the past two years, reaching almost $20 billion in 2008. This area remains one of the world's hot spots for investment, particularly as global oil prices continue to climb at unprecedented rates, approaching $140 per barrel in mid-2008. A number of large oil sands projects are being built or expanded—in line with the projection that oil sands production will increase from one million barrels per day (BPD) at present to 4.7 million BPD in 2025. However, this pace of development could be mitigated by a number of factors, as discussed in Section 2.0.

INVESTMENT BY GOVERNMENTS IN GEOSCIENCE

Exploring for minerals is akin to "searching for a needle in a haystack." It is public investment in basic geological surveying that helps the industry build knowledge regarding where the haystacks may be.

Being able to spend high-risk exploration dollars in areas where good geological data is available helps improve the likelihood of success.

The Geological Survey of Canada's (GSC) mandate since 1842 has been to maintain a national geoscience knowledge base sufficient to support mineral and hydrocarbon exploration and development across Canada. The GSC is also responsible for providing information to understand and address industry health, safety and environmental issues, and to advocate the interests of Canadian geoscience at the international level.

Investment in basic geological science in Canada has declined significantly over the past 20 years at both the federal and provincial/territorial levels (Figure 24). Spending dropped by about half between 1988 and 2007—from $98 million to $50 million for the federal government and from $74 million to $33 million for the provincial/territorial governments.

The decline in geoscience spending in Canada is a trend that greatly troubles the mining industry and MAC. One example of the consequences of underinvestment is that some 73% of Nunavut is either unmapped or has inadequate geological maps and, at current investment levels, would not be fully mapped for a further 80 years. Other Canadian regions have similar challenges, particularly in the north. Given the level of interest in diamonds, uranium, base metals and other northern resources, one must question how the public good is served by this underinvestment. Underinvestment also weakens Canadian claims regarding northern sovereignty.

In response to this decline, MAC has worked in recent years with federal, provincial and territorial government to advance the Cooperative Geological Mining Strategy—a strategy aimed at seeking federal re-investment that would be matched at the provincial level.

In February's Budget 2008, the federal government announced a re-investment in geological mapping of $34 million over the next two years. This very positive development was reinforced in subsequent discussions between MAC and federal officials. The actual investment in this initiative (entitled Geo-mapping for Energy and Minerals or GEM) extends a further three years, so the total federal injection of new money will be $100 million over five years. Approximately three-quarters of this spending will be directed toward investment in the three territories and one-quarter in the provinces. The GEM funding will be further supplemented through provincial funding increases, while the National Geological Survey Committee, comprising federal/provincial/territorial governments, will guide the planning and investment of the overall initiative. This is a positive development for the long-term prosperity of the industry and its employees and suppliers.

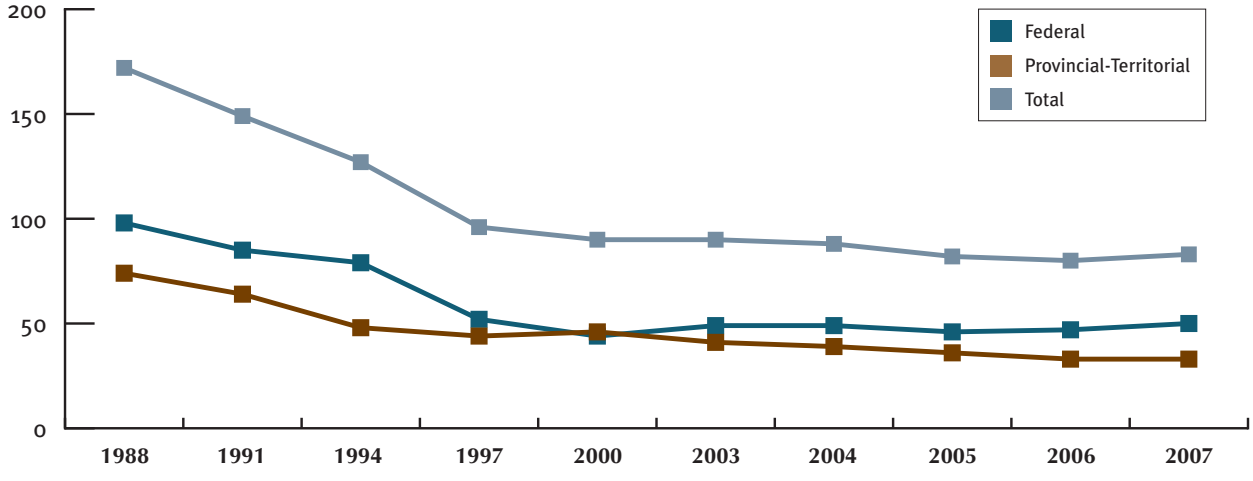
The federal Targeted Geoscience Initiative (TGI) is a parallel, though smaller investment program aimed at geoscience for base metals around existing camps. Ideally, TGI would be extended beyond 2010 and rolled into the GEM; in the lead-up to future federal budgets MAC may become engaged in supporting such a direction.

It is estimated that every dollar invested in basic geological survey triggers five dollars in exploration spending by the private sector, while also increasing the likelihood of discovering commercial-scale deposits. Given this estimate, it is evident that the government investments in geoscience through the GEM and TGI will pay economic dividends over the coming years.

Investment in geoscience is an important requirement for attracting mining investment, regardless of the country. It is interesting to note that Madagascar, for example, released airborne geophysical data for purchase covering large tracts of land during 2007. This attracted high interest from the mining industry gauging potential in gold, heavy mineral sands, bauxite, iron ore and coal.

FIGURE 24: GEOSCIENCE SPENDING IN CANADA, 1988–2007

($MILLIONS)



Source: Natural Resources Canada, Geological Survey of Canada

The People: Employment, Costs, Innovation

The Canadian mining industry has traditionally been viewed as a leader in investment, innovation and skills. As noted earlier, the industry invested almost $10 billion in capital spending in 2007 along with a further $16 billion in oil sands investment. Though investment flows are easier to commit in a period of buoyant prices, the Canadian industry has also invested during less prosperous times.

The industry improved productivity and cost-competitiveness during the 1990s, primarily due to implementing new technologies. Global communications systems and automation transformed business procedures, including human resource management, while investment in technology and process improvements helped turn previously uneconomic deposits into ore by lowering production costs. The availability of skilled, well-paid industry workers is the key to maximizing the potential benefit of these investments.

MINERALS AND METALS INDUSTRY EMPLOYMENT

Total employment across the Canadian economy averaged around 17 million workers in 2007, comprised of approximately 4 million workers in the goods sector and 13 million in the services sector.

Overall Industry Employment

The mining industry accounts for approximately 1 of every 46 Canadian jobs. As defined by Statistics Canada and Natural Resources Canada, the mining and mineral processing industry employed 363,000 in 2007 (Figure 25). This is comprised of 51,000 workers in mineral extraction, 79,000 in primary metal manufacturing, 55,000 in non-metallic mineral product manufacturing and 179,000 in fabricated metal product manufacturing.

The mineral extraction stage employs 23,000 in metal mining, 22,000 in non-metal mining and 6000 in coal mining.

FIGURE 25: EMPLOYMENT IN THE CANADIAN MINING AND MINERAL MANUFACTURING INDUSTRIES, 1991–2007

(NUMBER OF EMPLOYEES)

	MINING AND QUARRYING	PRIMARY METAL MANUFACTURING	NON-METALLIC MINERAL PRODUCT MANUFACTURING	FABRICATED METAL PRODUCT MANUFACTURING	**TOTAL MINING AND MINERAL PROCESSING**
1991	69,431	108,829	46,460	145,259	**369,979**
1992	64,956	102,130	44,645	136,473	**348,204**
1993	61,126	101,751	43,123	132,273	**338,273**
1994	61,160	102,587	43,880	134,821	**342,448**
1995	62,536	102,127	47,077	139,590	**351,330**
1996	60,764	101,727	45,687	146,910	**355,088**
1997	64,337	98,828	48,554	157,630	**369,349**
1998	60,090	100,957	52,166	165,626	**378,839**
1999	57,353	100,529	53,286	173,072	**384,240**
2000	56,698	104,253	56,440	183,246	**400,637**
2001	51,180	91,936	53,719	187,521	**384,356**
2002	47,433	90,322	52,547	183,980	**374,282**
2003	46,617	85,394	53,351	183,364	**368,726**
2004	45,567	79,703	53,307	178,988	**357,565**
2005	45,595	78,731	53,066	178,727	**356,119**
2006	47,263	80,681	55,521	183,051	**366,516**
2007	51,305	78,802	54,577	178,760	**363,444**

Source: Statistics Canada

The number of Canadian workers in mining extraction has decreased significantly—by 30%—since 1990 (Figure 26). The decline is equally significant in coal mining (47%) and metal mining (49%), while employment in non-metal mining has increased by 33%, reflecting, among other factors, the emergence of Canada as a major diamond producer. For example, diamond-mining employment in Canada grew from zero in 1997 to 1609 in 2005.

The primary metal manufacturing sector employed 79,000 workers in 2007. This includes employment in iron and steel mills, steel product manufacturing, alumina and aluminum production, non-ferrous metal production and processing, and foundries. The number of workers in the non-ferrous metal smelting and refining sector has declined from 23,000 to 13,000 over the past 15 years—a decrease of 43%. This is attributable to technological advancement and increased foreign competition.

Overall mining and oil sands employment statistics are changing rapidly due to industry growth and mergers/acquisitions. Acquisition of Placer Dome, Noranda, Falconbridge, Inco, Alcan and others in recent years has also changed the competitive landscape in Canadian mining.

FIGURE 26: EMPLOYMENT IN THE MINERAL EXTRACTION STAGE, 1991–2007

(NUMBER OF EMPLOYEES)

	METAL ORE	NON-METALLIC MINERAL	COAL	TOTAL
1991	37,111	19,442	12,879	**69,432**
1992	35,565	18,766	10,625	**64,956**
1993	32,911	18,468	9,748	**61,127**
1994	31,901	19,408	9,850	**61,159**
1995	32,830	19,544	10,161	**62,535**
1996	32,904	17,590	10,270	**60,764**
1997	35,511	19,095	9,730	**64,336**
1998	32,354	19,431	8,304	**60,089**
1999	29,555	19,987	7,812	**57,354**
2000	29,468	20,031	7,199	**56,698**
2001	25,633	19,517	6,030	**51,180**
2002	22,417	19,316	5,700	**47,433**
2003	21,902	19,875	4,841	**46,618**
2004	21,403	19,621	4,543	**45,567**
2005	20,758	19,799	5,037	**45,594**
2006	21,137	20,789	5,336	**47,262**
2007	22,975	22,486	5,844	**51,305**

Source: Statistics Canada

The leading mining employers, as listed in the August 2008 *Report on Business Top 1000* rankings, are: Barrick (17,800 employees); Teck Cominco (8900); Yamana Gold (8700); First Quantum (7427); Pan American Silver (7300); Sherritt International (5392); Goldcorp (5304); Alcoa (5200); Kinross Gold (5000); Fording Coal (3000); Cameco (2720); Anvil Mining (2550); FNX Mining (1500); Hudbay Minerals (1489); Eldorado Gold (1388); Agnico Eagle (1303); and Inmet (1100). These figures include employees at international operations.

Among the large industry employers who have been acquired and/or no longer report separate figures, the most recent figures from

2007 suggest that Rio Tinto Alcan employed 64,700, Xstrata 14,500, Vale Inco 11,700, Iron Ore Company of Canada 1900, and LionOre 1400. Among the main oil sands extraction companies, Suncor employed 5766 and Syncrude employed around 4300. Employment at these and other oil sands companies has increased significantly in recent years.

While exact statistics are dated and difficult to obtain, it is evident that the industry employs relatively few female workers. There were 961 female workers in the mining extraction sector in 2004, representing approximately 2% of total extraction workers. The female representation in Canadian engineering programs declined from 21% in 2001 to around 19% in 2004. These proportions are particularly low when one considers that women account for 60% of the overall undergraduate student body in Canadian universities and for around 47% of the total Canadian workforce. Women presently represent only 10% of the 160,000 licensed engineers across Canada.

Employment of Aboriginal Canadians

The information from Statistics Canada regarding Aboriginal employment in the mining industry is dated, as 2006 Census data has not yet been published. The available data suggests that 3840 Aboriginal people worked in the mining industry in 2001. This figure has increased 22% since 1996 and it is likely that it has continued to increase from 2001 to the present. The number of Aboriginals employed in the mining industry in Canada's three territories increased from 410 to 680 (66%) during the 1996 to 2001 period. It is estimated that Aboriginal workers accounted for 5.3% of the mining workforce in 2001, versus 3.6% in 1996.

In addition to these figures, there are also significant and growing levels of Aboriginal Canadians employed in the oil sands sector. As of 2005, around 1500 Aboriginal employees worked in permanent operations jobs, representing a 90% increase over 1998 levels. Oil sands companies have also awarded an estimated $1.5 billion worth of contracts to local Aboriginal companies over the past decade. These contracts are increasing each year. In 2005 alone, $315 million in contracts were awarded to local Aboriginal companies.

There remains potential to increase the number of Aboriginal mining workers. The growth rate of the Aboriginal population is double that of the non-Aboriginal Canadian population and many communities are located near mining operations. According to NRCan, some 1200 Aboriginal communities are located within 200 kilometres of 190 producing mines and 2100 exploration properties across Canada.

Some of the industry's anticipated worker shortages could be filled through the training and skills enhancement of Aboriginal Canadians. Progressive socio-economic agreements, such as the EKATI Mine Project agreement, can provide literacy and other training, employment, profit-sharing and environmental benefits to signatory Aboriginal groups. The Raglan Agreement in Quebec, signed by the Makivik Corporation and Falconbridge

(now Xstrata Nickel), gives priority hiring and training benefits to Inuit workers. In total, there are over 50 such agreements in place relating to mineral extraction projects.

Industry Need for Human Resources and Skills

The Canadian and global mining industry faces a serious human resource challenge in the coming decade. The Mining Industry Human Resources Council (MiHR) estimates that the sector will need to hire 9200 new workers per year for the next decade to meet anticipated production targets. This comes at a time when the skilled core of the industry, including some 65% of geoscientists, will reach retirement age. Teck Cominco, as one example, estimates that as many as half its workers in BC will retire over the next five years. In virtually all skill categories, the number of Canadian mining workers over age 50 is two to five times greater than the number below age 30. This is a more pronounced reality in mining than in other Canadian sectors. Addressing these challenges will require a significant and coordinated effort by the industry and all levels of government in Canada.

The predominance of advanced technology in today's mining industry translates into a requirement for highly educated workers. The industry requires technical mining extraction expertise, as well as skills in computer technology, information management, and mineral process technology, among others.

MiHR is a sector council focussed on the development of solutions to national human resources challenges facing the minerals and metals industry. In a recent study, MiHR noted that the industry has historically faced challenges recruiting women, visible minorities and immigrants. The study also estimated that Canadian universities would graduate 100 mining engineers in 2005—one-third fewer than the number required by the industry. The *Globe and Mail* noted in a March 2008 story that there will be 1200 geology graduates in Canada this year to fill 9000 positions (and that the average salary for geology undergrads has consequently risen over three years from $62,500 to $90,700 at present). This reality is compounded by the fact that companies in other countries are also actively recruiting Canadian graduates and workers. As well, several university mining programs in the US have been closed or cut back in the past decade in response to the industry downturn of the 1990s.

The report proposes such solutions/actions as increasing the promotion of the industry to youth, Aboriginals and non-traditional groups; developing programs to bring back retired workers, retain older workers and increase mentoring; enhancing educational programs and the provision of employer-provided training; and implementing standards for key occupations.

The human resources and skills pressure is being felt by the mining industry worldwide. For example, in Australia, where mining employment has increased by almost two-thirds in five years, it is estimated that the industry will need an extra 70,000 workers by 2015.

WAGES AND STRIKES

The globally competitive nature of Canada's mining industry has traditionally been reflected in its wages and salaries, which are the highest of any industry in Canada.

Average weekly wages and salaries in the mining industry (see Annex 7) were $1213 in 2007. Canada's coal mines offered the highest average weekly wage ($1427), followed by metal mining ($1284), smelting and refining ($1208), and non-metal mining ($1087). These wage levels have increased significantly from the previous year—by 8% on average. This reflects the industry's relatively buoyant price and profitability situation.

The Canadian mining industry was the only industrial sector with average weekly wages above $1000 in 2007. Indeed, as detailed in Annex 8, the average weekly earnings for a mining industry worker in 2007 were 30%, 29%, 24% and 22% higher than those of workers in the construction, manufacturing, forestry and finance sectors respectively.

