A REPORT ON THE STATE OF THE CANADIAN MINING INDUSTRY

FACTS + FIGURES 2010

The Mining Association of Canada | L'Association minière du Canada

ADVOCACY STEWARDSHIP COLLABORATION

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 industrial materials.

The Association's functions comprise advocacy, stewardship and collaboration: 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, mostly from 2009, though with some data also from 2010 and 2008. 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 expressed in Canadian dollars except where indicated otherwise.

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SUMMARY OF THE MINING INDUSTRY'S CONTRIBUTION, ISSUES AND RECOMMENDATIONS

Canada's mining industry is a major driver of Canadian prosperity, contributing $32 billion to GDP in 2009 and employing 306,000 workers in mineral extraction, processing and manufacturing. While the industry is important in remote communities, it also generates prosperity in our major cities. Toronto, Vancouver, Montreal, Edmonton, Calgary and Saskatoon all feature areas of global mining leadership. As well, there are over 3,200 companies who provide inputs to the industry, ranging from engineering services to drilling equipment. The industry paid around $5.5 billion in taxes and royalties to federal, provincial and territorial governments in 2009—down by half from the pre-recession levels of the previous year, though still a significant contribution. The Alberta, Saskatchewan, Newfoundland and Labrador, New Brunswick, Manitoba and British Columbia governments all typically derive a significant portion of their revenue from the mining industry.

Canada remained the top destination for global exploration in 2009, attracting 16% of world spending. The industry accounts for 19% of Canadian goods exports. A consequence of this global reach is that over half the freight revenues of Canada's railroads are generated by the mining industry. Canada also features world-leading mining finance expertise and mineral exploration capabilities. There are an estimated 1,000 Canadian exploration companies active in over 100 countries.

CANADA REMAINED THE TOP DESTINATION for global exploration in 2009, attracting 16% of world spending. The industry accounts for 19% of Canadian goods exports.

The industry places a high priority on corporate social responsibility (CSR) issues in Canada and abroad, as reflected by sector initiatives such as the Mining Association of Canada's (MAC) Towards Sustainable Mining program, and by company actions in developing countries such as helping to pay for schools, roads, electrical grids, hospitals, clinics, community halls, and child health and nutrition programs. Global CSR initiatives are also housed within the UN, the World Bank, the OECD, the global commercial banks and many others; Canada's mining companies are typically leaders in implementing these kinds of commitments. The Canadian government unveiled a CSR strategy in 2009, establishing an extractive sector counselor position among other components. MAC and the industry believe that this plan, if properly funded, provides an effective complement to the numerous industry measures and strategies already in existence. A proposed private member's bill known as C-300 has laudable objectives but is fundamentally flawed in its design. A more logical path forward is to give the government's CSR plan time to work and to strengthen whatever gaps may emerge.

As an important employer of Aboriginal Canadians, the mining industry has a largely positive relationship with the Aboriginal community, and there is potential to draw upon this source in greater numbers. Toward this end, the industry has signed agreements with the Assembly of First Nations in recent years to further cooperation on policy initiatives. At the company level, impact benefit agreements (IBAs) can facilitate progress on extractive and exploration projects while providing investment in Aboriginal education, training and jobs. There are an estimated 120 such agreements in place relating to mineral projects. Aboriginal communities can play a role in helping industry meet the broader human resources challenge of hiring an estimated 10,000 new workers per year over the coming decade to meet business demand and replace retiring workers.

Another industry challenge relates to the fact that there has been a decline in Canadian mineral reserves over the past 25 years in all major base metals. As well, at the value-added stage, Canadian smelters and refineries are facing competitiveness pressure from China and other low-cost or subsidized regions. Increased government spending in geological mapping in recent years is welcomed, although these increases should be made permanent given the long-term need for better data in northern Canada, and the 5:1 spending leverage that is triggered in private sector exploration. In the federal taxation area, the phased movement toward a 15% corporate income tax rate is positive, while the implementation of an at-depth exploration tax credit and improved new-mine rules for development within a defined proximity of current mines would further enhance Canada's investment competitiveness.

Increased government support should be provided in the areas of infrastructure and innovation. Strategic government investment in transportation and power, such as the Highway 37 power line in BC, can help open new remote and northern regions for development by improving the economics of dozens of potential projects. As for innovation, the mining industry invests some $650 million annually in research and development. Current R&D efforts extend from new exploration technologies, satellite imaging and new process technologies to continuous marginal improvement in milling and metallurgical processes, as well as development of new environmental technologies. The industry feels that the mining and metals sector should be supported in its innovation efforts to the same degree as other comparable sectors.

A final competitiveness variable, critically important, relates to the efficiency of Canada's regulatory and project approval processes. Canada's Commissioner of the Environment and Sustainable Development has noted the numerous government overlaps and duplications that exist in this area and concluded that there is no evidence that these burdens generate improved environmental outcomes. Recent amendments that enable the Canadian Environmental Assessment Agency to initiate and manage comprehensive studies offer hope that unwarranted delays in the review of mining projects will be reduced and coordination improved. While these amendments are an important step, more needs to be done to reduce delays and to improve equivalency and coordination between federal and provincial processes. There is also a need for government action, clarification and guidance regarding the interrelated issues of Aboriginal consultation, land use planning, protected areas and revenue sharing.

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, as well as 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—nickel, 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, copper
- 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

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.

- Sports equipment—graphite, aluminum, titanium, calcium carbonate, sulphur
- Sun protection—zinc oxide
- Steel—nickel, iron ore, zinc for rustproofing
- Vehicles and tires—steel, copper, zinc, barium, graphite, sulphur, bromine, iodine
- Wind, solar, hybrids—nickel, aluminum, lithium, gallium, indium, germanium

The mining sector impacts our everyday lives, and its opportunities, environmental challenges, investments and needs are inseparable from those of broader society. As a result of the industry'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 clean energy and environmental technologies of today and tomorrow also use metals and minerals as fundamental building blocks. Water purification systems, for example, rely on nickel and a host of rare earth elements. Hybrid vehicles draw energy from nickel hydride batteries. Catalytic converters require cerium and palladium. Cleaner energy sources, whether nuclear, solar, wind or hydrogen, all use a range of minerals and metals in their equipment and processes. Efficient lightweight vehicles and aircraft require aluminum and emerging, still lighter composites and alloys involving nickel and other metals.

Contribution to Canadian GDP

Until the global economic recession took hold in late 2008, the Canadian economy had 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 trillion-dollar threshold in 2003 and reached $1.29 trillion in 2009. Over the past 20 years, the value of minerals and metals to Canada's economy has remained in the range of 3.0% 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; the combined "extractive sector" contributed $51.5 billion to Canada's GDP in 2009, or approximately 4.3% of the national total. By this measure, the extractive industry is fourteen 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 $32.0 billion in 2009. In comparison, the oil and gas extraction sector contributed $39.0 billion in GDP (although an estimated $16 billion of this relates to oil sands, some of which could also be 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 $7.2 billion to Canada's GDP in 2009.*
- 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 $9.0 billion to Canadian GDP in 2009.*

Figure 1: Canada's Gross Domestic Product by Industry, 2000–2009

($ MILLIONS)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
All industries	1,026,242	1,040,943	1,068,765	1,091,378	1,124,998	1,158,680	1,191,250	1,222,697	1,230,365	1,195,602
Agriculture	18,009	16,204	14,630	16,910	18,716	19,441	19,288	19,343	20,773	19,744
Fishing, hunting and trapping	985	1,085	1,118	1,138	1,164	1,119	1,117	1,168	1,248	1,206
Forestry and logging	5,632	5,676	5,893	5,756	6,142	6,177	5,868	5,218	4,368	3,580
Support activities for mining and oil & gas	4,825	5,274	4,987	5,571	5,883	6,836	7,887	6,709	7,124	5,140
Mining (Including Milling), Quarries and Oil & Gas Extraction	**51,519**	**51,236**	**53,488**	**54,979**	**55,672**	**55,941**	**57,276**	**57,940**	**56,230**	**51,498**
Manufacturing	188,925	181,084	182,736	181,349	184,814	187,901	184,616	182,297	171,906	151,035
Construction	51,757	55,542	57,775	59,871	63,453	66,725	69,693	72,414	74,452	69,051
Transportation and warehousing	48,921	50,176	50,066	50,270	52,169	55,235	56,977	58,045	58,323	55,839
Information and cultural industries	34,007	36,498	38,229	38,631	40,813	42,039	44,001	45,211	46,132	45,724
Electric power, gas and water utilities	29,050	27,384	28,883	29,057	28,993	30,527	30,172	31,313	31,033	29,634
Trade, wholesale	52,519	53,438	55,226	57,767	59,990	63,662	66,798	70,318	70,693	65,978
Trade, retail	52,579	55,234	58,483	60,515	62,666	64,841	69,081	72,808	74,963	74,570
Finance and insurance	60,978	62,802	63,630	64,820	68,212	70,396	75,634	79,332	81,644	81,816
Real estate and rental and leasing	121,899	126,782	131,410	134,681	138,631	144,065	147,619	152,772	155,511	159,914
Community, business and personal services	243,367	249,339	256,105	262,549	269,991	276,721	285,639	294,843	302,030	303,763
Public administration	57,968	59,705	61,523	63,314	64,085	65,115	67,239	68,714	70,596	72,575

Source: Statistics Canada, National Economic Accounts CANSIM Table 379-0027 and Catalogue No. 15-001-X.

- Stage III captures non-metallic mineral processing industries such as abrasives, gypsum, lime, cement, glass and ceramics. *Stage III contributed $4.7 billion to Canadian GDP in 2009.*
- 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 $11.1 billion to Canadian GDP in 2009.*

Economic growth came to a halt during the period from late 2008 to mid-2009 as the effects of unstable oil prices, unsound mortgages, high consumer and corporate debt, and ineffective regulation of the financial sector in the United States served to trigger a global recession. Over the course of 2009, Canadian GDP declined by 2.5%. Mineral prices fell in most commodities in response to declining global demand. As discussed in Section 2.0, operations in some 32 Canadian mines were closed or suspended. Across our economy, business capacity reached its lowest level in 27 years. The mining industry's decline through the recession is reflected in Figure 2, where the industry's contribution to Canadian GDP fell by 20% in 2009.

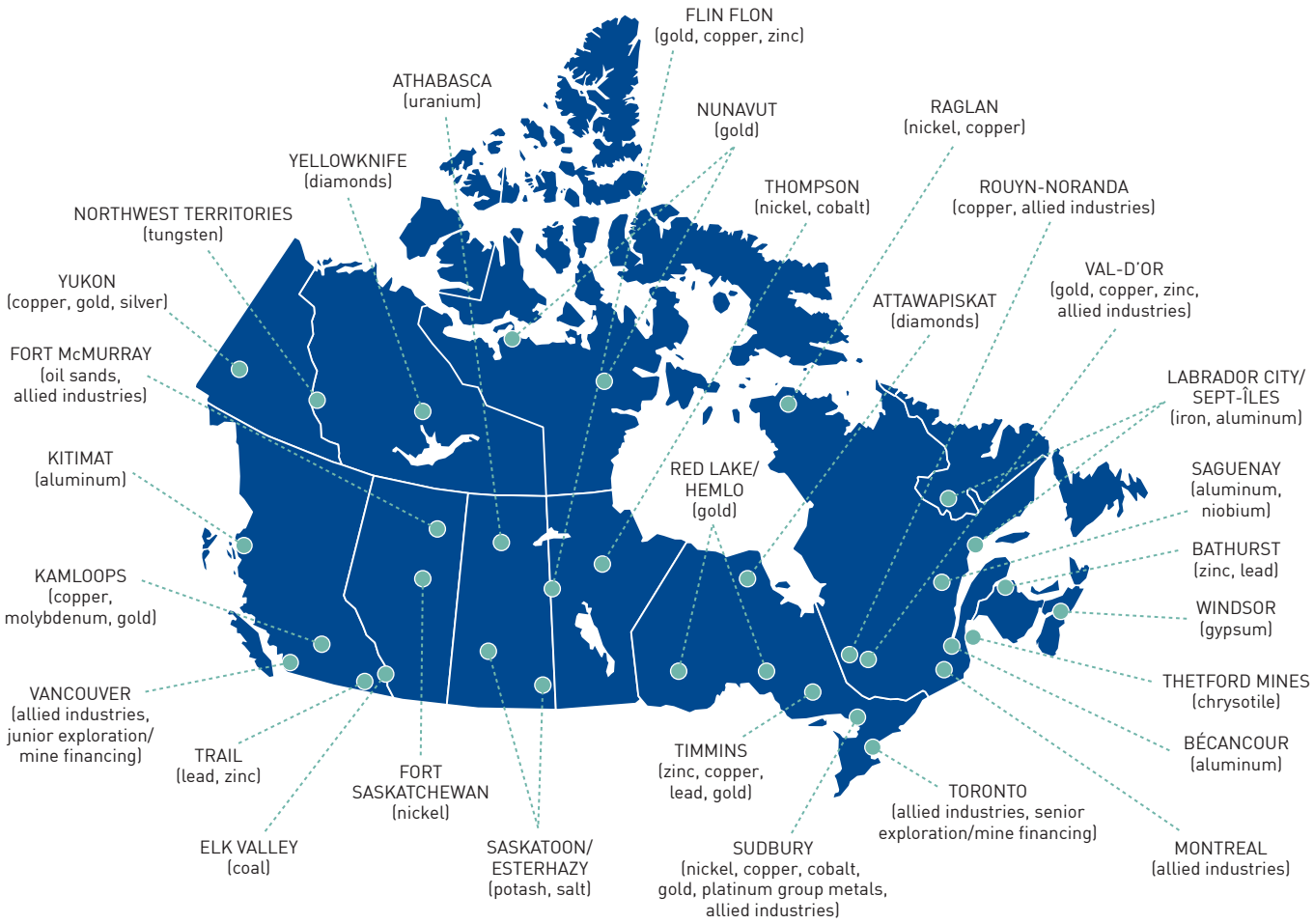
Economic conditions continued to be slow through the first half of 2009, though growth resumed through the fourth quarter and the first quarter of 2010. According

Figure 2: Gross Domestic Product—Mining and Mineral Manufacturing, 2000–2009

($ MILLIONS)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Metal mines	4,567	4,301	4,113	4,003	3,845	3,837	3,788	3,807	3,801	3,048
Non-metal mines	3,057	3,276	3,388	4,091	4,379	4,348	4,050	4,741	4,684	3,472
Coal mines	1,185	1,321	1,057	794	993	1,019	859	944	936	806
Total Mining	**8,825**	**8,876**	**8,559**	**8,856**	**9,093**	**9,087**	**8,651**	**9,113**	**9,067**	**7,188**
Primary metal manufacturing	10,882	10,663	11,087	10,897	11,550	12,095	11,957	11,794	11,840	8,968
Fabricated metal product manufacturing	14,201	13,734	14,062	13,711	13,479	13,746	13,984	14,530	13,314	11,126
Non-metallic mineral product manufacturing	4,779	4,994	5,096	5,375	5,570	5,820	5,848	5,894	5,618	4,664
Total Mineral Manufacturing	**29,862**	**29,391**	**30,245**	**29,983**	**30,599**	**31,661**	**31,789**	**32,218**	**30,772**	**24,758**
Oil and gas extraction	37,850	37,188	39,943	40,618	40,860	40,531	41,626	42,474	40,600	39,274
Petroleum and coal products manufacturing	3,056	3,423	3,477	3,477	3,432	3,332	3,179	3,196	3,092	3,043
Support activities for mining and oil & gas	4,825	5,274	4,987	5,571	5,883	6,836	7,887	6,709	7,124	5,140
Total	**84,418**	**84,152**	**87,211**	**88,505**	**89,867**	**91,447**	**93,132**	**93,710**	**90,655**	**79,403**

Source: Statistics Canada, National Economic Accounts CANSIM Table 379-0027 and Catalogue No. 15-001-X.

Figure 3: Canadian Mining Industry Clusters



to Statistics Canada, the utilization of primary metal manufacturing capacity rose 10% in each of these quarters, reaching 86%, while utilization of mining capacity increased around 8% in each of these quarters, reaching 66%. At the time of writing, however, there remained some concern amongst economic analysts regarding the size of the U.S. fiscal deficit, with debt loads in some European Union countries and with future growth rates in China. The possibility of a "double dip recession" has not been dismissed.

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 an illustration of this, it is estimated by SJ Research that the direct, indirect and induced effects of mining account for 12% of Saskatchewan's GDP. As well, approximately 1,200 Aboriginal communities in Canada are located within 200 kilometres of mineral properties, creating a source of potential economic opportunity.

As of end-2008, there were 961 mining establishments in Canada, including 71 in metals and 890 in non-metals (see Annex 2 for details). The non-metals sector is dominated by sand and gravel quarries (573), stone quarries (193) and peat mines (70); these tend to be relatively small in size and local in focus. Quebec has the largest number of metal mines with 24, followed by Ontario with 16 and British Columbia with 12.

Canadian mineral production (preliminary figure) was valued at $32.2 billion in 2009 (a 30% decline from 2008), of which $6.3 billion was generated in Ontario, $6.2 billion in Quebec and $5.7 billion in BC (Figure 4). The Saskatchewan share

of Canadian production value has grown since 1999, although fell in the past year in line with reduced market prices of uranium and potash. The Quebec share has grown significantly over the past year, reflecting the province's relative importance in gold production.

The Northwest Territories' share has increased over the past decade, reflecting the territory's importance as a diamond producer, although this share has now levelled off. The fact that exploration spending in the NWT fell from $148 million in 2008 to $30 million in 2009 indicates that the positive momentum of this diamond production is in decline. The Newfoundland and Labrador share has increased over the past decade, as the Vale Inco nickel-copper mine opened at Voisey's Bay in 2005.

As detailed in Figure 5, Ontario, BC, Quebec and Saskatchewan are also the leading provinces in terms of mineral exploration expenditures. Canada's three northern territories together attracted 17% of total Canadian exploration spending in 2009. While a reduced share from the previous year, this is nonetheless three times their share of production value and reflects the global interest in Canada's northern mineral potential. Some $6.3 billion was invested in Canadian mine complex development in 2009, with Saskatchewan, Ontario, Quebec, the NWT, New Brunswick and BC each receiving large infusions.

Figure 4: Value of Canadian Mineral Production by Region,[1] 1999 and 2009[p]

PROVINCE/TERRITORY	1999 ($ MILLIONS)	1999 (%)	1999 RANK	2009[p] ($ MILLIONS)	2009[p] (%)	2009[p] RANK
Ontario	5,120	27.7	1	6,330	19.7	1
Quebec	3,657	19.8	2	6,217	19.3	2
British Columbia	2,445	13.2	3	5,734	17.8	3
Saskatchewan	2,319	12.5	4	5,010	15.6	4
Newfoundland and Labrador	820	4.4	7	2,290	7.1	5
Alberta	1,092	5.9	5	2,016	6.3	6
Northwest Territories	653	3.5	9	1,510	4.7	7
Manitoba	811	4.4	8	1,321	4.1	8
New Brunswick	851	4.6	6	1,090	3.4	9
Nova Scotia	326	1.8	11	380	1.2	10
Yukon	61	0.3	12	251	0.8	11
Prince Edward Island	7	...	13	3	...	12
Nunavut	349	1.9	10	0	0	13
Total Canada	**18,511**	**100.0**		**32,152**	**100.0**	

p Preliminary ... Amount too small to be expressed
1 This table includes the production of coal but excludes the production of petroleum and natural gas.
Sources: Natural Resources Canada; Statistics Canada.

On a commodity basis (see Annex 3), the top three jurisdictions for gold production in 2009 were Ontario, Quebec and BC. The top three copper producers were BC, Ontario and Manitoba. In both cases, the three provinces account for 80%–90% of production value. Gold mines were recently redeveloped for production at the Lamaque and Fabie Bay mines in Quebec and at the QR mine in BC. Several gold and copper mines are expected to proceed in BC during the coming years, potentially including Taseko's Prosperity project, the Copper Mountain project, Terrane Metal's Mt. Milligan and Teck/NovaGold's Galore Creek projects.

Figure 5: Total Capital Expenditures for Mineral Resource Development by Region, 2009[p]

PROVINCE/TERRITORY	EXPLORATION	DEPOSIT APPRAISAL	MINE COMPLEX DEVELOPMENT	TOTAL EXPENDITURES
Newfoundland and Labrador	34,049,126	19,470,909	136,047,957	189,567,992
Prince Edward Island	–	–	–	–
Nova Scotia	5,923,818	4,258,000	20,742,844	30,924,662
New Brunswick	9,260,705	750,520	437,266,172	447,277,397
Quebec	201,157,841	228,568,172	895,571,244	1,325,297,257
Ontario	338,469,179	131,896,039	895,295,401	1,365,660,619
Manitoba	53,069,631	30,706,558	180,124,762	263,900,951
Saskatchewan	153,112,877	147,600,282	2,243,048,000	2,543,761,159
Alberta	5,020,863	6,420,000	194,891,306	206,332,169
British Columbia	103,837,625	94,185,332	582,354,444	780,377,401
Yukon	64,586,114	11,873,305	49,000,000	125,459,419
Northwest Territories	18,151,057	20,863,021	464,156,268	503,170,346
Nunavut	99,429,230	95,460,039	227,687,764	422,577,033
Total Canada	**1,086,068,066**	**792,052,177**	**6,326,186,162**	**8,204,306,405**

– Nil p Preliminary

Note: Includes field work, overhead costs, engineering, economic and pre- or production feasibility studies, environment, and land access costs. Also includes machinery and equipment and non-residential construction.

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

Ontario, Manitoba, Quebec and Newfoundland and Labrador 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, although this placement slipped in the past year. A strike in Sudbury and in Labrador between Vale and some 3,000 members of the steelworkers union negatively affected Canadian production of nickel during the past year; a settlement was reached in June 2010, ending the Sudbury strike after almost 12 months. Newfoundland and Labrador and Quebec produced over 99% of Canada's iron ore in 2009, while the NWT produced 86% of Canada's diamonds. Iron ore production increases will be seen in coming years in Quebec, as a half-billion-dollar investment by Consolidated Thompson will serve to double the projected iron ore output and significantly extend the Bloom Lake mine's life.

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.

While it is perceived as benefitting primarily rural, remote and northern communities, the mining industry also has strong economic ties to major cities across Canada. Some of Canada's largest companies are located in urban centres such as Vancouver (Teck, Goldcorp), Saskatoon (Potash Corporation, Cameco), Toronto (Xstrata, Vale, Barrick, Inmet) and Montreal (Alcan, 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. The TSX has a worldwide reputation in financing both mining and mineral exploration activities. As well, Vancouver is the world's mining exploration centre; there are some 1,200

exploration companies in BC, mostly located in the greater Vancouver area. Montreal is an important location for Rio Tinto Alcan and its world-leading aluminum-related expertise. The city also hosts significant mining research and education facilities. The emergence of the oil sands on a global scale over the past several years has sparked the growth of Edmonton and Calgary as hubs 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 direct GDP contribution. For example, the industry contributes over half of Canada's rail-freight revenues and Canadian port tonnage—so organizations such as CN Rail, CP Rail, the Port of Montreal and the Port of Vancouver depend on a vibrant Canadian mining industry. As well, some $3.5 billion in contracts with northern and Aboriginal suppliers have flowed from the EKATI diamond mine during its 12 years of operations in the NWT.

Global Infomine, a database analyst, reports that 3,223 Canadian goods and services firms provide technical, legal, financial, accounting, environmental and other expertise to the mining industry as of 2010, including:

- 89 geotechnical consulting firms
- 247 environmental consulting firms
- 150 exploration consulting firms
- 155 management and financial firms, including 57 financial analysis firms
- 70 education and training organizations and 86 health and safety consultants
- 26 drilling/blasting contractors and 153 drilling/blasting equipment companies
- 33 mineral processing contractors and 230 mineral processing equipment companies
- 76 crusher/conveyor equipment companies
- 102 laboratory and appliances equipment companies
- 114 transportation companies

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Ontario (1,329), BC (964), Alberta (547), Quebec (420), Saskatchewan (106) and Manitoba (82) have the largest number of mining industry suppliers, according to Global Infomine. Supplier companies are important to the introduction and dissemination of innovative technologies and ideas to the mining industry.

Section 3.0 details the role of the Canadian investment services sector as a supplier to the mining industry. During the past five years, fully 32% of global mining capital and 82% of 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.

The Global Infomine data also provide an interesting comparison of the relative size of the mining supply sector in leading countries. The U.S. ranks first with 5,526 suppliers, followed by Canada (3,223), Brazil (2,510), Chile (1,628), Australia (1,273), UK (969), Peru (957), Argentina (814), China (581) and South Africa (513).

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 table draws from a consulting study conducted for the Mining Association of Canada in mid-2010 by ENTRANS Policy Research Group, and it reflects the most recently available data.

As shown, the industry (including oil sands mining) paid an estimated $5.4 billion to federal and provincial/territorial governments in 2009—approximately $2.2 billion in royalties, $1.4 billion in corporate income tax and $1.8 billion in personal income tax—with around 40% of this amount accruing to the federal government and 60% to the provincial governments. The provincial share has increased in recent years, in line with strong growth in royalty payments. In the oil sands, for example, many projects have repaid investors' initial capital spending and thus have entered a higher royalty bracket. The ENTRANS data suggest that Alberta, Saskatchewan, Newfoundland and Labrador, New Brunswick, Manitoba and BC all typically derive a significant portion of government revenues from the mining industry.