There were 15 mining industry strikes and lockouts in 2007, involving a total of 2766 workers. These totals are comparable to the 14 incidents involving 2273 workers as reported by the federal government in 2006 (see Annexes 9 and 10). This suggests that approximately 0.8% of industry workers were involved in strikes and lockouts during 2007. Economy-wide, approximately 0.4% of Canada's workers were involved in strikes and lockouts; the level of strike activity in

FACT:
There remains potential to increase the number of Aboriginal mining workers. The growth rate of the Aboriginal population is double that of the non-Aboriginal Canadian population and many communities are located near mining operations.

the mining sector was therefore higher than it was in the general Canadian workforce.

PRODUCTION COSTS

Because mineral prices are generally established through international trading and exchanges, mining companies have limited control over the revenue side of the income statement. To remain globally competitive, companies must therefore maintain control over production costs.

Statistics Canada's annual survey of business production costs (Figure 27) is drawn from NRCan's annual mining census; it reports three major production cost elements for 819 mining establishments: wages, energy (fuel and electricity), and materials and supplies. For the overall industry, these three cost components amounted to $2.5 billion, $1.9 billion and $5.4 billion respectively in 2006. Wages amounted to about 8% of the industry's production value, energy 6%, and materials and supplies 17%.

Mining companies in Canada and abroad faced mounting costs through 2005, 2006 and 2007, with a likelihood of continued increases. In its regular global cost commentary in mid-2006, BHP Billiton noted that costs are being driven by increased competition for capital, energy, personnel, equipment and materials—and that high costs and lengthening equipment delivery times are causing delays in its development of new capacity in Australia and elsewhere.

FIGURE 27: SELECTED COSTS OF PRODUCTION IN THE MINERALS INDUSTRY, 2006

	NO. OF FIRMS SURVEYED	WAGES ($000)	FUEL & ELECTRICITY ($000)	MATERIALS & SUPPLIES ($000)	VALUE OF PRODUCTION ($000)
Metals	59	1,374,979	937,299	3,852,099	20,817,374
Non-metals	735	768,553	706,303	1,152,621	7,166,791
Coal	25	314,112	223,838	371,782	2,793,972
Total Mining	**819**	**2,457,644**	**1,867,440**	**5,376,502**	**30,778,136**

Source: Natural Resources Canada; Statistics Canada – Cat. No. 26-201 XIB

Increased exploration levels and intense activity in the oil sands sector are putting upward pressure on labour supply and wages throughout the Canadian resource economy. Even businesses willing to pay above-market rates are having difficulty hiring the required numbers of new workers. Some anecdotal examples of this trend include the following:

- One oil sands project operator estimated that the overall per-barrel cost of building/operating an expansion was 3.2 times higher in 2007 than five years ago.
- It was recently estimated that per barrel cash operating costs for synthetic oil rose 65% between 2002 and 2006, based on selected component costs. Concrete costs increased 112%, seamless pipe costs 172%, and scrubber costs 130% during the 2001–2007 period.
- As noted in a survey by the Metals Economics Group, one executive estimated that (between 2004 and 2007) the overall contract drilling rate increased by 35%, geophysics costs by 28–50%, assaying costs by 27%, and vehicle fuel costs by 25%.
- A PricewaterhouseCoopers study indicates that mining companies' profitability declined in 2007 as operating costs outpaced sales. Costs among 40 tracked companies increased 38% during the year, while sales advanced 32%, leading to a squeeze in profit margins.

Cost increases, together with tight supply of human resources and equipment, are leading to a slowing of major resource development projects in Canada and abroad.

PRODUCTIVITY AND TECHNOLOGY

Productivity is a measure of the efficiency of the inputs—people, capital and natural resources—that are employed to create an output. There are general indications that the Canadian minerals and metals industry is innovative and employs advanced technologies, although the supporting statistics are dated. Productivity in the industry grew by an annual average of 2.8% between 1989 and 2001 (the latest available data from Statistics Canada), double the 1.4% growth in the manufacturing sector and four times Canada's overall productivity growth of 0.6%.

Through the 1990s, the combination of low commodity prices, consolidations, globalization and regulatory constraints drove Canadian mining companies to higher levels of innovation and productivity. The rapid development of the Internet helped the industry enhance productivity while minimizing operational costs. An industry such as mining, with facilities in remote locations, could draw particular benefit from information management and communications technologies.

At the exploration stage of the industry, the technological challenge is to locate large, high-grade reserves with minimal ground disturbance and disruption to the environment. New technologies, including GPS surveying information, airborne technologies and down-hole seismic imaging are allowing companies to locate new deposits not otherwise discoverable with traditional methods.

In extraction, a high portion of Canada's remaining mineral inventory is likely located two kilometres or more below the surface. This presents geo-mechanical, labour, energy efficiency and operational challenges to the industry's productivity and profitability. The industry has responded by investing in remote-operated equipment, automated loading and transportation systems, robotics and seismic mapping. These technologies, combined with high mineral prices, are allowing companies to exploit deposits at greater depths and keep open mines that would otherwise have closed.

International mineral smelting and refining technology has not experienced any step-change advances over the past 20 years. Pyrometallurgical operations drawing upon thermal treatment, and newer hydro-metallurgical operations drawing upon electricity and chemistry, continue to be adjusted and improved upon, in the aim of extracting maximum metal from the mineral while minimizing energy use and emissions. Similar gradual improvements are seen in iron ore pelletizing facilities; for example, Arcelor Mittal Mines (formerly QCM) aims to improve the energy efficiency of its pelletizing operations and conceivably reduce GHG emissions by 30%. In terms of particulate matter emissions, traditional technologies such as bag-houses and electrostatic precipitators continue to be utilized.

FACT:
It is estimated that the industry needs 9200 new workers per year for the next decade to meet anticipated production targets. This comes at a time when the skilled core, including some 65% of geoscientists, will reach retirement age.

In the coming years, it is likely that the industry in Canada and internationally will be directing increased attention to energy management and carbon emissions. This will be driven both by increased energy costs—$150 per barrel oil—and by the plethora of new greenhouse gas regulations, taxes and trading systems that will emerge over the next decade.

In one emerging area—carbon capture and sequestration (CCS)—it is already mandated that Canadian oil sands projects after 2011 will be required to invest in this area. Statoil, which acquired North American oil sands assets in 2007, is recognized as a global leader in CCS and presently stores carbon dioxide at the three commercial CCS projects it operates (the world's fourth CCS site is Encana's facility in Saskatchewan). Statoil faces a $60 per tonne carbon tax from the Norwegian government and estimates that its carbon-mitigation practices save $100,000 per day.

Research and Development

According to the Statistics Canada catalogue 88-202 entitled *Industrial Research and Development*, Canadian mining companies invested $538 million in research and development in 2006, the most recent year for which data is available. This R&D spending comprises $70 million in mineral extraction, $239 million in primary metals, $177 million in fabricated metal products and $52 million in non-metallic mineral products (Figure 28). Mining industry investment in R&D increased by 10% in 2003 and remained roughly at this level during the ensuing three years.

The R&D investment intentions of the mining industry in 2006 exceeded that of several large sectors in Canada, including oil and gas extraction, motor vehicles and parts, forestry and wood/paper products, and machinery. Spending on metals and mining sector R&D was over six times higher than the combined investment of the agriculture, fishing and forestry sectors.

As detailed in Figure 29, there are 271 R&D workers in the mining extraction area, 1405 in primary metals and 2916 in metal manufacturing operations, for a sector total of 4592. The aerospace and pharmaceutical sectors, which receive significant government financial and policy support, employ only slightly more R&D personnel than does the mining and mineral manufacturing industry (although they invest a considerably higher portion of their revenues on R&D).

The Canadian corporate R&D database, RE$EARCH Infosource Inc. (2007), ranked eight mining and oil sands companies

FIGURE 28: R&D EXPENDITURES, BY INDUSTRY, 2002–2006

($MILLIONS)	2002	2003	2004	2005	2006
Mining – extraction	45	53	66	67	70
Primary metals – ferrous	42	31	37	35	36
Primary metals – non-ferrous	192	231	214	205	203
Fabricated metal products	156	171	175	172	177
Non-metallic mineral products	46	45	50	52	52
Total – Mining and Mineral Manufacturing	**481**	**531**	**542**	**531**	**538**
Others – oil and gas extraction	209	215	208	178	191
Others – petroleum and coal products	99	139	135	131	143
Others – motor vehicles and parts	432	451	533	523	537
Others – machinery	456	452	446	470	488
Others – wood products and paper	461	461	529	527	527
Others – aerospace products and parts	867	889	886	890	912
Total Manufacturing	**8,257**	**7,973**	**7,986**	**8,092**	**8,273**
Total All Industries	**13,516**	**13,704**	**14,441**	**14,655**	**14,850**

Note: 2006 figure denotes R&D intentions.
Source: Statistics Canada, 88-202-XIE

FIGURE 29: NUMBER OF PEOPLE ENGAGED IN R&D, BY INDUSTRY, 2005

	PROFESSIONALS	TECHNICIANS	OTHER	TOTAL
Mining – extraction	151	93	27	271
Primary metals – ferrous	191	84	48	323
Primary metals – nonferrous	579	355	148	1,082
Fabricated metal products	1022	1,162	371	2,555
Non-metallic mineral products	156	136	69	361
Total – Mining and Mineral Manufacturing	**2,099**	**1,830**	**663**	**4,592**
Others – oil and gas extraction	203	147	40	390
Others – petroleum and coal products	128	78	7	213
Others – motor vehicles and parts	2,384	1,061	688	4,133
Others – machinery	2,653	2,019	908	5,580
Others – paper and wood products	819	904	403	2,126
Others – aerospace products and parts	2,588	1,395	1,243	5,226
Others – pharmaceutical and medicine	2,890	1,543	1,114	5,547
Total Manufacturing	**35,381**	**15,834**	**8,038**	**59,253**
Total All Industries	**70,796**	**31,227**	**14,270**	**116,293**

Source: Statistics Canada, 88-202-XIE

among the top 100 private-sector R&D investors in Canada in 2006:

- Alcan ranks 7 at $250 million
- Suncor ranks 29 at $74 million
- Syncrude ranks 35 at $68 million
- CVRD Inco (now Vale-Inco) ranks 36 at $68 million
- Novelis (aluminum rolling/recycling firm) ranks 51 at $45 million
- Rio Tinto ranks 90 at $18 million
- Teck Cominco ranks 92 at $17 million
- Falconbridge (now Xstrata) ranks 100 at $15 million

Some of these firms have increased their investment over the previous year, while others have reduced their R&D spending.

The mining industry, through the involvement of MAC and other organizations, is engaged in the federal government's new Science and Technology Policy and its support of business-led networks of centres of excellence under the umbrella of the newly created Canadian Mining Innovation Council (CMIC). The funding, structure and activities of the CMIC will develop further through 2008.

FACT:
Canadian mining companies invested $538 million in R&D in 2006, comprising $70 million in extraction, $239 million in primary metals, $177 million in fabricated metal products and $52 million in non-metallic mineral products.

The Environment

Few industry sectors face the degree of scrutiny from environmental and social groups that is accorded to the mining industry. Mineral extraction and processing, virtually by definition, involves an intrusion upon the landscape—whether to build access roads and power lines, to undertake exploration programs, to conduct open pit or underground mining, or to treat and manage waste products. These actions represent encounters between humans and the surrounding environment—and the attendant need to manage and minimize the risk that accompanies these encounters.

In the Canadian context, mining can mean accessing lands situated within the boreal forest. Accessing land and resources in northern Canada can frequently raise issues of Aboriginal rights and relationships. Comparable issues, though on a greater scale, face the mining industry in its international operations, which often occur in countries with less developed infrastructure and with thinner environmental protection and community consultation capacities.

In response to these challenges, as discussed in this chapter, the Canadian mining industry places a high priority on enhancing environmental performance and responding to social issues within a sustainable development framework. Globally, the Canadian mining industry is generally regarded as operating at the leading edge of social–environmental practices.

PROGRESS THROUGH THE *TOWARDS SUSTAINABLE MINING* INITIATIVE

Launched in 2004, the Towards Sustainable Mining (TSM) initiative addresses the mining industry's social licence to operate. It reflects industry's commitment to align its priorities and values with those of its communities of interest, while improving business and environmental performance. TSM includes performance indicators and targets for tailings management, energy use and greenhouse gas emissions management, external outreach, and crisis management. Participation in TSM and its annual reporting process is a requirement of membership in MAC.

In 2007, TSM added two new indicators to address biodiversity and Aboriginal relations, and required members to implement outside verification of their 2006 company performance assessment. The new TSM biodiversity criteria will help drive continued improvements in such areas as mine and facility closure. One example of planning for closure is the DeBeers process that preceded opening of the Snap Lake and Victor mines. The company worked with Laurentian University to determine how to best re-establish vegetation with local species following project closure. A baseline of local fauna and flora species has been assembled to guide the future restoration of these sites.

In recognition of its environmental work, the Globe Foundation awarded the *Industry Association Award for Environmental Performance* to MAC in 2005. This award is presented annually to associations whose industry has gone beyond regulatory compliance to improve environmental performance through research, development and education. MAC was recognized for its TSM initiative.

The global context surrounding TSM is affected by the large number of international sustainability and social licence initiatives that continue to be developed. The Global Reporting Initiative (GRI), for example, calls upon international organizations in numerous sectors to report on economic, environmental and social performance and to adhere to sector-specific guidelines. With respect to the mining sector, a GRI Mining and Metals Sector Supplement was developed in 2005. Numerous other international initiatives have been designed pertaining to specific mining industry segments, including diamonds, gold and jewellery, as well as to overall responsible mining extraction practices.

Canadian firms are also actively involved in domestic environmental research and consultation initiatives such as Mine Environment Neutral Drainage (MEND) and the National Orphaned and Abandoned Mines Initiative (NAOMI). *See the Mining Association of Canada's annual Towards Sustainable Mining Report at* www.mining.ca *for details.*

Figure 30 highlights MAC member companies' progress in reducing releases to the environment over the past 13 years. These figures reflect data from those companies accounting for a large majority of Canada's mining production. As indicated, the industry has made significant progress in most areas. Mercury releases have been reduced by 91%, lead by 79%, zinc by 68%, hydrogen sulphide by 64%, cadmium by 47% and copper by 46% between the 1993 to 2006 period. This illustrates the success of investment by mining companies in cleaner processes and technologies in response to early-stage voluntary actions and emerging Canadian regulatory requirements.

Vale Inco's operations in Sudbury provide one example of such investment. The company announced in mid-2006 that it would invest $115 million in its Sudbury operations with the aim of reducing sulphur dioxide emissions by 34%. Using fluidized-bed roaster off-gas scrubbing technology, the SO2 Abatement Project will lower emissions from the current regulatory limit of 265 kt to 175 kt annually. This investment was conducted as part of a broader company objective to achieve 75% reduction from current emissions limits by 2015.

FACT:
Mineral extraction and processing involves an intrusion upon the landscape—whether to build access roads and power lines, to undertake exploration programs, to conduct open pit or underground mining, or to treat and manage waste products.

FIGURE 30: RELEASE OF SUBSTANCES TO THE ENVIRONMENT

(TONNES)	1993	2003	2005	2006	% CHANGE (1993–2006)
Arsenic	67	133	81	70	4
Cadmium	72	28	31	35	-51
Copper	691	274	353	290	-58
Hydrogen sulphide	366	86	64	110	-70
Lead	1,113	297	199	180	-84
Mercury	11	1	2	1	-91
Nickel	503	260	393	310	-38
Zinc	1,402	467	405	330	-76

Note: Data is drawn from industry submissions to the National Pollutant Release Inventory (NPRI).
Source: MAC member companies, *TSM Progress Report,* 2008

There may also be potential over the medium- and long-term for Canadian mining companies to use their metallurgical facilities to process discarded electronic material and thereby reduce landfill volumes. As an industry leader, Teck Cominco is using furnace and metallurgical processing capacity in its Trail BC facility to process e-scrap and, in so doing, recover zinc, lead, indium, cadmium and other metals. The future of such businesses will depend in part on the extent to which manufacturers and consumers are required by government regulation to take responsibility for life-cycle management and stewardship of the products they produce and consume. It will also be important that greenhouse gas and clean air policies being developed by the federal government, as discussed later in this chapter, do not actually work against the practice of greater recycling.

ABORIGINAL RELATIONS AND IMPACT BENEFIT AGREEMENTS

It is critically important that the mining industry have a strong and progressive relationship with Canada's Aboriginal community. As noted earlier, mining is the largest private-sector employer of Aboriginal Canadians and, given the relatively high proportion of Aboriginal youth, there is potential to draw upon this human resources source in greater numbers. Approximately 1200 Aboriginal communities are located in reasonable proximity of mineral exploration and production sites.

At the industry-wide level, MAC places a high priority upon this area and, among other activities, is aiming to complete and sign a memorandum of understanding with the Assembly of First Nations in fall 2008. MAC is also developing the TSM architecture to help guide and support company undertakings and reporting in the area of Aboriginal relations. As part of this effort, MAC is holding workshops involving a range of Aboriginal communities that are affected by or involved with the mining industry in order to obtain input on the draft Mining and Aboriginal Peoples Framework and to share experiences between the communities and MAC member companies.

A strong relationship is equally or more important at the individual company level. Beyond complying with applicable laws and regulations, and passing through relevant environmental review processes, it is increasingly evident that companies must have formal agreements in place with affected Aboriginal groups to facilitate progress on extractive projects. These agreements, generally known as Impact Benefit Agreements (IBAs), are usually signed between mining companies and Aboriginal communities and, among other components, may contain commitments regarding education, training, business contracts and financial payments. IBAs have also been developed in Canada for pipeline, hydro-power, and oil sands projects. There are over 50 IBAs in place relating to mineral extraction projects; these involve companies such as Barrick, Voisey's Bay Nickel, Syncrude, Tahera Diamond, Diavik, BHP Billiton, De Beers, Cameco, Raglan-Falconbridge, and Aber Resources.

ENERGY EFFICIENCY AND GREENHOUSE GAS EMISSIONS

Energy and greenhouse gas policy issues have gained visibility and importance in Canada in recent years. Heightened awareness of climate change, increased linkages between clean air and health, strong growth of oil sands development and frequent front-page political attention have moved these issues to the top of the public mind.

Mineral Extraction

The extraction segment of the mining industry was exempted from the large-final-emitters regime under the previous Liberal federal government and continues to be exempt from the present Conservative government's clean air and GHG emissions targets. There are some 190 operating metal and non-metal mines in Canada that cumulatively account for a fraction of one percent of Canada's total emissions. The government has concluded that it is more fruitful to focus new clean air and GHG targets on the relatively few smelters, refineries and pelletizing facilities whose emissions are higher.

While not subject to regulated targets, many mining operations in Canada have nonetheless been improving their capabilities in compressed air, ventilation, metering and energy management. Investment in such areas will continue to be a priority for MAC and the industry in its dealings with Natural Resources Canada, the department that oversees federal programs for energy efficiency.

Among the energy-efficiency challenges facing mine sites is the fact that today's older and deeper mines require more energy to access and extract the ore. Mining operations in northern Canada also face a particular energy challenge, given the lack of electrical grid capacity. Both the Diavik and Ekati operations are dependent on fuel oil being transported to the site over a winter ice road and therefore are less able to lower their carbon emissions. The mines have been designed with energy efficiency as a key consideration. Among numerous other actions, Diavik is outfitting its haul trucks with engine heaters, thereby allowing operators to shut down at certain temperatures rather than idling; this is projected to save the operation over one million litres of fuel annually.

Metals Smelting and Refining

Each stage of the value-added chain in the mining and metals sector is energy-intensive; hence the Canadian mining industry is a relatively large user of energy and emitter of air pollutants and greenhouse gases. The industry's base metal smelters, iron ore pellet plants and oil sands operations are classified as "large emitters" by the federal government and are the subject of ongoing discussions within the government's clean air and climate change regulatory framework. (The oil sands operations are grouped within the oil and gas sector for the purposes of the government's framework.)

The most energy-intensive players in the mining sector—namely smelting and refining—have made considerable progress in improving energy and greenhouse gas intensity performance over the past 16 years. The metal smelting and refining industry has reduced its energy requirements from 50 terajoules per kilotonne of production output in 1990 to 42 TJ/kt in 2005—an improvement of 16%.

As detailed in Figure 31, the metal smelting and refining industry has improved its 2005 greenhouse gas emissions intensity index by 36% from the 1990 base year. In terms of absolute emissions, this industrial segment has bettered Canada's economy-wide target under the Kyoto Protocol. These improvements are due to investments in energy efficiency and, where possible, a shift away from carbon-intensive energy sources such as heavy fuel oil.

Given that it has taken the industry 16 years to improve GHG intensity by 36% (2.25% per year), it is evident that the target proposed under the federal government's climate change and clean air strategy (18% improvement from 2007 to 2010) will not be achieved over three years. Under such a scenario, companies would have to pay into a technology fund to meet a large portion of the gap unless a legitimate carbon trading regime or offsets regime is developed in the near future (which seems unlikely given the slow pace of federal government progress in these areas). As a further complication, the government proposes to phase out the technology fund after only a handful of years.

Apart from the emissions intensity improvement target, the framework presented by the government poses problems on other fronts. First, in terms of emissions

FIGURE 31: MINING INDUSTRY ENERGY AND GHG EMISSIONS DATA, 1990–2005

	1990	1995	2000	2004	2005
Total Canadian Economy					
Energy use (PJ)	9,608	10,155	11,362	12,155	11,848
GHG emissions (mt)	599	649	725	758	747
All Canadian Industry					
Energy use (PJ)	2,400	2,533	2,724	2,731	2,765
Direct GHG emissions (mt)	105	107	111	119	113
Total GHG emissions (mt)	142	144	161	170	164
Metal Mining					
Energy use – from electricity (PJ)	47	42	36	36	37
Energy use – from natural gas (PJ)	7	4	3	3	3
Energy use – from heavy fuel oil (PJ)	15	16	12	11	12
Energy use – from middle distillates (PJ)	17	13	13	12	14
Energy use – from coal coke (PJ)	11	11	12	11	12
Total energy use (PJ)	102	91	81	76	82
Share of Canadian energy use (%)	1.06	.90	.71	.63	.69
Energy per output index	1.0	.86	.69	.67	.66
Total GHG emissions (mt)	5.8	5.1	4.4	4.3	4.5
GHG emissions per output index	1.0	.97	.77	.87	.90
Metal Smelting and Refining					
Energy use – from electricity (PJ)	31	41	42	41	36
Energy use – from natural gas (PJ)	23	23	22	18	18
Energy use – from heavy fuel oil (PJ)	6	4	4	3	n.a.
Energy use – from coal (PJ)	13	10	11	n.a.	n.a.
Total energy use (PJ)	77	84	86	79	73
Share of Canadian energy use (%)	.80	.83	.75	.65	.62
Energy per output index	1.0	.99	.87	.80	.74
Total GHG emissions (mt)	7.4	6.7	7.1	6.7	5.5
GHG emissions per output index	1.0	.84	.78	.69	.56

PJ petajoules mt megatonnes

Source: Assorted tables in CIEEDAC Report, January 2008

trading, a carbon trading regime and a SOX/NOX trading regime that is limited to the domestic market will be too small and illiquid to be workable. Second, the carbon budget allocated as credit for early action is relatively tiny and may not be worth the bureaucratic effort. Third, it seems likely that a hodgepodge of regulatory and reporting obligations will emerge as provincial governments unveil plans that do not mesh with the proposed federal approach and vice versa.

It is also important that any federal plan on GHG emissions engage all Canadians in the solution. The proposed federal plan leaves the consumer element of Canadian society largely unaffected, focusing instead on the easier political targets of Big Industry. This approach leaves some 55% of Canadian GHG emissions "on the sidelines" and consequently places an inordinate competitiveness burden on Canadian industry. One interesting illustration of the global competitiveness context is that China is presently commissioning new coal-fired power plants at a rate of one every two to three weeks, generally using old technology. China's GHG emissions *growth* each year exceeds the sum of Canada's total annual emissions from all sectors. Development in China and elsewhere should take place within a global GHG framework and using the cleanest possible technologies.

Oil Sands

Oil sands operations face particular challenges with respect to GHG emissions. Oil production from Alberta's oil sands projects will increase from one million barrels per day in 2006 to a projected 4.7 million in 2025. Given current technology, this could create a five-fold increase in greenhouse gas emissions.

Developing nuclear power plants in the region to supply electricity and steam could improve the industry's GHG intensity and, toward this end, Energy Alberta Corp and Atomic Energy of Canada are jointly examining the potential for such an investment. Total SA and Areva of France have also had discussions on this issue. However, there are many challenges facing this option, including the fact that Alberta has no nuclear infrastructure or precedent and the oil sands projects are located at relatively great distance from each other, negating the ease of transporting steam.

A second major technology that could produce "step improvements" in GHG intensity is the development, construction and operation of a large-scale carbon capture and sequestration system. Future oil sands projects (post-2011) will be required to invest in this area. However, this technology is in its infancy, with only a couple active CCS operations in the world, and the cost of developing a system of controlled underground repositories could be extremely high. Examination of this technological option is underway in the US and Canada.

THE EMERGING CLEAN ENERGY ECONOMY

The global demand for environmental goods and services is estimated to be $700 billion in 2006, climbing to $800 billion by 2010. The most promising future technologies, according to a *Climate Change Business Journal* survey, relate to low-carbon energy, energy storage, carbon capture and storage, green buildings and materials, clean vehicles and renewable energy.

It is worth noting that this cleaner society, and particularly our ability to make progress over the coming decade, will depend upon the availability of metals and minerals as building blocks.

Hybrid vehicles for example draw energy from nickel hydride batteries. Catalytic converters, used to reduce vehicle emissions, require platinum, rhodium and cerium. Rechargeable batteries require lithium, while solar cells require gallium, indium and germanium. Water purification systems rely on nickel and a host of rare earth elements. Developing other clean

energy sources, whether nuclear, wind or hydrogen, requires a range of minerals and metals.

Nickel, to take one example, has the strength and corrosion-resistant properties necessary for air pollution abatement hardware and renewable energy infrastructure; for example, wind turbines are made from nickel alloys. Small biogas projects (such as some Clean Development Mechanism projects in India) use gas turbines made from nickel alloys; the rotor, nozzle, shaft, heat shield and fuel injectors are also made from nickel-containing alloys.

New lighter and stronger materials will continue to be developed. For example, aircraft fuel efficiency has improved 70% in 40 years because of materials such as aluminum, yet next-generation technologies will draw upon still lighter composites such as the nickel-alloy material Invar. Similar examples are evident throughout virtually all facets of our residential, municipal, communications and transportation infrastructure.

REGULATORY ENVIRONMENT

The Canadian mining industry, in particular the large mineral producers and processors, operate within a complex regulatory environment. There are 19 federal acts and 14 federal regulations related to the mining industry. They range from the specific, such as the British Columbia *Indian Reserves Mineral Resources Act*, to the general, including the *Income Tax Act* and the *Canada Labour Code*. In addition, there are dozens of provincial laws and regulations. For example, 21 provincial acts and 12 regulations govern the mining industry in Ontario.

Canadian mining companies and domestic and foreign investors depend on governments for a clear understanding of information requirements, approval processes, timetables and responsibilities. Mining industry experience over recent years—for example, with respect to environmental legislation such as the *Canadian Environmental Assessment Act*—has been very uneven. This can have a negative effect on Canada's status as a destination for capital investment.

The mining industry was pleased with the announcement in federal Budget 2007 that $150 million would be allocated over five years toward the Regulatory Improvement Initiative. This initiative includes the establishment of a major projects review office to coordinate the multiple agencies and departments involved in project review. The objective is to cut project review times in half—from four years to two. The government has made good progress on this issue during 2008.

While this regulatory initiative is positive, developments in the climate change and clean air regulatory areas may not offer similar promise. As noted, many industrial sectors fear that a complicated, duplicative regulatory and reporting system may emerge as the government develops federal regulations where provincial regulations already exist or are being developed.

There are some signs that the government may strive to develop a better coordinated national plan on air pollutants, including the formation of a multi-stakeholder team in mid-2008. The likelihood of progress on this front will become clearer over the coming months. On the greenhouse gas front, industry needs clarity and certainty with respect to regulatory processes and mechanisms in order to make appropriate solution-oriented investments.

FACT:

Our ability to move toward a cleaner energy economy will depend upon the availability of metals and minerals as building blocks. Hybrid vehicles draw energy from nickel hydride batteries. Catalytic converters, used to reduce vehicle emissions, require platinum, rhodium and cerium. Rechargeable batteries require lithium, while solar cells require gallium, indium and germanium. Water purification systems rely on nickel and a host of rare earth elements.

International Market Activities and Developments

The two most common measures of international market activity—investment and trade—are mutually reinforcing. Companies that are active direct investors also tend to be active traders. In general, increased direct investment tends to lead to greater trade levels.

There are few industry sectors in Canada as internationally active as the mining industry. Canadian companies are global leaders; there are almost 1000 Canadian exploration companies active in other countries and the industry accesses new capital, ideas and opportunities through high flows of inward and outward investment. Canadian stock exchanges provided 35% of the world's mining equity and handled 80% of the world's financing transactions in 2007. Canadian-listed firms have around 4900 mineral projects in varying states of development outside Canada.

FOREIGN INVESTMENT STATISTICS

As a "home grown" sector, the Canadian minerals and metals sector has historically had a significant global investment reach, and invested more abroad than it has received in Canada. While the sector remains a large global investor, this characteristic has evolved during 2006 and 2007.

Canadian direct investment abroad (CDIA) was valued at $515 billion in 2007 (Figure 32). The minerals and metals sector accounted for 10.6% of this figure; it has held steady at approximately 10% for the past five years, down from 15% in the 1990s. This decline was due to significant increases during the past decade from the energy and financial services sectors. CDIA stocks of the energy sector rose from $20 billion in 1999 to $40 billion in 2002 and $60 billion in 2007.

Canadian minerals and metals companies have an accumulated stock of $54 billion in CDIA invested abroad as of 2007, down 13% from the previous year. The CDIA is aimed primarily toward the United States and Latin America. This level of CDIA is comparable to the energy sector. The Canadian finance/insurance industry has the largest stock of direct investment abroad, by a considerable margin.

The total stock of foreign direct investment in Canada (FDIC) in the metallic minerals and metal products sector grew dramatically in 2007 to a level of $65 billion. This represented 13% of total FDIC stocks in Canada, up from 8.5% in 2006 and 6.2% in 2005. These significant increases reflect the foreign acquisitions that occurred in Canada's

minerals and metals sector in recent years. Other leading Canadian industries in terms of FDIC stocks include finance and insurance ($103 billion), energy ($87 billion), and services and retailing ($51 billion).

INTERNATIONAL TRADE STATISTICS

The data in Annexes 11 and 12 reflect combined figures for all mining stages—from ores to refined and fabricated products. These annexes illustrate Canada's significant trade deficit in iron and steel and trade surpluses in copper, gold, aluminum and coal.

Exports

There has been strong growth over the past five years in exports for the first three mining stages. This is due to significant metal price increases in recent years (Figure 33). Export of first-stage minerals grew from $10 billion in 2003 to $18 billion in 2007, while refined product exports grew from $14 billion to $32 billion, and semi-fabricated product exports from $11 billion to $18 billion. Cumulatively, exports of these three stages increased from $35 billion in 2003 to $68 billion in 2007. Exports of the fabricated product stage have remained level at around $13 billion over the past five years.

In total, the Canadian mining industry exported $81 billion worth of metals, non-metals and coal in 2007—$66 billion in metals, $12 billion in non-metals and $3 billion in coal. This $81 billion figure equates to 19% of total Canadian goods exports in 2007. As detailed in Annex 11, key exports in 2007 included iron and steel, aluminum, nickel, copper, gold, uranium, coal, potash, zinc, diamonds and iron ore. Exports of these specific products ranged from $1.9 billion to $14.5 billion.

Roughly 60% of Canada's total metal exports are to the United States, predominately iron and steel, aluminum, copper and nickel. In non-metals, nitrogen and potash are important export commodities to the US market. The European Union is a primary destination for Canadian gold, nickel, uranium and diamonds. The "other destinations" category, which includes China, receives significant exports of nickel, copper and potash. Overall, Canada is an important nickel supplier to China.

Imports

The pattern of imports exhibited a similar trend as exports; the value of imports for the first three stages has increased over the past five years, while fourth-stage imports have remained stable.

Annex 12 details the Canadian industry imports of $53 billion in metals, $9 billion in non-metals and $1 billion in coal in 2007, for a total of $63 billion. This figure equates to about 15% of total Canadian goods imports in 2007. Key imports in 2007 included iron and steel, aluminum, copper, gold and coal.