Figure 6: Direct Revenues to Governments from the Mineral Sector, 2002–2009

($ MILLIONS)	2002	2003	2004	2005	2006	2007	2008	2009
Mineral Sector Excluding Oil Sands Mining								
Royalties/mining taxes	508	471	835	985	982	1,553	3,269	829
Corporate income tax	1,085	1,049	1,572	1,810	2,858	2,532	2,379	1,389
Personal income tax	1,604	1,585	1,581	1,566	1,589	1,761	1,802	1,493
Total	**3,197**	**3,105**	**3,988**	**4,361**	**5,429**	**5,846**	**7,450**	**3,711**
of which federal	1,951	1,977	2,377	2,405	3,097	2,973	2,819	1,980
of which provincial	1,247	1,129	1,611	1,956	2,332	2,873	4,631	1,731
– percent share	39.0	36.3	40.4	44.8	43.0	49.1	62.2	46.6
Mineral Sector Including Oil Sands Mining								
($ MILLIONS)	2002	2003	2004	2005	2006	2007	2008	2009
Royalties/mining taxes	570	586	1,336	1,576	2,545	3,444	5,677	2,161
Corporate income tax	1,380	1,773	1,943	2,393	4,005	4,213	3,193	1,389
Personal income tax	1,732	1,726	1,730	1,731	1,784	1,970	2,030	1,799
Total	**3,682**	**4,085**	**5,009**	**5,700**	**8,334**	**9,627**	**10,900**	**5,349**
of which federal	2,243	2,605	2,758	2,799	3,707	4,005	3,527	2,190
of which provincial	1,440	1,480	2,251	2,901	4,627	5,622	7,373	3,159
– percent share	39.1	36.2	44.9	50.9	55.5	58.4	67.6	59.1

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

As detailed in Figure 6, the level of royalties and corporate taxes paid in 2009 declined significantly from previous years. The global economic downturn that endured through the first half of 2009 caused these payments to decrease by around 50%. A positive interpretation of this is that the tax system seems to work as it should: payments decline during a period of recession and low mineral prices, and increase during economically buoyant periods.

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 industry." Some of the outputs of this fourth stage, such as cutlery, fixtures and boilers, likely fall outside the logical bounds. Including the fourth stage of activity within the above analysis would mean that the industry paid an additional amount of around $1.8 billion to governments in 2009, bringing the mining and mineral manufacturing industry total to $7.2 billion. (It is worth noting as well that the oil sands industry pays large sums—as high as $2 billion in some years—to the Alberta government in the form of land sales payments.)

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 the then 21% to 15% by 2012, a direction that was reconfirmed in federal Budget 2010. The industry was pleased as well with the continuation of the super flow-through share provision in Budget 2010, and with two technical clarifications made by the Canada Revenue Agency in recent years. The CRA clarified the treatment of certain tangible

expenses in underground mines and clarified that the expenses associated with consulting with Aboriginal and other groups on exploration projects are generally eligible for CEE/flow-through share treatment. In an age of highly mobile capital, these actions serve to improve Canada's investment climate.

Among the tax policy areas where continued improvements are needed, the Canadian mining industry is concerned that federal tax regulations work against exploration and development spending in proximity of existing mines. Expenses for new exploration and development at depth (within existing underground workings) are treated less attractively than similar greenfield exploration costs, thereby reducing the incentive for companies to explore and develop in these expensive (yet potentially resource-rich) areas. The industry is in discussion with the federal government on this issue, although progress is constrained by the magnitude of the federal deficit situation.

SECTION 2.0

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 efficiently. 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. Although value declined significantly in 2009, Canada held its position as a leading mineral-producing nation with production value estimated at $32.2 billion.

We rank among the top five countries in the production of 12 major minerals and metals. Canada ranks first globally in production of potash and uranium; second in nickel and cobalt; third in titanium, aluminum and platinum-group metals; and fifth in diamonds, asbestos, zinc, molybdenum and salt. Canada no longer holds a top-five position in the production of gold, silver, copper or lead. Australia, Russia, the United States, China and Peru are among the other leading supplier countries (see Annex 4 for more details).

As detailed in Figure 7, Canadian metal production values fell to $16.2 billion in 2009, down 28% from the previous year's figure, which itself had declined 14% from 2007. This reflects the metals price collapse of late 2008. The Canadian non-metals (industrial minerals) sector has grown at a steady pace since the mid-1990s and grew dramatically in 2008, reaching a production value of $19.4 billion before declining by 40% in 2009. Potash and diamonds are the largest non-metal commodities in terms of production value in 2009, while cement is the leading structural material. In the mineral fuels area, rising energy prices have served to increase coal production values in recent years, and have made possible the opening of new Canadian coal mines. The Trend mine and the Brule mine, both in British Columbia, began new production in 2008, while the Donkin coal mine in Nova Scotia is to be re-opened in 2010 by Xstrata and is projected to reach 3 million tonnes of coking coal production annually after an investment of some $350 million.

CANADA RANKS FIRST GLOBALLY in production of potash and uranium; second in nickel and cobalt; third in titanium, aluminium and platinum-group metals; and fifth in diamonds, asbestos, zinc, molybdenum and salt.

Of the minerals shown in Figure 8, only gold, coal and iron ore have shown increased production value in 2009. A significant decline in potash production value served to move it to second rank in 2009, behind coal. The ten minerals and metals shown in Figure 8 each had 2009 production values in excess of $1.4 billion and cumulatively represent $25 billion in value—79% of the total Canadian mineral production value. Annex 5 shows that gold had a strong production value increase during 2009, while the value of zinc, copper

and nickel declined significantly. The following subsections discuss market developments surrounding a few key minerals.

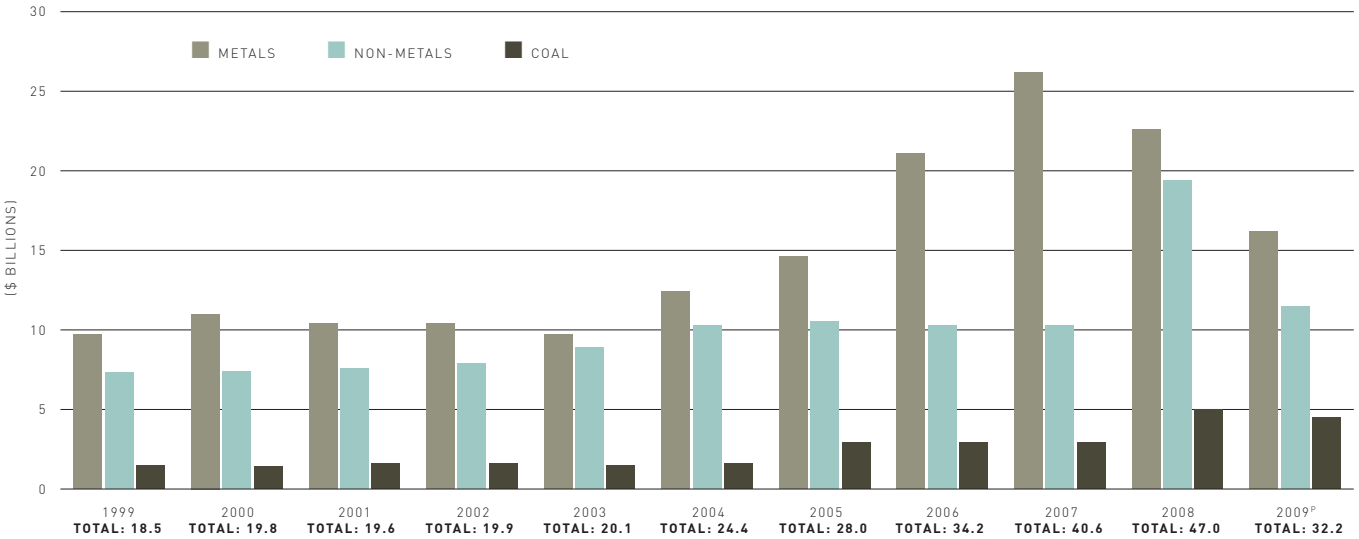
Potash

Potash prices and values have followed a turbulent path in recent years and, while prices will presumably increase over the longer term (driven by changing diets and agricultural practices in China and India), these countries will strive to keep prices in check. New supply from BHP Billiton and Vale could also serve to dampen prices. CIBC World Markets has noted that global grain demand is increasing 2% annually (largely to feed animals), yet the actual acreage under cultivation is declining; fertilizer from potash is bridging this global gap by increasing crop yields. Negotiated potash prices for 2009–2010 are US$550 per tonne in China and US$750 in Korea and Japan—lower than the $1000 levels seen in 2007–2008, but four to five times higher than prices of five years earlier. Saskatchewan remains a world-leading potash region, a position that will likely be reinforced through the emergence of BHP Billiton as a major player in the province—the company is expected to invest some $5 billion in the provincial potash industry over the coming years. The outcome of an August 2010 proposal from BHP Billiton to acquire Potash Corporation of Saskatchewan was unclear at the time of writing, although this development could significantly affect future investment patterns in the potash industry.

Diamonds

Canada has presented a particularly interesting story in diamonds over the past 12 years, progressing from zero production value to the world's third-ranked diamond producer during this period. Canadian diamonds, mined in the Northwest Territories, Nunavut and Ontario, account for 13% of global production. Canadian diamond exports totalled $2.8 billion in 2008, versus zero exports in 1998. These

Figure 7: Value of Canadian Mineral Production, 1999–2009[p]



p Preliminary
Sources: Natural Resources Canada; Statistics Canada – Catalogue No. 26-202 XIB.

exports are primarily sold to Antwerp and London for further processing, although some processing is conducted in the NWT. Some 10% of the diamonds from De Beer's Victor Mine, which came into production in Ontario in 2008, will be cut and polished locally, including at a new facility, Crossworks Manufacturing, located in Sudbury.

From 1998 to 2004, the Diavik and EKATI mines produced $6 billion worth of high-quality diamonds. The Diavik mine reached full production in 2004, producing 7 to 8 million carats per year. The first half of 2008 saw strong growth in Canadian production, with the opening of two new De Beers mines, Snap Lake in the NWT and Victor in northern Ontario. By year-end, however, the global industry suffered a setback as the recession took hold and demand for luxury goods such as jewellery declined. This resulted in a drop in demand for rough and polished diamonds and a 40%–50% drop in average rough prices, as well as in temporary mine shutdowns during 2009 for most leading diamond-producing countries, including in Canada at Snap Lake and Diavik.

OVER THE LONG TERM, Alberta's oil sands production is projected to increase from around 1.3 million barrels per day to 4.7 million in 2025 and 6.3 million by 2035, depending on longer-term economic growth and oil price performance.

On a positive note, the Snap Lake and Victor projects have entered into full production, which marks the culmination of a 40-year Canadian diamond exploration and development effort for De Beers. Future diamond potential may also exist in the northern territories and in Saskatchewan, where the Fort à la Corne project

Figure 8: Canada's Top 10 Minerals by Value of Production, 1999 and 2009

		1999		2009	
	UNIT OF MEASURE	QUANTITY (MILLIONS)	$ VALUE (MILLIONS)	QUANTITY (MILLIONS)	$ VALUE (MILLIONS)
Coal	t	72	1,474	63	4,544
Potash (K_2O)	t	8	1,634	4	3,380
Gold	g	158	2,099	96	3,365
Iron ore	t	34	1,304	32	3,174
Copper	kg	582	1,366	480	2,775
Nickel	kg	177	1,592	132	2,239
Diamonds	ct	2	606	11	1,684
Sand and gravel	t	243	961	216	1,487
Cement	t	13	1,231	11	1,441
Uranium	kg	10	526	10	1,392

Note: Data include shipments by producers regardless of their industrial classification.
Sources: Natural Resources Canada; Statistics Canada – Catalogue No. 26-202-X.

is among the largest kimberlite fields in the world. The Stornoway Renard project in Quebec has continued to show progress during the past year. Another interesting development is that China became the top importer of polished diamonds from Antwerp through the first quarter of 2010, surpassing the U.S. China and India will become the dominant forces in global diamond demand over the coming years as the population of middle-class consumers increases dramatically.

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.

The value of uranium produced in Canada increased by 82% in 2005, by 26% in 2006 and by 76% in 2007, reflecting the strengthened global price and supply/demand situation. However, the value of production declined by 60% in 2008, reflecting a fall in uranium prices. Canadian production value will increase by an estimated 50% in 2009 as prices have rebounded somewhat.

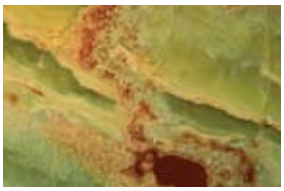
The medium- and long-term direction for nuclear energy and uranium demand remains positive. It is estimated by Ux Consulting that 100 new reactors could be built worldwide over the coming two to three decades, including an estimated 41 reactors in 25 new countries. China envisions a six-fold increase in its nuclear energy capacity to 50 GW by 2020, while Russia projects adding 2–3 GW of nuclear power annually to 2030. In the U.S., some 38 reactors have recently been granted licence extensions and 15 new reactors are anticipated by 2015.

The McArthur River uranium mine in northern Saskatchewan is the world's largest and highest-grade deposit, with an average ore grade of 21% and annual production of around 8,200 tonnes of uranium oxide. However, production levels in Kazakhstan and Africa are projected to increase over the coming decades. In June 2009, Uranium One announced its purchase of a 50% share of the Karatau uranium mine in Kazakhstan, which is expected to triple production over the next four years. Areva's large Imouraren uranium mine in Niger is scheduled for commissioning in 2010 and full production in 2012.

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 per barrel in the 1990s to $70 in 2007 and to $140 in mid-2008 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 increased wealth and economic activity in western Canada during the past decade, creating 200,000 jobs that helped to offset job losses in Canada's manufacturing sector. Fort McMurray in Alberta, the hub of oil sands activity, has grown from a population of 6,000 in 1968 to around 80,000 in 2008.

Given that oil sands operating costs are around $40–$50 per barrel, the significant oil price reductions of late 2008—falling from $140 to the $40 per barrel range—caused many companies to delay or shelve expansion projects and contributed to job loss and diminished government revenues, among other impacts. Some 1.2 million barrels a day of future projects were deferred. However, growth and investment returned to the region and sector through mid-2009, as oil prices rebounded to $70. Prices remain in this range as of mid-2010.



CANADA'S TRANSPORTATION SYSTEM is critically important to facilitating the flow of mined and refined products to markets in Canada and abroad.

Imperial Oil announced in mid-2009 that it was proceeding with the first phase of the Kearl oil sands project, a surface mining operation northeast of Fort McMurray. This phase is projected to cost $8 billion and produce 110,000 barrels per day by 2012, with plans for continued growth beyond these figures.

The merger of Suncor and Petro-Canada, announced in March 2009 and completed in August, establishes Canada's largest oil company and significantly impacts the oil sands scene, creating efficiencies and accelerating particular projects such as the delayed Fort Hills project. Suncor reaffirmed its core commitment to the oil sands in June 2010, after announcing plans to sell conventional holdings in the North Sea and the Netherlands.

Over the long term, Alberta's oil sands production is projected to increase from around 1.3 million barrels per day at present to 4.7 million in 2025. A more recent study by HIS Energy Research Associates projects that output could reach 6.3 million barrels by 2035, depending on long-term economic growth and oil price performance. Prior to the late 2008 downturn in oil prices, it was projected that around $100 billion in oil sands investment would be made over the coming 15 years, an estimated 40% of which was for mining projects and 60% for in-situ. The exact timetable and investment amounts

Figure 9: Production of Synthetic Crude Oil by Quantity and Value, 1998–2008

	SYNTHETIC CRUDE OIL (000S OF M^3)	TOTAL CRUDE OIL AND EQUIVALENTS	SYNTHETIC CRUDE AS % OF TOTAL	SYNTHETIC CRUDE OIL ($000)	TOTAL CRUDE OIL AND EQUIVALENTS ($000)	SYNTHETIC CRUDE AS % OF TOTAL
Alberta						
1998	17,870.8	94,676.2	18.9	2,313,518	9,734,475	23.8
1999	18,766.9	89,065.5	21.1	3,252,547	13,727,829	23.7
2000	18,608.0	89,136.1	20.9	5,188,916	21,687,681	23.9
2001	20,260.6	89,364.5	22.7	4,995,003	17,734,825	28.2
2002	25,494.6	89,885.1	28.4	6,455,743	19,778,759	32.6
2003	25,028.8	95,311.4	26.3	6,777,342	22,187,602	30.5
2004	26,661.9	101,007.0	26.4	8,570,468	27,767,704	30.9
2005	21,932.5	98,878.7	22.2	9,213,624	33,282,754	27.7
2006	28,764.2[r]	106,017.8[r]	27.1[r]	14,831,145	38,498,843	38.5
2007	39,900.2[r]	108,853.3[r]	36.7[r]	18,012,945[r]	42,130,415[r]	42.8[r]
2008	38,020.7	108,322.4	35.1	25,214,415	62,941,690	40.1
Canada						
1998	17,870.8	128,400.3	13.9	2,313,518	12,940,149	17.9
1999	18,766.9	122,287.0	15.3	3,252,547	18,698,282	17.4
2000	18,608.0	127,769.2	14.6	5,188,916	30,523,595	17.0
2001	20,260.7	128,951.0	15.7	4,995,003	24,911,953	20.1
2002	25,494.6	136,969.8	18.6	6,455,743	29,956,080	21.6
2003	25,028.8	144,813.2	17.3	6,777,342	33,610,498	20.2
2004	26,661.9	149,159.6	17.9	8,570,468	40,639,940	21.1
2005	21,932.5	146,207.9	15.0	9,213,624	49,159,801	18.7
2006	28,764.2[r]	161,434.0	17.8[r]	14,831,145	63,649,683	23.3
2007	39,900.2[r]	160,448.3[r]	24.9[r]	18,012,945[r]	62,919,592[r]	28.6[r]
2008	38,020.7	158,950.4	23.9	25,214,415	91,757,005	27.5

r Revised
Source: Statistics Canada

have been adjusted in recent announcements, although the overall amounts and timelines may prove over time to be close to these figures. This investment is reflected in several oil sands operations beyond the aforementioned, including Suncor's Voyageur project, Syncrude, Shell Albian Sands and Canadian Natural Resources' Horizon project.

Most oil sands output is exported to the U.S., although future customers may include Asian countries, assuming environmental and related challenges could be overcome. Enbridge has proposed a dual pipeline between Edmonton and coastal facilities in Kitimat, BC that could open up Asian market potential and move a projected half-million barrels per day to Asian markets. There have been noteworthy investments by Chinese entities in the oil sands during the past year—including a $5 billion investment in Syncrude—and more are anticipated in the coming years.

As detailed in Figure 9, synthetic crude oil accounted for around 24% of Canada's crude-oil production volume (28% by value) in 2008, up from 14% a decade earlier. The absolute value of this production increase is considerable. Canada produced $2.3 billion in synthetic crude in 1998 and $25.2 billion in 2008. All of this production is from Alberta, although Saskatchewan also holds reserves that are attracting interest.

There remains considerable room for expansion of oil sands development in the medium and longer term. Alberta's oil sands deposits are estimated to contain 2.5 trillion barrels of bitumen that, using existing technologies, would yield 300 billion barrels—larger than Saudi Arabia's reserves. According to the Alberta Energy Department, the lease agreements in place cover only some 20% of potential oil sands areas. It is also worth noting that Cenovus received approval in July 2010 to build an in-situ test well in a new area: the untapped bitumen deposits in the 100-billion barrel Grand Rapids region.

Until the recent recession, it was felt that labour cost and availability issues could serve to curtail investment in the oil sands, as the cost of equipment, labour and supplies had increased considerably and availability had tightened. Post-recession, these variables are felt to be on a sounder footing.

As discussed in Section 5.0, environmental issues surrounding oil sands development are receiving increased public and political attention. For example, some NGOs and politicians in the U.S. have argued that carbon-intensive fuels and imports such as oil from oil sands should be disadvantaged for environmental reasons. The fact that a shift toward greater in-situ treatment of bitumen could reduce one environmental concern (tailings volumes) while increasing another (energy requirements and GHG emissions) illustrates the scale of this challenge. The ability to manage these issues will affect the pace of future development, although it should be noted that all forms of energy generation carry environmental consequences and that it would be difficult to enact trade barriers against oil sands production without inviting retaliation. For example, as shown in Figure 32, there are some 30 U.S. states that have an equivalent or greater coal-related GHG challenge than that faced by Canada's oil sands operations.

Figure 10: Non-Ferrous Smelters and Refineries, 2009[1]

OWNER	OPERATION	TYPE OF FACILITY	LOCATION	OUTPUTS
New Brunswick				
Xstrata Zinc Canada (Brunswick)	Brunswick	(Sm.)	Belledune	Pb, Bi, PM
Quebec				
Alcoa Inc.	Baie-Comeau	(Sm.)	Baie-Comeau	Al
Alcoa Inc.	Deschambault	(Sm.)	Deschambault	Al
Alcoa Inc./Rio Tinto Alcan Inc.	Bécancour	(Sm.)	Bécancour	Al
Newalta Income Fund	Sainte-Catherine	(Ref.), (Sec. Sm.)	Sainte-Catherine	Recycled Pb
Rio Tinto Alcan Inc.	Alma	(Sm.)	Alma	Al
Rio Tinto Alcan Inc.	Arvida	(Sm.)	Arvida	Al
Rio Tinto Alcan Inc.	Beauharnois	(Sm.)	Beauharnois	Al
Rio Tinto Alcan Inc.	Grande-Baie	(Sm.)	Grande-Baie	Al
Rio Tinto Alcan Inc.	Laterrière	(Sm.)	Laterrière	Al
Rio Tinto Alcan Inc.	Shawinigan	(Sm.)	Shawinigan	Al
Rio Tinto Alcan Inc. (Vaudreuil)	Vaudreuil	(Ref.)	Jonquière	Alumina
Rio Tinto Alcan Inc./Aluminium Austria Metall Québec/ Hydro Aluminum a.s./Société générale de financement du Québec/Marubeni Québec Inc. (Alouette)	Alouette	(Sm.)	Sept-Îles	Al
Xstrata Copper Canada (CCR)	CCR	(Ref.)	Montréal-Est	Cu, Au, Ag, Se, Te, Ni, PGM
Xstrata Copper Canada (Horne)	Horne	(Sm.)	Noranda	Cu, PM
Xstrata Zinc Canada (General Smelting Company of Canada)	General Smelting Company of Canada	(Sec. Sm.)	Lachine	Recycled Pb
Xstrata Zinc Canada/Noranda Income Fund (Canadian Electrolytic Zinc Limited – CEZinc)	Canadian Electrolytic Zinc Limited (CEZinc)	(Ref.)	Valleyfield	Zn, Cd, S*
Ontario				
Cameco Corporation	Fuel Services Division	(Con. Fac.)	Port Hope	U
Cameco Corporation	Fuel Services Division	(Ref.)	Blind River	U
Johnson Matthey Limited	Brampton	(Sm.), (Ref.)	Brampton	Au, Ag, Recycled Pb
Royal Canadian Mint	Ottawa	(Ref.)	Ottawa	Au, Ag
Vale Inco Limited	Copper Cliff complex	(Sm.), (Ref.), (Pl.)	Sudbury	Ni, Cu, Au, Ag, Se, Te, PGM, S*
Vale Inco Limited	Port Colborne	(Ref.)	Port Colborne	Electrolytic Co, PGM, Co oxide
Aleris International, Inc.	Mississauga	(Sec. Sm.)	Mississauga	Recycled Zn
Xstrata Copper Canada (Kidd Metallurgical)	Kidd Metallurgical	(Sm.), (Ref.), (Pl.)	Timmins	Cu, Zn, Cd, In, S*
Xstrata Nickel Canada	Sudbury	(Sm.), (Pl.)	Sudbury	Ni-Cu, Co, Au, Ag, PGM
Manitoba				
HudBay Minerals Inc.	Flin Flon	(Sm.), (Ref.)	Flin Flon	Zn, Cu, Cd
Vale Inco Limited	Manitoba	(Sm.), (Ref.)	Thompson	Ni, Co oxide, PM
Alberta				
Sherritt International Corporation/General Nickel Company S.A. (The Cobalt Refinery Company Inc.)	The Cobalt Refinery Company Inc.	(Ref.)	Fort Saskatchewan	Ni, Co, Cu sulphide, ammonium sulphate
British Columbia				
Thompson Creek Mining Limited/Sojitz Moly Resources Inc. (Endako)	Endako	(Pl.)	Fraser Lake	Mo trioxide
Rio Tinto Alcan Inc.	Kitimat	(Sm.)	Kitimat	Al
Metalex Products Ltd.	Richmond	(Sec. Sm.)	Burnaby	Recycled Pb
Teck Cominco Limited	Trail	(Sm.), (Ref.), (Pl.)	Trail	Zn, Pb, Bi, Cd, In, Ge, PM, S*

(Sm.) Smelter (Ref.) Refinery (Sec. Sm.) Secondary smelter (Pl.) Plant (Con. Fac) Conversion facility S Sulphuric acid*
1 In operation as of December 31, 2009.
Source: Natural Resources Canada, Map 900A.

Mineral Processing

Canada has a significant mineral-processing industry, with 33 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 smelter/refineries
- Ontario—2 smelters, 3 refineries, 3 smelter/refineries, 1 conversion facility
- Quebec—12 smelters, 3 refineries, 1 smelter/refinery
- New Brunswick—1 smelter

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

With the depletion of proven 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 and aluminum have remained steady over the past five years, while those of copper and zinc have declined (Figure 11). Refined nickel production increased during the 2006–2008 period with the opening of the Voisey's Bay mine, though declined in 2009 as a major strike at Vale Inco took effect.

The ability to source raw material supplies from domestic mines remains an important influence on costs and hence on the 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. The age of some Canadian processing operations, combined with their ability to meet emerging regulatory requirements, also impacts their viability. For example, HudBay Minerals recently announced that it would be closing its 80-year-old copper smelter in Manitoba in mid-2010.

Figure 11: Canadian Production of Selected Refined Metals, 2004–2009

(TONNES)	2004	2005	2006	2007	2008	2009
Aluminum	2,592,160	2,894,204	3,051,128	3,082,625	3,120,148	3,030,269
Cadmium	1,880	1,727	2,090	1,388	1,409	1,299
Cobalt	4,673	4,618	4,555	4,883	4,899	4,358
Copper	526,955	515,223	500,463	453,453	442,050	335,052
Lead	241,169	230,237	250,464	236,688	259,094	258,940
Nickel	151,518	139,683	153,743	162,646	167,732	113,067
Zinc	805,438	724,035	824,464	802,103	764,310	685,504

Sources: Natural Resources Canada; Statistics Canada – Catalogue No. 26-202-X.

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 and sulphur.

In parallel with the emergence of "globalization" in recent decades, global shipping has become dominated by container traffic given the related ease of handling and transfer between rail, truck and marine modes of transportation. Canada's large import volumes from Asia (furniture, electronics, clothing and building products via container) has created a surplus situation where imported containers are relatively full of products while those leaving Canada are not, which has led to an ongoing effort to adapt export products so they can be containerized. Some agri-food products are now being shipped in containers rather than in bulk and a similar trend may develop in the mining sector.

The level of freight volumes carried by the global transportation system is significantly affected by the world market price of oil. For example, as noted by economist Jeff Rubin, the cost of shipping a container from Shanghai increased from $2,000 to $8,000 over the past eight years and would rise to $15,000 were oil to reach $200 per barrel, thereby diminishing the business case driving investment in China. While these rates have declined since the recession, if oil prices increase from present rates in the coming years, this variable has the potential to dramatically change investment and global shipping patterns for mining and other industry sectors.

Rail

In its 2009 *Transportation in Canada* publication, Transport Canada reports that the minerals and metals sector (coal, fertilizer, iron ore, ores and metals) accounted for 44% of the 236 million tonnes in commodity volumes carried by railroads in Canada in 2009. Among the next largest segments, grain accounted for 15%, forest products for 14% and chemicals for 6% of this volume. According to Statistics Canada, shipments of coal and processed minerals transported by Canadian railways represent approximately 50% of total rail revenue freight (Figure 12).

Figure 12: Minerals and Mineral Products Transported by Canadian Railways, 2002–2009

(MILLION TONNES)	2002	2003	2004	2005	2006	2007	2008	2009
Total revenue freight[1]	238.7	235.1	251.2	260.7	258.7	255.7	244.4	212.9
Total crude minerals	108.0	107.1	106.9	112.8	108.0	112.0	111.9	85.0
Total processed mineral products	24.8	23.3	27.2	27.3	27.9	27.7	27.6	21.7
Total crude and processed minerals	132.8	130.3	134.0	140.0	135.9	139.8	139.4	106.7
(%)								
Crude minerals and processed mineral products as a percentage of revenue freight	55.6	55.4	53.4	53.7	52.5	54.7	57.1	50.1

1 Revenue freight refers to a local or interline shipment from which earnings accrue to a carrier.
Source: Statistics Canada, Catalogue No. 52-001-XIE.

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 2007 illustrated the importance of the 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 materials in and finished products out to customers.

In 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 changes were supported by MAC and the Canadian mining industry, and became law in February 2008. They helped improve the competitive balance between the interests of shippers (lower rates, better service) and those of rail companies (higher rates and profitability) by strengthening the ability to arbitrate disputes over rail fees and ancillary charges.

As a follow-up to these legislative changes, the federal government is undertaking a review of railway service levels. The 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. A key message conveyed by MAC and other shipper stakeholders during the review is that railways should face the same kind of penalties and disciplines on their service performance as shippers already do. Four important consulting studies conducted as part of the review were released in March 2010

for the consideration of an expert advisory panel that was itself established in September 2009. It is expected that the panel will conclude this review in late 2010.

Important Canadian mining companies such as Teck Resources have also submitted views to this process, highlighting the negative impacts that poor rail service or non-competitive rates can have on the viability of Canadian mining operations. Industry submissions are urging the advisory panel to seek greater rail competition through its ministerial recommendations, as this would lead to higher levels of service and lower freight rates.

Some mining companies are also involved in periodic dialogue with the government regarding the *Transportation of Dangerous Goods* legislation and processes, in the aim of ensuring that these products can be moved safely and efficiently into and out of mining facilities.

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. As detailed in *Transportation in Canada*, trucks carried $137 billion worth of Canadian exports in 2008 (down 20% from the previous year, reflecting the recession), of which $13 billion or 9.3% was base metals and articles of base metal. Of the $193 billion in imports shipped by truck, $15 billion (7.7%) was base metals and articles of base metal. Only small quantities of minerals, ores and concentrates are traded by truck—around 0.5% of total truck exports and 0.1% of imports. There is no comparable information of sufficient detail to describe domestic truck shipments by commodity.

THE MINING INDUSTRY IS, by some measures, the single most important customer for Canada's transportation system. Minerals and fabricated mineral products provide significant tonnage, particularly bulk commodities such as iron ore, coal, potash, and sulphur.

Marine

The federal government's annual *Transportation in Canada* report lists total Canadian industrial exports sent via marine transport to the U.S. at $26 billion in 2008, most of this being gasoline and crude petroleum. Marine imports from the U.S. are relatively small—totalling $8 billion—and comprise mainly gasoline, coal and iron ore. In the mining sphere, Canada exported around $700 million worth of iron ore and $300 million in non-ferrous products and alloys via ship to the U.S., while importing $1 billion in coal and $900 million worth of iron ore.

Canadian industrial exports by ship to overseas (non-U.S.) countries totalled $70 billion in 2008, led by grains and food, metals and alloys, and coal. Imports totalled $71 billion, led by crude oil, automobiles, machinery and electronics. In mining, Canada exported a significant value of non-ferrous products and alloys ($8 billion), potash ($3 billion), non-ferrous metals ($2 billion) and iron ore ($2 billion) via ship, while significant imports were seen only in non-ferrous products and alloys ($2 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, coke and coal represented 37% of total Seaway traffic in 2009, while other mine products (mainly salt) contributed a further 14%.

The mining sector is also an important customer at Canadian ports, accounting for an estimated two-thirds of commercial volumes. 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, 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. At the Port of Vancouver, coal accounts for 22% of the total volume handled by the port, fertilizer for 10%, and metals and minerals for an additional 11%.

Air

The high value and low volume characteristics of gold and precious metals are relevant to the air cargo industry. According to the *Transportation in Canada* report, Canada exported $40 billion worth of products by air in 2009, of which fully $9 billion was gold and precious metals; Canada imported $54 billion in products via air in 2009, of which $7.5 billion was gold and precious metals. Of all traded products, only the machinery sector was a larger user of air transportation. The other important mining product shipped via air was base metals, where exports totalled $0.5 billion and imports $1 billion.

SECTION 3.0

THE MONEY: RESERVES, PRICES, FINANCING, EXPLORATION AND INVESTMENT

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 and broaden Canadian benefits. 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 and detailed in Annex 6, there has been a significant decline in proven and probable Canadian mineral reserves over the past 25 years in all major base metals.

The most dramatic decline over the past quarter-century—over 80%—was seen in lead, zinc and silver reserves, while copper and nickel declined by over half. Gold reserves in 2008 are around 50% of their 1995 levels. It is evident that without sustained and effective exploration, Canadian mineral production will outstrip reserve additions, our smelters and refiners will be forced to rely increasingly on imported raw materials, and Canada's mining industry will be at serious competitive and strategic risk.

IN THE MEDIUM TERM, most mining analysts believe that a combination of continued development in China, a depreciated U.S. dollar, aging Western infrastructure, industry consolidation and a dearth of new mining projects worldwide will create strong mineral price fundamentals.

On the positive side, exploration investment reached historically high levels in Canada until the recent downturn, and Canada remains the world's top destination for mineral exploration. Consistent investment over an extended period, combined with the development of modern geological mapping data, has the potential to add significantly to Canada's proven and probable reserves. As discussed earlier, the Government of Canada should aim to continuously improve the policy environment that fosters exploration spending and a strong, dynamic mining industry. There are some tax measures that could be considered toward this end.

Global Metal Prices

Global economic events and trends have a direct and daily impact on 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 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


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Figure 13: Canadian Reserves of Selected Metals, 1980–2008

YEAR	COPPER (000 T)	NICKEL (000 T)	LEAD (000 T)	ZINC (000 T)	MOLYBDENUM (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
2007	7,565	3,778	682	5,984	213	6,588	987
2008	7,456	3,605	636	5,005	222	5,665	947

Note: One tonne (t) = 1.1023113 short tons = 32 150.746 troy oz.
Source: Natural Resources Canada, based on company reports and the federal-provincial/territorial survey of mines and concentrators.

out in 2000. While prices and exploration levels grew strongly from 2002 to 2007, Canada continues to face a mineral reserves crisis.

The Canadian industry responds to prices driven largely by the strength of the United States and Chinese economies. China imports over $100 billion in metals annually and presently buys some 30% of the world's base metals versus a 5% share in the 1980s. China also stockpiles significant amounts of iron ore, aluminum, copper, nickel, tin, zinc and oil at strategic moments of low price—a practice that makes it more difficult for analysts to project future mineral prices and marine shipping prices.

During the global recession beginning in the third quarter of 2008, many mining companies curtailed production in order to bring supply into balance with demand. For example, some 20 zinc smelters worldwide moved in late 2008 and early 2009 to curtail production. In Canada, some 32 mining operations closed or saw temporary production cuts during these months. The economic recovery since mid-2009 has been driven largely by Chinese demand. Recovery in the U.S. and the European Union remains sluggish through mid-2010, with the result that global companies in numerous sectors (autos, pharmaceuticals, electronics, lumber, minerals) are deriving increasing shares of profitability from Chinese sales.

The information in Figure 14 illustrates three stories: the strong mineral price growth seen during the 2000–2007 period, the dramatic decline seen in late 2008 in most metals, and the fact that prices of zinc, nickel and copper rebounded through 2009 and the first half of 2010. Some interesting commodity-specific price observations include the following:

- Although some 80% of demand relates to jewellery, gold also serves as a store of wealth and prices are largely driven by geo-political uncertainties such as the mounting U.S. fiscal and trade deficits, the debt and Euro crisis facing some EU countries, and the evolving situation in Iran and Iraq. The price of gold is at its highest level since the early 1980s and continued to increase during the 2009 recession, exceeding US$1200 an ounce at time of writing. As noted in an April 2010 edition of *Mining Journal*, gold demand from China, the world's second-largest market, has increased by 13% annually over the past five years and is expected to double in the

Figure 14: Metal Prices, 2000–July 2010

MINERAL PRICES	2000	2007	2008	2009	2010/07
Aluminum (US$/lb)	0.70	1.20	0.79	0.76	0.89
Copper (US$/lb)	0.82	3.23	1.28	2.34	2.99
Zinc (US$/lb)	0.51	1.47	0.49	0.75	0.80
Nickel (US$/lb)	3.92	16.88	4.38	6.50	9.04
Uranium (US$/lb)	8.29	98.81	53.00	47.00	41.75
Gold (US$/oz)	279	697	836	973	1,234
Crude oil (US$/brl)	30	72	100	62	76

Note: Average yearly prices as well as actual price as of July 2010.
Source: Scotiabank Commodity Price Index.

coming decade. In line with supply constraints, some analysts have actually forecast prices that could reach $5,000–$10,000 per ounce over the next decade.

- Copper remains a "bellwether commodity" with demand tied closely to economic growth and consumption of wire, computer chips, electronics and vehicles. Copper is attracting particular attention from analysts, particularly regarding whether the price increases seen through 2009 are sustainable. Prices have continued to increase through mid-2010 to US$3 per pound, and metals consultancy GFMS projects that prices could exceed US$4 toward end-2010 as production has difficulty keeping up with consumption.
- Spot prices for uranium reached US$99 per pound in 2007 (from US$8 in 2000), driven by increasing global demand and production difficulties in Australia. Prices declined during the first half of 2008 though have since settled at around US$42, five times higher than a decade ago. The enduring strength of the uranium price has served to intensify exploration interest in Saskatchewan and other regions, including Argentina and Peru.
- Iron ore prices tend to be set through contractual agreements between lead suppliers and customers, rather than through global trading. Spot pricing has become more prevalent in recent months, to the point where it has largely replaced the annual benchmarking price system. Such a shift brings greater transparency while being more aligned with a steel system where prices are set daily. The long delays in 2009 in reaching benchmark price agreement between Rio Tinto, BHP Billiton, Vale and Chinese steel companies reinforced the shift to spot price markets.

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.

In the medium term, most mining analysts believe that a combination of continued development in China, a depreciated U.S. dollar, aging Western infrastructure, industry consolidation and a dearth of new mining projects worldwide will create strong mineral price fundamentals. With the more gradual emergence of India and its 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.

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 some 1,200 cars are being added to the streets of Beijing every day, Chinese consumers still have only an estimated 10 cars per 100 people, versus around 76 cars in the U.S. Though not a definitive benchmark of national economic development and while such gaps may never be totally closed, similar discrepancies nonetheless exist in many metals-intensive areas.

The challenge of bringing new discoveries into commercial production is another variable that may support high mineral prices in the medium and longer term. Underinvestment in new copper mine capacity during the price downturn of the 1990s, for example, means that refined supplies are likely insufficient to meet future global demand. In a recent address, Anglo American's CEO estimated that 20 new world-scale copper mines would be needed to meet projected global demand—there are four mines of this scale in operation today.

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 to increase royalty rates. This issue is discussed in greater detail in Section 6.0.

Financing

The development and implementation of a successful exploration and capital investment program depends on a company's ability to raise capital. Historically, Canada has had a strong global presence in mining finance. Canadian firms are responsible for the largest share of exploration spending in Canada, the U.S., 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 is home to the largest group of mining companies in the world. As of end-2009, the TSX listed 59% of the world's public mining companies with 1,434 listed issuers, compared to 610 on the Australian exchange and 171 on London. TSX mining stock trading nearly tripled between 2005 and 2007 before levelling off at $450 billion in 2007 and 2008.

The TSX is a global destination for financing international projects. Listing companies are required to meet disclosure standards known as National Instrument 43-101—this standard is increasingly viewed as the global mining disclosure benchmark.

The TSX is also home to the Venture Exchange, the former Canadian Venture Exchange purchased by TSX in 2001, headquartered in Calgary with offices in Toronto, Winnipeg, Vancouver and Montreal. The TSX Venture Exchange provides emerging companies with efficient access to capital while offering investors a regulated market for making venture investments. The 1,103 mining issuers listed on the Venture Exchange in 2009 were valued at $20 billion—over double the market value of one year earlier—and they raised around $3 billion in equity capital in 2009. Gold, potash, uranium, copper, silver, nickel, iron ore, coal and diamonds were the main targets of TSX mining issuers.

Among senior companies, there are 331 mining issuers listed on the Toronto Stock Exchange, valued at $347 billion; these companies raised $19 billion in 2009. Twenty-two TSX-listed mining companies have a market capitalization exceeding $1 billion as of 2009, with Barrick Gold Corporation, Potash Corporation, Goldcorp, Teck Resources, Kinross Gold, Cameco Corporation and Agrium each valued at over $10 billion.

International Perspective

The global mining industry completed 2,327 public financings in 2009, raising $65.9 billion in equity. As detailed in Figure 15, over a five-year period, around 82% of these financings have been undertaken on the TSX, followed by the Australian and London exchanges handling around 9% and 8%, respectively; by value, the

Figure 15: Global Mining Financings, 2005–2009

(VALUE IN US$ BILLION)

EXCHANGE	FINANCINGS	%	VALUE	%
TSX – Toronto	8,316	82	64	32
LSE-AIM – London	774	8	50	25
ASX – Australia	924	9	28	14
NYSE – New York	24	–	14	7
HKEx – Hong Kong	11	–	12	6
BOVESPA – Brazil Sao Paulo	1	–	12	6
Shanghai	3	–	10	5
JSE – Japan	10	–	2	1
Other	109	1	8	4
Total	**10,172**	**100**	**200**	**100**

Source: Gamah International, 2005–2009, compiled by TMX Group.

Figure 16: Mining Equity Raised—Role of Toronto Stock Exchange, 2000–2009

(VALUE IN US$ BILLION)	2000	2002	2005	2006	2007	2008	2009
Worldwide equity raised	3.1	8.4	9.7	26.5	50.3	46.6	65.9
Equity raised on TSX exchanges	1.1	2.2	4.0	10.1	17.6	8.3	22.2
Percent of worldwide total on TSX	36	26	41	38	35	18	34

Source: Gamah International, compiled by TSX.

TSX handled 32%, London 25% and Australia 14%. Much of the London exchange's mining market capitalization is due to three companies (BHP Billiton, Anglo and Rio Tinto). There have been some large single-equity financings on the Sao Paulo and Shanghai exchanges in recent years, but these are rare and dependent on the plans of a few companies.

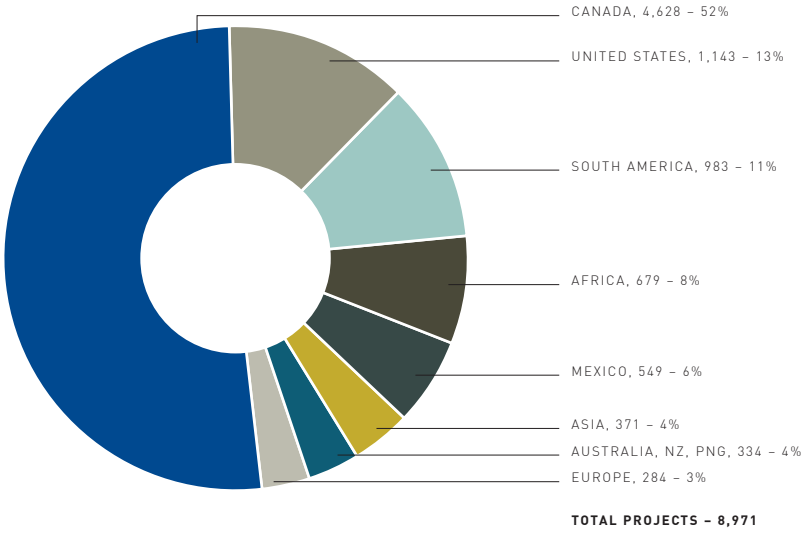
The fact that 82% of all public financings were conducted on the TSX reflects its strong appeal to both junior and senior business players. The ability to handle equity financing in the $1 million to $5 million range efficiently is unique to the TSX Venture Exchange and to Canada. It is one reason why Canadian companies are world leaders in the exploration business.

As detailed in Figure 16, a record $66 billion in equity was raised worldwide by the mining industry in 2009. This illustrates that the effects of the recession were relatively short-lived in the global mining industry—a decline beginning in late 2008 followed by a rebound in demand from China and elsewhere.

The Canadian mining industry has a strong international focus, and this is also evident in the financing activities of the TSX (Figure 17). TSX-listed companies have 8,971 "mineral projects" in progress worldwide in 2010, mainly for exploration, of which 52% are located inside Canada and 48% outside. The U.S., South America, Africa and Mexico are home to 13%, 11%, 8% and 6%, respectively, of the mineral projects undertaken by TSX-listed companies—proportions that are comparable to the prior year. Within Asia, there are 90 Chinese projects in progress in 2010, comparable to the previous year but down from 125 in 2008. Canada's mining industry has long had an active interest in South America: among TSX-listed companies, 247 mineral projects are located in Peru, 208 in Argentina, 143 in

Figure 17: Geographic Reach of TSX-Listed Companies, 2010

(BY LOCATION OF MINERAL PROJECTS)



Source: InfoMine, compiled by TSX, July 2010.

Brazil and 137 in Chile. TSX-listed firms also have an important presence in Africa, with 83 mineral projects in Mali, 76 in South Africa, 68 in Tanzania, 58 in DRC and 55 in Burkina Faso. Finally, it is interesting to note the minimal presence in Russia and India—only 31 and 3 projects, respectively—and indicative of the uneven reception provided to foreign exploration interests in these countries.

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. The mining industry agrees with the sentiment in federal Budget 2006 that "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." Following a period of consultation, the Canadian Securities Regulator Transition Office was created as a national body in June 2009 to make progress on this issue. The federal government introduced a proposed *Securities Act* to create a national regulator in May 2010 and simultaneously submitted a reference to the Supreme Court seeking clarity regarding the government's legislative authority in this area. The latest indications from the transition office suggest that Canada's approach would still have a balkanized characteristic, with multiple regional offices and no national office.

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 purposes 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 and subsequent mine complex development 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 $1.7 billion in 2009 (Figure 18), down significantly from recent years and reflective of the tight financial situation that many exploration/mining companies faced one year ago. Exploration spending generally accounts for around 80% of this total and deposit appraisal spending for 20%; the combined spending is generically referred to as "exploration spending." Reflecting the resumption in economic growth, NRCan's exploration spending intentions estimate increases to $2.2 billion in 2010.

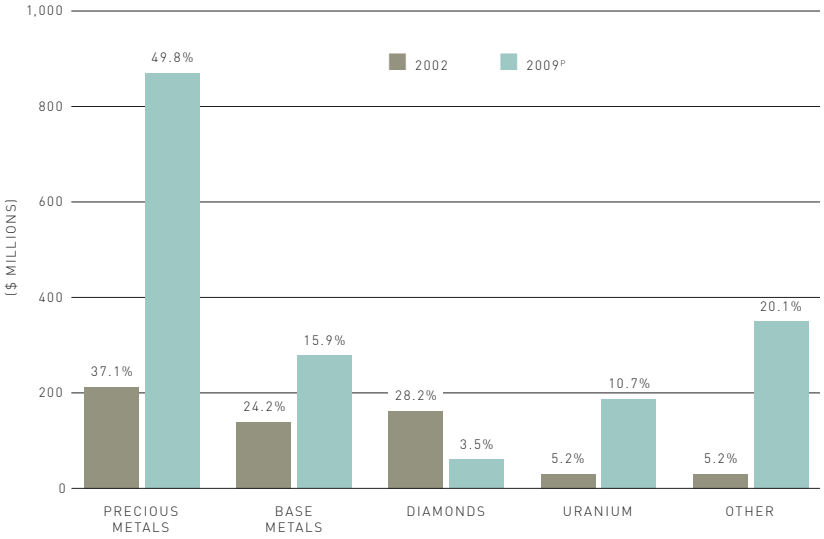
Figure 18: Mineral Exploration and Deposit Appraisal Expenditures by Region, 2004–2010[i]

PROVINCE	2004 ($ MILLIONS)	2005 ($ MILLIONS)	2006 ($ MILLIONS)	2007 ($ MILLIONS)	2008 ($ MILLIONS)	2009[p] ($ MILLIONS)	2010[i] ($ MILLIONS)	% CHANGE FROM 2009 TO 2010
Newfoundland and Labrador	33.2	48.7	100.8	148.0	146.7	53.5	57.8	8.0
Nova Scotia	9.1	6.5	11.0	23.5	21.4	9.8	19.8	102.0
New Brunswick	13.4	10.1	13.4	35.8	32.7	10.0	16.9	69.0
Quebec	227.2	205.1	295.1	476.4	526.1	347.9	466.9	34.2
Ontario	306.9	294.0	346.5	571.7	799.3	469.4	607.7	29.5
Manitoba	36.0	52.9	52.9	102.6	152.1	83.7	72.6	-13.3
Saskatchewan	71.8	133.9	235.6	314.0	430.7	292.6	292.9	0.1
Alberta	6.3	6.6	18.7	11.8	20.8	8.0	10.1	26.3
British Columbia	151.9	218.1	344.2	470.6	435.4	179.0	236.6	32.2
Yukon	22.0	54.0	106.4	144.7	134.0	74.9	75.8	1.2
Northwest Territories	112.4	96.3	176.2	193.7	147.7	29.5	66.3	124.7
Nunavut	187.5	178.7	210.6	338.0	432.6	189.0	238.2	26.0
Total	**1,177.8**	**1,304.8**	**1,911.5**	**2,830.8**	**3,279.5**	**1,747.4**	**2,161.7**	**23.7**

p Preliminary i Intentions
Note: Includes field work, overhead costs, engineering, economic and pre- or production 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 (current dollars).

Approximately 16% of Canadian exploration spending in 2009 focused on base metals, 50% on precious metals, 4% on diamonds and 11% on uranium (Figure 19). Actual dollar expenditures have increased significantly in each area except diamonds between 2002 and 2009—most dramatically in uranium, where the absolute amount being spent has increased sixfold and some 350 uranium exploration projects are in play, primarily in Saskatchewan and Newfoundland and Labrador. Precious metals exploration spending continued to be very robust in 2009 and, given the strong gold price performance during and since the recession, it is likely that the amount of spending directed to precious metals will increase further in 2010. Under the "other" category, spending on potash exploration has increased significantly, in line with buoyant prices and Saskatchewan's world-leading position. Coal exploration spending also showed an increase in 2009, especially in British Columbia. The "Ring of Fire" region in northern Ontario west of James Bay is attracting significant exploration investment in chromite, as well as interest in diamonds, copper, nickel and platinum. Proper management of Aboriginal and community issues will be very important in proposed or future Ring of Fire mineral development. Despite the recent general decline in northern exploration, it is felt that future production potential remains in gold, base metals, iron ore and diamonds in the northern territories.