Of Canada's total metals imports in 2007, around 57% originated from the United States and 27% from "other" regions, including South America, Russia and Africa. These countries are an important source of copper, gold, iron and steel, and aluminum for Canadian smelters and refiners.

INTERNATIONAL DEVELOPMENTS IN 2007

The mining industry is one of the most global of any sectors. As well, many countries and governments gain important revenues from the industry and it is not unusual for the state

FACT:
The Canadian mining industry exported $81 billion worth of metals, non-metals and coal in 2007—this equates to 19% of total Canadian goods exports.

FIGURE 32: METALLIC MINERALS AND METAL PRODUCTS – DIRECT INVESTMENT STOCKS

($BILLIONS)	1990	1995	2000	2002	2003	2004	2006
Mining industry CDIA	13.5	24.5	42.4	43.1	44.5	47.7	61.5
Total CDIA	98.4	161.2	356.5	433.3	403.4	445.1	523.3
Mining Industry Percent of Total CDIA	**13.7**	**15.2**	**11.9**	**9.9**	**11.0**	**10.7**	**11.8**
Mining industry FDIC	9.8	9.6	17.4	20.7	20.9	22.6	38.2
Total FDIC	130.9	168.2	319.1	354.1	354.5	365.7	448.9
Mining Industry Percent of Total FDIC	**7.5**	**5.7**	**5.5**	**5.8**	**5.9**	**6.2**	**8.5**

CDIA – Canadian Direct Investment Abroad
FDIC – Foreign Direct Investment in Canada
Source: Statistics Canada, Cansim Table 376-0038

FIGURE 33: MINERAL AND MINERAL PRODUCT IMPORTS AND EXPORTS, 2003–2007

($MILLIONS)	2003	2004	2005	2006	2007	2007 PERCENTAGE OF CANADA'S TOTAL
Import Value						
Stage I	4,472	5,264	5,568	7,142	7,821	1.9
Stage II	3,503	5,249	6,778	7,771	7,652	1.9
Stage III	12,483	16,091	18,144	19,896	19,513	4.8
Stage IV	24,971	25,742	26,240	27,194	27,767	6.8
Stage I – IV	**45,430**	**52,346**	**56,730**	**62,002**	**62,753**	**15.4**
Metals	36,193	42,871	47,203	52,150	52,657	–
Non-metals	8,102	8,165	7,992	8,328	8,751	–
Coals & cokes	1,135	1,310	1,536	1,524	1,345	–
Total Economy Imports	**336,141**	**355,886**	**380,859**	**396,645**	**406,620**	**–**
Total Exports						
Stage I	9,710	11,409	15,189	16,645	17,819	4.2
Stage II	13,515	17,003	18,339	25,926	32,074	7.6
Stage III	10,918	13,414	15,405	17,148	17,712	4.2
Stage IV	12,357	12,972	13,179	13,397	13,078	3.1
Stage I – IV	**46,500**	**54,799**	**62,112**	**72,115**	**80,683**	**19.2**
Metals	35,120	42,020	46,979	57,515	65,525	–
Non-metals	9,693	10,869	11,699	11,169	11,995	–
Coals & cokes	1,689	1,909	3,434	3,431	3,163	–
Total Economy Exports	**354,303**	**385,526**	**408,458**	**411,390**	**419,891**	**–**

Stage 1 Primary – involves the discovery of ore, ore extraction and processing to the concentrate stage.
Stage II Smelting and Refining – refers to the metallurgical extraction process, the product of which is a relatively pure mineral, a metal or an alloy.
Stage III Semi-Fabricated – involves the manufacturing or processing steps required to bring products to a semi-finished or semi-fabricated stage or form.
Stage IV Fabricated – includes products of Stage III which have undergone further processing.
Source: Natural Resources Canada; Statistics Canada, February 2007

to play a central role in funding or controlling mineral resource development. The global industry is therefore directly affected by international trade and investment policy developments. The past year was particularly active on this front, with interesting developments in many areas.

Market Demand and Climbing Canadian Dollar

Global demand for metals and minerals is forecast to remain high. China, India and Brazil are the first, second and fifth most populous countries in the world and rank among the 20 largest economies. As an annual average, these countries have grown approximately 9%, 6% and 3% respectively over the past decade. The result of this growth is being seen in higher incomes and a developing industrial base and middle class, which is driving a growing appetite for minerals and metals and the products they make possible. As noted earlier, despite the growth of the past decade, the per-capita usage of many metals-intensive products remains relatively low in these emerging markets.

It is unclear how the increased value of the Canadian dollar will affect the trade competitiveness of the mining industry over the longer term. The dollar has climbed almost 50% in this decade in US dollar terms, driven in large part by booming commodity prices and Canada's strength in these areas. During 2008, the Canadian dollar has reached, exceeded and then stabilized at around par versus the US dollar. Previous studies, such as a TD Canada Trust economics study, have concluded that the primary mineral industry, which exports a high portion of its production, is more vulnerable to rising currency than other industries. For the Canadian mining industry, minerals are generally priced in US dollars, while labour and other costs are denominated in Canadian currency; a climbing currency therefore serves to reduce profitability. To date, the benefits to the industry of strengthened mineral prices have generally exceeded or largely offset the costs of a strengthened currency.

Governments Seeking Greater Revenues

Given the strength of mineral prices over the past five years, the governments of many countries have attempted to obtain a larger share of the overall revenue streams. These government actions can significantly affect business profitability, share price and investment. Furthermore, these actions do not necessarily consider the fact that costs for capital, labour and equipment have also been increasing sharply in recent years. Some examples include:

- Ecuador's constitutional assembly passed a mandate that cancels 88% of all concessions and suspends all mining activity for 180 days while the government drafts a new mining law. This action affected "hundreds" of mining concessions and negatively affected the prospects of many companies such as IAMGold and Ascendant Copper.
- Mongolia is examining amendments to its mining law that could allow the government to back into strategic mines with a majority stake. This has affected the progress of projects such as the Oyu Tolgoi copper-gold project and had an impact on firms such as Rio Tinto and Ivanhoe Mines. Mongolia has large estimated reserves of copper, gold, coal and uranium.

- Ecuador has revoked "hundreds" of mineral licenses and imposed a 70% windfalls profit tax on the mining industry.
- Zambia is considering increasing its windfall tax on copper exports in the aim of generating $400 million in additional government revenue.
- The Democratic Republic of Congo (DRC) is examining the fairness of some 61 mining contracts in the aim of increasing the government share. It is estimated that the DRC may be home to one-half of the world's copper reserves.
- Argentina has imposed a 10% tax increase on exports, a move which may lead to legal action by several of the world's largest mining firms.
- In Venezuela, the allocations of the world's exploration firms declined by 60% in 2006 in response to the nationalist Chavez government. Neighbouring Bolivia, for its part, has spoken of a desire for "nationalization without expropriation."
- The government of Uzbekistan has presented tax challenges to investors during recent years, while investment disputes in Russia have damaged that country's reputation. The Kyrgyz government has also moved to challenge the position of the Kumtor gold project, proposing new taxes and the prospect of consolidating all gold deposits into one state-owned company.

Investment flows into and out of Canada are affected by the perceived attractiveness of the investment climate in other countries. The threat of resource nationalization that has emerged in some Latin American, African and Asian countries could dampen investment in these regions, while making Canada relatively more attractive.

The Fraser Institute survey of mining executives from 333 companies in March 2007 rated Canadian jurisdictions among the world leaders for best policy environment for mining investment, with political stability and security being important variables in this regard. Manitoba, Alberta and Nevada were the three top-rated jurisdictions. On the negative side, Chile fell from third spot in 2006 to the 27 rank in 2007. Chile has mounting concerns over the availability of water and is moving to better monitor water extraction levels associated with specific mine sites. Concerns also exist regarding the availability of energy in northern Chile, given reduced natural gas imports from Argentina. (South Africa has also encountered significant electricity supply problems; uncertain supply is hindering the ability of mining companies to operate at normal levels of production.) Mongolia also fell sharply down the list, having changed its policy "overnight" with proposals to increase taxation levels.

It should be noted that even Canada, regarded as one of the world's safest regimes for investment, is not immune from negative developments. A new diamond royalty proposed by the Ontario government without advance consultation in its March 2007 budget was viewed by industry as arbitrary and discriminatory, and came on the eve of the opening of Ontario's first diamond mine, itself the culmination of a $1 billion, multiple-year investment. While this issue has been resolved to some extent, such proposals do send negative signals to the international mining investment community.

Trade Policy

The global trade policy front has been relatively quiet for several years, although some have suggested that there may be momentum behind real progress, driven by the coinciding legacy wishes of soon-departed leaders in the US, European Union and Brazil. In recent World Trade Organization negotiating sessions, there have been indications of a willingness to reduce export subsidies, and the market access provisions are reportedly close to agreement—wherein countries would reduce tariffs according to a set formula. Under the proposed formula, China, for example, would move from a current average MFN rate of approximately 9% to a rate of around 5.7%, and India from roughly 19% to 12%. Some federal trade officials suggest that a WTO agreement could be reached that enters into force in 2010. This seems optimistic—a more likely scenario is that the present US administration will reach its end while a new administration establishes its own trade policy objectives and presumably seeks renewed fast-track negotiating authority at a future time. It also seems evident that agricultural issues remain a key obstacle.

FACT:
Given the strength of mineral prices over the past five years, the governments of many countries have attempted to obtain a larger share of the overall revenue streams. These government actions can significantly affect business profitability, share price and investment. Furthermore, these actions do not necessarily consider the fact that costs for capital, labour and equipment have also been increasing sharply in recent years.

Within this trade policy vacuum, some economic observers see signs of key countries becoming increasingly protective of their raw material supply:

- For example, China has a permit system for copper concentrate and applies an export duty on unwrought copper; both policies are aimed at protecting critically important raw material supplies for domestic use. The effect is to keep these raw material flows out of the global trading system. A similar effort is being seen in energy. It is also believed that China is considering imposing further export quotas on such alloys as molybdenum, over concerns regarding security of supply to the steel sector.
- China is also implementing measures aimed at increasing the scale and self-sufficiency of its metal smelting operations. For example, under recently adopted regulations, new zinc smelters must exceed 100,000 t/y capacity and source at least 30% of concentrate from their own mine supplies. This will presumably force smelters to develop or buy into new mines. Similar objectives have also been established for lead and copper smelters.
- China is not the only country with extensive government involvement in resource trading. Twice in the past two years, Russia has arbitrarily halted energy exports to Belarus and Ukraine.
- India's government imposed a US $7/t export tax in March 2007 aimed at cutting iron ore exports in half, over concerns that existing high-grade reserves may not meet domestic demand. India is the world's third-largest exporter of iron ore, mainly to steel companies in China, Japan and South Korea. It is worth noting that steel producers Pohang Iron and Steel and Arcelor Mittal have recently agreed to build steel mills in India. India's steel output is expected to increase from 43 Mt per year at present to 200 Mt by 2020, a reality that helps explain its efforts to restrict iron ore exports.
- Countries such as Germany and Japan are themselves reliant upon raw material supply to feed large domestic manufacturing needs; they are increasingly concerned about raw material trade barriers. The OECD is examining this general issue in greater detail.
- A trade policy area that is beginning to gain more mainstream discussion relates to carbon tariffs—wherein a given country could decide to apply a tariff against imports sourced from countries that allegedly have weaker CO_2 emission requirements. There have also been suggestions from environmental groups that higher carbon footprint fuels (oil from oil sands being the most frequent suggestion) should face import tariffs or bans. This type of trade policy issue could receive greater attention over the coming years.

In contrast to these examples, Canada continues to be among the world's most open countries in terms of trade and investment flows in mining. There are no noteworthy barriers in place, except for some foreign ownership restrictions in uranium. Even these have been waived on occasion with respect to investment from Areva of France. As well, the report

from the "Red Wilson Panel" studying federal competition and investment policy, provided to the government in June 2008, recommended that these remaining restrictions be loosened further under certain conditions. MAC is generally supportive of the recommendations in this report and will be monitoring developments on this front over the coming months.

The federal government moved toward further liberalization of Canadian relations with Peru and with Colombia in 2007 and 2008. A Canada–Peru Free Trade Agreement underwent a process of translation and legal vetting during the spring of 2008 with the final agreement made public in May. Among other components, the agreement's investment provisions lock in market access for Canadian investors, ensure the free transfer of capital, protect against unlawful expropriation, and provide for non-discriminatory treatment. In addition, investors will now have access to binding international arbitration to resolve disputes. The agreement requires parliamentary approval and ratification in the two countries. In mid-2008, Canada completed negotiations on a Canada–Colombia free trade agreement; over the coming months this could follow a similar process as the Peru agreement.

Canada is also in varying phases of discussion—ranging from preliminary exploration to serious negotiation—regarding potential or strengthened foreign investment protection agreements with Tanzania, Madagascar, Mongolia, Indonesia, Vietnam, Kuwait, Russia, South Africa and China. Some of these, particularly China and Russia, are of high relevance to the mining industry. MAC and the mining industry support these directions and periodically provide detailed input to Canadian policy makers and negotiators.

Mergers and Acquisitions Activity and Investment Flows

The price growth in most metals and minerals over the past few years has contributed to record company profits and increased merger and acquisition (M&A) activity.

At its core, as a business strategy issue, a handful of large companies are generally aiming to raise their in-house ore ratio and they are operating under the premise that a constrained base-metal mineral reserves situation combined with strong global economic growth and infrastructure development in China and India is a potent combination—an equation that means strong mineral prices for many years to come. In this view, the movement is toward a world with more municipal infrastructure, with more automobiles, with more medical equipment, with more housing and with more iPods—this means a need for more minerals. Acquiring resources through M&A is a quicker way to realize profits than through the more extended and uncertain process of finding through exploration and development.

The acquisitions of Inco and Falconbridge by CVRD and Xstrata respectively in 2006 and of Alcan by Rio Tinto in 2007 were driven by views on how best to take advantage of mounting prices, limited supplies and the Chinese reality. In the view of McCarthy Tetrault's M&A team, as expressed in June 2008, Canadian mining companies continue to be viewed as relatively inexpensive long-term investments by countries needing supply of the basic building blocks of copper and zinc.

As noted earlier, as an important indicator of global M&A activity, the amount of equity raised worldwide by the mining industry has increased dramatically in recent years, growing from US $3 billion in 2000 to almost US $10 billion in 2005 and $26.5 billion in 2006, before doubling to $50 billion in 2007.

Sovereign wealth funds, fuelled by record oil prices and earnings, have also become increasingly important funding sources. Russia's oil stabilization fund, for example, comprises a $131 billion reserve fund and a $34 billion wealth fund earmarked for riskier investments. Global Insight analysts estimate the combined value of global sovereign wealth funds at $3.6 trillion in 2007—equal to the established economies of Britain, France or Germany. There are some 40 funds in place in 34 countries. It is estimated that the funds of the Gulf Arab states spent $60 billion on foreign assets in 2007, double the two previous years combined.

It is also evident that Chinese investment globally and in Canada's mining industry will grow over the coming years. China presently holds over US $1 trillion in foreign

FACT:
The world is building more municipal infrastructure, automobiles, medical equipment, housing and iPods—this means a need for more minerals. Acquiring resources through merger and acquisition can be a quicker way to realize profits than through the more extended and uncertain process of exploration and development.

exchange reserves. While investment abroad was discouraged by Chinese authorities until a few years ago, this is no longer the case. China is investing actively in Africa and is increasingly seeking opportunities in Western countries. A Chinese company has made a modest investment in a Canadian oil sands project, and more investment may be on the horizon.