Figure 19: Canadian Exploration and Deposit Appraisal Spending by Target, 2002 and 2009^{p}



p Preliminary
Source: Natural Resources Canada, based on the Federal-Provincial-Territorial Surveys of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures (current dollars).

Junior companies' share of exploration investment increased significantly between 2004 and 2007, although the proportion declined in 2008, 2009 and 2010. Juniors accounted for $1 billion in Canadian exploration in 2009, with a projected $1.1 billion in 2010 (Figure 20). This traditionally strong junior presence 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.

Around 75% of Canadian exploration spending occurs off-site in greenfield areas, rather than close to existing mine sites. As discussed in Section 1.0, fiscal measures are needed to encourage greater on-site exploration spending, as significant reserves may still exist in close proximity to existing mine sites.

Figure 20: Canadian Exploration and Deposit Appraisal Expenditures by Type of Company, 2004–2010[i]

($ MILLIONS)

TYPE OF COMPANY	2004	%	2005	%	2006	%	2007	%	2008	%	2009[P]	%	2010[I]	%
Junior	600	51	801	61	1,238	65	1,904	67	2,118	65	977	56	1,113	51
Senior	578	49	504	39	674	35	927	33	1,161	35	770	44	1,049	49
Total	**1,178**	**100**	**1,305**	**100**	**1,912**	**100**	**2,831**	**100**	**3,279**	**100**	**1,747**	**100**	**2,162**	**100**

p Preliminary i Intentions
Note: Includes field work, overhead costs, engineering, economic and pre- or production 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 (current dollars).

International Exploration

Globally, Canada has been the number one destination for mineral exploration investment for 18 of the past 32 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 1,846 surveyed companies. The analysis indicates that worldwide exploration investments totalled around US$7.3 billion in 2009, a 42% decline from the US$12.6 billion investment in 2008. Until this decline, global exploration investment had risen for six consecutive years from a low of US$2 billion in 2002. Uranium exploration is not included within these figures and would add a further US$0.7 billion to the 2009 total.

MEG identified the 10 countries that accounted for 67% of total global exploration investment in 2009 (Figure 21). The traditional big two—Canada and Australia—head the list, with Canada hosting 16% of total global exploration spending and Australia 13%. A host of countries occupy the next tier, including Peru at 7%, the U.S. at 6% and Mexico, Chile and Russia each at 5%. In general, there has been an increase in the number of companies willing to explore in higher-risk countries, where the risk is 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 48% of worldwide exploration budgets in 2009, up significantly from the 39% share a year ago and reflective of the continued growth in gold prices. The balance is claimed by base metals (35%), diamonds (6%) and platinum group metals (2%). The base metals share has increased in recent years while the diamonds share has declined. Within base metals, copper allocations account for around 60%, nickel for 25% and zinc for 15% of the exploration total.

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.

The diamond share of worldwide exploration spending has declined for seven consecutive years. Africa and Canada have been the largest recipients of diamond exploration spending over the past decade, with each receiving around $2 billion

during this period. Silver, molybdenum, cobalt, potash, mineral sands and manganese are among the other important targets of global exploration spending.

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

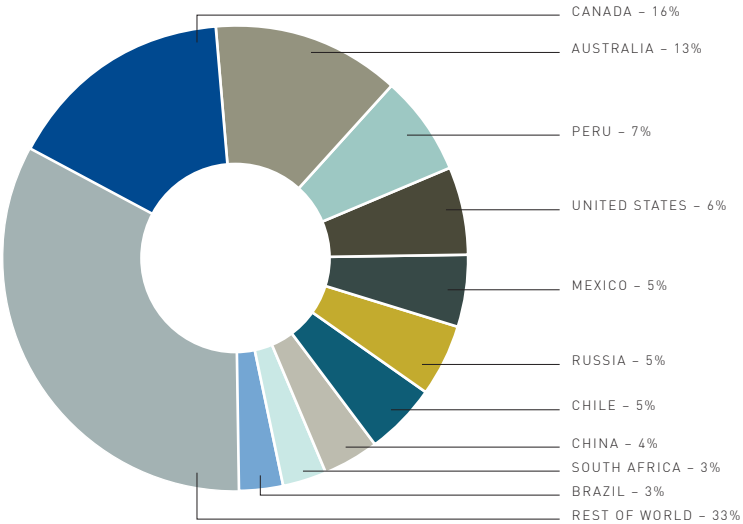
Given the large global exploration spending totals in the half-dozen years preceding the economic downturn in late 2008, it is of concern that only a handful of major discoveries and projects will come into production over the next five years. The global community is still paying for the dearth of exploration spending of the 1990s and early 2000s and, given environmental and infrastructure challenges, major new discoveries may require many years to be converted to producing mines. As well, the dramatic increases in exploration spending through the 2000s has been offset to some extent by rising costs of drilling, assaying, geoscience expertise, fuel and other inputs. Recent years have made it evident that the world's easily accessible mineral reserves have been found and that future reserves will be increasingly difficult to find and develop.

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

Figure 21: Top Ten Countries by Exploration Budgets, 2009

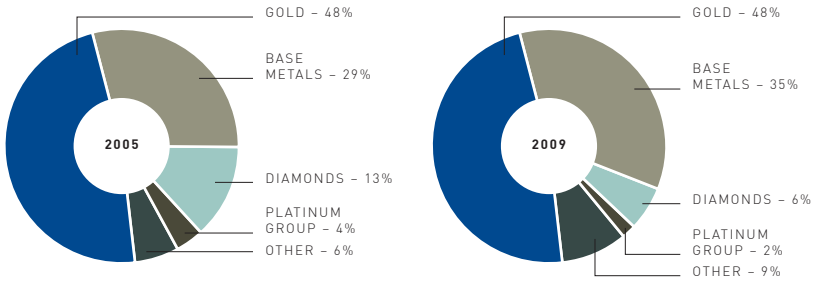
(AS % OF WORLDWIDE EXPLORATION)



Note: Top 10 countries account for 67% of world total of US$7.3 billion.
Source: Metals Economics Group, 2010.

Figure 22: Worldwide Exploration Spending by Target, 2005 and 2009

(AS % OF WORLDWIDE EXPLORATION)



Note: 1,845 companies' budgets totalled US$7.3 billion.
Source: Metals Economics Group, 2010.

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 (announced in September 2009) could stimulate $3.5 billion in mining investment over time. Ongoing policy discussions regarding the future of public infrastructure such as the Ridley bulk-handling marine terminal could also affect future economic development in northern BC.

As detailed in Figure 23, capital investment in the mining industry totalled $9.8 billion in 2009, down from $12.1 billion the previous year. This comprises spending through the four stages of the industry, although around 90% is invested in the first two stages, extraction and smelting/refining. As detailed in the Statistics Canada catalogue, roughly 60% of capital spending in mineral extraction is on construction and 40% on machinery and equipment; at the smelting/refining stage, around 20% 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 mineral extraction stage and $2.7 billion in the three mineral manufacturing stages. Combining this estimate with the above capital ($9.8 billion) and exploration ($1.7 billion) spending figures generates an estimated total amount of $16.2 billion in Canadian mineral development investment in 2009.

The largest capital investors in the metal mining sector in 2009 were gold/silver mines at $1.2 billion, followed by nickel-copper mines at $780 million, copper-zinc mines at $590 million and iron ore mines at $491 million. The coal mining industry invested $444 million in capital spending, while the potash industry figure is unreported although likely very large.

Figure 23: Capital Expenditures in the Canadian Mining Industry, 2007–2010[i]

($ MILLIONS)	2007	2008	2009[p]	2010[i]
Stage 1 – Total mineral extraction	6,832	8,587	7,222	8,556
Metal ore mineral extraction	3,874	5,244	3,600	4,887
Non-metallic mineral extraction	2,553	2,533	3,178	3,050
Coal mining	405	810	444	620
Stage 2 – Primary metal manufacturing	1,558	1,918	1,464	2,120
Stage 3 – Non-metallic mineral product manufacturing	969	787	477	604
Stage 4 – Fabricated metal product manufacturing	793	846	656	599
Total	**10,152**	**12,138**	**9,819**	**11,879**
Non-conventional oil extraction (oil sands)	16,816	20,663	13,539	14,998

p Preliminary i Intentions
Source: Statistics Canada, Catalogue No. 61-205.

Among the major Canadian mine developments of recent years, Aur Resources' Duck Pond metals mine (now owned by Teck Resources) 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. Associated with the Voisey's Bay mine, Vale is proceeding with a $2.2 billion hydromet nickel-processing plant in Long Harbour. Rio Tinto is proceeding with a $475 million investment to expand the mining, processing and transportation capacity of IOC's facilities in Labrador and Sept-Îles, aiming to increase capacity by 50% by 2011. In addition, six gold mines and two base metal mines reopened in Ontario, Quebec, BC and Manitoba in recent years, while two new coal mines and a molybdenum mine were expected to open in BC. Among mine developments in Manitoba, HudBay re-opened its Chisel North mine and zinc concentrator in late 2009—this investment and progress at the Lalor zinc-copper mine could help offset jobs losses associated with the Flin Flon copper smelter closure in July 2010. In the NWT, North American Tungsten announced in mid-2010 that it planned to restart production at its Cantung mine in October, with production levels rising to become the Western world's largest supplier of tungsten concentrate.

Figure 23 also details the magnitude of capital investment in the oil sands, where spending was $13.5 billion in 2009—down 30% from 2008 although still very significant. The Canadian Energy Research Institute estimated that some $200 billion in announced oil sands projects and expansions were affected by the recession and the decline in oil prices from the $140 peak of 2008.

Saskatchewan produces one-third of the world's potash, though this production draws upon mines that are all over 40 years old. Potash prices have remained strong, driven in part by changing diets in India and China and the related fertilizer needs of beef and other protein-based agricultural products. Potash One's new Legacy mine is expected to open in Saskatchewan in 2013, while other significant mining companies (including BHP Billiton) are undertaking expanded exploration programs in the province. The outcome of an August 2010 proposal from BHP Billiton to acquire Potash Corporation of Saskatchewan will affect future investment patterns in the potash

industry. In northern Saskatchewan, the Cigar Lake uranium project has experienced delays associated with flooding problems, though it is scheduled to start production within a few years.

Future potential also remains within the Canadian diamonds sector, despite the exploration spending decline of recent years. Peregrine's Chidliak project on Baffin Island, De Beers' Gahcho Kué diamond feasibility project in the NWT, Stornoway's Aviat diamond field on Melville Peninsula in Nunavut and its Renard project in central Quebec all offer promise. In December 2009, Stornoway provided a project update that tripled the tonnage and diamond count of its Renard deposit; this, along with the Quebec government's funding commitment toward an access road to the Otish Mountains region, shows momentum behind Quebec becoming the next region to enter diamond production in Canada.

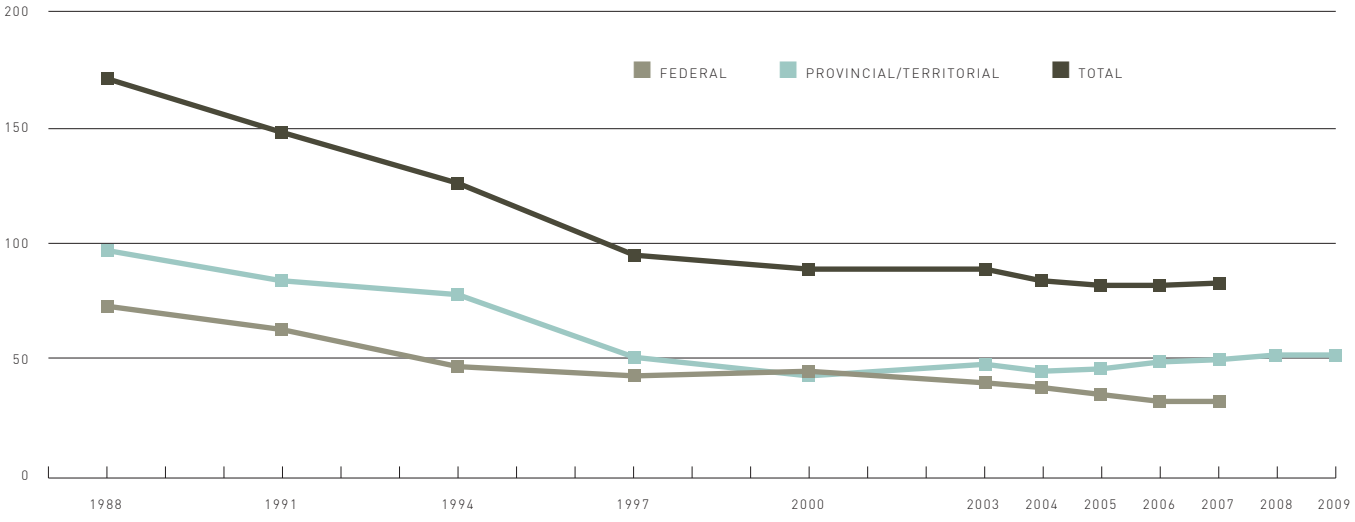
COMBINING REPAIR, capital and exploration spending figures generates an estimated total amount of $16.2 billion in Canadian mineral development investment in 2009. Oil sands investment is additional to this figure.

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 those haystacks may be. Being able to spend high-risk exploration dollars in areas where good geological data are 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 clarify and address industry health, safety and environmental issues, and for advocacy on behalf of Canadian geoscience at the international level.

Figure 24: Geoscience Spending in Canada, 1988–2009



Source: Natural Resources Canada, Geological Survey of Canada.

The parliamentary appropriation supporting 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 the Mining Association of Canada. 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, will not be fully mapped for another 80 years. Other Canadian regions have similar challenges, particularly in the northern regions. 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, which weakens Canada's preparedness for northern development and sovereignty.

In response to this decline, MAC has worked in recent years with federal, provincial and territorial governments to support the case for federal re-investment in geoscience that would be matched at the provincial level. Through Budget 2008, the federal government responded by investing $100 million in new money over five years. Approximately three-quarters of this spending will be directed toward investment in the three territories and one-quarter in the provinces. This Geo-mapping for Energy and Minerals (GEM) program 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 federal investment is classed as a "temporary" allocation of funds that increased from $21 million in 2007 to $29 million in 2008, $32 million in 2009 and $37 million in 2010. This funding is a positive development for the medium-term prosperity of the industry and its employees and suppliers, although a more sustained approach would be to increase the permanent appropriation for GEM.

The federal Targeted Geoscience Initiative (TGI) is a parallel, though smaller investment program aimed at geoscience for base metals around existing camps. Budget 2010 provided $12 million over two years to Natural Resources Canada to renew TGI, with a focus on developing new ways of exploring for deeper mineral deposits. Ideally, TGI would be rolled into GEM as a permanent infusion of geoscience investment.

It is estimated that every dollar invested in a 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 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 covering large tracts of land for purchase by the private sector during 2007; this attracted high interest from the mining industry gauging potential in gold, heavy mineral sands, bauxite, iron ore and coal. In its periodic meetings with foreign delegations, MAC highlights investment in geological mapping as a fundamental economic building block for these national governments.

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 an estimated $16.2 billion in Canadian mineral development investments in 2009, along with some portion of a further $13.5 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. For example, the industry improved productivity and cost-competitiveness during the 1990s, primarily through implementing new technologies and automating business procedures—investments that helped turn previously uneconomic deposits into viable projects 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 2009, 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 one of every 50 Canadian jobs. As defined by Statistics Canada and Natural Resources Canada, the mining and mineral processing industry directly employed 306,000 in 2009 (Figure 25). This figure is comprised of 51,000 workers in mineral extraction, 59,000 in primary metal manufacturing, 49,000 in non-metallic mineral product manufacturing and 147,000 in fabricated metal product manufacturing. As noted earlier, there are also 3,223 companies that supply goods and services to the industry. A recent taskforce report in British Columbia estimated an indirect employment multiplier of 2.5 as applicable to the industry's direct employment.

MIHR ESTIMATES that the sector will need to hire 10,000 new workers per year for the next decade to satisfy replacement needs and fill new positions—this suggests that roughly one out of every two present employees will have to be replaced over the next decade.

Mineral extraction employment is divided roughly at 24,000 in metal mining, 22,000 in non-metal mining and 6,000 in coal mining. The number of Canadian workers in extraction decreased by 13% in 2009, comparable to the decrease seen in the overall industry (Figure 26). A particularly steep decline has been seen in metal smelting and refining (43% in the past decade) and in the metal mining stage. This is attributable to technological advancement, aging Canadian facilities and increased foreign competition for feedstock.

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

Canada's leading mining employers, as listed in the 2009 *Report on Business Top 1000* rankings, are: Barrick (16,300 employees); Yamana Gold (9,300); Teck Resources (9,000); Goldcorp (6,807); Pan American Silver (6,729); First Quantum (6,548); Sherritt International (5,971); Iamgold (5,883); Alcoa (5,200); Kinross Gold (5,500); Agnico Eagle (4,500); Inmet (3,400); Cameco (3,166); Fording Coal (3,000); Centerra Gold (2,939); Eldorado Gold (1,484); HudBay Minerals (1,412); Lundin (1,400); and Anvil Mining (1,300). These figures also include employees at international operations. Among the main oil sands extraction companies, Suncor employed 12,978 in mining and oil and gas activities, while Syncrude employed an estimated 4,300. A number of other mining and metals companies have been acquired or no longer report separate employment figures. In this category, prior to the changes, Rio Tinto Alcan employed 64,700; Xstrata 14,500; Vale Inco 11,700; Iron Ore Company of Canada 1,900; and LionOre 1,400 (figures are for 2007).

While exact statistics are dated and difficult to obtain, it is evident that the industry employs relatively few female workers. In analyzing Statistics Canada data, the Mining Industry Human Resources Council (MiHR) estimates that 14% of mineral extraction and processing workers are female. The female representation in Canadian engineering programs is reportedly less than 20%, and women represent only 10% of the 160,000 licensed engineers across Canada. These proportions are particularly low when one considers that women account for 60% of the student body in Canadian universities and half of the total Canadian workforce.

Figure 25: Employment in the Canadian Mining and Mineral Manufacturing Industries, 1998–2009

(NUMBER OF EMPLOYEES)

YEAR	MINING AND QUARRYING NAICS 212	NON-METALLIC MINERAL PRODUCT MANUFACTURING NAICS 327	PRIMARY METAL MANUFACTURING NAICS 331	FABRICATED METAL PRODUCT MANUFACTURING NAICS 332	TOTAL MINING AND MINERAL PROCESSING
1998	60,090	52,166	100,957	165,626	378,839
1999	57,353	53,286	100,529	173,072	384,240
2000	56,698	56,440	104,253	183,246	400,637
2001	51,118	53,719	91,185	184,269	380,291
2002	47,782	51,423	90,322	181,096	370,623
2003	46,875	51,329	85,402	180,561	364,167
2004	45,824	51,403	79,703	176,439	353,369
2005	46,689	51,304	78,731	176,068	352,792
2006	48,830	53,701	80,681	179,728	362,940
2007	52,877	52,807	78,802	175,091	359,577
2008	58,505	52,707	69,107	171,126	351,445
2009	51,116	48,711	59,339	147,808	306,974

NAICS – North American Industry Classification System.
Source: Statistics Canada.

Employment of Aboriginal Canadians

The information from Statistics Canada regarding Aboriginal employment in the mining industry is drawn from the most recent Census data and indicates that 4,515 Aboriginal people worked in the mining industry in 2006—an increase of 43% since 1996. The number of Aboriginals employed in the mining industry in the Northwest Territories increased from 100 to 560 from 1996 to 2006. Significant increases have also been seen in Newfoundland and Labrador during the same period (from 40 in 1996 to 350 in 2006), in BC (from 360 to 650) and in Saskatchewan (from 630 to 930). It is estimated that Aboriginal workers accounted for 7.5% of the mining workforce in 2006 versus 3.6% in 1996. These proportions are around double the Aboriginal representation within the Canadian workforce as a whole. (Data from the mine sites suggest that Aboriginal employment in the NWT diamond mines reached 850 in 2008, 25% of the total employment in these mines.)

In addition to these figures, there are also significant levels of Aboriginal Canadians employed in the oil sands sector. As of 2007, over 1,500 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 2007 alone, $606 million in contracts were awarded to local Aboriginal companies by the Alberta oil sands operations.

There remains potential to increase the number of Aboriginal mining workers. The growth rate of the Aboriginal population is double that of

Figure 26: Employment in the Mineral Extraction Stage, 1998–2009

(NUMBER OF EMPLOYEES)

YEAR	METAL MINES	NON-METAL MINES	COAL	TOTAL
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	25,564	19,524	6,030	51,118
2002	22,585	19,497	5,700	47,782
2003	21,810	20,224	4,841	46,875
2004	21,374	19,907	4,543	45,824
2005	21,196	20,456	5,037	46,689
2006	22,007	21,487	5,336	48,830
2007	23,850	23,183	5,844	52,877
2008	28,074	23,988	6,443	58,505
2009	23,767	21,775	5,575	51,117

Source: Statistics Canada, Survey of Employment, Payroll and Hours (SEPH).

the non-Aboriginal Canadian population and many communities are located near mining operations. According to NRCan, some 1,200 Aboriginal communities are located within 200 km of a producing mine or exploration property.

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 impact benefit agreement (IBA) in the NWT and the Raglan Agreement in Quebec, can provide literacy and other training, employment, profit-sharing and environmental benefits to signatory Aboriginal groups. Agreements between Vale Inco and the Innu and Inuit in Labrador comprised sections on training, employment, work conditions, contracting, shipping, financial benefits, environmental commitments and dispute settlement—these provided the necessary confidence and mutual benefit for the project to move forward. In total, there are over 50 (some sources suggest 120) such impact benefit agreements in place relating to mineral extraction projects, involving companies such as Barrick, Voisey's Bay Nickel, Syncrude, Tahera Diamond, Diavik, BHP Billiton, De Beers, Cameco, Raglan-Falconbridge and Aber Resources. The fact that secondary school graduation rates in the NWT have increased from 36% to 56% since the discovery of diamonds in 1991, and that reliance on income support has been halved, illustrates the broader social benefits that can be associated with mineral development.

AVERAGE WEEKLY EARNINGS for a mining industry worker in 2009 were $1,350—a figure that is 58%, 47%, 30% and 29% higher than that of workers in the forestry, manufacturing, finance and construction sectors, respectively.

Industry Need for Human Resources and Skills

The Canadian and global mining industry faces a serious human resource challenge in the coming decade. MiHR estimates in its *Canadian Mining Industry Employment and Hiring Forecasts 2010* report (see the full report at www.mihr.ca) that the sector will need to hire 10,000 new workers per year for the next decade to satisfy replacement needs and fill new positions—in effect, to meet the industry's baseline production targets. Using MiHR definitions, this suggests that roughly one out of every two present employees will have to be replaced over the next decade.

This need comes at a time when the skilled core of the industry, including some 65% of geoscientists, will reach retirement age. Ernst & Young estimates that 40% of the industry's workforce will retire by 2014; to give a specific example, Teck Resources 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. 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 geoscientists, metallurgists, mining engineers and geologists, as well as employees skilled in computer technology, information management, mechanical repair and heavy equipment operation, among other areas.

MiHR is a sector council focused 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 one-third fewer mining engineers in the coming year than the number required by the industry. *The Globe and Mail* noted in March 2008 that there would be 1,200 geology graduates in Canada in 2008 to fill 9,000 positions. 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 U.S. have been closed or cut back in the past decade in response to the industry downturn of the 1990s.

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

The MiHR report proposes such 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 employer-provided training; and implementing standards for key occupations.

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 sector in Canada.

As detailed in Annex 8, the average weekly earnings for a mining industry worker in 2009 totalled $1,350—a figure 58%, 47%, 30% and 29% higher than that of workers in the forestry, manufacturing, finance and construction sectors, respectively. This earnings gap has widened in recent years. In remote regions, or in situations with rotating workers, higher wages are often necessary to attract and retain the necessary skills and numbers to proceed with mining operations.

There were a total of 11 strikes and lockouts in the mining and mineral manufacturing sector in 2009, involving a total of 4,954 workers. While the number of strikes and lockouts is lower than in recent years, the duration in person-years has increased significantly. This reflects the strike at Vale in the Sudbury and Voisey's Bay regions—the Sudbury area strike was settled in July 2010 after a duration of one year. The figures in Annexes 9 and 10 suggest that approximately 3.1% of industry workers in these three stages were involved in strikes and lockouts during 2009. Economy-wide, less than 1% of Canada's workers were involved in strikes and lockouts. The level of strike activity in the mining sector was therefore higher than its proportion within the overall Canadian workforce.

Figure 27: Selected Costs of Production in the Mineral Industry, 2008

BY INDUSTRY	ESTABLISHMENTS SURVEYED (NUMBER)	WAGES FOR PRODUCTION & RELATED WORKERS ($000)	FUEL & ELECTRICITY ($000)	MATERIALS & SUPPLIES ($000)	VALUE OF PRODUCTION ($000)
Metal ore mining	71	1,672,570	1,254,284	4,509,163	20,905,465
Non-metallic mining and quarrying	890	987,078	900,627	1,689,435	14,062,091
Coal	22	404,083	352,051	573,553	5,486,541
Total Mineral Industry	**983**	**3,063,731**	**2,506,962**	**6,772,151**	**40,454,097**

Source: Natural Resources Canada; Statistics Canada – Catalogue No. 26-201-X.

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 983 mining establishments: wages, energy (fuel and electricity), and materials and supplies. For the overall industry, these three cost components amounted to $3.1 billion, $2.5 billion and $6.8 billion, respectively, in 2008, the most recent year for which data were available. Wages amounted to about 8% of the industry's production value, energy 6%, and materials and supplies 17%, proportions that are similar to past years.

Mining companies in Canada and abroad faced mounting costs through 2005, 2006 and 2007. In its regular global cost commentary in mid-2006, BHP Billiton noted that costs were being driven by increased competition for capital, energy, personnel, equipment and materials—and that high costs and lengthening equipment delivery times were causing delays in its development of new capacity in Australia and elsewhere. Until the onset of the recession, the increased exploration levels and intense activity in the oil sands sector was putting upward pressure on labour supply and wages throughout the Canadian resource economy; 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 earlier. According to PricewaterhouseCoopers, costs among 40 tracked mining companies increased by 38% during 2007, while sales advanced by 32%, leading to a squeeze in profit margins and to a pre-recession slowing of major resource development projects in Canada and abroad. Post-recession, the industry is felt to be progressing through 2010 on a better input-cost footing.

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 may not be easily comparable. According to the Centre for the Study of Living Standards and Statistics Canada data, annual productivity growth during the decade 1997 to 2006 was approximately as follows:

- All Canadian industries: 1.5% per year
- Manufacturing sector: 2.1% per year
- Mineral extraction: 1.8% per year
- Non-metallic mineral product manufacturing: 1.6% per year
- Primary metal manufacturing: 4.8% per year
- Fabricated metal product manufacturing: 1.2% per year

These data suggest that productivity growth in the mineral extraction phase and in the primary metal phase exceeded that of the "All Canadian Industries" category. Productivity growth in the primary metals stage was over double that of the Canadian manufacturing sector as a whole.

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, was able to draw particular benefit from new information management and communications technologies.

Productivity comparisons with other countries should be drawn carefully. Available data from the U.S. Bureau of Labour Statistics suggest annual labour productivity growth in the U.S. during the past decade (1997 to 2006) was approximately 1.1% per year in mineral extraction, 1.5% in non-metallic mineral product manufacturing, 3.4% in primary metal manufacturing, and 2.0% in fabricated metal product manufacturing. These data suggest that productivity growth in the first three stages of the Canadian industry exceeded the performance recorded in the U.S. industry.

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, three-dimensional data maps, 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 base metals 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 are providing companies with the capability to exploit deposits at greater depths and hence keep open mines that would otherwise have closed—tasks that are more viable in times of strong prices. A September 2009 study of Canadian mining productivity by the Centre for the Study of

NEW TECHNOLOGIES, including GPS surveying information, three-dimensional data maps, airborne technologies and down-hole seismic imaging are allowing companies to locate new deposits not otherwise discoverable with traditional methods.

Living Standards concluded that companies tend to extract from marginal resource deposits during times of higher prices, which leads to higher profitability yet lower productivity.

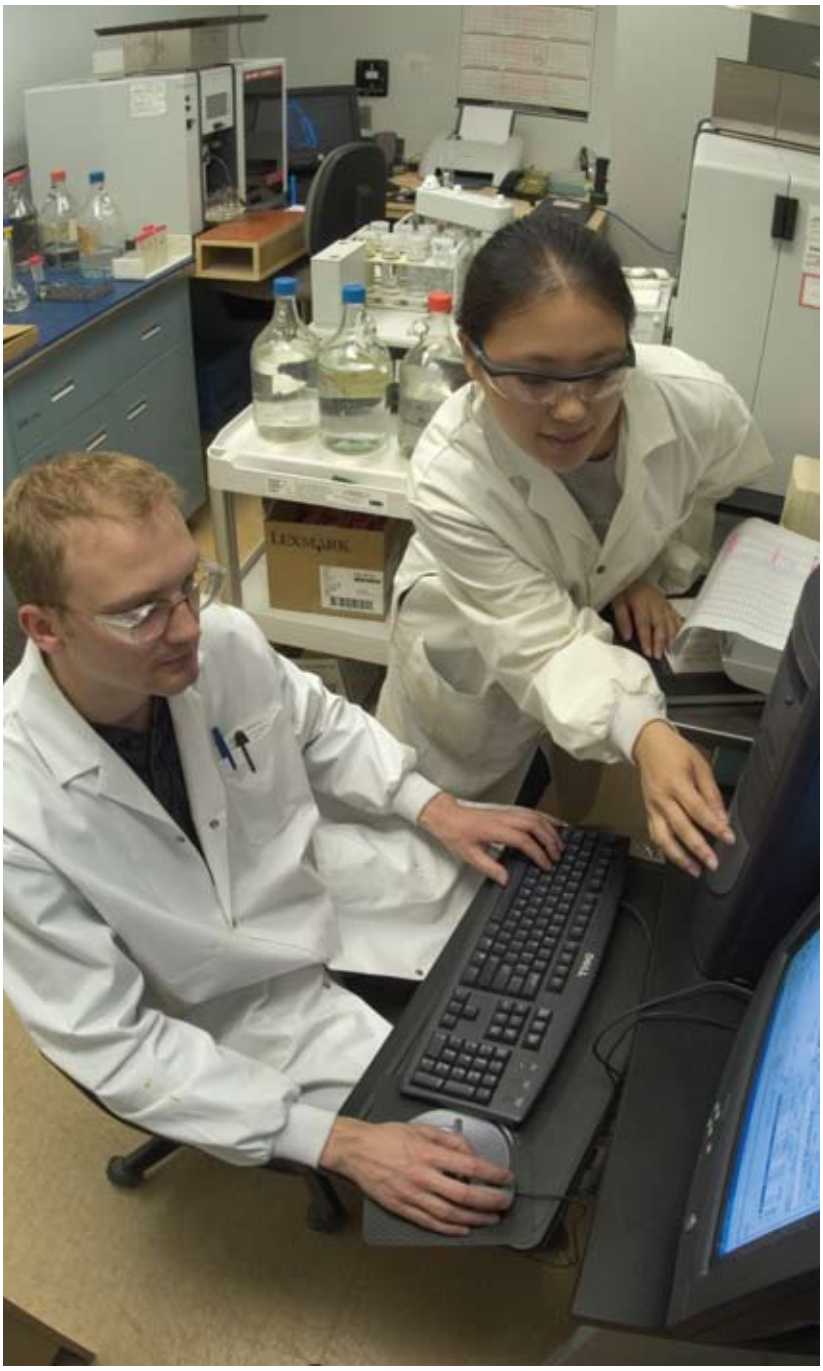
International mineral smelting and refining technology has not experienced any step-change advances over the past 20 years. Pyrometallurgical operations drawing upon thermal treatment, and newer hydro-metallurgical operations drawing upon electricity and chemistry, continue to be adjusted and improved upon in the aim of extracting maximum metal from the mineral while minimizing energy use and greenhouse gas (GHG) emissions. Similar gradual improvements are seen in iron ore pelletizing facilities—for example, ArcelorMittal Mines (formerly Quebec-Cartier) 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.

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—such as a potential return to $150 per barrel oil—and by the plethora of new GHG regulations, taxes and trading systems that could emerge over the next decade. Emerging regulatory requirements may affect the viability of some older processing facilities in Canada. This was a consideration, for example, in the recent HudBay decision to close its 80-year-old copper smelter in Flin Flon, Manitoba in 2010.

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. The future evolution and commercial viability of CCS technology will likely remain unclear for several years. One of the few operating CCS projects in the world is located in Saskatchewan, where Encana is buying CO^2 from a coal gasification plant in North Dakota and piping it for injection into an oil field near Weyburn. The Alberta government announced three demonstration projects from its $2 billion CCS fund in June 2009—two relating to capturing CO^2 from oil sands upgraders and one involving a clean coal plant. Some industry analyses in the oil sands area have concluded that a carbon price of over $100 would be needed to make CCS investments approach viability, while CCS projects at some coal-fired power plants may be viable at a lower carbon price. Costs and viability of CCS technology will remain an evolving variable for years to come. In 2007, SaskPower cancelled plans for a clean coal plant incorporating CCS after estimated costs ballooned to $3.8 billion from $1.5 billion. In 2008, the U.S. Department of Energy pulled out of a similar project in Illinois after the estimated cost doubled to US$1.8 billion.

Research and Development

According to the Statistics Canada catalogue *Industrial Research and Development*, Canadian mining companies invested $615 million in research and development in 2006. This R&D spending comprises $63 million in mineral extraction, $261 million in primary metals, $222 million in fabricated metal products and $69 million in non-metallic mineral products (Figure 28). The R&D investment of the mining industry in 2006



exceeded that of several large sectors in Canada, including oil and gas extraction, motor vehicles, forestry and wood/paper products, and machinery. Some of these data have not been published in subsequent years because of low response levels, although the figures that have been published suggest the mining industry continues to invest more in R&D than these other sectors.

As detailed in Figure 29, there are 6,848 R&D workers in the four stages of the industry. This figure is larger than those of the aerospace and pharmaceutical sectors, both of which receive significant government financial and policy support.

The Canadian corporate R&D database, RE$EARCH Infosource Inc. (2009), ranked seven mining and oil sands companies among the top 100 private-sector R&D investors in Canada in 2008:

- Vale-Inco ranks 31 at $63 million
- Novelis (aluminum rolling/recycling firm) ranks 37 at $55 million
- Syncrude ranks 45 at $50 million
- Petro-Canada ranks 51 at $40 million
- Teck Resources ranks 80 at $23 million
- Rio Tinto Iron & Titanium ranks 82 at $22 million
- ArcelorMittal Dofasco ranks 85 at $20 million

There have been several changes in this list in recent years. For example, Alcan invested $250 million in 2006 before declining to $58 million in 2007 (as Rio Tinto Alcan); a corresponding 2008 figure is not reported in this year's database. Suncor

Figure 28: R&D Expenditures by Mining and Selected Industries, 2004–2009

($ MILLION)	2004	2005	2006	2007	2008	2009
Mining – extraction	58	41	63	71	73	74
Primary metals – nonferrous	225	257	261	N/A	195	201
Fabricated metal products	202	211	222	218	N/A	N/A
Non-metallic mineral products	44	73	69	65	64	62
Total – Mining and Metals	**529**	**582**	**615**	**N/A**	**N/A**	**N/A**
Other sectors:						
Oil and gas extraction	314	440	525	476	376	385
Motor vehicles and parts	657	631	612	495	447	432
Wood products and paper		449	N/A	361	N/A	N/A
Machinery		561	544	530	605	618
Total Manufacturing	**8,343**	**8,367**	**8,504**	**8,211**	**8,496**	**8,437**
Total All Industries	**15,299**	**15,774**	**16,021**	**15,882**	**15,980**	**16,146**

N/A Not available
Note: 2009 figures are preliminary. Some other figures are Statistics Canada estimates.
Source: Statistics Canada, 88-202-XIE.

reported a $50 million R&D investment figure in 2007, but were not listed in the 2008 data. Teck reduced its investment from $32 million to $23 million during 2009 as the company addressed serious financial issues.

R&D spending is also seen in the supply segments. Simulator equipment company CAE, for example, indicated a $274 million R&D commitment toward the mining and heavy equipment sector in 2009. Simulator technology could facilitate training in a sector where machinery and equipment is generally used to the maximum, limiting access to the machines to train operators and drivers.

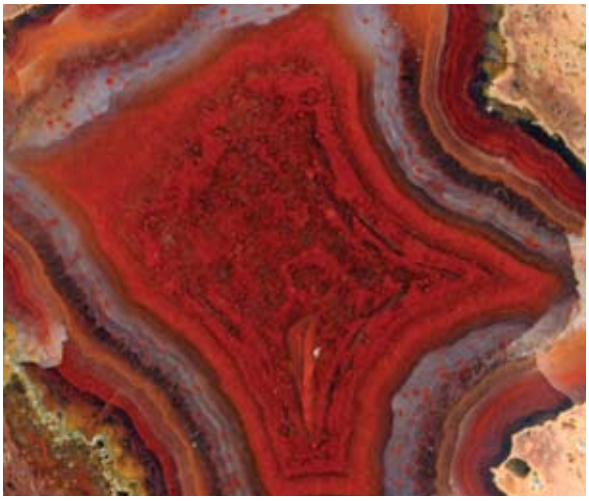
The mining industry, through the involvement of the Mining Association of Canada and other organizations, is engaged in the federal government's Science and Technology Policy and its support of business-led networks of centres of excellence under the umbrella of the newly-created Canadian Mining Innovation Council (CMIC). The industry feels that federal departments and agencies do not provide support to the industry commensurate with the research needs and priorities discussed in this section. As well, those mining education and R&D centres that do exist could benefit from better national focus and priority-setting in mining innovation. Toward this end, the CMIC is in discussion with relevant federal funding agencies with respect to enhanced support in three areas: exploration technology, energy efficiency and tailings management. Governments should be prepared to respond to these needs by investing in the innovative future of the industry on a scale seen in other sectors.

Figure 29: Number of Persons Engaged in R&D by Industry, 2007

	PROFESSIONALS	TECHNICIANS	OTHER	TOTAL
Mining – extraction	165	108	36	309
Primary metals – nonferrous	696	557	214	1,467
Fabricated metal products	1,530	1,972	670	4,172
Non-metallic mineral products	441	348	111	900
Total – Mining and Metals	**2,832**	**2,985**	**1,031**	**6,848**
Other sectors:				
Oil and gas extraction	452	272	109	833
Motor vehicles and parts	2,253	1,934	1,018	5,205
Wood products and paper	941	939	358	2,438
Machinery	3,553	3,611	1,040	8,184
Aerospace products and parts	2,221	1,154	1,356	4,731
Pharmaceutical and medicine	3,138	1,622	995	5,755
Total Manufacturing	**41,080**	**22,391**	**10,356**	**73,827**
Total All Industries	**87,577**	**44,284**	**16,952**	**148,813**

Source: Statistics Canada, 88-202-XIE

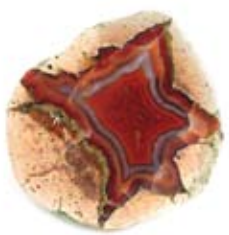
THE ENVIRONMENT



Mining activities have never been, nor will they ever be, environmentally benign. The process of extracting ore from rock, where the ore may constitute only 1% or less of the volume, poses many technical challenges. Similarly, the process of turning raw concentrate into a 99.99% pure metal also poses a long list of challenges, many of which have environmental considerations. Society needs this purity of metal for use in cellphones, aircraft, computers, solar energy technologies, medical equipment and the host of other products used by businesses and average Canadians (including the social and environmental groups that are often critical of the mining industry).

In the Canadian context, mineral development can mean accessing lands situated within the Boreal Forest or, given that much of Canada is covered in lakes, it can require using a natural water body to safely store tailings. A proposed $800 million copper-gold mine in a struggling BC region, for example, is facing some NGO and regulatory opposition in large part because waste tailings would be stored in a neighbouring natural water body. Accessing land and resources in northern Canada can also raise issues of Aboriginal rights and relationships. Comparable issues face the mining industry in international operations, which often occur in countries with less developed infrastructure and environmental protection and community consultation capacities. One current illustration of this challenge can be seen in the Philippines, where environmental concerns may cause the banning of open-pit mines—a legislative move that could halt a planned $5 billion copper-gold project.

MINING ACTIVITIES have never been environmentally benign. The process of extracting ore from rock poses many technical challenges. Similarly, the process of turning raw concentrate into a pure metal also poses challenges, many of which have environmental considerations.



In response to these types of 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 commitment to align 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 requirements is a mandatory requirement of membership in the Mining Association of Canada. In recognition of its TSM initiative,

the Globe Foundation awarded the *Industry Association Award for Environmental Performance* to the Mining Association of Canada in 2005.

In 2007, TSM added two new indicators to address biodiversity and Aboriginal relations, and required members to implement outside verification of their 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 De Beers process that preceded opening of the Snap Lake and Victor mines. The company worked with Laurentian University to assemble a baseline of local fauna and flora species and to finalize a site restoration plan.

The global context surrounding TSM is affected by the large number of international sustainability and social licence initiatives that continue to be developed. For example, companies seeking financing to build projects are guided by rules espoused by financial institutions such as Export Development Canada and the World Bank, and by commercial banks who have adopted the Equator Principles (equivalent to the IFC standards of the World Bank). Companies dealing in dangerous substances must observe regulations such as those of Canada's *Transportation of Dangerous Goods Act*, the Basel Convention and the International Cyanide Management Code. The practices of many companies are guided by the UN's Global Compact, the Extractive Industries Transparency Initiative, the Devonshire Initiative, the Kimberly Process, ISO 14001 certification and other targeted sustainability programs.

Figure 30: Mining Industry Release of Substances to the Environment, Base Year to 2008

	BASE-YEAR	2003	2005	2008	% CHANGE (BASE-08)
Arsenic	319	133	81	100	(69)
Cadmium	130	28	31	20	(85)
Copper	976	274	353	314	(68)
Lead	1,844	297	199	487	(74)
Mercury	28	1	2	3	(89)
Nickel	1,372	260	393	213	(84)
Zinc	3,015	467	405	347	(88)

Notes: The air/water pollutant releases are tonnes per year and are primarily associated with the operation of metal smelters and oil sands upgraders. Data are drawn from industry submissions to the federal government's National Pollutant Release Inventory (NPRI). Base year varies by company though is generally around 1993. Source: MAC Member Companies, TSM Progress Report, 2010.

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 (NOAMI). As well, MAC is presently engaged in an air pollutants dialogue with the federal government in two areas: helping government and industry respond to a 2009 court ruling regarding reporting of data to the National Pollutant Release Inventory (NPRI), and contributing to an evolving federal consultation regarding new air pollutant targets. *See the Mining Association of Canada's annual* Towards Sustainable Mining Progress Report *at* www.mining.ca *for details*.

Figure 30 highlights MAC member companies' progress in reducing releases to the environment over the past 15–20 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 relative to the base year. Mercury releases have been reduced by 89%, zinc by 88%, arsenic by 69%, cadmium by 85% and copper by 68% between the early 1990s and 2008. This illustrates the success of investment by mining companies in cleaner processes and technologies in response to voluntary actions and emerging Canadian regulatory requirements. Performance results in the past few years have been more mixed, with continued decreases in some areas and increases in others where industry may have reached the limits of current technology. The natural variability in metal content of feedstock can also affect results from one year to the next.

The area of metals recycling requires increased societal attention in Canada. Environment Canada estimates that e-waste volumes are increasing by around 4% annually in Canada as consumer and business trends favour "disposable" technology and two-to-three-year turnarounds in laptops, cellphones and other electronics. Beyond the waste volumes, the e-waste issue also raises concerns regarding the release of metals and other potential pollutants once protective casings are broken during disposal.

Some Canadian mining companies are well placed to help Canada address its e-waste challenges. For example, Teck Resources is using furnace and metallurgical processing capacity in its Trail, BC facility to process e-scrap and, in so doing, recovering zinc, lead, indium, cadmium and other metals. Waste plastic and wood are used in co-generating energy and steam, while silica and iron waste is re-used in cement production. Xstrata's Horne smelter in Rouyn-Noranda, Quebec also uses precious metal–bearing recyclable materials as feedstock in producing 99% anode copper; Xstrata recently completed an investment that doubled the Horne smelter's e-scrap recycling capacity. (The fact that the e-scrap recycling process, desirable as it is, consumes more per-unit energy is a point that should be considered in any future greenhouse gas mitigation policies.)

The recycling issue tends to receive greater attention internationally. European Union environment ministers, for example, are presently examining a proposal on "sustainable materials management," which envisions a move from waste policies toward life-cycle policies involving the extraction, product design, production, consumption and disposal phases. This ongoing exercise to promote responsible use of materials will likely be considered in the context of a 2011 European Commission decision to adopt a roadmap on resource efficiency. An EU e-waste directive has already required that all e-scrap be recycled. Countries such as China also tend to have an ingrained recycle and reuse culture, where scrap metal serves as an important input to the country's manufacturing processes.

The future of such businesses in Canada 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.

Aboriginal Relations and Impact Benefit Agreements

It is 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 geographic proximity and the relatively high proportion of Aboriginal youth, there is potential to draw upon this human resource in greater numbers. At the provincial level, some governments are in the process of modernizing mining legislation with the objective of bringing legislative requirements into the new millennium and clarifying the consultation requirements affecting companies and Aboriginal groups. Ontario, for example, is amending its mining act to modernize its map-staking system and to implement a consultation system during the exploration and mining processes, among other features.

At the industry-wide level, the Mining Association of Canada places a high priority upon this area and, among other activities, completed and signed a Memorandum of Understanding with the Assembly of First Nations in 2009. MAC is also improving the TSM architecture to help guide and support company undertakings and reporting in the area of Aboriginal relations.

A strong relationship is equally important at the individual company level. Beyond meeting 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, jobs, business contracts and financial payments. IBAs have also been developed in Canada for pipeline, hydro-power and oil sands projects. By some estimates, there are 120 such agreements in place relating to mineral exploration and extraction projects.

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 global summits and front-page political attention have moved these issues to the top of the public's mind.

Mineral Extraction

There are around 200 operating metal and non-metal mines in Canada that cumulatively account for a fraction of one percent of Canada's total emissions. Given this reality, the federal government has generally 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. MAC and NRCan funded the preparation and translation of a detailed energy and GHG management guidance document as well as the delivery of workshops in recent years to help companies in their continuous improvement efforts.

As seen in Figure 31, the energy required per unit of extracted metal ore has remained fairly stable since 1990. 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

Figure 31: Mining Industry Energy and GHG Emissions Data, 1990–2008

	1990	1995	2000	2005	2007	2008
Total Canadian Economy						
Energy use (PJ)	9,608	10,155	11,362	11,851	12,477	12,060
GHG emissions (mt)	592	642	718	734	747	740
All Canadian Industry						
Energy use (PJ)	2,400	2,533	2,724	2,682	2,695	2,531
Direct GHG emissions (mt)	105	107	111	113	119	121
Total GHG emissions (mt)	142	144	161	163	169	176
Metal Ore Mining						
Energy use – from electricity (PJ)	47	42	36	37	32	33
Total energy use (PJ)	102	91	81	82	79	85
Share of Canadian energy use (%)	1.06	0.90	0.71	0.70	0.66	0.70
Energy per unit (TJ/kt)	0.36	0.34	0.33	0.33	0.34	0.35
Total GHG emissions (mt CO_2e)	3.9	3.6	3.3	3.3	3.5	3.9
GHG emissions per unit (t/kt)	14	15	13	13	15	16
Primary Metal Smelting and Refining						
Energy use – from electricity (PJ)	31	41	42	36	22	22
Total energy use (PJ)	77	84	86	73	66	67
Share of Canadian energy use (%)	0.80	0.83	0.75	0.62	0.52	0.55
Energy per unit (TJ/kt)	50	46	45	42	38	38
Total GHG emissions (mt CO_2e)	6.1	4.9	5.4	3.7	3.4	3.4
Share of Canadian GHG emissions (%)	1.0	0.8	0.8	0.5	0.5	0.5
GHG emissions per unit (kt CO_2e/kt)	4.0	2.7	2.9	2.1	2.0	2.0

Source: Assorted tables in CIEEDAC Report, March 2010.

Diavik and EKATI operations, for example, 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.

Metals Smelting and Refining

Each stage of the value-added chain in the mining and metals sector is energy-intensive. 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 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.)