There have been a number of interesting M&A activities and investment developments during the past year, including the following:

- Vale's plans to potentially acquire Xstrata did not proceed but Vale remains interested in potential acquisitions.
- BHP Billiton, the world's largest mining firm, made a bid for the second-largest firm Rio Tinto in 2008—to date, Rio Tinto has rejected the bid while acquisition review bodies have expressed competition-related concerns.
- Aluminum Corp of China and Alcoa jointly bought a 12% Rio Tinto stake in February 2008, thereby becoming engaged in any strategic developments that may emerge with BHP Billiton.
- Aluminum Corp of China bought Minerva Peru Copper while Northern Peru Copper sold its Galeno copper-gold-moly project to Minmetals and Jiangxi Copper. Zijin Mining, China's biggest gold miner, and two other Chinese partners bought Peru's second-biggest copper mine, Monterrico, in 2007.
- According to the Xinhua News Agency, foreign companies have invested in some 277 mineral exploration projects in China, including 166 gold projects. China will be changing its approach to operating gold mining entities between 2006 and 2010, by which time the state will no longer play the role of sole investor. The industry will reportedly be called upon to diversify and restructure by welcoming foreign investment, new technology and management expertise. Sino Gold and Gold Fields, as well as Canada's Dynasty Gold, are among the firms that have entered Chinese joint ventures to explore for and develop gold projects.
- In recent years, China has turned toward Africa as a potential source of raw materials. Africa has become China's leading source of imported oil, with Angola being its single largest supplier and Sudan, Nigeria and Gabon also becoming major partners. In early 2007, the state-owned energy company CNOOC announced that it would invest US $2.3 billion in an offshore Nigerian oil field. China has provided Angola with a US $2 billion package of loans and aid that includes funds for Chinese companies to build railroads, schools, roads, bridges, hospitals, and fibre-optic networks. In electricity, China has established linkages with South Africa's nuclear power program, and has built power stations in Angola, Zambia and Zimbabwe. In minerals, Chinese firms have invested in mining operations in Zambia and the DRC and have acquired the rights to mine gold and uranium in Zimbabwe. One of the investments in Zambia is an off-take agreement for concentrate from the Munali nickel mine. The DRC government stated in early 2008 that it planned to borrow $5 billion from China to invest in infrastructure and to help revive its mining industry. The African–Chinese economic relationship will presumably continue to grow.
- As an indication of India's emerging presence on the global economic scene, Essar Global, the controller of India's largest steel exporter, purchased Algoma Steel in April 2007.
- Teck Cominco bought Global Copper and its principal asset of the Relincho copper moly deposit in northern Chile in April 2008.
- The M&A activity of recent years has also affected industry suppliers. Bateman Engineering acquired Intertech's mining process division to help drive expansion into Russia, while Sandvik has made several recent acquisitions, including Aubema of Germany. Linatex acquired Durex Products in late 2007 to broaden its mineral processing capabilities.

As a general principle, the Canadian mining industry supports a free and open flow of direct investment. Foreign investment flows—inward and outward—enhance the access of Canadian businesses to new technologies and concepts and to larger markets and production chains. In this respect, government's main role should be to ensure the fairness and openness of two-way flows, to negotiate investment protection agreements, and to ensure that Canada maintains an attractive climate for investment.

The Canadian government's proposal to deny deductibility of interest payments in Canada on investments in operations abroad, as announced in Budget 2007, sent the wrong signal to Canada's global investment community, as it could serve to discourage companies from extending their global reach through investment abroad. The mining industry and MAC are encouraged that the government has deferred implementing this measure until January 2012, and that it has referred the issue to a technical committee for consultation and recommendations.

Corporate Social Responsibility

Representatives from MAC, along with the Prospectors and Developers Association of Canada and NGOs, have been involved in recent years in an advisory group to the federal government on the subject of corporate social responsibility. This public dialogue was aimed at promoting good practices in the international activities of the extractive sectors. The consultation process culminated in an agreed set of recommendations conveyed jointly by industry and NGO representatives to the federal government in March 2007. The framework proposes to establish standards and reporting obligations for Canadian companies, to create an ombudsman office to investigate and assess complaints, and to have government withhold services from companies in cases of serious non-compliance. The federal government's response to these recommendations has been expected over the past year, though has not yet been announced.

FACTS & FIGURES 2008

List of Annexes

ANNEX 1: PRODUCING MINES IN CANADA, 2007

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Newfoundland & Labrador				
Crew Gold Canada Ltd.	Nugget Pond	C	Snook's Arm	Au
Teck Cominco Limited	Duck Pond	U	Millertown	Cu, Zn
Vale Inco Limited	Voisey's Bay	P, C	Voisey's Bay	Ni, Cu, Co
Iron Ore Company of Canada (IOC)	Carol Lake	P	Labrador City	Fe
Wabush Mines	Scully	P, C	Wabush	Fe
Trinity Resources & Energy Ltd.	Manuels	P	Manuels	Pyrophyllite
Atlantic Industrial Minerals Incorporated	Lower Cove	P	Lower Cove	Limestone, dolomite
Galen Gypsum Mines Limited	Coal Brook	P	St. George's Bay	Gypsum
Nova Scotia				
ScoZinc Ltd. (Acadian Mining Corporation)	Scotia	P, C	Gays River	Zn, Pb
Atlantic Industrial Minerals Incorporated	Glen Morrison	P	Cape Breton	Limestone
CGC Inc.	Little Narrows	P	Little Narrows	Gypsum
Georgia-Pacific Canada, Inc.	Melford	P	Melford	Gypsum
Georgia-Pacific Canada, Inc.	Sugar Camp	P	Melford	Gypsum
E-Z-EM Canada Inc. (Nystone Chemicals Ltd.)	Brookfield	P, Plant	Brookfield	Barium sulphate, barite
Lafarge Canada Inc.	Brookfield	P, Plant	Brookfield	Limestone
The Canadian Salt Company Limited	Pugwash	U	Pugwash	Salt
National Gypsum (Canada) Ltd.	Milford	P	Milford	Gypsum
Shaw Resources Ltd.	Nova Scotia Sand and Gravel	P	Nine Mile River	Silica
Fundy Gypsum Company – USG Canadian Mining Ltd.	Wentworth and Miller Creek	P	Wentworth	Gypsum
Sifto Canada Inc.	Nappan	Solution Mining	Nappan	Salt
Black Bull Resources Inc.	White Rock	P	White Rock	Quartz
Pioneer Coal Ltd.	Stellarton	P	Stellarton	Coal
New Brunswick				
Xstrata Plc	Brunswick	U, C	Bathurst	Pb, Zn, Cu, Ag, Au
Blue Note Mining Inc.	Caribou	P, U, C	Restigouche	Zn, Pb, Cu, Ag
Sun Gro Horticulture Canada Ltd.	Maisonnette	Bog, Plant	Maisonnette	Perlite
Graymont Inc.	Havelock	P, Plant	Havelock	Lime, limestone
Potash Corporation of Saskatchewan Inc.	New Brunswick (Sussex)	U, Plant	Sussex	Potash, salt
Brookville Manufacturing Company	Brookville	P, Plant	Brookville	Dolomitic lime
Atlantic Silica Inc.	Poodiac	P	Poodiac	Silica
N.B. Coal Limited	Salmon Harbour	P	Minto	Coal
Quebec				
Quebec Cartier Mining Company	Mount-Wright	P	Mount Wright	Fe
IAMGOLD Corporation	Niobec	U, C	Saint-Honoré-de-Chicoutimi	Nb, Ta
Xstrata Plc	Raglan	P, U, C	Katinniq	Ni, Cu, Co, PGMs
Campbell Resources Inc.	Copper Rand	U, C	Chibougamau	Au, Ag, Cu, Zn
Campbell Resources Inc.	Merrill Island	P	Chibougamau	Cu
Campbell Resources Inc.	Joe Mann	U, C	Chibougamau	Au, Ag, Cu
Inmet Mining Corporation	Troilus	P, C	Chibougamau	Au, Ag, Cu
Breakwater Resources Ltd.	Langlois	U	Lebel-sur-Quévillon	Zn, Cu, Au, Ag
Louvem Mines Inc.	Beaufor	U, C	Pascalis Twp.	Au, Ag
Wesdome Gold Mines Ltd.	Kiena	U	Val-d'Or	Au
Century Mining Corporation	Sigma-Lamaque	U, P	Val-d'Or	Au, Ag
IAMGOLD Corporation	Sleeping Giant	U, C	north of Amos	Au, Ag
Richmont Mines Inc.	Camflo	C	Val-d'Or	Au
Richmont Mines Inc.	East Amphi	P	Malartic	Au
IAMGOLD Corporation	Doyon	U	Cadillac	Au, Ag
Agnico-Eagle Mines Limited	LaRonde	U, C	Cadillac	Zn, Cu, Au, Ag
IAMGOLD Corporation	Mouska	U	Cadillac	Au, Ag
Aurizon Mines Ltd.	Casa Berardi	U	north of La Sarre	Au
First Metals Inc.	Fabie Bay	P, U	Hébécourt	Cu, Zn, Au, Ag
Rocmec Mining Inc.	Russian Kid	U	shore of Labyrinth Lake	Au

ANNEX 1: PRODUCING MINES IN CANADA, 2007 *(continued)*

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
The Canadian Salt Company Limited (Seleine Mines Inc.)	Seleine	U	Îles-de-la-Madeleine	Salt
QIT-Fer et Titane inc.	Tio	P	Hâvre Saint-Pierre	Ilmenite
Le Groupe Berger Ltée	Saint-Modeste	P	Saint-Modeste	Vermiculite, perlite
LAB Chrysotile, Inc.	Bell Asbestos and Black Lake	P, U, Plant	Thetford Mines	Chrysotile
Graymont Inc.	Marbleton	P, Plant	Marbleton	Limestone, lime
Jeffrey Mine Inc.	Jeffrey	P	Asbestos	Chrysotile
Junex inc.	Bécancour	Solution Mining	Bécancour	Salt
Graymont Inc.	Bedford	P, Plant	Bedford	Limestone, lime
OMYA (Canada) Inc.	Saint-Armand	P, Plant	Saint-Armand	Calcium carbonate
Dufferin (St. Lawrence Cement Inc.)	Joliette	P	Joliette	Limestone
Graymont Inc.	Joliette	P, Plant	Joliette	Lime, limestone
La Compagnie Bon Sable Ltée	Ormstown	P	Ormstown	Silica
La Compagnie Bon Sable Ltée	Saint-Joseph-du-Lac	P	Saint-Joseph-du-Lac	Silica
Unimin Canada Ltd.	Saint-Canut	P, Plant	Saint-Canut	Silica
Unimin Canada Ltd.	Saint-Donat-de-Montcalm	P, Plant	Saint-Donat-de-Montcalm	Silica
Suzorite Mica Products Inc.	Letondal	P	Suzor	Mica
Timcal Canada Inc.	Lac-des-Îles	P, Plant	Lac-des-Îles	Graphite
Temisca inc.	Saint-Bruno-de-Guigues	P	Saint-Bruno-de-Guigues	Silica
Ontario				
Goldcorp Inc.	Dome	U, C	Timmins	Au
Kirkland Lake Gold Inc.	Macassa	U, C	Kirkland Lake area	Au, Ag
St. Andrew Goldfields Ltd.	Clavos	U	northeast of Timmins	Au
St. Andrew Goldfields Ltd.	Stock Gold	U, C	northeast of Timmins	Au
Vale Inco Limited	Garson	U	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Vale Inco Limited	Stobie	U	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Xstrata Plc	Thayer Lindsley	U	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Vale Inco Limited	Clarabelle	C	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Vale Inco Limited	Copper Cliff North	U	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Vale Inco Limited	Copper Cliff South	U	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Vale Inco Limited	Creighton	U	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Goldcorp Inc.	Hoyle Pond	U	south of Porcupine	Au, Ag
Goldcorp Inc.	Pamour	P	Timmins	Au, Ag
Liberty Mines Inc.	Redstone	U	southeast of Timmins	Ni
First Nickel Inc.	Lockerby	U	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Xstrata Plc	Fraser	U	Sudbury	Ni, Cu, Co, PGMs
FNX Mining Company Inc.	Levack	U	Sudbury	Cu, Ni
Vale Inco Limited	McCreedy East/Coleman	U	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
FNX Mining Company Inc.	McCreedy West	U	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Xstrata Plc	Onaping/Craig	U	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Xstrata Plc	Strathcona	C	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Xstrata Plc	Kidd Creek	U, C	Timmins	Cu, Zn, Ag, Se, Te, In, Cd
Xstrata Plc	Montcalm	U	Timmins	Ni, Cu, Co, PGMs
Richmont Mines Inc.	Island Gold	U	Dubreuilville	Au
Wesdome Gold Mines Ltd.	Eagle River	U, C	Wawa	Au
Teck Cominco Limited	David Bell	U, C	Marathon	Au

ANNEX 1: PRODUCING MINES IN CANADA, 2007 *(continued)*

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Teck Cominco Limited	Williams	U, P, C	Marathon	Au
North American Palladium Ltd.	Lac des Iles	P, U, C	Thunder Bay	PGMs, Ni, Au, Cu, Co
Goldcorp Inc.	Musselwhite	U, C	Thunder Bay	Au, Ag
Goldcorp Inc.	Campbell	U, C	Balmertown	Au, Ag
Goldcorp Inc.	Red Lake	U, C	Balmertown	Au, Ag
OMYA (Canada) Inc.	Tatlock	P	Tatlock	Calcium carbonate
ESSROC Canada Inc.	Picton	P	Picton	Limestone (cement)
I.K.O. Industries Ltd.	Madoc	P	Madoc	Trap rock
Sherritt International Corporation	Madoc (Henderson)	P, U	Madoc	Talc, dolomite
St. Lawrence Cement Inc.	Ogden Point	P	Ogden Point	Limestone (cement)
Unimin Canada Ltd.	Blue Mountain	P, Plant	Blue Mountain	Nepheline syenite
Regis Resources Inc.	Vermiculite	P	Cavendish	Vermiculite
St. Marys CBM (Canada) Inc.	Bowmanville	P	Bowmanville	Limestone
Hutcheson Sand & Gravel Ltd.	Huntsville	P	Huntsville	Silica
Miller Minerals (division of Miller Paving Limited)	Bucke	P	Bucke	Limestone
Brampton Brick Limited	Cheltenham	P	Cheltenham	Shale (brick)
CGC Inc.	Hagersville	U	Hagersville	Gypsum
E.C. King Contracting Ltd.	Sydenham	P	Sydenham	Dolomitic lime
Lafarge Canada Inc.	Woodstock	P	Woodstock	Limestone
Extender Minerals of Canada Limited	North Williams	U	North Williams	Barite
St. Marys CBM (Canada) Inc.	St. Mary's	P	St. Mary's	Limestone (cement)
Arriscraft International Inc.	Adair	P	Albemarle	Dolomite, brick, stone, limestone
Great White Minerals Ltd.	Fripp	P	Fripp	Silica
Unimin Canada Ltd.	Badgeley Island	P	Midland	Silica
Sifto Canada Inc.	Goderich	U	Goderich	Salt
Rio Tinto plc (Rio Tinto Minerals Group)	Penhorwood	P	Penhorwood	Talc
Agrium Inc.	Kapuskasing	P	Kapuskasing	Phosphate
The Canadian Salt Company Limited	Ojibway	U	Windsor	Salt
The Canadian Salt Company Limited	Windsor	Solution Mining	Windsor	Salt
Ontario Trap Rock Ltd.	Bruce	P, Plant	Bruce Mines	Trap rock
Manitoba				
Tantalum Mining Corporation of Canada Limited	Bernic Lake	U, C	Lac-du-Bonnet	Ta, Li, Cs, Rb
San Gold Corporation	Rice Lake	U	Bissett	Au
San Gold Corporation	San Gold #1	P	Bissett	Au
Vale Inco Limited	Birchtree	U	Thompson	Ni, Cu, Co, PGMs
Vale Inco Limited	Thompson	U, C	Thompson	Ni, Cu, Co, PGMs
HudBay Minerals Inc.	Chisel North	U, C	Snow Lake	Cu, Zn
HudBay Minerals Inc.	Callinan/777	U	Flin Flon	Cu, Zn, Au, Ag
HudBay Minerals Inc.	Trout Lake	U	Flin Flon	Cu, Zn, Au, Ag
Sun Gro Horticulture Canada Ltd.	Elma	Bog, Plant	Elma	Perlite
Graymont Inc.	Faulkner	P, Plant	Faulkner	Limestone, lime
CertainTeed Gypsum Canada, Inc.	Amaranth	P	Harcus	Gypsum
Lehigh Inland Cement limited	Mafeking	P	Mafeking	Limestone
Saskatchewan				
Claude Resources Inc.	Seabee	U, C	Saskatoon	Au, Ag
Cameco Corporation	Rabbit Lake	U, C	Rabbit Lake	U
AREVA Resources Canada Inc.	McClean Lake	P, C	Wollaston Lake	U
Cameco Corporation	McArthur River	U	north of Key Lake	U
Cameco Corporation	Key Lake	C	north of Highrock Lake	U
Potash Corporation of Saskatchewan Inc.	Rocanville	U	Rocanville	Potash
The Mosaic Company	K-1 and K-2	U, Plant	Esterhazy	Potash, salt
Winn Bay Sand Limited Partnership	Hanson Lake	P, Plant	Hanson Lake	Silica
Big Quill Resources Inc.	Wynyard	P, U, Plant	Wynyard	Potassium sulphate
Canadian Clay Products Inc.	Wilcox	P	Wilcox	Clays, bentonite
The Mosaic Company	Belle Plaine	U, Plant	Belle-Plaine	Potash, salt

ANNEX 1: PRODUCING MINES IN CANADA, 2007 *(continued)*

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Potash Corporation of Saskatchewan Inc.	Lanigan	U	Lanigan	Potash
Zeox Corporation	Palo	P, Plant	Whiteshore Lake	Sodium sulphate
The Mosaic Company	Colonsay	U, Plant	Colonsay	Potash, salt
Potash Corporation of Saskatchewan Inc.	Allan	U, Plant	Allan	Potash
Potash Corporation of Saskatchewan Inc.	Patience	U	Blucher	Potash
Saskatchewan Minerals Inc.	Chaplin Lake	P, Plant	Chaplin Lake	Sodium sulphate
Potash Corporation of Saskatchewan Inc.	Cory	U	Saskatoon	Potash
Agrium Inc.	Vanscoy	U	Vanscoy	Potash, salt
Sifto Canada Inc.	Unity	Solution Mining	Unity	Salt (evaporated)
Prairie Mines & Royalty Ltd.	Bienfait	P	Bienfait	Coal
Prairie Mines & Royalty Ltd.	Poplar River	P	Coronach	Coal
Alberta				
The Canadian Salt Company Limited	Lindbergh	Solution Mining	Elk Point	Salt
Birch Mountain Resources Ltd.	Muskeg Valley	P	north of Fort McMurray	Limestone
Sil Industrial Minerals Inc.	Sherwood	P	Sherwood Park	Silica
Graymont Inc.	Summit	P, Plant	Coleman	Limestone, lime
Sun Gro Horticulture Canada Ltd.	Seba Beach	Bog, Plant	Seba Beach	Perlite
Graymont Inc.	Exshaw	P, Plant	Exshaw	Limestone, lime
Lafarge Canada Inc.	Exshaw	P, Plant	Exshaw	Limestone
Prairie Mines & Royalty Ltd.	Sheerness	P	Hanna	Coal
Prairie Mines & Royalty Ltd.	Paintearth	P	Forestburg	Coal
Prairie Mines & Royalty Ltd.	Genesee	P	Warburg	Coal
Prairie Mines & Royalty Ltd.	Highvale	P	Seba Beach	Coal
Prairie Mines & Royalty Ltd.	Whitewood	P	Warburg	Coal
Sherritt International Corporation	Coal Valley	P	Edson	Coal
Elk Valley Coal Corporation	Cheviot Creek	P	Hinton	Coal
Grande Cache Coal Corporation	Grande Cache Nos. 7-4 and 12S B2	P, U	Grande Cache	Coal
Syncrude Canada Ltd.	Base and North	P	Fort Mackay	Upgraded crude oil
Suncor Energy Inc.	Millennium	P	Fort Mackay	Upgraded crude oil
Albion Sands Energy Inc.	Muskeg River	P	Fort Mackay	Upgraded crude oil
Syncrude Canada Ltd.	Aurora	P	Fort Mackay	Upgraded crude oil
British Columbia				
Forty Two Metals Inc. (Roca Mines Inc.)	MAX	U, C	Trout Lake	Mo
Craigmont Mines Ltd.	Craigmont	P, C	Merritt	Fe
Teck Cominco Limited	Highland Valley	P, C	Logan Lake	Cu, Mo
Imperial Metals Corporation	Mount Polley	P, C	northeast of Williams Lake	Au, Cu
Cross Lake Minerals Ltd.	QR	P, U, C	southeast of Quesnel	Au
Taseko Mines Limited	Gibraltar	P, C	north of Williams Lake	Cu, Mo
Thompson Creek Mining Limited	Endako	P, C	Fraser Lake	Mo
Breakwater Resources Ltd.	Myra Falls	U, C	Buttle Lake	Zn, Cu, Au, Ag
Northgate Minerals Corporation	Kemess	P, C	Smithers	Au, Cu
Imperial Metals Corporation	Huckleberry	P, C	Houston	Cu, Mo, Au
Cusac Gold Mines Ltd.	Table Mountain	U	Cassiar	Au
Barrick Gold Corporation	Eskay Creek	U, C	Smithers	Au, Ag
Georgia-Pacific Canada, Inc.	4J	P	Canal Flats	Gypsum
Baymag Inc.	Mount Brussilof	P	Mount Brussilof	Magnesite (fused), magnesia (products)
CertainTeed Gypsum Canada, Inc.	Elkhorn	P	Windermere	Gypsum
Imasco Minerals Inc.	Crawford Bay	U	Crawford Bay	Dolomite, limestone
Heemskirk Canada Limited	Moberly	P	Golden	Silica
Imasco Minerals Inc.	Lost Creek	U	Lost Creek	Limestone
Mighty White Dolomite Ltd.	Rock Creek	P, Plant	Rock Creek	Dolomite
Lafarge Canada Inc.	Harper Ranch	P, Plant	Kamloops	Limestone

ANNEX 1: PRODUCING MINES IN CANADA, 2007 *(continued)*

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Heemskirk Canada Limited	Bromley Creek/Zeo	P	Bromley Creek	Zeolite
Absorbent Products Ltd.	Bud	P	Princeton	Calcium, clay
Absorbent Products Ltd.	Red Lake	P	Red Lake	Diatomite, bentonite, leonardite
Industrial Mineral Processors	Z-2	P	Cache Creek	Zeolite
Graymont Inc.	Pavilion Lake	P, Plant	Pavilion Lake	Limestone, lime
Lightweight Advanced Volcanic Aggregates Inc.	Mount Meager	P	Mount Meager	Pumice
Ash Grove Cement Company	Blubber Bay	P	Texada Island	Limestone
Texada Quarrying Ltd. (Lafarge Canada Inc.)	Gillies Bay	P	Texada Island	Limestone
Fireside Minerals Ltd.	Fireside	P	Fireside	Barite
Imasco Minerals Inc.	Benson Lake	P	Benson Lake	Limestone
Elk Valley Coal Corporation	Coal Mountain	P	Sparwood	Coal
Elk Valley Coal Corporation	Line Creek	P	Sparwood	Coal
Elk Valley Coal Corporation	Elkview	P	Sparwood	Coal
Elk Valley Coal Corporation	Fording River	P	Elkford	Coal
Elk Valley Coal Corporation	Greenhills	P	Sparwood	Coal
Northern Energy and Mining Inc.	Trend	P	Tumbler Ridge	Coal
Western Canadian Coal Corporation	Wolverine	P, U	Tumbler Ridge	Coal (metallurgical)
Western Canadian Coal Corporation	Brule	P	Tumbler Ridge	Coal
Pine Valley Mining Corporation	Willow Creek	P	Tumbler Ridge	Coal
Hillsborough Resources Limited	Quinsam	U	Campbell River	Coal
Yukon				
Sherwood Copper Corporation	Minto	P	Carmacks	Cu, Au
Northwest Territories				
North American Tungsten Corporation Ltd.	CanTung	U, C	Cantung	W
Diavik Diamond Mines Inc.	Diavik	P, U, Plant	Lac de Gras	Diamonds
BHP Billiton Diamonds Inc.	Ekati	P, Plant	Lac de Gras	Diamonds
De Beers Canada Inc.	Snap Lake	U, Plant	Snap Lake	Diamonds
Nunavut				
Tahera Diamond Corporation	Jericho	P, Plant	Carat Lake	Diamonds

P Open-Pit U Underground C Concentrator

Data compiled by the Minerals and Metals Sector and the National Energy Board

ANNEX 2: MINING ESTABLISHMENTS IN CANADA, BY MINERAL AND REGION, 2008

	NF	PE	NS	NB	PQ	ON	MB	SK	AB	BC	YT	NT	NV	TOTAL
Iron ore	2	–	–	–	2	–	–	–	–	–	–	–	–	**4**
Gold & silver ore	–	–	–	–	13	9	1	1	–	2	–	–	–	**26**
Lead-zinc ore	1	–	–	1	–	–	–	–	–	–	–	–	–	**2**
Nickel-copper ore	1	–	–	–	1	5	1	–	–	–	–	–	–	**8**
Copper, copper-zinc ore	1	–	–	–	4	1	1	–	–	5	1	–	–	**13**
Molybdenum	–	–	–	–	–	–	–	–	–	2	–	–	–	**2**
Uranium	–	–	–	–	–	–	–	3	–	–	–	–	–	**3**
Other metals	–	–	–	–	2	1	1	–	–	–	–	1	–	**5**
TOTAL METALS	**5**	**0**	**0**	**1**	**22**	**16**	**4**	**4**	**0**	**9**	**1**	**1**	**0**	**63**
Chrysotile	–	–	–	–	2	–	–	–	–	–	–	–	–	**2**
Diamonds	–	–	–	–	–	–	–	–	–	–	–	3	1	**4**
Gypsum	–	–	4	–	–	–	1	–	–	2	–	–	–	**7**
Peat	1	1	1	21	34	–	4	1	5	1	–	–	–	**69**
Potash	–	–	–	1	–	–	–	9	–	–	–	–	–	**10**
Salt	–	–	2	–	1	4	–	2	1	–	–	–	–	**10**
Sand and gravel	3	–	11	8	58	183	15	13	59	33	1	–	–	**384**
Stone	6	–	11	8	73	77	6	–	3	11	–	–	–	**195**
Shale, clay and other refractory minerals	–	–	1	–	3	2	–	1	2	–	–	–	–	**9**
Other non-metals	–	–	1	–	3	3	–	2	1	3	–	–	–	**13**
TOTAL NON-METALS	**10**	**1**	**31**	**38**	**174**	**269**	**26**	**28**	**71**	**50**	**1**	**3**	**1**	**703**

– Nil

Sources: Natural Resources Canada; Statistics Canada

ANNEX 3: CANADIAN PRODUCTION OF LEADING MINERALS, BY REGION, 2007

	NICKEL		COPPER		POTASH (K20)		COAL		URANIUM	
	TONNES	$000	TONNES	$000	KILO-TONNES	$000	KILO-TONNES	$000	TONNES	$000
Newfoundland	72,881	2,943,866	60,680	476,522	–	–	–	–	–	–
Prince Edward Island	–	–	–	–	–	–	–	–	–	–
Nova Scotia	–	–	–	–	–	–	x	x	–	–
New Brunswick	–	–	8,906	69,937	x	x	x	x	–	–
Quebec	24,622	994,571	21,303	167,290	–	–	–	–	–	–
Ontario	114,026	4,605,871	178,673	1,403,120	–	–	–	–	–	–
Manitoba	33,617	1,357,875	55,517	435,973	–	–	–	–	–	–
Saskatchewan	–	–	–	–	x	x	10,542	x	9,098	2,522,674
Alberta	–	–	–	–	–	–	32,807	x	–	–
British Columbia	–	–	252,177	1,980,343	–	–	26,046	1,964,626	–	–
Yukon	–	–	–	–	–	–	–	–	–	–
Northwest Territories	–	–	–	–	–	–	–	–	–	–
Nunavut	–	–	–	–	–	–	–	–	–	–
Canada	**245,146**	**9,902,183**	**577,255**	**4,533,185**	**11,426**	**3,142,349**	**69,541**	**2,760,980**	**9,098**	**2,522,674**

	IRON ORE		GOLD		ZINC		CEMENT		DIAMONDS	
	KILO-TONNES	$000	KILO-GRAMS	$000	TONNES	$000	KILO-TONNES	$000	CARATS	$000
Newfoundland	18,436	1,401,710	268	6,358	15,678	55,985	–	–	–	–
Prince Edward Island	–	–	–	–	–	–	–	–	–	–
Nova Scotia	–	–	–	–	–	–	x	x	–	–
New Brunswick	–	–	230	5,463	244,251	872,219	–	–	–	–
Quebec	14,647	x	27,354	649,163	104,777	374,160	3,129	382,008	–	–
Ontario	–	–	53,034	1,258,597	84,019	300,032	5,993	650,465	–	–
Manitoba	–	–	3,738	88,716	105,602	377,104	–	–	–	–
Saskatchewan	–	–	1,391	33,014	–	–	–	–	–	–
Alberta	–	–	53	1,247	–	–	x	x	–	–
British Columbia	75	x	12,101	287,174	30,355	108,398	2,679	342,932	–	–
Yukon	–	–	1,988	47,189	–	–	–	–	–	–
Northwest Territories	–	–	–	–	–	–	–	–	16,638	1,412,230
Nunavut	–	–	–	–	–	–	–	–	370	32,431
Canada	**33,158**	**2,512,050**	**100,157**	**2,376,922**	**584,682**	**2 ,087,899**	**14,738**	**1,802,377**	**17,008**	**1,444,661**

p Preliminary x Confidential – Nil

Sources: Natural Resources Canada; Statistics Canada

ANNEX 4: CANADA'S WORLD ROLE AS A PRODUCER OF MINERALS, 2007

			RANK OF FIVE LEADING COUNTRIES				
		WORLD	1	2	3	4	5
			Canada	Australia	Kazakhstan	Niger	Russia
Uranium (metal content)	t	3,512	**9,862**	7,606	5,279	3,434	3,262
(mine production)	% of world total		**25.0**	19.2	13.4	8.7	8.3
			Canada	Russia	Belarus	Germany	Israel
Potash (K2O equivalent)	000 t	30,000	**10,200**	5,300	4,000	3,660	2,100
(mine production)	% of world total		**34.0**	17.7	13.3	12.2	7.0
			Russia	**Canada**	Australia	Indonesia	New Caledonia
Nickel (mine production)	000 t	1,494	300	**234**	185	150	103
	% of world total		20.1	**15.6**	12.4	10.0	6.9
			Congo, D.R.	Australia	**Canada**	Russia	Zambia
Cobalt (mine production)	t	60,748	22,000	7,000	**6,976**	4,759	4,556
	% of world total		36.2	11.5	**11.5**	7.8	7.5
			China, P.R.	U.S.A.	**Canada**	Russia	Israel
Magnesium (metal)	000 t	803	526	113	**65**	35	25
	% of world total		65.5	14.1	**8.1**	4.4	3.1
			Australia	South Africa	**Canada**	China, P.R.	Norway
Titanium concentrate	000 t	5,000	1,210	893	**780**	475	381
(Ilmenite)	% of world total		24.2	17.9	**15.6**	9.5	7.6
			South Africa	Russia	**Canada**	U.S.A.	Zimbabwe
Platinum group metals	kg	512,993	307,000	143,000	**22,878**	18,693	10,000
(metal content)	% of world total		59.8	27.9	**4.5**	3.6	1.9
			China, P.R.	Russia	**Canada**	U.S.A.	Australia
Aluminum (primary metal)	000 t	33,945	9,349	3,718	**3,051**	2,283	1,932
	% of world total		27.5	11.0	**9.0**	6.7	5.7
			U.S.A.	Iran	Spain	**Canada**	Mexico/China, P.R.
Gypsum (mine production)	000 t	119,000	21,200	13,000	11,500	**9,450**	7,400
	% of world total		17.8	10.9	9.7	**7.9**	6.2
			Russia	China, P.R.	Kazakhstan	**Canada**	Brazil
Chrysotile (asbestos)							
(mine production)	000 t	2,300	925	400	350	**240**	236
	% of world total		40.2	17.4	15.2	**10.4**	10.3
			China, P.R.	South Korea	Japan	**Canada**	Kazakhstan
Cadmium (metal)	t	21,162	4,600	3,320	2,286	**2,094**	2,000
	% of world total		21.7	15.7	10.8	**9.9**	9.5
			China, P.R.	Australia	Peru	U.S.A.	**Canada**
Zinc (mine production)	000 t	10,694	2,996	1,362	1,202	727	**638**
	% of world total		28.0	12.7	11.2	6.8	**6.0**
			U.S.A.	China, P.R.	Chile	Peru	**Canada**
Molybdenum (Mo content)	t	178,342	60,500	41,000	38,700	17,500	**7,842**
(mine production)	% of world total		33.9	23.0	21.7	9.8	**4.4**
			China, P.R.	U.S.A.	Germany	India	**Canada**
Salt (mine production)	000 t	240,000	48,000	46,000	18,600	16,000	**15,000**
	% of world total		20.0	19.2	7.8	6.7	**6.3**
			China, P.R.	Australia	U.S.A.	Peru	Mexico
Lead (mine production)[1]	000 t	3,543	1,251	686	453	313	134
	% of world total		35.3	19.4	12.8	8.8	3.8
			South Africa	China, P.R.	Australia	U.S.A.	Peru
Gold (mine production)[2]	t	2,344	272	247	247	242	203
	% of world total		11.6	10.5	10.5	10.3	8.7
			Peru	Mexico	China, P.R.	Australia	Chile
Silver[3]	t	19,961	3,471	2,700	2,600	1,727	1,607
	% of world total		17.4	13.5	13.0	8.7	8.1
			Chile	U.S.A.	Peru	China, P.R.	Australia
Copper (mine production)[4]	000 t	15,064	5,361	1,220	1,050	915	875
	% of world total		35.6	8.1	7.0	6.1	5.8