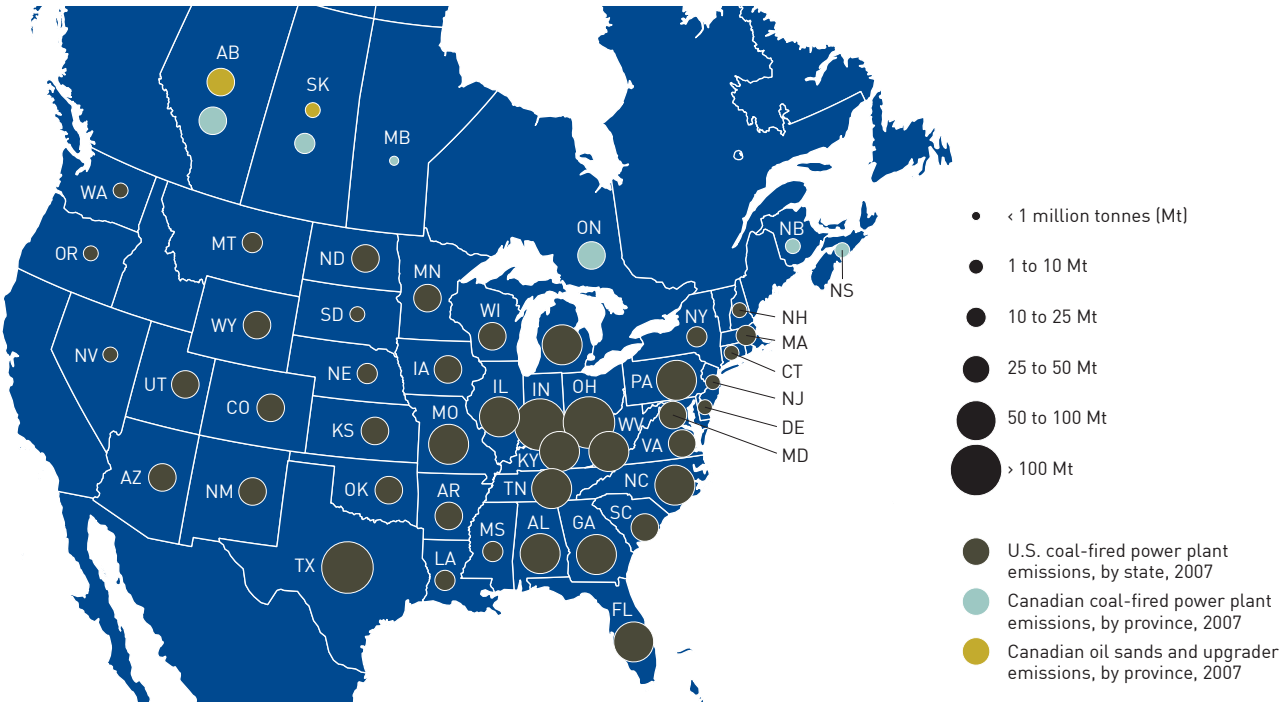
The most energy-intensive players in the mining sector—namely, smelting and refining—have made considerable progress in improving energy and greenhouse gas intensity performance over the past 18 years. As detailed in Figure 31, the primary metal smelting and refining industry has reduced its energy requirements from 50 terajoules per kilotonne of production output in 1990 to 38 TJ/kt in 2007—an improvement of 24%. The segment has reduced its GHG emissions intensity from 4.0 kilotonnes of CO_2e per kilotonne of unit production output in 1990 to 2.0 in 2008, an intensity improvement of 50%. While some of this improvement is due to fuel switching and investments in efficiency, a significant portion is also attributable to reduced emissions of SF6, a high warming-factor GHG that is associated with magnesium production. Given that it has taken the industry 18 years to improve GHG intensity by 50% (2.8% per year), it is evident that the target proposed under the federal government's *Turning the Corner* strategy (18% improvement from 2007 to 2010) would not have been achievable in the proposed timeframe, and companies would have likely had to pay into a technology fund to meet targets (especially in the absence of any viable emissions trading scheme).

It is important that any federal plan on GHG emissions engage all Canadians in the solution. The federal plan, as proposed in 2007, essentially left some 55% of Canadian GHG emissions "on the sidelines" and consequently placed 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 few weeks, generally using old technology. China's GHG emissions *growth* each year exceeds the sum of Canada's total annual emissions from all sectors. In value-added areas such as aluminum smelting, China has added massive processing capacity in recent years, drawing on its under-priced coal-fired electricity generation. Development in China and other competing countries should take place within a global GHG framework and using the cleanest possible technologies.

During the past year, with the failure of the Copenhagen Summit and other setbacks, it has become less clear whether any real global progress in climate change policy is imminent. The U.S. Congress is caught in a process of exchanging modest proposals, while the Obama Administration has expended political capital in other areas such as healthcare reform. At the state level, the western climate initiative has lost momentum in recent years, as some states have withdrawn. In Canada, climate change plans in 1990, 1995, 2000, 2002, 2005 and 2006 have come and gone, while the government's 2007 plan has been deferred, pending U.S. developments.

In light of this policy inertia, it is unclear whether there will eventually be a price attached to carbon emissions in Canada and the U.S. Designing a cap-and-trade system is not easy, as the European example illustrates. The widespread allocation of free permits and special exemptions caused a collapse of the ETS and continues to affect the system's design and function—while setting a poor precedent for any Canadian/American system that may emerge. More likely is that smaller, though perhaps more effective undertakings such as enhanced fuel standards for cars and trucks will be implemented. Any broad shift in the U.S. or other countries from coal to shale gas would also, over time, have a significant impact in reducing global GHG emissions.

Figure 32: Canada and the United States: The GHG Challenge



Oil Sands

Oil sands operations face particular challenges with respect to GHG emissions. Oil production from Alberta's oil sands projects are projected to increase from 1.5 million barrels per day at present to 4.7 million in 2025 and 6.3 million by 2035. Given current technology, this could create a four-fold increase in greenhouse gas emissions. The scale of the GHG challenge facing Alberta and Canada, while significant, is placed in context through Figure 32, which shows the oil sands challenge as being comparable to the coal-emissions challenge faced by 15 U.S. states, and smaller than that faced by 15 other states: Texas, Missouri, Illinois, Indiana, Ohio, Kentucky, Tennessee, Alabama, Georgia, Florida, Ohio, Michigan, West Virginia, Pennsylvania and North Carolina. This places the emerging debate over "trade barriers against GHG-intensive oil," as advanced by some NGOs in the U.S. and Canada, in a more realistic context. The U.S. faces comparable or greater GHG challenges in 30 of its own states drawing electricity from coal combustion.

Developing nuclear power plants in the oil sands region to supply electricity and steam could improve the industry's GHG intensity, and some important industry players have had discussions toward this end. However, there are many challenges facing this option, including the fact that Alberta has no nuclear infrastructure or history with nuclear energy and that 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 large-scale carbon capture and sequestration (CCS) systems. Future oil sands projects (post-2011) will be required to invest in this area. This technology is in its infancy, however, with only a couple of 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 U.S., Canada and elsewhere, and governments around the world are allocating significant funding toward this end.

In the area of oil sands tailings management, an emerging technology of adding a polymer flocculent to fine tailings could allow water to be released (and tailings to dry) more quickly. Suncor is presently developing this technology, which could reduce reclamation times from 40 years to around seven; the technology could be deployed in Suncor's operations by mid-2010.

The Emerging Clean Energy Economy

Given the energy-intensive nature of mineral processing, the availability of stable and competitively-priced energy is a key criterion driving industry investment. While there is debate regarding the scale of global oil supply—ranging from "peak-oil" at one end of the spectrum to "800-year supply" at the other—it should be noted that coal and shale gas supply projections extend centuries into the future. In oil shale as well, there are some 600 known deposits worldwide, in 30 countries, and estimated reserves approach three trillion barrels. Therefore, while the global economy will presumably move toward cleaner supply technologies in the coming decades, the pace of change will not necessarily be driven by lack of traditional energy supply.

In the interim, it will be important for Canadian political leaders and policy makers to continue to ensure that industrial energy supply in their jurisdictions is stable, long-term and competitively priced. To offer one illustration, a concentrator investment near a proposed chromite mine in Ontario's Ring of Fire region could reportedly be viable with power pricing at four cents per kWh, though not at a higher figure. Jurisdictions that desire these types of economic development must be able to offer competitively-priced and stable energy supply.

In today's world of rapidly-growing demand for environmental goods and services, 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. In this sense, environmental groups calling for clean technologies should similarly be advocating for the minerals and metals development that underpins these technologies. Hybrid vehicles, for example, draw energy from nickel hydride batteries. Catalytic converters, used to reduce vehicle air pollutants, 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 as well. Nickel has the strength and corrosion resistant properties necessary for air pollution abatement hardware and renewable energy infrastructure. Wind turbines are made from nickel alloys, and small biogas projects (such as some Clean Development Mechanism projects in India) also use gas turbines, shafts and fuel injectors made from nickel alloys. New materials will continue to be developed with the aim of being made lighter and stronger. 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. Similar examples are evident throughout many 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 some 35 federal acts and regulations related to the mining industry, coupled with dozens of laws and regulations at the provincial and territorial level—21 provincial acts and 12 regulations govern the mining industry in Ontario alone.

Canadian mining companies and domestic and foreign investors depend on governments for a clear understanding of information requirements, approval processes, timetables and responsibilities. The mining industry's experience in recent years—for example, with respect to environmental legislation such as the *Canadian Environmental Assessment Act*—has been very uneven. Canada's Commissioner of the Environment and Sustainable Development has commented in the past on the overlapping nature of multiple government review agencies, critically noting that there is no evidence of this approach leading to improved environmental outcomes. As discussed in Section 6.0, such overlaps and inefficiencies 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 a regulatory improvement initiative, including the establishment of a Major Projects Management Office (MPMO) to coordinate the multiple agencies and departments involved in reviewing projects proposed by industry. The government has made some progress on this issue during 2008 and 2009, although the economic recession and the decreased number of projects in the pipeline make it premature to gauge the actual level of improvement flowing from the MPMO. Changes introduced in Budget 2010, empowering the Canadian Environmental Assessment Agency to initiate and manage comprehensive studies, could also serve to improve timeliness by enabling quicker ministerial decisions regarding scale and by reducing the number of agencies involved in certain project assessments.

A CLEANER SOCIETY, and particularly Canada's ability to make progress over the coming decade, will depend upon the availability of metals and minerals as building blocks. In this sense, environmental groups calling for clean technologies should similarly be advocating for the minerals and metals developments that underlie these technologies.

While these regulatory initiatives are positive, developments in the climate change and clean air regulatory areas may not offer similar promise. While progress in climate change policy areas has been very minimal in 2009, a real possibility remains that complicated and duplicative regulatory and reporting systems could emerge as the federal government develops regulations where provincial regulations already exist or are being developed. On the greenhouse gas front, industry needs clarity and certainty with respect to regulatory processes and mechanisms in order to make appropriate investments. With respect to evolving air pollutant targets and processes, the federal government should avoid creating inter-jurisdictional overlap or a one-size-fits-all requirement, and should focus effort on those facilities and regions that will deliver actual environmental and health benefits. As well, in all regulatory respects, governments must ensure that they have the skills and resources to appropriately staff an efficient regulatory system.

Given the challenge associated with Canada's declining mineral reserves, it is important that governments consider economic development issues before removing large areas of land from development. In February 2010, for example, the BC government placed a moratorium on exploration, mining and oil and gas activity in the Flathead Valley region in south-eastern BC, a decision taken without significant consultation that removes a large area of land from resource development. Similarly, a recent strategy of the Ontario government to remove large areas in the far north from development can negatively affect economic prospects for Aboriginal and non-Aboriginal residents, a factor that should have been taken into consideration.

SECTION 6.0

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 traders with multi-billion dollar exports in many areas. There are almost 1,000 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 have provided 32% of the world's mining equity and handled 82% of the world's financing transactions over the past five years. Canadian-listed firms have over 4,300 mineral projects in varying states of development outside Canada.

Foreign Investment Statistics

Despite the ownership changes that affected some large companies in 2006–2007, Canada remains home to the most "top 100" mining companies in the world with 19 companies, followed by China (17), Australia (11), the United States (11) and South Africa (9), according to NRCan. The Canadian minerals and metals sector has historically had a significant global investment reach and, until recently, outward investment levels exceeded inward investment. While the sector remains a large global investor, this characteristic has evolved in recent years.

MINERAL PRODUCTS have strategic importance to countries with large infrastructure needs and manufacturing sectors. It's not unusual for the global mining industry to be directly affected by international trade and investment policy.

Canadian direct investment abroad (CDIA) was valued at $593 billion in 2009 (Figure 33). The minerals and metals sector accounted for 9.4% of this figure; it has held steady at approximately 10% over the past decade, down from 15% in the 1990s. This relative decline was due to significant CDIA 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, $60 billion in 2007 and over $80 billion in 2009.

Canadian minerals and metals companies have an accumulated stock of $56 billion in CDIA invested abroad as of 2009. The CDIA is aimed primarily toward the U.S. and Latin America. This level of CDIA is high relative to the overall size of the industry. 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 $59 billion, remained at this level in 2008, and increased significantly again in 2009. This represents around 13.5% of total FDIC stocks in Canada, up from 8.5% in 2006 and the

Figure 33: Metallic Minerals and Metal Products—Direct Investment Stocks, 1990–2009

($ BILLIONS)	CDIA	TOTAL	%	FDIC	TOTAL	%
1990	13.5	98.4	13.7	9.8	130.9	7.5
1995	24.5	161.2	15.2	9.6	168.2	5.7
2000	42.4	356.5	11.9	17.4	319.1	5.5
2002	43.1	433.3	9.9	20.7	354.1	5.8
2003	44.5	403.4	11.0	20.9	354.5	5.9
2004	47.7	445.1	10.7	22.6	365.7	6.2
2006	61.5	523.3	11.8	38.2	448.9	8.5
2007	55.8	515.4	10.8	59.1	491.3	12.0
2008	66.7	637.2	10.5	59.2	504.9	11.7
2009	55.8	593.3	9.4	74.1	549.4	13.5

Note: CDIA is Canadian Direct Investment Abroad. FDIC is Foreign Direct Investment in Canada.
Source: Statistics Canada, Cansim Table 376-0038; 2009 figures are preliminary.

5%–7% range of previous decades. 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 ($95 billion), energy ($113 billion), and services and retailing ($52 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 was strong export growth during the 2005 to 2008 period for the first three mining stages (Figure 34) due to significant metal price increases in these years. Similarly, price declines led to a 31% decrease in the value of these exports in 2009. Export of first-stage minerals grew from $15 billion in 2005 up to $29 billion in 2008, then down to $20 billion in 2009; cumulatively, exports of these three stages increased from $50 billion in 2005 to $80 billion in 2008, then down to $55 billion in 2009. Exports of the fabricated product stage remained level at around $14 billion annually over these years before declining to $11 billion in 2009. Canada generally has a large trade surplus in the first three stages and a trade deficit in the fabricated products stage.

As detailed in Annex 11, the Canadian mining industry exported a total of $66 billion worth of metals, non-metals and coal in 2009, including $49 billion in metals, $12 billion in non-metals and $5 billion in coal. This $66 billion figure equates to 18.5% of total Canadian goods exports in 2009. Key exports in 2009 included aluminum, nickel, copper, gold, uranium, coal, potash, zinc, diamonds, iron and steel and iron ore. Exports of these specific products ranged from $1.4 billion to $10 billion each.

Roughly 58% of Canada's total metal exports are to the U.S., predominantly iron and steel, aluminum, copper, gold and nickel. The European Union is an important destination for Canadian gold, iron ore, uranium and diamonds. The "other destinations" category, which includes China, receives significant exports of nickel, copper, iron ore and potash.

Figure 34: Mineral and Mineral Product Imports and Exports, 2005–2009

($ MILLIONS)	2005	2006	2007	2008	2009	2009 PERCENTAGE OF CANADA'S TOTAL ECONOMY
Total Imports						
Stage I	5,558	7,125	7,790	9,142	6,960	1.9
Stage II	6,787	7,763	7,664	9,377	7,740	2.1
Stage III	18,155	19,924	19,546	21,983	15,273	4.2
Stage IV	26,358	27,293	27,892	29,053	25,204	6.9
Stage I–IV	**56,858**	**62,106**	**62,891**	**69,554**	**55,177**	**15.1**
Metals	47,331	52,248	52,796	57,630	45,604	–
Non-metals	7,991	8,332	8,764	9,991	8,387	–
Coal & coke	1,536	1,526	1,331	1,933	1,187	–
Total Economy Imports	**380,858**	**397,044**	**407,272**	**433,976**	**365,151**	**–**
Total Exports						
Stage I	15,259	16,935	18,171	28,807	19,921	5.5
Stage II	18,705	25,315	32,570	31,122	22,050	6.1
Stage III	16,225	18,427	19,746	20,420	13,156	3.7
Stage IV	14,418	14,851	14,616	14,799	11,305	3.1
Stage I–IV	**64,608**	**75,527**	**85,103**	**95,148**	**66,432**	**18.5**
Metals	48,980	60,449	69,408	69,381	49,121	–
Non-metals	12,145	11,642	12,522	19,289	12,095	–
Coal & coke	3,483	3,437	3,174	6,479	5,216	–
Total Economy Exports	**436,351**	**440,365**	**450,413**	**483,579**	**359,700**	**–**

Source: TRAGS, Natural Resources Canada; Statistics Canada.

Imports

The pattern of imports exhibited a similar trend as exports: the value of imports for the first three stages increased during the 2005 to 2008 period, before declining considerably in 2009. Fourth stage imports have remained stable.

Annex 12 details the Canadian industry imports of $46 billion in metals, $8 billion in non-metals and $1 billion in coal in 2009, for a total of $55 billion. This figure equates to about 15% of total Canadian goods imports in 2009. Key imports in 2009 included iron and steel, aluminum, copper, gold and coal.

Of Canada's total metals imports in 2009, around 54% originated from the U.S. and 32% from "other" origins, including South America, Russia and Africa. These other regions are an important source of copper, gold, iron and steel, and aluminum for Canadian smelters and refineries.

International Developments in 2009

The mining industry is among the most global of all sectors. Mineral products have strategic importance to countries with large or growing infrastructure needs and manufacturing sectors. As well, many countries and governments gain important revenues from the industry. It is therefore not unusual for the state to play a central role in funding or controlling mineral resource development and for the global mining industry to be directly affected by international trade and investment policy. Recent years have seen interesting developments in many areas, as discussed in the following pages.

THROUGH INVESTMENTS and policies over the past two decades, Chinese organizations have cornered some 93–97% of the global rare earth market. Supply concerns are increasing in western countries, given the unique properties of rare earth elements and their importance in defence, clean energy and communications technologies.

A Pause, then Uncertain Recovery in Global Market Demand

As detailed in Section 3.0, the demand for and price of many minerals fell significantly in late 2008. Several dozen mines in Canada and abroad were closed, and numerous other project delays and cuts were implemented in the aim of bringing supply in line with demand.

Beyond these short-term adjustments, though, the longer-term worldwide demand for metals and minerals is expected to remain on a growth trajectory. 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 through 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. According to a recent World Economic Forum study, the economic growth projected in China in the 2020–2025 timeframe will still be in the range of 6%–9% annually, and that of India will average 6%. In the immediate term, the effects of government stimulus spending will likely be seen as the near-$800 billion package in the U.S. and the $600 billion program in China wind through the system.

The Canadian dollar has climbed around 50% in this decade in U.S. dollar terms, driven in large part by growth in global commodity prices and Canada's strength in these areas. For the

Canadian mining industry, minerals are generally priced in U.S. dollars, while labour and other costs are denominated in Canadian currency—a climbing currency therefore serves to reduce profitability. However, as noted in a March 2010 paper by Natural Resources Canada, the benefits to the industry of strengthened mineral prices have more than offset the negative effects of a strengthened currency.

International Governments Seeking Greater Revenues

Given the strength of mineral prices during the 2003 to 2008 period, the governments of many countries endeavoured to obtain a larger share of the overall revenue streams through reviewing existing licenses, re-writing contracts or suspending the issuance of permits. *Facts & Figures 2008* detailed the actions being proposed or taken in Ecuador, Mongolia, Zambia, the Democratic Republic of the Congo, Argentina, Venezuela, Uzbekistan and Russia in this regard. Beyond these, the opposition takeover of the Kyrgyz government in April 2010 negatively affected values of mining companies there (although the fact that the government owns a third of the large Kumtor gold mine could help provide stability). In February 2010, the youth league of the African National Congress released a proposal calling for some 60% of South Africa's mining industry to be nationalized. These types of actions can affect business profitability, share price and investment. As well, government decisions could be taken in isolation without considering that costs for mining capital, labour and equipment also increased during these years.

Sub-national governments can also be of concern. An April 2009 article in *Mining Environmental Management* magazine discussed the issue of local communities and politicians being manipulated by interest groups to adopt an anti-mining platform, citing the example of Argentina.

It should be noted that the desire to capture larger revenues from mining is not restricted to governments of developing countries. The Australian government proposed a plan in its May 2010 budget to implement a 40% super-profits tax and to apply the changes to existing operations. This caused significant opposition from industry sources, who noted that the sector already contributed over double its GDP share of the country's corporate income tax—and several companies withheld investment decisions pending further consultations. This issue was an important contributor to the resignation of Australia's prime minister in June 2010, and the subsequent agreement with the government that reduced the super-profit tax rate, narrowed its scope and increased the profitability threshold.

In Canada, a new diamond royalty proposed by the Ontario government without advance consultation in its 2007 budget was viewed by industry as arbitrary and discriminatory, and coming 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. The province of Alberta has also changed its oil and gas royalty regime, raising rates effective in 2009, and subsequently backing off some changes so as to encourage unconventional extraction techniques.

Other Developments Affecting International Competitiveness

Beyond these examples of troubled investment regimes, other countries are actively aiming to attract investment to develop their natural resources. Jamaica, for example, unveiled its first national minerals policy in May 2009, improving the investment climate for enhanced development of bauxite, base and precious metals, and industrial minerals. Tanzania, Zambia, Colombia and others have difficult investment regimes, yet are looking to improve the climate for mineral exploration and development. Mongolia's recent election brought a pro-development president to power. This has

provided some momentum behind development of the Oyu Tolgoi copper-gold mine proposed by Ivanhoe Mines; some $750 million is projected to be invested in 2010 as construction begins toward a 2013 production timetable. Projections suggest that this will become one of the world's largest copper-gold projects and will position Mongolia among economic growth leaders in Asia. Further evidence of the importance of government actions was seen in South America, where the conclusion of a tax agreement between Chile and Argentina in 2009 led to formal approval by Barrick Gold for construction of the Pascua-Lama project, one of the world's best undeveloped gold projects and involving pre-production construction costs in the US$3 billion range.

The availability of energy, water and transportation infrastructure are other important variables that affect investment decisions, and conditions can vary widely from one country to the next. For example, Chile has water availability challenges and is actively monitoring water extraction levels associated with specific mine sites. Concerns exist as well regarding the availability of energy in northern Chile, while uncertain power supply is hindering the ability of mining companies to operate at normal levels of production in South Africa. In transportation, there are many instances where significant infrastructure investments are required, such as rail links in Tanzania or highways in northern Quebec. Often, the share to be paid by companies versus by governments can be unclear and require negotiation. While the Middle East is not viewed as a region of traditional mining strength, it is interesting to note that the World Bank criticized Middle East governments in a 2009 document as being too focused on oil, having inappropriate fiscal and legal practices for the mining sector, and featuring governments that are overly interfering. There is felt to be mining potential in the region for those countries that can create a positive investment climate.

CANADIAN MINING COMPANIES operate in dozens of countries, paying taxes and creating jobs and supply linkages in these countries. Individual companies are also active in developing countries in helping to pay for schools, roads, hospitals, child health and nutrition programs and a range of other social investments.

The Fraser Institute survey released in April 2010, featuring input from 670 companies, 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. Quebec, New Brunswick, Finland, Alberta, Nevada, Saskatchewan, Chile, Newfoundland and Labrador, Manitoba and South Australia were the ten top-rated jurisdictions of the 72 captured in the survey. Ontario, ranked 10th in last year's survey, fell to 22nd this year, while BC fell from 24th to 38th rank. The lowest-ranked jurisdictions were Venezuela, Ecuador, the Philippines, Zimbabwe, DRC, Mongolia, Bolivia, Honduras, Guatemala and California. The survey was completed prior to changes announced in Quebec's March 2010 budget that tax rates would be increased from 12% to 16% and some deductions reduced. The effect of these changes should be captured in the 2011 Fraser Institute study.

Some Canadian analysts are concerned that lack of clarity and commitment in the land access area could negatively impact the future competitiveness of mining in Canada. Issues such as government proposals to protect large areas of land in the north and amendments to provincial mining legislation require the proper balance—indeed, imbalance in resolving these issues could serve to drive mineral exploration, development and operational investment to

other jurisdictions and to stifle development opportunities for Aboriginal communities, among others. In this regard, it should be highlighted that large U.S. lobby interests such as the Pew Trusts have become actively involved working with NGOs against certain Canadian economic developments.

As a final point on the international competitiveness theme, it should be noted that NRCan officials have been conducting some interesting research measuring Canada's mining competitiveness. Preliminary indications are that Canada is more competitive in the extraction and concentrate stages than in the metal fabrication stage, and that Canadian operations in aluminum and nickel are more competitive than those in copper and zinc. The work also notes that scale of operation can be another important variable—the average capacity of the world's top ten copper smelters has grown from 270 to 480 thousand tonnes in a decade, an 80% increase that risks leaving Canadian facilities in its wake.

China Trade and Investment Policy Issues

There have been a number of trade policy activities in China in recent years that are relevant to the mining industry.