1. Canada ranked 6th 2. Canada ranked 7th 3. Canada ranked 9th 4. Canada ranked 8th

Sources: Natural Resources Canada, from World Nonferrous Statistics and the Canadian Minerals Yearbook; U.S. Geological Survey (USGS)

ANNEX 5: MINERAL PRODUCTION OF CANADA, 2005–2007

	UNIT	2005 QUANTITY	2005 ($000)	2006 QUANTITY	2006 ($000)	2007[p] QUANTITY	2007[p] ($000)
Metals							
Antimony	t	66	283	226	1,344	203	1,231
Bismuth	t	141	1,423	177	2,113	122	4,011
Cadmium	t	634	2,533	502	1,698	388	3,197
Calcium	t	x	x	–	–	–	–
Cesium	t	x	x	x	x	x	x
Cobalt	t	2,391	101,952	2,899	124,767	3,211	223,181
Columbium (niobium)	t	3,710	x	4,177	x	4,313	x
Copper	t	577,304	2,572,467	586,489	4,470,218	577,255	4,533,185
Gold	kg	119 ,549	2,071,787	103,513	2,280,913	100,157	2,376,922
Ilmenite	kt	x	x	x	x	x	x
Indium	kg	x	x	x	x	x	x
Iron ore	kt	30,387	2,339,451	33,543	2,530,298	33,158	2,512,050
Iron, remelt	kt	x	x	x	x	x	x
Lead	t	72,828	86,083	79,171	115,748	68,735	199,400
Lithium	t	x	x	x	x	x	x
Magnesium	t	x	x	–	–	–	–
Molybdenum	t	7,667	x	7,117	x	6,812	x
Nickel	t	192,855	3,510,339	224,565	6,165,883	245,146	9 ,902,183
Platinum group	kg	22,709	405,356	23,170	498,187	23,042	542,768
Selenium	t	107	14,131	106	6,262	62	4,672
Silver	t	1,063	303,991	970	409,211	831	380 647
Tantalum	t	77	6,177	68	4,650	55	4,500
Tellurium	t	11	675	10	729	8	721
Tungsten	t	484	8,155	2,500	64,497	2,700	71,875
Uranium	t	12,597	1,131,568	9,781	1,430,561	9,098	2,522,674
Zinc	t	618,844	1,035,944	601,481	2,182,776	584,682	2,087,899
Total Metals			**14,582,608**		**21,056,639**		**26,344,873**
Non-metals							
Barite	kt	23	4,825	20	4,805	7	2,335
Carbonatite	kt	x	x	x	x	x	x
Cement	kt	14,656	1,661,314	14,586	1,673,192	14,738	1,802,377
Chrysotile	kt	x	x	x	x	x	x
Clay products	kt	...	232,691	...	223,779	...	209,220
Diamonds	000 carats	12,314	1,762,053	13,278	1,598,613	17,008	1,444,661
Gemstones	t	78	3,492	68	3,806	60	4,282
Graphite	kt	x	x	x	x	x	x
Gypsum	kt	8,570	113,928	9,036	127,006	7,638	112,054
Lime	kt	2,289	261,848	2,189	267,015	2,138	274,048
Magnesitic dolomite	kt	x	x	x	x	x	x
Marl	kt	x	x	x	x	x	x
Mica	kt	x	x	x	x	x	x
Nepheline syenite	kt	745	63,286	734	60,665	765	66,997
Peat	kt	1,304	219,107	1,217	219,675	1,187	237,048
Phosphate	kt	x	x	x	x	x	x
Potash (K2O)	kt	10,140	2,437,488	8,518	2,240,660	11,426	3,142,349
Potassium sulphate	kt	x	x	x	x	x	x
Pumice	kt	x	x	x	x	x	x
Quartz	kt	1,807	59,707	2,146	67,495	2,263	78,428
Salt	kt	13,463	432,020	14,460	460,722	11,818	426,645
Sand and gravel	kt	243,440	1,180,266	238,515	1 275,682	234,658	1,316,480
Soapstone, talc, pyrophyllite, etc.	kt	70	26,228	72	24,206	67	23,544
Sodium sulphate	kt	x	x	x	x	x	x
Stone	kt	141,275	1,215,037	153,897	1 372,907	145,825	1,333,067
Sulphur, elemental	kt	7,757	234,205	7,762	126,406	7,603	180,769

ANNEX 5: MINERAL PRODUCTION OF CANADA, 2005–2007 *(continued)*

	UNIT	2005 QUANTITY	2005 ($000)	2006 QUANTITY	2006 ($000)	2007[p] QUANTITY	2007[p] ($000)
Sulphur, in smelter gas	kt	653	36,018	676	34,283	632	25,880
Titanium dioxide	kt	x	x	x	x	x	x
Zeolite	kt	x	x	x	x	x	x
Total Non-metals			**10,485,489**		**10,290,286**		**11,269,529**
Fuels							
Coal	kt	65,345	2,329,021	65,895	2,886,182	69,541	2,760,980
Total Fuels			**2,329,021**		**2,886,182**		**2,760,980**
Total Mining			**27,397,119**		**34,233,107**		**40,375,382**

p Preliminary x Confidential – Nil … Not available

Notes: Confidential values are included in totals. This table excludes petroleum and natural gas.

Sources: Natural Resources Canada, from World Nonferrous Statistics and the Canadian Minerals Yearbook; U.S. Geological Survey (USGS)

ANNEX 6: CANADIAN RESERVES OF SELECTED MAJOR METALS, 1977–2006

Metal Contained in Proven and Probable Mineable Ore[1] in Operating Mines[2] and Deposits Committed to Production

YEAR	COPPER (000 T)	NICKEL (000 T)	LEAD (000 T)	ZINC (000 T)	MOLYBDENUM (000 T)	SILVER (T)	GOLD[3] (T)
1977	16,914	7,749	8,954	26,953	369	30,991	493
1978	16,184	7,843	8,930	26,721	464	30,995	505
1979	16,721	7,947	8,992	26,581	549	32,124	575
1980	16,714	8,348	9,637	27,742	551	33,804	826
1981	15,511	7,781	9,380	26,833	505	32,092	851
1982	16,889	7,546	9,139	26,216	469	31,204	833
1983	16,214	7,393	9,081	26,313	442	31,425	1,172
1984	15,530	7,191	9,180	26,000	361	30,757	1,208
1985	14,201	7,041	8,503	24,553	331	29,442	1,373
1986	12,918	6,780	7,599	22,936	312	25,914	1,507
1987	12,927	6,562	7,129	21,471	231	25,103	1,705
1988	12,485	6,286	6,811	20,710	208	26,122	1,801
1989	12,082	6,092	6,717	20,479	207	24,393	1,645
1990	11,261	5,776	5,643	17,847	198	20,102	1,542
1991	11,040	5,691	4,957	16,038	186	17,859	1,433
1992	10,755	5,605	4,328	14,584	163	15,974	1,345
1993	9,740	5,409	4,149	14,206	161	15,576	1,333
1994	9,533	5,334	3,861	14,514	148	19,146	1,513
1995	9,250	5,832	3,660	14,712	129	19,073	1,540
1996	9,667	5,623	3,450	13,660	144	18,911	1,724
1997	9,032	5,122	2,344	10,588	149	16,697	1,510
1998	8,402	5,683	1,845	10,159	121	15,738	1,415
1999	7,761	4,983	1,586	10,210	119	15,368	1,326
2000r	7,419	4,782	1,315	8,876	97	13,919	1,142
2001	6,666	4,335	970	7,808	95	12,593	1,070
2002	6,774	4,920	872	6,871	82	11,230	1,023
2003	6,037	4,303	749	6,251	78	9,245	1,009
2004	5,546	3,846	667	5,299	80	6,568[r]	801
2005	6,589	3,960	552	5,063	95	6,684[r]	965
2006	6,923	3,940	737	6,055	101	6,873	1,032

r Revised

Note: One tonne (t) = 1.1023113 short tons = 32 150.746 troy oz.

1. No allowance is made for losses in milling, smelting and refining. Excludes material classified as "resources."
2. Includes metal in mines where production has been suspended temporarily.
3. Excludes metal in placer deposits because reserves data are generally unavailable.

Source: Natural Resources Canada, based on company reports and the federal-provincial/territorial survey of mines and concentrators

ANNEX 7: AVERAGE WEEKLY EARNINGS IN THE CANADIAN MINERAL INDUSTRY[1], 1997–2007

	NUMBER OF EMPLOYEES[2] (000)	AVERAGE WEEKLY EARNINGS ($)	TOTAL WEEKLY WAGES FOR GROUP ($)
Metal Mines			
1997	35.51	1,053.23	37,401,250
1998	32.35	1,127.77	36,487,870
1999	29.56	1,123.25	33,197,650
2000	29.47	1,168.98	34,447,500
2001	25.63	1,168.94	29,963,440
2002	22.42[r]	1,165.58[r]	26,128,807
2003	21.90[r]	1,165.53[r]	25,527,438
2004	21.40[r]	1,160.98[r]	24,848,455
2005	20.76[r]	1,154.92[r]	23,973,829
2006	21.14[r]	1,194.34[r]	25,244,765
2007	**22.98**	**1,284.18**	**29,504,036**
Coal Mines			
1997	9.73	1,045.80	10,175,630
1998	8.30	1,138.11	9,450,870
1999	7.81	1,126.95	8,803,730
2000	7.20	1,204.74	8,674,128
2001	6.03	1,232.08	7,429,442
2002	5.70	1,217.15	6,937,755
2003	4.84[r]	1,273.25[r]	6,163,803
2004	4.54[r]	1,383.07[r]	6,283,287
2005	5.04[r]	1,378.43[r]	6,943,152
2006	5.34[r]	1,390.34[r]	7,418,854
2007	**5.84**	**1,426.94**	**8,339,037**
Non-metal Mines			
1997	19.10	873.86	16,686,360
1998	19.43	893.33	17,358,300
1999	19.99	882.64	17,641,330
2000	20.03	944.20	18,913,270
2001	19.52[r]	943.65[r]	18,417,217
2002	19.32[r]	954.37[r]	18,434,611
2003	19.88[r]	966.16[r]	19,202,430
2004	19.62[r]	992.71[r]	19,477,963
2005	19.80[r]	986.92	19,540,029
2006	20.79[r]	996.43	20,714,783
2007	**22.49**	**1,087.51**	**24,453,750**
Smelting & Refining[3]			
1997	20.91	1,019.77	21,323,391
1998	21.27	1,015.67	21,603,301
1999	21.42	1,033.71	22,142,068
2000	23.09	1,035.31	23,905,308
2001	19.60	1,056.76	20,710,382
2002	16.70	1,089.41	18,193,147
2003	14.72	1,116.15	16,431,960
2004	14.30	1,111.26	15,888,795
2005	14.43	1,127.19	16,263,097
2006	16.22	1,104.95	17,923,394
2007	**16.85**	**1,208.31**	**20,360,024**

ANNEX 7: AVERAGE WEEKLY EARNINGS IN THE CANADIAN MINERAL INDUSTRY[1], 1997–2007 *(continued)*

	NUMBER OF EMPLOYEES[2] (000)	AVERAGE WEEKLY EARNINGS ($)	TOTAL WEEKLY WAGES FOR GROUP ($)
Total			
1997	85.25	1,003.95	85,586,631
1998	81.35	1,043.64	84,900,341
1999	78.78	1,038.14	81,784,778
2000	79.79	1,077.08	85,940,206
2001	70.78[r]	1,081.18[r]	76,520,482
2002	64.13[r]	1,086.72[r]	69,694,320
2003	61.34[r]	1,097.58[r]	67,325,632
2004	59.87[r]	1,110.81[r]	66,498,500
2005	60.02[r]	1,111.59[r]	66,720,108
2006	63.48	1,123.16[r]	71,301,796
2007	**68.16**	**1,212.78**	**82,656,846**

r Revised

1. Excludes natural gas & petroleum.
2. Number of employees is based on the North American Industry Classification System (NAICS).
3. Non-ferrous metal production and processing (excluding aluminum).

Source: Statistics Canada – Annual Estimates of Employment, Earnings and Hours 72F0023XCB

ANNEX 8: AVERAGE WEEKLY EARNINGS, BY CANADIAN INDUSTRIAL SECTOR, 1994–2007

($)	FORESTRY	MINING[1]	MANUFACTURING	CONSTRUCTION	FINANCE & INSURANCE
1994	700.01	938.13	705.67	733.95	701.24
1995	697.64	980.13	712.75	748.83	719.52
1996	745.69	1,007.19	733.82	767.56	769.49
1997	786.46	1,003.95	752.42	786.91	801.64
1998	766.36	1,043.64	770.92	781.44	820.45
1999	773.42	1,038.14	782.43	782.63	824.82
2000	810.15	1,077.08	796.89	808.06	845.54
2001	827.76[r]	1,081.18[r]	809.6[r]	801.97	x[r]
2002	852.49[r]	1,086.72[r]	834.14[r]	810.86	849.81[r]
2003	855.94[r]	1,097.58[r]	846.09[r]	831.48[r]	876.37[r]
2004	891.16[r]	1,110.81[r]	862.57[r]	841.18[r]	897.76[r]
2005	916.51[r]	1,111.59[r]	886.82[r]	872.70[r]	932.91[r]
2006	959.3[r]	1,123.16[r]	906.09[r]	895.09[r]	962.04[r]
2007	**975.97**	**1,212.78**	**938.14**	**935.81**	**998.11**

r Revised

x confidential

1. Excludes crude petroleum and natural gas and includes quarries and sand pits and nonferrous metal production and processing.