- Among other measures, China has a permit system for copper concentrate and applies an export duty on unwrought copper—both policies are aimed at protecting important raw material supplies for domestic use and keeping these raw material flows out of the global trading system. Relevant to this point, the U.S., the EU and Mexico are challenging Chinese export restrictions on nine categories of mineral raw materials. The dispute has been driven, among other factors, by complaints from the U.S. and EU steel industries alleging that Chinese export barriers are serving to keep raw materials within China, and thus in effect available at subsidized rates for its manufacturers. In a May 2010 ruling, the World Trade Organization (WTO) dispute panel narrowed the scope of some complainants' claims while potentially broadening other claims. 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. Beyond the WTO action, the OECD is also examining this general issue in greater detail.
- China is implementing measures to increase the scale and self-sufficiency of its metal smelting operations. 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.
- In May 2009, China's state committee announced its intent to consolidate the base metals industry and restrict new aluminum projects, both to cope with the international financial crisis and to accelerate industry restructuring. The government plans to set up a handful of large metals producers by 2011 and to adjust industry structure such that the top ten producers control 90% of national copper output, 70% of aluminum, 60% of lead and 60% of zinc production. Outdated production and over-capacity will be eliminated over time.
- In recent years, China has invested periodically in its strategic stockpiling efforts with purchases of iron ore, aluminum, copper, nickel, tin and zinc as well as crude oil. These purchases supported the global metal price increases seen from mid-2009 onward.
- While investment abroad was discouraged by Chinese authorities until a few years ago, this is no longer the case. China presently holds over US$2 trillion in foreign exchange reserves. As detailed below, China is investing actively in Africa and is increasingly seeking opportunities in Western countries, as well as closer oil supply relationships with Iraq, Iran and Venezuela. The number of acquisitions of Japanese companies, mainly in high-tech areas, by Chinese firms has doubled in the past year. China has also indicated investment interest in former CIS countries, particularly Uzbekistan, where Chinese organizations have invested in the Amantayau gold-silver mine development and in a Boztau uranium exploration project.
- It also seems evident that Chinese investment in Canada's mining industry will grow over the coming years. A Chinese company has made a modest investment in a Canadian oil sands project, and in July 2009 China Investment Corp, the country's official sovereign wealth fund (SWF), invested $1.7 billion to acquire 17% of Teck Resources. From Teck's perspective, the strategic move provides the company with potential marketing partners in China as well as an equity infusion.

It is speculated in mid-2010 that China's state aluminum company, Chinalco, could buy a minority stake in Canada's Ivanhoe Mines or in the large Mongolian Oyu Tolgoi project that Ivanhoe controls.

- Through investments over the past two decades, Chinese organizations have cornered some 93%–97% of the global rare earth market, an area in which export barriers are present as a means of consolidating domestic supply. In mid-2010, the Chinese government announced that it would be reducing rare earth export quotas by 72% in the second half of 2010. Attention to supply is increasing in Western countries, given the unique magnetic and spectroscopic properties of rare earth elements and their importance in defence, clean-energy and communications technologies. A U.S. senator introduced legislation in March 2010 proposing that tax revenues be used to build a national defence stockpile of rare earth metals. (Advisory firm Hallgarten describes Western government failures in rare earth security as "duty shirked" and estimates that it could take 15 years for the U.S. to rebuild its rare earth supply chain.) In June 2010, the European Commission highlighted potential shortages and recommended that the EU should increase its support for exploration of strategic metals, including rare earths, and increase incentives for recycling. In Canada, several companies are looking to develop rare earth finds in Quebec, the NWT, the Yukon, Ontario, New Brunswick, Manitoba and Saskatchewan.
- In recent years, China has turned to Africa as a potential source of raw materials. Africa has become China's leading source of imported oil, with Angola,

Sudan, Nigeria and Gabon becoming major partners. Transactions include a US$2.3 billion investment in an offshore Nigerian oil field by China's state-owned energy company, and a US$2 billion package of loans and aid to Angola 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. The DRC government stated in 2008 that it planned to borrow $5 billion from China to invest in infrastructure and to help revive its mining industry. In 2009, African Minerals announced that its $2.5 billion iron ore project in Sierra Leone would be funded and built by Chinese construction companies in exchange for iron ore supply guarantees.

- Relations between China and Australia were tested during the past year in connection with the charging and sentencing of four Rio Tinto employees regarding bribery and stealing state secrets. Some of the circumstances surrounding this issue, and the relationship to iron ore price negotiations, remain murky. There have been numerous Chinese acquisitions in Australia in recent years, including Minmetals of OZ Minerals and Wuhan Iron and Steel of Centrex Metals.
- There has been debate within the U.S. Congress and the Obama Administration regarding whether China is manipulating its currency. Some research suggests that the yuan is undervalued by 40% vis-à-vis the U.S. dollar and that inflating its value to a "proper balance" would lead to the creation of 1.2 million jobs in the U.S. Some 130 congress members wrote the U.S. Treasury Secretary in 2010 urging punitive duties in this respect. In June 2010, the Chinese government sent positive signals regarding an appreciation of the currency and the U.S. government held off on pronouncing China as a currency manipulator.
- There are signs that segments of China's low-cost workforce will be gaining improved working conditions and wages, as workers in companies such as Honda obtain increases in the 30% range through strike actions. This issue will evolve over the coming decade, as the middle class will presumably gain greater purchasing power while companies may see their low-cost competitive advantage gradually eroded.

CANADA CONTINUES to be among the world's most open countries in terms of trade and investment flows in mining.

Other Trade and Investment Policy Developments

The global trade policy front has been relatively quiet for several years, although World Trade Organization trade discussions have continued intermittently. In recent 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. Despite progress in these aspects, prospects for a culmination of the WTO Doha negotiating round remain distant as of mid-2010, as countries turn their global economic focus to addressing fiscal and debt challenges and to bilateral trade policy initiatives.

Within this trade policy vacuum, economic observers see signs of some important economies becoming increasingly protective of their raw material supply. For example, Russia has arbitrarily halted energy exports to Belarus and Ukraine twice in recent years. Along this vein, overall investment interest in Russia has cooled in recent years, a trend that will likely be reinforced through passage of its strategic deposits law in 2008. The number of exploration projects ongoing in Russia is limited, as is the number of successes. It seems likely that the Russian government will play a greater role in financing or bearing risks associated with mineral exploration projects.

As well, India's government imposed an export tax in 2007 aimed at cutting iron ore exports in half, over concerns that existing 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 ArcelorMittal are building steel mills in India, and that the country's steel output is expected to increase five-fold to 200 Mt by 2020—a reality that helps explain its efforts to restrict iron ore exports. As an indication of India's emerging global investment presence, Essar Global, the controller of India's largest steel exporter, purchased Canada's Algoma Steel in 2007. Coal India, a state entity and the world's largest coal producer with 473 operating mines, indicated in April 2010 that it would seek strategic international acquisitions, including possible joint ventures in Australia. McKinsey research estimates that up to $120 billion could be invested in India's coal, aluminum and steel industries by 2015.

Another trade policy area that is gaining 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 and some legislators in the U.S. that higher carbon footprint fuels (oil from oil sands being the most frequent suggestion) should face import tariffs or bans. While this type of trade policy issue could receive greater attention over the coming years, any actions along this path would likely lead to retaliatory measures given that all forms of energy generation carry environmental consequences. In the U.S., for example, some 30 states have a coal-powered carbon footprint as large as or larger than that of Alberta's oil sands.

Another investment policy development that has become very important in recent years relates to sovereign wealth funds (SWFs). Fuelled by record oil prices and earnings, SWFs have become increasingly important funding sources. Global Insight analysts estimate the combined value of global SWFs at $3.6 trillion in 2007 (equal to the established economies of Britain, France or Germany) and potentially rising to US$10 trillion within a decade. Goldman Sachs estimates that some $1.8 trillion is shifting from oil consumers to oil producers each year—wealth that is directed in large part to the SWFs of oil producing countries. There are some 40 SWFs in place in 34 countries, including the Abu Dhabi Investment Authority ($627 billion in assets), the Norwegian Government Pension Fund ($443 billion), Saudi Arabia's SAMA ($415 billion) and the China Investment Corp ($289 billion). It is estimated that the funds of the Gulf Arab states spent $60 billion acquiring foreign assets in 2007, double the two previous years combined. There is considerable policy debate regarding the role of SWFs—concern over the opaqueness and political orientation of these funds mixed with support of their ability to provide liquidity and stability to the global economy.

Continued Canadian Openness

In contrast to the examples of protectionism and government intervention described above, 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, which themselves have been waived in certain instances and which will be waived in instances where reciprocal openness is seen. Canada's openness to investment was seen in a substantial manner in the 2006–2007 period when Inco, Falconbridge and Alcan were each acquired by foreign companies driven by views on how best to take advantage of mounting prices, limited supplies and the Chinese reality. As a general principle, MAC and the Canadian mining industry support a free and open flow of

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.

Canada and the EU announced the launch of negotiations towards a comprehensive economic agreement in May 2009. A background study estimated that trade liberalization could lead to a $12 billion increase in Canada's GDP and increase bilateral trade by 20%. This will be an extensive undertaking and the negotiations will face many challenges in meeting the targeted two-year timeframe. The third round of negotiations between Canadian and EU officials was held in April 2010, with a fourth round scheduled for July 2010.

The federal government has also moved toward further liberalization of Canadian relations with Peru and Colombia. Legislation implementing a Canada-Peru FTA received Royal Assent in June 2009, while a Canada-Colombia FTA received assent in June 2010.

Canada is also in varying phases of negotiation regarding potential or strengthened foreign investment protection agreements with Tanzania, Madagascar, Mongolia, Indonesia, Vietnam, Kuwait, India and China, among others. It is possible as well that Canada and India could launch free trade negotiations in the fall of 2010. Some of these potential agreements would be of high relevance to the mining industry. FIPAs

CANADA AND THE EU announced the launch of negotiations towards a comprehensive economic agreement in May 2009. A background study estimated that trade liberalization could lead to a $12 billion increase in Canada's GDP and increase bilateral trade by 20%.

are bilateral agreements that place investment-treatment obligations on each country and that provide foreign investors with access to independent rules and arbitrators should disputes arise between the investor and host government. While the actual enforcement components are rarely used, the mere existence of a FIPA can help guide foreign governments with a set of rules and expectations of fairness and transparency. MAC and the mining industry support these directions and periodically provide input to Canadian policy makers and negotiators.

Corporate Social Responsibility

Among other definitions, corporate social responsibility (CSR) reflects the inclusion of public interest into corporate decision-making and the recognition of a bottom line that encompasses People, Planet and Profit. In a recent analysis of branding and globalization, consultancy Oxford Metrica estimated that business executives have an 82% chance of facing corporate disaster within any five-year period, up from 20% two decades ago. The difference lies in the mix of globalization (spreading activities more broadly) and the Internet (spreading news instantaneously). This combination of increased worldwide investment with heightened community awareness has contributed to increased attention by companies and non-governmental organizations to the area of CSR.

The Canadian mining industry is at the forefront in this area. Representatives from MAC, along with the Prospectors and Developers Association of Canada (PDAC) and NGOs, participated in a federal advisory group in 2007 aimed at promoting good practices in the international activities of the extractive sectors. The consultation

process culminated in recommendations conveyed jointly by industry and NGO representatives to the federal government in March 2007. In a much-delayed response, the federal government unveiled its approach in March 2009. The *Building the Canadian Advantage* plan proposed to establish an Extractive Sector CSR Counsellor, to promote CSR guidelines and to create a CSR Centre of Excellence, among other measures. MAC and the industry believe that this plan, if properly funded, provides an effective complement to the CSR measures and requirements already contained in TSM, and to the numerous CSR activities and investments made by Canadian mining companies internationally.

The government's two-year delay in unveiling its approach caused opposition politicians to grasp the CSR mantle—in one case by tabling a private member's bill known as Bill C-300. MAC and other industry representatives view the Bill's objective as laudable, although the proposed legislation is naïve and fundamentally flawed in its design. A more logical path forward is to give the government's plan time to work and to strengthen whatever weaknesses may emerge in the passage of time.

In general, Canadian mining companies operate in dozens of countries in all regions of the world, paying taxes and creating jobs and supply linkages in these countries, while also investing heavily in CSR practices. Individual Canadian companies are socially active in developing countries, helping pay for schools, roads, electrical grids, hospitals, clinics, school breakfast programs, community halls, child health and nutrition programs, and a range of other social investments. There are many global CSR initiatives in place housed within bodies such as the UN and the World Bank's International Finance Corporation (IFC), the OECD, the global commercial banks, the International Council on Mining and Metals, and many others. Canada's mining companies are typically leaders in adopting and implementing these kinds of commitments. In the diamonds area, the Kimberly Process of certification has played an important role in the fact that zero African diamond producing states were in civil war in 2006, versus six in 2000.

Despite the high priority attached to CSR abroad, there is no shortage of challenges facing industry on this theme. For example, the operations of companies abroad, on the ground, can be complicated by the existence of artisanal and small-scale mining in proximity of formal mine sites. It is estimated by *Mining Environmental Management* magazine that up to 100 million people worldwide are dependent on revenues from this informal segment. It is not uncommon for land disputes, security concerns, child labour issues, tax evasion, mercury contamination and related social-environmental issues to arise at the intersection of the formal and informal mining sectors in developing countries.

List of Annexes

Annex 1: Producing Mines in Canada, 2009[1]

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Newfoundland & Labrador				
Beaver Brook Antimony Mines Inc.	Beaver Brook	(U.) (C.)	Glenwood	Sb
Rambler Metals and Mining PLC	Nugget Pond	(C.)	Snook's Arm	Au
Anaconda Mining Inc.	Pine Cove	(P., C.)	Baie Verte	Au
Teck Cominco Limited	Duck Pond	(U.)	Millertown	Cu, Zn
Vale Inco Limited	Voisey's Bay	(P., C.)	Voisey's Bay	Ni, Cu, Co
Wabush Mines	Scully	(P., C.)	Wabush	Fe
Iron Ore Company of Canada (IOC)	Carol Lake	(P.)	Labrador City	Fe
Hurley Slateworks Company Inc.	Burgoyne's Cove	(P.)	Burgoyne's Cove	Slate
Atlantic Barite Ltd.	Buchans	(P., C.)	Buchans	Barite
Galen Gypsum Mines Limited	Coal Brook	(P.)	St. George's Bay	Gypsum
Atlantic Minerals Limited	Lower Cove	(P.)	Lower Cove	Limestone, dolomite
Labrador Inuit Development Corporation	Ten Mile Bay	(P.)	Nain	Anorthosite
Iron Ore Company of Canada (IOC)	Plateau Dolomite	(P.)	Labrador City	Dolomite
Shabogamo Mining and Exploration Ltd.	Roy's Knob	(P.)	Labrador City	Silica
Nova Scotia				
ScoZinc Ltd. (Acadian Mining Corporation)	Scotia	(P., C)	Gays River	Zn, Pb
Atlantic Industrial Minerals Incorporated	Glen Morrison	(P.)	Cape Breton	Limestone
Georgia-Pacific Canada, Inc.	Sugar Camp	(P.)	Melford	Gypsum
Georgia-Pacific Canada, Inc.	Melford	(P.)	Melford	Gypsum
CGC Inc.	Little Narrows	(P.)	Little Narrows	Gypsum
Mosher Limestone Company Limited	Upper Musquodoboit	(P.)	Upper Musquodoboit	Limestone
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
3061831 Nova Scotia Ltd.	Florence	(P.)	Big Pond	Coal
Pioneer Coal Ltd.	Point Aconi	(P.)	Point Aconi	Coal
Pioneer Coal Ltd.	Stellarton	(P.)	Stellarton	Coal
New Brunswick				
Xstrata Zinc Canada	Brunswick	(U., C.)	Bathurst	Pb, Zn, Cu, Ag, Au
Potash Corporation of Saskatchewan Inc.	New Brunswick (Sussex)	(U., Plant)	Sussex	Potash, salt
Graymont Inc.	Havelock	(P., Plant)	Havelock	Lime, limestone

Annex 1: Producing Mines in Canada, 2009[1] (continued)

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Brookville Manufacturing Company	Brookville	(P., Plant)	Brookville	Dolomitic lime
Elmtree Resources Ltd.	Sormany	(P., Plant)	Sormany	Limestone
Atlantic Silica Inc.	Poodiac	(P.)	Poodiac	Silica
Quebec				
ArcelorMittal Mines Canada Inc.	Mount-Wright	(P., C.)	Fermont	Fe
Consolidated Thompson Iron Mines Ltd.	Bloom Lake	(P., C.)	Labrador City	Fe
IAMGOLD Corporation	Niobec	(U., C.)	Saint-Honoré-de-Chicoutimi	Nb, Ta
Xstrata Nickel Canada	Raglan	(P., U., C.)	Katinniq	Ni, Cu, Co, PGMs
Inmet Mining Corporation	Troilus	(P., C.)	Chibougamau	Au, Ag, Cu
Metanor Resources Inc.	Barry	(P.)	Barry Twp.	Au, Ag
Metanor Resources Inc.	Bachelor Lake	C	Desmaraisville	Au, Ag
Louvem Mines Inc./Richmond Mines Inc.	Beaufor	(U.)	Val-d'Or	Au, Ag
Alexis Minerals Corporation	Lac Herbin	(U.)	Val-d'Or	Au, Ag
Xstrata Zinc Canada	Perseverance	(U., C.)	Matagami	Zn, Cu, Au, Ag
Agnico-Eagle Mines Limited	Goldex	(U., C.)	Val-d'Or	Au, Ag
Wesdome Gold Mines Ltd.	Kiena	(U., C.)	Val-d'Or	Au, Ag
North American Palladium Ltd.	Sleeping Giant	(U., C.)	north of Amos	Au, Ag
Richmont Mines Inc.	Camflo	(C.)	Malartic	Au, Ag
Agnico-Eagle Mines Limited	LaRonde and LaRonde II	(U., C.)	Cadillac	Zn, Cu, Au, Ag, Pb
IAMGOLD Corporation	Doyon	(U., C.)	Cadillac	Au, Ag
Agnico-Eagle Mines Limited	Lapa	(U.)	Val-d'Or	Au
IAMGOLD Corporation	Mouska	(U.)	Cadillac	Au, Ag, Cu
Aurizon Mines Ltd.	Casa Berardi	(U., C.)	Berardi Twp.	Au, Ag
First Metals Inc.	Fabie Bay	(P., U.)	Hébécourt	Cu, Zn, Au, Ag
The Canadian Salt Company Limited	Seleine	(U.)	Îles-de-la-Madeleine	Salt
QIT-Fer et Titane inc.	Tio	(P.)	Hâvre Saint-Pierre	Ilmenite
Le Groupe Berger Ltée.	Sainte-Modeste	(P.)	Sainte-Modeste	Vermiculite, perlite
Elkem Metal Canada Inc.	Sitec Inc.	(P.)	Petit lac Malbaie	Silica, silicon carbide
9184-6808 Québec inc. (LAB Chrysotile)	Black Lake	(P., Plant)	Thetford Mines	Chrysotile
Graymont Inc.	Marbleton	(P., Plant)	Marbleton	Limestone, lime
Jeffrey Mine Inc.	Jeffrey	(P., Plant)	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
St. Lawrence Cement Inc.	Joliette	(P.)	Joliette	Limestone
Graymont Inc.	Joliette	(P., Plant)	Joliette	Lime, limestone

Annex 1: Producing Mines in Canada, 2009[1] (continued)

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Silco Sands Inc.	Saint-Clotilde	(P.)	Beauharnois	Silica, ferrosilicon
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-Donat-de-Montcalm	(P., Plant)	Saint-Donat-de-Montcalm	Silica
Unimin Canada Ltd.	Saint-Canut	(P., Plant)	Saint-Canut	Silica
Suzorite Mica Products Inc.	Letondal	(P.)	Suzor Twp.	Mica
Timcal Canada Inc.	Saint-Aimé-du-Lac-des-Îles	(P., Plant)	Saint-Aimé-du-Lac-des-Îles	Graphite
Temisca inc.	Saint-Bruno-de-Guigues	(P.)	Saint-Bruno-de-Guigues	Silica
Ontario				
Kirkland Lake Gold Inc.	Macassa	(U., C.)	Kirkland Lake area	Au, Ag
Apollo Gold Corporation	Black Fox	(P., C.)	Matheson	Au
Vale Inco Limited	Garson	(U.)	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Xstrata Nickel Canada	Thayer-Lindsley	(U.)	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Vale Inco Limited	Stobie	(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
FNX Mining Company Inc.	Podolsky	(U.)	Norman Twp.	Ni, Cu, PM
Goldcorp Inc.	Hoyle Pond	(U.)	south of Porcupine	Au, Ag
Goldcorp Inc.	Pamour	(P.)	Timmins	Au, Ag
Goldcorp Inc.	Dome	(U., C.)	Timmins	Au
Liberty Mines Inc.	Redstone	(U., C.)	southeast of Timmins	Ni
Vale Inco Limited	McCreedy East/ Coleman	(U.)	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Xstrata Nickel Canada	Fraser	(U.)	Sudbury	Ni, Cu, Co, PGMs
Xstrata Nickel Canada	Strathcona	(C.)	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
Xstrata Nickel Canada	Onaping/Craig	(U.)	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te
FNX Mining Company Inc.	Levack	(U.)	Sudbury	Cu, Ni, PM
FNX Mining Company Inc.	McCreedy West	(U.)	Sudbury	Ni, Cu, Co, PGMs, Au, Ag, Se, Te

Annex 1: Producing Mines in Canada, 2009[1] (continued)

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Xstrata Copper Canada	Kidd Creek	(U., C.)	Timmins	Cu, Zn, Ag, Se, Te, In, Cd
Xstrata Nickel Canada	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
Teck Cominco Limited	Williams	(U., P., C.)	Marathon	Au
Goldcorp Inc.	Musselwhite	(U., C.)	Thunder Bay	Au, Ag
Goldcorp Inc.	Red Lake	(U., C.)	Balmertown	Au, Ag
OMYA (Canada) Inc.	Tatlock	(P.)	Tatlock	Calcium carbonate
Lafarge Canada Inc.	Bath	(P.)	Bath	Limestone
ESSROC Canada Inc.	Picton	(P.)	Picton	Limestone (cement)
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
CGC Inc.	Hagersville	(U.)	Hagersville	Gypsum
E.C. King Contracting Ltd.	Sydenham	(P.)	Sydenham	Dolomitic lime
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)
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 Group	Penhorwood	(P.)	Penhorwood	Talc
Agrium Inc.	Kapuskasing	(P.)	Kapuskasing	Phosphate
The Canadian Salt Company Limited	Windsor	(Solution Mining)	Windsor	Salt
The Canadian Salt Company Limited	Ojibway	(U.)	Windsor	Salt
De Beers Canada Inc.	Victor	(P., Plant)	James Bay Lowlands	Diamonds
Manitoba				
Tantalum Mining Corporation of Canada Limited	Bernic Lake	(U., C.)	Lac-du-Bonnet	Ta, Li, Cs, Rb
San Gold Corporation	Hinge	(U.)	Bissett	Au
San Gold Corporation	Rice Lake	(U.)	Bissett	Au
Vale Inco Limited	Thompson	(U., C.)	Thompson	Ni, Cu, Co, PGMs
Vale Inco Limited	Birchtree	(U.)	Thompson	Ni, Cu, Co, PGMs
Crowflight Minerals Inc.	Bucko	(U., C.)	Wabowden	Ni, Cu, Co, PGMs
HudBay Minerals Inc.	Chisel North	(U., C.)	Snow Lake	Cu, Zn

Annex 1: Producing Mines in Canada, 2009[1] (continued)

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
HudBay Minerals Inc.	Callinan/777	(U.)	Flin Flon	Cu, Zn, Au, Ag
HudBay Minerals Inc.	Trout Lake	(U.)	Flin Flon	Cu, Zn, Au, Ag
Graymont Inc.	Faulkner	(P., Plant)	Faulkner	Limestone, lime
CertainTeed Gypsum Canada, Inc.	Amaranth	(P.)	Harcus	Gypsum
Lehigh Cement Company	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
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
Prairie Mines & Royalty Limited	Bienfait	(P.)	Bienfait	Coal
Prairie Mines & Royalty Limited	Boundary Dam	(P.)	Estevan	Coal
Prairie Mines & Royalty Limited	Poplar River	(P.)	Coronach	Coal
Alberta				
The Canadian Salt Company Limited	Lindbergh	(Solution Mining)	Elk Point	Salt
Hammerstone Corporation	Steepbank	(P.)	north of Fort McMurray	Limestone
Suncor Energy Inc.	Fort McMurray West	(P.)	Fort McMurray	Limestone
Rio Petro Ltd.	Sunnynook	(Solution Mining)	Cessford	Salt
Hammerstone Corporation	Muskeg Valley	(P.)	north of Fort McMurray	Limestone
Hammerstone Corporation	Aurora	(P.)	Fort McMurray	Limestone
Canexus Chemicals Canada Ltd.	Redwater	(Solution Mining)	Bruderheim	Salt

Annex 1: Producing Mines in Canada, 2009[1] (continued)

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
Ward Chemicals Inc.	Calling Lake	(Solution Mining)	north of Athabasca	Salt
Tiger Calcium Services Inc.	Mitsue	(Solution Mining)	Slave Lake	Salt
Graymont Inc.	Summit	(P., Plant)	Coleman	Limestone, lime
Graymont Inc.	Exshaw	(P., Plant)	Exshaw	Limestone, lime
Lafarge Canada Inc.	Exshaw	(P., Plant)	Exshaw	Limestone
Burnco Rock Products Ltd.	Clearwater	(P., Plant)	Clearwater River	Limestone
Prairie Creek Quarries Ltd.	Cougar Ridge	(P., Plant)	Rocky Mountain House	Limestone
Graymont Inc.	Fish Creek	(P., Plant)	Nordegg	Limestone
Lehigh Cement Company	Mcleod	(P.)	Cadomin	Limestone
Prairie Mines & Royalty Limited	Sheerness	(P.)	Hanna	Coal
Prairie Mines & Royalty Limited	Paintearth	(P.)	Forestburg	Coal
Alberta Power (2000) Ltd.	Vesta	(P.)	Cordel	Coal
Dodds Coal Mining Company Ltd.	Dodds Coal	(P.)	Dodds	Coal
Prairie Mines & Royalty Limited	Genesee	(P.)	Warburg	Coal
Keephills Aggregate Company Ltd.	Burtonsville	(P.)	Burtonsville	Coal
Prairie Mines & Royalty Limited	Highvale	(P.)	Seba Beach	Coal
Prairie Mines & Royalty Limited	Whitewood	(P.)	Warburg	Coal
Coal Valley Resources Inc.	Coal Valley	(P.)	Edson	Coal
Teck Coal Limited	Cardinal River	(P.)	Hinton	Coal
Coal Valley Resources Inc.	Obed Mountain	(P.)	north of Hinton	Coal
Grande Cache Coal Corporation	Grande Cache	(P., U.)	Grande Cache	Coal
Suncor Energy Inc.	Millennium	(P.)	Fort Mackay	Upgraded crude oil
Syncrude Canada Ltd.	Mildred Lake	(P.)	Fort Mackay	Upgraded crude oil
Syncrude Canada Ltd.	Aurora North and South	(P.)	Fort Mackay	Upgraded crude oil
Shell Canada Energy	Muskeg River	(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 Resources 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
Northgate Minerals Corporation	Kemess	(P., C)	Smithers	Au, Cu
Imperial Metals Corporation	Huckleberry	(P., C.)	Houston	Cu, Mo, Au
Georgia-Pacific Canada, Inc.	4J	(P.)	Canal Flats	Gypsum

Annex 1: Producing Mines in Canada, 2009[1] (continued)

COMPANY	MINE SITE	ACTIVITY TYPE	LOCATION	COMMODITY
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
Mighty White Dolomite Ltd.	Rock Creek	(P., Plant)	Rock Creek	Dolomite
Imasco Minerals Inc.	Lost Creek	(U.)	Lost Creek	Limestone
Lafarge Canada Inc.	Harper Ranch	(P., Plant)	Kamloops	Limestone
Absorbent Products Ltd.	Bud	(P.)	Princeton	Calcium, clay
Heemskirk Canada Limited	Bromley Creek/Zeo	(P.)	Bromley Creek	Zeolite
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
Imperial Limestone Co. Ltd.	Imperial Limestone	(P.)	Texada Island	Limestone
Texada Quarrying Ltd. (Lafarge Canada Inc.)	Gillies Bay	(P.)	Texada Island	Limestone
Ash Grove Cement Company	Blubber Bay	(P.)	Texada Island	Limestone
Fireside Minerals Ltd.	Fireside	(P.)	Fireside	Barite
Imasco Minerals Inc.	Benson Lake	(P.)	Benson Lake	Limestone
Teck Resources Limited	Coal Mountain	(P.)	Sparwood	Coal
Teck Resources Limited	Line Creek	(P.)	Sparwood	Coal
Teck Resources Limited	Elkview	(P.)	Sparwood	Coal
Teck Resources Limited	Greenhills	(P.)	Sparwood	Coal
Teck Resources Limited	Fording River	(P.)	Elkford	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
Hillsborough Resources Limited	Quinsam	(U.)	Campbell River	Coal
Yukon				
Capstone Mining Corporation	Minto	(P., C.)	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., U., Plant)	Lac de Gras	Diamonds
De Beers Canada Inc.	Snap Lake	(U., Plant)	Snap Lake	Diamonds

(P.) Open-Pit (U.) Underground (C.) Concentrator
1 Included are operations that produced during 2009.
Note: Excluded operations are clay products, peat, and most construction materials (stone, sand and gravel).
Data compiled by the Minerals and Metals Sector, Natural Resources Canada and the National Energy Board.