Source: Statistics Canada, Labour Division

ANNEX 9: STRIKES AND LOCKOUTS, BY CANADIAN SECTOR, 2005–2007

	2005			2006			2007[p]		
	STRIKES AND LOCKOUTS	WORKERS INVOLVED	DURATION IN PERSON-DAYS	STRIKES AND LOCKOUTS	WORKERS INVOLVED	DURATION IN PERSON-DAYS	STRIKES AND LOCKOUTS	WORKERS INVOLVED	DURATION IN PERSON-DAYS
Agriculture	1	44	400	–	–	–	–	–	–
Forestry	–	–	–	1	198	29,110	–	–	–
Fishing & trapping	–	–	–	–	–	–	–	–	–
Mining (except oil and gas)	**4**	**1,695**	**61,050**	**3**	**857**	**45,400**	**6**	**1,425**	**45,580**
Utilities	1	850	60,260	–	–	–	3	187	3,120
Manufacturing	65	12,449	454,670	61	10,978	339,303	46	12,068	664,855
Construction	6	158	11,320	1	18	2,550	16	16,329	222,282
Transportation & warehousing	12	1,527	40,160	13	9,510	33,780	24	10,946	170,652
Wholesale and retail	29	6,768	234,620	14	977	43,250	10	752	18,820
Finance	22	6,607	36,250	6	265	12,540	7	462	13,228
Education, health & social services	65	81,223	655,960	19	11,475	160,880	50	12,663	188,785
Entertainment & hospitality	42	26,099	440,270	18	3,024	77,490	28	3,171	87,980
Public administration	8	40,983	608,440	11	4,793	31,370	10	7,006	287,480
Information & cultural industries	5	20,646	1,545,730	4	219	16,080	7	1,876	105,610
Total, All Industries	**260**	**199,049**	**4,149,130**	**151**	**42,314**	**791,753**	**207**	**66,885**	**1,808,392**

– Nil p Preliminary

Source: Human Resources Development Canada; Workplace Information Directorate

ANNEX 10: STRIKES AND LOCKOUTS IN CANADIAN MINING AND MINERAL MANUFACTURING INDUSTRY, 2005–2007

	2005			2006			2007[p]		
	STRIKES AND LOCKOUTS	WORKERS INVOLVED	DURATION IN PERSON-DAYS	STRIKES AND LOCKOUTS	WORKERS INVOLVED	DURATION IN PERSON-DAYS	STRIKES AND LOCKOUTS	WORKERS INVOLVED	DURATION IN PERSON-DAYS
Mines	**4**	**2,545**	**121,310**	**3**	**857**	**45,400**	**6**	**1,425**	**45,580**
Metals	3	1,683	60,190	1	117	5,240	4	1,305	40,910
Non-metals	1	12	860	2	740	40,160	–	–	–
Mineral fuels	–	–	–	–	–	–	–	–	–
Support activities for mining	–	–	–	–	–	–	2	120	4,670
Mineral Manufacturing	**14**	**2,621**	**149,080**	**11**	**1,416**	**32,862**	**9**	**1,341**	**61,700**
Primary metals	11	2,464	135,980	7	1,099	29,800	6	1,137	48,400
Non-metallic mineral products	3	157	13,100	4	317	3,062	3	204	13,300

– Nil p Preliminary

Source: Human Resources Development Canada; Workplace Information Directorate

ANNEX 11: EXPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND DESTINATION, 2007

($000)	U.S.A.	EUROPEAN UNION	JAPAN	MEXICO	OTHER	TOTAL
METALS						
Aluminum	10,272,522	918,817	521,156	122,529	552,487	12,387,511
Antimony	417	117	–	–	143	677
Barium	59	–	–	–	–	59
Beryllium	–	–	–	–	106	106
Bismuth	648	932	–	–	3,456	5,036
Cadmium	1,008	9,152	210	–	2,333	12,703
Calcium metals	2,595	63	60	…	1,363	4,081
Chromium	13,720	180	–	14	60	13,974
Cobalt	81,872	113,785	121,962	107	247,061	564,787
Copper	3,995,896	807,574	715,375	2,762	973,453	6,495,060
Gallium	–	–	–	–	–	–
Germanium	–	–	–	–	–	–
Gold	2,423,015	2,950,524	50,798	113	698,176	6,122,626
Hafnium	–	–	–	–	–	–
Indium	–	–	–	–	–	–
Iron and steel	12,501,075	507,281	41,335	354,825	1,123,504	14,528,020
Iron ore	337,472	882,020	113,007	–	611,354	1,943,853
Lead	516,350	65,501	3,278	1,593	41,514	628,236
Lithium	68	94	6,501	69	22	6,754
Magnesium and magnesium compounds	98,782	2,103	1,229	69	2,451	104,634
Manganese	39,527	366	–	2	328	40,223
Mercury	539	1	–	–	17	557
Molybdenum	139,805	151,208	138,992	56,053	21,386	507,444
Nickel	2,378,776	2,777,368	360,840	54	5,180,717	10,697,755
Niobium	19,571	57,772	6,705	–	22,456	106,504
Platinum group metals	93,902	40,103	253	112	2,252	136,622
Rare earth metals	256	41	–	…	52	349
Rhenium	–	–	–	–	–	–
Selenium	10,533	6,136	–	–	4,723	21,392
Silicon	95,187	33,601	315	–	18,139	147,242
Silver	566,074	127,845	42,700	20	35,933	772,572
Strontium	–	–	–	–	–	–
Tantalum	148	25	–	–	45	218
Tellurium	2,062	401	145	–	1,677	4,285
Thallium	–	–	–	–	–	–
Tin	31,559	238	412	20	284	32,513
Titanium metal	47,295	3,145	24	56	7,313	57,833
Tungsten	23,423	5,471	6	16	39,789	68,705
Uranium and thorium	568,326	3,388,821	34,022	3,043	96,147	4,090,359
Vanadium	109,965	74	–	–	1	110,040
Zinc	2,203,493	295,773	62,318	429	185,144	2,747,157
Zirconium	3,321	4,960	630	7	12,379	21,297
Other metals	4,354,085	1,101,807	61,259	70,818	673,091	6,261,060
Total Metals	**40,933,346**	**14,253,299**	**2,283,532**	**612,711**	**10,559,356**	**68,642,244**
NON-METALS						
Abrasives	232,767	16,096	11,701	1,051	19,540	281,155
Arsenic	–	–	–	–	–	…
Barite and witherite	288	–	–	1	–	289
Boron	1,458	184	–	9	834	2,485
Bromine	206	6	–	…	–	212
Calcium (industrial minerals)	–	–	–	–	–	–
Cement	754,283	18,044	498	257	12,053	785,135
Chlorine and chlorine compounds	214,837	9,762	1	1	1,772	226,373

ANNEX 11: EXPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND DESTINATION, 2007 *(continued)*

($000)	U.S.A.	EUROPEAN UNION	JAPAN	MEXICO	OTHER	TOTAL
NON-METALS *(continued)*						
Chrysotile (asbestos)	19,771	844	1,203	3,856	78,098	103,772
Clay and clay products	68,374	24,042	206	882	6,505	100,009
Diamonds	139,114	1,823,185	212	12,961	46,647	2,022,119
Dolomite	22,918	–	–	–	8,738	31,656
Feldspar	267	11	–	–	1	279
Fluorspar	67,948	294	…	…	2,344	70,586
Glass and glassware products	893,550	59,239	2,329	1,368	40,328	996,814
Granite	51,203	921	302	–	8,906	61,332
Graphite	113,970	9,187	261	3,249	40,955	167,622
Gypsum	180,582	3,183	75	10	5,630	189,480
Iodine	8,269	1,213	–	…	168	9,650
Lime	41,064	–	–	–	46	41,110
Limestone flux and other limestone	16,680	45	20	–	2,327	19,072
Marble, travertine and other calcareous stones	40,556	535	3	–	1,191	42,285
Mica	6,314	913	2,538	75	1,453	11,293
Mineral pigments	155,740	5,219	2,834	1,679	13,693	179,165
Nepheline syenite	53,122	12,350	1,031	–	4,130	70,633
Nitrogen	1,471,758	1,821	37	2	20,316	1,493,934
Olivine	–	–	–	–	–	–
Pearls	4,539	16	11	–	40	4,606
Peat	271,977	1,725	13,619	946	20,291	308,558
Perlite	–	–	–	–	–	–
Phosphate and phosphate compounds	19,880	161	424	30	2,457	22,952
Potash and potassium compounds	1,712,447	14,519	1,543	21,389	1,268,737	3,018,635
Salt and sodium compounds	406,435	7,000	32,634	1	20,674	466,744
Sand and gravel	57,529	182	12	–	4,419	62,142
Sandstone	329	–	–	–	25	354
Silica and silica compounds	59,771	1,800	212	525	2,307	64,615
Slate	10,106	21,139	9	–	377	31,631
Sulphur and sulphur compounds	175,653	147	35	5,380	462,565	643,780
Talc, soapstone and pyrophyllite	24,595	1	–	1	59	24,656
Titanium oxides	193,401	2,166	20	18	1,388	196,993
Vermiculite	–	–	–	–	–	–
Other non-metals	402,856	37,591	1,842	4,899	35,229	482,417
Other structurals	173,354	5,846	363	759	15,097	195,419
Total Non-metals	**8,067,911**	**2,079,387**	**73,975**	**59,349**	**2,149,340**	**12,429,962**
FUELS						
Coal	341,983	741,837	970,913	21,466	1,053,888	3,130,087
Coke	43,841	–	–	…	3	43,844
Total Coal and Coke	**385,824**	**741,837**	**970 ,913**	**21,466**	**1,053,891**	**3,173,931**
Total Mining Exports	**49,387,081**	**17,074,523**	**3,328,420**	**693,527**	**13,762,587**	**84,246,137**

– Nil … Amount too small to be expressed

Source: Natural Resources Canada; Statistics Canada, May 2008

ANNEX 12: IMPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND ORIGIN, 2007

($000)	U.S.A.	EUROPEAN UNION	JAPAN	MEXICO	OTHER	TOTAL
METALS						
Aluminum	3,633,714	251,014	8,551	23,401	2,033,498	5,950,178
Antimony	610	654	15	2,703	8,277	12,259
Barium	873	4,440	761	264	3,574	9,912
Beryllium	645	...	–	–	33	678
Bismuth	1,195	516	–	–	782	2,493
Cadmium	199	64	...	17	492	772
Calcium metals	40,069	2,154	59	3	1,494	43,779
Chromium	14,347	5,970	42	909	38,864	60,132
Cobalt	25,134	8,546	7,044	–	31,287	72,011
Copper	2,224,709	190,991	6,008	50,731	1,238,368	3,710,807
Gallium	30	43	–	–	1	74
Germanium	3,720	5,539	...	...	1,288	10,547
Gold	1,704,797	154,166	57	153,785	2,496,784	4,509,589
Hafnium	13	3	–	–	–	16
Indium	3,229	24	7	–	1,066	4,326
Iron and steel	13,078,649	2,185,918	647,029	662,198	4,061,976	20,635,770
Iron ore	623,283	214	...	...	1,084	624,581
Lead	398,788	36,082	7,163	22,938	72,018	536,989
Lithium	27,388	6,667	14,267	221	24,143	72,686
Magnesium and magnesium compounds	53,057	14,657	2,229	496	116,218	186,657
Manganese	160,012	6,836	1,247	5,887	200,125	374,107
Mercury	3,440	167	3	...	915	4,525
Molybdenum	219,218	1,013	55	766	42,665	263,717
Nickel	376,599	207,982	9,506	472	402,131	996,690
Niobium	4,618	533	–	–	25,336	30,487
Platinum group metals	197,991	67,273	56	2	152,909	418,231
Rare earth metals	633	1,875	81	–	554	3,143
Rhenium	17	1	–	–	–	18
Selenium	713	7,497	675	–	1,115	10,000
Silicon	23,516	325	1	–	77,863	101,705
Silver	273,342	44,103	535	11,385	193,997	523,362
Strontium	120	367	–	269	39	795
Tantalum	949	57	...	–	40	1,046
Tellurium	1	6,367	1,251	–	193	7,812
Thallium	...	–	–	–	–	...
Tin	24,295	2,397	460	1,491	52,469	81,112
Titanium metal	98,469	19,240	3,894	567	30,275	152,445
Tungsten	12,687	4,611	41	–	3,107	20,446
Uranium and thorium	73,951	21,070	101	–	501,030	596,152
Vanadium	6,098	1,421	–	–	21,937	29,456
Zinc	662,606	19,508	185	10,475	268,114	960,888
Zirconium	51,279	2,830	622	...	4,534	59,265
Other metals	6,394,453	1,305,369	243,473	1,065,108	2,569,109	11,577,512
Total Metals	**30,419,456**	**4,588,504**	**955,418**	**2,014,088**	**14,679,704**	**52,657,170**
NON-METALS						
Abrasives	193,812	101,150	11,390	5,512	90,961	402,825
Arsenic	16	1	31	–	108	156
Barite and witherite	2,412	404	–	...	9,342	12,158
Boron	20,121	1,203	49	7	4,305	25,685
Bromine	5,064	4	...	–	82	5,150
Calcium (industrial minerals)	7,581	3	–	–	418	8,002
Cement	274,667	12,773	818	1,430	50,361	340,049
Chlorine and chlorine compounds	60,005	3,293	950	793	5,597	70,638
Chrysotile (asbestos)	80,653	2,818	4,511	3,483	20,632	112,097

ANNEX 12: IMPORTS OF MINERALS AND MINERAL PRODUCTS, BY COMMODITY AND ORIGIN, 2007 *(continued)*

($000)	U.S.A.	EUROPEAN UNION	JAPAN	MEXICO	OTHER	TOTAL
NON-METALS *(continued)*						
Clay and clay products	366,618	263,485	22,341	45,774	472,661	1,170,879
Diamonds	90,829	100,372	75	123	459,908	651,307
Dolomite	10,631	44	–	–	11	10,686
Feldspar	338	1	–	–	1	340
Fluorspar	17,858	6,200	157	9,548	47,456	81,219
Glass and glassware products	1,592,923	252,591	20,297	64,299	355,930	2,286,040
Granite	12,485	27,679	28	406	106,442	147,040
Graphite	243,306	66,832	32,329	3,056	68,453	413,976
Gypsum	116,728	636	4	1,671	500	119,539
Iodine	6,104	690	2,068	3	8,780	17,645
Lime	10,005	95	–	–	47	10,147
Limestone flux and other limestone	19,730	889	–	16	366	21,001
Marble, travertine and other calcareous stones	22,081	38,655	1	1,716	66,118	128,571
Mica	7,343	1,245	387	…	551	9,526
Mineral pigments	129,046	11,960	4,628	5,055	8,057	158,746
Nepheline syenite	140	–	–	–	–	140
Nitrogen	94,285	93,647	111	203	172,228	360,474
Olivine	659	–	–	–	7	666
Pearls	6,035	774	3,479	6,153	15,249	31,690
Peat	2,680	633	–	–	1,376	4,689
Perlite	12,486	2,197	–	17	3	14,703
Phosphate and phosphate compounds	371,975	6,515	298	503	29,131	408,422
Potash and potassium compounds	41,186	3,676	299	639	11,057	56,857
Salt and sodium compounds	288,697	22,314	7,596	6,977	110,765	436,349
Sand and gravel	16,430	171	…	32	772	17,405
Sandstone	3,155	59	–	–	1,912	5,126
Silica and silica compounds	109,771	17,793	3,601	463	12,623	144,251
Slate	1,911	254	–	7	14,308	16,480
Sulphur and sulphur compounds	22,683	782	10	201	288	23,964
Talc, soapstone and pyrophyllite	15,403	416	462	–	718	16,999
Titanium oxides	147,503	19,104	2,170	13,441	16,288	198,506
Vermiculite	5,180	721	–	–	3,206	9,107
Other non-metals	554,212	55,575	8,510	6,447	70,512	695,256
Other structurals	66,809	12,727	2,796	1,013	23,143	106,488
Total Non-metals	**5,051,556**	**1,130,381**	**129,396**	**178,988**	**2,260,673**	**8,750,994**
FUELS						
Coal	991,928	3,681	100	20	207,241	1,202,970
Coke	60,098	740	–	–	80,969	141,807
Total Coal and Coke	**1,052,026**	**4,421**	**100**	**20**	**288,210**	**1,344,777**
Total Mining Imports	**36,523,038**	**5,723,306**	**1,084,915**	**2,193,097**	**17,228,587**	**62,752,941**

– Nil … Amount too small to be expressed

Source: Natural Resources Canada; Statistics Canada, May 2008

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The Canadian Mining Industry at a Glance

	2003	2004	2005	2006	2007
Mining Industry GDP ($B)	39.0	39.5	40.0	40.0	41.9
Percentage of Total Canadian GDP (%)	3.9	3.8	3.8	3.7	3.4
Value of Mineral Production ($B)	20.1	24.3	27.4	34.2	40.4
Synthetic Crude Production Value ($B)	6.8	8.6	9.2	14.8	n.a.
Synthetic Crude Share of Total Crude (%)	20.2	21.1	18.7	23.3	n.a.
Synthetic Crude Production (M cubic m)	25.0	26.7	21.9	30.1	n.a.
Number of Mining Establishments	808	757	859	801	766
Mineral Extraction Employment (T)	46	45	46	47	51
Total Mining Industry Employment (T)	368	357	356	367	363
Average Employee Weekly Earnings ($)	1,098	1,111	1,111	1,123	1,213
Metal Prices – Copper (cents per pound)	81	129	168	309	322
Metal Prices – Gold ($ per ounce)	364	409	445	604	697
Mineral Exploration/Appraisal Spending ($M)	687	1,178	1,305	1,912	2,560
Mining Industry Capital Expenditures ($B)	4.8	7.2	7.4	8.3	9.2
Oil Sands Capital Expenditures ($B)	5.2	6.3	9.8	12.2	16.0
Mining Industry Payments to Governments ($B)	4.0	4.8	5.5	8.2	n.a.
Stock of Foreign Direct Investment ($B)	20.7	20.9	22.6	38.2	65.1
Stock of Canadian Direct Investment Abroad ($B)	43.1	44.5	47.7	61.5	54.2
Mineral and Mineral Products Exports ($B)	46.5	54.8	62.1	72.1	80.7
Percentage of Total Canadian Exports (%)	13.2	13.8	14.8	18.2	19.2
Mineral and Mineral Products Imports ($B)	45.4	52.4	56.7	62.0	62.9
Mining Industry Share of Rail Revenue Freight (%)	56	53	54	53	55
Mining Industry R&D ($M)	531	542	531	538	n.a.
Petroleum Industry R&D ($M)	354	343	309	334	n.a.

n.a. Not available at time of printing
B billion
M million
T thousand

The Mining Association of Canada
L'Association minière du Canada

350 Sparks Street
Suite 1105
Ottawa ON K1R 7S8

Telephone: 613-233-9391
Fax: 613-233-8897
Website: www.mining.ca