Annex 2: Mining Establishments in Canada by Mineral and Region, 2009[1]

	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	YT	NT	NV	TOTAL
Iron ore	2	–	–	–	2	–	–	–	–	1	–	–	–	5
Gold and silver ore	1	–	–	–	13	8	1	1	–	4	–	–	–	28
Lead-zinc ore	–	–	1	2	–	–	–	–	–	–	–	–	–	3
Nickel-copper ore	1	–	–	–	1	6	1	–	–	–	–	–	–	9
Copper, copper-zinc ore	1	–	–	–	6	1	1	–	–	5	1	–	–	15
Molybdenum	–	–	–	–	–	–	–	–	–	2	–	–	–	2
Uranium	–	–	–	–	–	–	–	4	–	–	–	–	–	4
Other metals	–	–	–	–	2	1	1	–	–	–		1	–	5
Total Metals	**5**	**0**	**1**	**2**	**24**	**16**	**4**	**5**	**0**	**12**	**1**	**1**	**0**	**71**
Chrysotile	–	–	–	–	2	–	–	–	–	–	–	–	–	2
Diamonds	–	–	–	–	–	1	–	–	–	–	–	3	1	5
Gypsum	1	–	4	–	–	–	1	–	–	2	–	–	–	8
Peat	1	1	1	22	34	–	4	1	5	1	–	–	–	70
Potash	–	–	–	1	–	–	–	9	–	–	–	–	–	10
Salt	–	–	2	–	1	4	–	2	1	–	–	–	–	10
Sand and gravel	4	–	13	9	64	220	16	39	151	55	2	–	–	573
Stone	7	–	11	8	69	74	5	0	4	15	–	–	–	193
Shale, clay and other refractory minerals	–	–	1	–	4	2	–	1	1	–	–	–	–	9
Other non-metals	–	–	–	–	3	3	–	2	–	2	–	–	–	10
Total Non-metals	**13**	**1**	**32**	**40**	**177**	**304**	**26**	**54**	**162**	**75**	**2**	**3**	**1**	**890**
Coal	–	–	–	1	–	–	–	3	9	9	–	–	–	22

– Nil
1 As of December 31, 2009.
Sources: Natural Resources Canada; Statistics Canada.

Annex 3: Canadian Production of Leading Minerals by Region, 2009[p]

	COAL		POTASH (K_2O)		GOLD		IRON ORE		COPPER	
	KILO-TONNES	$000	KILO-TONNES	$000	KILO-GRAMS	$000	KILO-TONNES	$000	TONNES	$000
Newfoundland	–	–	–	–	117	4123	17,126	1,472,634	38,526	222,524
Prince Edward Island	–	–	–	–	–	–	–	–	–	–
Nova Scotia	–	–	–	–	–	–	–	–	–	–
New Brunswick	161	x	x	x	209	7356	–	–	7,937	45,842
Quebec	–	–	–	–	27,767	976,345	14,500	x	28,812	166,417
Ontario	–	–	–	–	52,211	1,835,832	–	–	118,684	685,521
Manitoba	–	–	–	–	3,965	139,435	–	–	48,935	282,646
Saskatchewan	10,401	x	x	x	1,396	49,076	–	–	–	–
Alberta	30,603	1,061,690	–	–	56	1,969	–	–	–	–
British Columbia	21,450	3,316,510	–	–	7,666	269,552	73	x	210,077	1 213,405
Yukon	–	–	–	–	2,310	81,230	–	–	27,410	158,318
Northwest Territories	–	–	–	–	–	–	–	–	–	–
Nunavut	–	–	–	–	–	–	–	–	–	–
Canada	**62,615**	**4,544,423**	**4,318**	**3,380,281**	**95,698**	**3,364,917**	**31,699**	**3,174,185**	**480,380**	**2,774,674**

	NICKEL		DIAMONDS		SAND AND GRAVEL		CEMENT		URANIUM	
	TONNES	$000	000 CARATS	$000	KILO-TONNES	$000	KILO-TONNES	$000	TONNES	$000
Newfoundland	28,023	476,585	–	–	3,164	7,770	–	–	–	–
Prince Edward Island	–	–	–	–	201	1,424	–	–	–	–
Nova Scotia	–	–	–	–	3,842	24,872	x	x	–	–
New Brunswick	–	–	–	–	3,029	14,405	–	–	–	–
Quebec	28,120	478,239	–	–	18,627	97,029	2,563	368,540	–	–
Ontario	44,253	752,615	696	236,364	85,198	486,136	4,630	520,973	–	–
Manitoba	31,235	531,205	–	–	10,543	55,626	–	–	–	–
Saskatchewan	–	–	–	–	10,755	62,286	–	–	10,076	1,392,088
Alberta	–	–	–	–	51,446	501,886	x	x	–	–
British Columbia	–	–	–	–	27,871	228,265	1,571	212,298	–	–
Yukon	–	–	–	–	1,225	5,943	–	–	–	–
Northwest Territories	–	–	10,250	1,447,940	268	1,796	–	–	–	–
Nunavut	–	–	–	–	–	–	–	–	–	–
Canada	**131,631**	**2,238,644**	**10,946**	**1,684,304**	**216,170**	**1,487,438**	**10,951**	**1,440,505**	**10,076**	**1,392,088**

p Preliminary – Nil x Confidential
Note: Totals may not add due to rounding.
Sources: Natural Resources Canada; Statistics Canada – Catalogue No. 26–202–X.

Annex 4: Canada's World Role as a Producer of Certain Important Minerals, 2008

			RANK OF FIVE LEADING COUNTRIES				
		WORLD	1	2	3	4	5
			Canada	Kazakhstan	Australia	Namibia	Russia
Uranium (metal content)	t	43,923	**9,001**	8,521	8,471	4,366	3,521
(mine production)	% of world total		**20.5**	19.4	19.3	9.9	8.0
			Canada	Russia	Belarus	Germany	Israel
Potash (K_2O equivalent)	000 t	36,000	**11,000**	6,900	5,100	3,600	2,400
(mine production)	% of world total		**30.6**	19.2	14.2	10.0	6.7
			Russia	**Canada**	Australia	Indonesia	New Caledonia
Nickel (mine production)	000 t	1,515	277	**260**	200	180	103
	% of world total		18.3	**17.1**	13.2	11.9	6.8
			Congo, D.R.	**Canada**	Australia	Brazil	Zambia
Cobalt (mine production)	t	66,788	31,000	**8,644**	5,500	4,300	3,841
	% of world total		46.4	**12.9**	8.2	6.4	5.8
			Australia	South Africa	**Canada**	China	Norway
Titanium concentrate	000 t	5,640	1,250	1,090	**900**	550	380
(ilmenite)	% of world total		22.2	19.3	**16.0**	9.6	6.7
			South Africa	Russia	**Canada**	U.S.A.	Zimbabwe
Platinum group metals	kg	479,919	291,600	127,500	**21,177**	16,100	11,500
(metal content)	% of world total		60.8	26.6	**4.4**	3.4	2.4
			China	Russia	**Canada**	U.S.A.	Australia
Aluminum (primary metal)	000 t	39,267	13,177	3,800	**3,120**	2,658	1,974
	% of world total		33.6	9.7	**7.9**	6.8	5.0
			Russia	Botswana	Congo, D.R.	Australia	**Canada**
Diamonds (precious)	000 carats	165,200	36,925	32,595	33,402	15,670	**14,803**
	% of world total		22.4	19.7	20.2	9.5	**9.0**
			Russia	China	Kazakhstan	Brazil	**Canada**
Chrysotile (asbestos)	000 t	2,180	925	380	300	220	**175**
(mine production)	% of world total		42.4	17.4	13.8	10.1	**8.0**
			China	Peru	Australia	U.S.A.	**Canada**
Zinc (mine production)	000 t	11,709	3,186	1,603	1,519	778	**716**
	% of world total		27.2	13.7	13.0	6.6	**6.1**
			U.S.A.	China	Chile	Peru	**Canada**
Molybdenum (Mo content)	t	211,300	61,400	59,800	45,000	17,000	**9,150**

Annex 4: Canada's World Role as a Producer of Certain Important Minerals, 2008 (continued)

			RANK OF FIVE LEADING COUNTRIES				
		WORLD	1	2	3	4	5
(mine production)	% of world total		29.1	28.3	21.3	8.0	**4.3**
			China	U.S.A.	Germany	India	**Canada***
Salt (mine production)	000 t	260,000	60,000	46,000	19,000	15,800	**12,000**
	% of world total		23.1	17.7	7.3	6.1	**4.6**
			China	South Korea	Japan	Kazakhstan	Mexico
Cadmium (metal)[1]	t	19,566	4,300	3,090	2,126	1,700	1,550
	% of world total		22.0	15.8	10.9	8.7	7.9
			China	U.S.A.	Iran	Spain	Thailand
Gypsum (mine production)[2]	000 t	151,000	40,700	12,700	12,000	11,300	8,800
	% of world total		27.0	8.4	7.9	7.5	5.8
			China	Australia	U.S.A.	Peru	Mexico
Lead (mine production)[3]	000 t	3,956	1,546	645	410	345	141
	% of world total		39.1	16.3	10.4	8.7	3.6
			China	U.S.A.	Australia	South Africa	Russia
Gold (mine production)[4]	t	2,298	285	235	214	213	185
	% of world total						
			Chile	U.S.A.	Peru	China	Australia
Copper (mine production)[5]	000 t	15,404	5,330	1,310	1,268	931	886
	% of world total		34.6	8.5	8.2	6.0	5.8
			Peru	Mexico	China	Australia	Chile
Silver[6]	t	21,304	3,686	3,236	2,800	1,926	1,405
	% of world total		17.3	15.2	13.1	9.0	6.6

** Tied with Australia for fifth*
1 Canada ranked 6th.
2 Canada ranked 6th.
3 Canada ranked 6th.
4 Canada ranked 8th.
5 Canada ranked 8th.
6 Canada ranked 10th.
Sources: Natural Resources Canada, from World Nonferrous Statistics and the Canadian Minerals Yearbook; U.S. Geological Survey (USGS).

Annex 5: Mineral Production of Canada, 2007–2009[P]

		2007		2008		2009[P]	
	UNIT	(QUANTITY)	($000)	(QUANTITY)	($000)	(QUANTITY)	($000)
Metallic Minerals							
Antimony	t	162	990	111	731	55	327
Bismuth	t	137	4,442	71	1,918	86	1,637
Cadmium	t	293	2,396	313	1,976	284	944
Calcium	t	–	–	–	–	–	–
Cesium	t	x	x	x	x	x	x
Cobalt	t	4,761	344,675	4,809	440,913	2,276	99,137
Copper	t	577,545	4,418,220	584,003	4,329,801	480,380	2 774,674
Gold	kg	102,211	2 460,623	94,909	2,835,318	95,698	3,364,917
Ilmenite	000 t	x	x	x	x	x	x
Indium	kg	x	x	x	x	x	x
Iron ore	000 t	32,774	2,502,500	32,102	4,063,452	31,699	3,174,185
Iron, remelt	000 t	x	x	x	x	x	x
Lead	t	69,851	193,626	87,127	236,115	72,074	140,256
Lithium	t	x	x	x	x	x	x
Magnesium	t	–	–	–	–	–	–
Molybdenum	t	6,819	x	8,229	x	8,836	x
Nickel	t	244,539	9,795,249	246,197	5,713,003	131,631	2 238,644
Niobium (Columbium)	t	4,337	x	4,400	x	4,330	x
Platinum group	kg	21,925	530,932	22,764	618,547	12,686	280,899
Selenium	t	144	10,760	191	13,933	173	10,228
Silver	t	829	384,399	709	364,295	608	325,749
Tantalum	t	55	4,509	53	x	29	x
Tellurium	t	14	1,206	20	4,526	16	2,721
Tungsten	t	2,718	57,244	2,795	61,862	2,501	50,100
Uranium	t	9,100	2,525,775	8,703	953,858	10,076	1,392,088
Zinc	t	594,113	2,069,890	704,780	1,408,149	672,379	1,242,556
Total, Metallic Minerals		**N/A**	**26,247,356**	**N/A**	**22,594,378**	**N/A**	**16,151,492**
Non-metallic Minerals							
Barite	000 t	9	2,929	9	3,344	15	4,878
Carbonatite	000 t	x	x	x	x	x	x
Cement	000 t	14,462	1,785,293	13,604	1,733,146	10,951	1,440,505
Chrysotile	000 t	x	x	x	x	x	x
Clay products	000 t	N/A	208,136	N/A	187,774	N/A	135,613
Diamonds	000 ct	17,144	1,799,714	14,523	2,369,266	10,946	1,684,304
Gemstones	t	67	4,630	51	5,851	49	2,844
Graphite	000 t	x	x	x	x	x	x
Gypsum	000 t	7,562	111,650	5,819	83,023	3,540	55,713

Annex 5: Mineral Production of Canada, 2007–2009[p] (continued)

		2007		2008		2009[p]	
	UNIT	(QUANTITY)	($000)	(QUANTITY)	($000)	(QUANTITY)	($000)
Lime	000 t	2,134	273,418	2,046	273,316	1,601	228,671
Magnesite	000 t	x	x	x	x	x	x
Marl	000 t	x	x	x	x	x	x
Mica	000 t	x	x	x	x	x	x
Nepheline syenite	000 t	690	61,746	646	54,864	513	54,534
Peat	000 t	1,282	232,537	1,231	238,510	1,131	220,729
Phosphate	000 t	x	x	x	x	x	x
Potash (K_2O)	000 t	11,085	2,814,563	10,379	7,662,373	4,318	3,380,281
Potassium sulphate	000 t	x	x	x	x	x	x
Pumice	000 t	x	x	x	x	x	x
Quartz (silica)	000 t	1,987	68,462	1,938	74,872	1,296	54,798
Salt	000 t	11,970	442,845	14,224	537,273	14,566	664,093
Sand and gravel	000 t	243,096	1,496,737	241,591	1,690,944	216,170	1 487,438
Serpentine	000 t	–	–	–	–	–	–
Soapstone, talc, pyrophyllite	000 t	79	26,480	64	22,314	44	19,453
Sodium sulphate	000 t	x	x	x	x	x	x
Stone	000 t	149,982	1,402,915	153,556	1,488,290	135,895	1,324,014
Sulphur, elemental	000 t	7,456	224,537	6,880	2,116,017	6,439	23,900
Sulphur, in smelter gas	000 t	696	31,345	746	148,456	538	79,695
Titanium dioxide	000 t	x	x	x	x	x	x
Tremolite	000 t	–	–	–	–	–	–
Zeolite	000 t	–	–	x	x	x	x
Total, Non-metallic Minerals		**N/A**	**11,588,310**	**N/A**	**19,372,019**	**N/A**	**11,455,586**
Mineral Fuels							
Coal	000 t	69,131	2,735,202	67,750	4,985,956	62,615	4,544,423
Total Mineral Fuels		**69,131**	**2,735,202**	**67,750**	**4,985,956**	**62,615**	**4,544,423**
Total Mineral Production		**N/A**	**40,570,868**	**N/A**	**46,952,353**	**N/A**	**32,151,502**

– Nil N/A Not available p Preliminary x Confidential
Sources: Natural Resources Canada; Statistics Canada – Catalogue No. 26–202 XIB.

Annex 6: Canadian Reserves of Selected Major Metals, 1978–2008

METAL CONTAINED IN PROVEN AND PROBABLE MINEABLE ORE IN OPERATING MINES AND DEPOSITS COMMITTED TO PRODUCTION

YEAR	COPPER (000 T)	NICKEL (000 T)	LEAD (000 T)	ZINC (000 T)	MOLYBDENUM (000 T)	SILVER (T)	GOLD (T)
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
2000	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	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
2007	7,565	3,778	682	5,984	213	6,588	987
2008	7,456	3,605	636	5,005	222	5,665	947

Note: One tonne (t) = 1.1023113 short tons = 32 150.746 troy oz.
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] 1999–2009

	NUMBER OF EMPLOYEES (000)	AVERAGE WEEKLY EARNINGS ($)	TOTAL WEEKLY WAGES FOR GROUP ($)
Metal Mines			
1999	29.56	1,123.25	33,197,654
2000	29.47	1,168.98	34,447,503
2001	25.56	1,180.02	30,166,031
2002	22.59	1,140.29	25,753,450
2003	21.81	1,194.46	26,051,173
2004	21.37	1,244.41	26,598,019
2005	21.20	1,240.90	26,302,116
2006	22.01	1,262.54	27,784,718
2007	23.85	1,362.87	32,504,450
2008	28.07	1,428.19	40,095,006
2009	23.77	–	–
Non-metal Mines			
1999	19.99	882.64	17,641,326
2000	20.03	944.20	18,913,270
2001	19.52	976.88	19,072,605
2002	19.50	907.65	17,696,452
2003	20.22	1,000.39	20,231,887
2004	19.91	1,040.27	20,708,655
2005	20.46	1,067.16	21,829,825
2006	21.49	1,023.00	21,981,201
2007	23.18	1,203.68	27,904,913
2008	23.99	1,246.76	29,907,279
2009	21.78	1,243.30	27,072,858
Coal Mines			
1999	7.81	1,126.95	8,803,733
2000	7.20	1,204.74	8,672,923
2001	6.03	1,159.56	6,992,147
2002	5.70	1,104.33	6,294,681
2003	4.84	1,193.05	5,775,555
2004	4.54	1,294.43	5,880,595
2005	5.04	1,291.55	6,505,537
2006	5.34	1,269.39	6,773,465
2007	5.84	1,427.52	8,342,427
2008	6.44	–	–
2009	5.58	–	–

Annex 7: Average Weekly Earnings in the Canadian Mineral Industry,[1] 1999–2009 (continued)

	NUMBER OF EMPLOYEES (000)	AVERAGE WEEKLY EARNINGS ($)	TOTAL WEEKLY WAGES FOR GROUP ($)
Smelting & Refining			
1999	21.42	1,033.71	22,136,900
2000	23.09	1,035.31	23,902,202
2001	19.60	1,054.75	19,878,873
2002	16.70	1,095.92	18,301,864
2003	14.72	1,128.16	16,608,772
2004	14.30	1,201.95	17,185,481
2005	14.43	1,204.58	17,379,680
2006	16.22	1,158.34	18,789,433
2007	16.85	1,274.35	21,472,798
2008	13.17	1,299.66	17,112,623
2009	13.08	1,274.96	16,675,202
Total Mining, Smelting & Refining			
1999	78.78	1,038.22	81,779,612
2000	79.79	1,077.09	85,935,898
2001	70.71	1,087.82	76,109,656
2002	64.49	1,055.28	68,046,447
2003	61.59	1,114.78	68,667,387
2004	60.12	1,170.50	70,372,751
2005	61.13	1,178.35	72,017,159
2006	65.06	1,158.01	75,328,817
2007	69.72	1,293.97	90,224,587
2008	71.67	–	–
2009	64.21	–	–

– Unavailable
1 Number of employees is based on the North American Industry Classification System (NAICS); 2122 Metal Ore Mining, 2123 Non-Metallic Mineral Mining and Quarrying, 2121 Coal Mining, 3314 Non-Ferrous Metal (except Aluminum) Production and Processing.
Source: Statistics Canada.

Annex 8: Average Weekly Earnings by Canadian Industrial Sector, 1995–2009

($)	FORESTRY	MINING, SMELTING & REFINING[1]	MANUFACTURING	CONSTRUCTION	FINANCE & INSURANCE
1995	697.64	980.13	711.97	748.83	719.52
1996	745.69	1,007.19	733.06	767.56	769.49
1997	786.46	1,003.95	751.95	786.91	801.64
1998	766.36	1,043.64	770.47	781.44	820.45
1999	773.42	1,038.14	781.99	782.63	824.82
2000	810.15	1,077.08	796.25	808.06	845.54
2001	815.52	1,087.83	799.39	790.11	x
2002	809.81	1,063.63[r]	818.56	819.64	852.00
2003	847.06	1,132.42[r]	838.23	847.87	877.34
2004	894.01	1,171.13[r]	862.60	846.38	887.00
2005	883.89	1,167.44[r]	896.35	877.34	921.01
2006	902.28	1,186.92[r]	904.69	900.32	951.25
2007	907.41	1,300.09[r]	940.67	961.16	998.93[r]
2008	935.84	1,342.18[r]	949.54	1,014.51	1,002.03[r]
2009	**853.28**	**1,350.42[r]**	**917.73**	**1,048.42**	**1,036.81**

r Revised x Confidential

1 Based on a weighted average of Mining (Except Oil and Gas) and Non-Ferrous Metal (except Aluminum) production and processing, North American Industry Classification System (NAICS) codes 212 and 3314.

Source: Statistics Canada.

Annex 9: Strikes and Lockouts by Canadian Sector, 2007–2009[p]

	2007			2008			2009[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	–	–	–	–	–	–	–	–	–
Logging and forestry	–	–	–	–	–	–	–	–	–
Fishing and trapping	–	–	–	–	–	–	–	–	–
Mining	6	1,433	45,580	2	662	17,880	1	205	22,400
Utilities	3	187	3,120	3	347	5,070	2	2,842	14,210
Oil and gas extraction	–	–	–	–	–	–	–	–	–
Construction	16	16,329	222,282	4	60	1,930	–	–	–
Manufacturing	46	11,930	652,015	55	6,368	315,620	42	9,120	853,720
Wholesale and retail trade	10	749	19,630	35	1,818	77,280	30	1,859	80,770
Transportation and warehousing	24	10,313	158,380	11	14,287	114,820	12	5,574	112,440
Information and culture	7	1,801	105,670	5	1,039	56,870	3	314	7,360
Finance, insurance and real estate	7	462	13,240	6	187	13,950	10	821	23,420
Education, health and social sciences	49	12,218	173,160	27	12,264	118,560	19	8,495	95,060
Entertainment and hospitality	28	3,124	88,380	30	3,211	133,350	19	2,084	130,460
Public administration	10	7,006	289,250	9	1,048	20,310	16	35,741	763,530
Total, All Industries	**206**	**65,552**	**1,770,707**	**187**	**41,291**	**875,640**	**154**	**67,055**	**2,103,370**

p Preliminary – Nil

Source: Human Resources and Social Development Canada, Workplace Information Directorate.

Annex 10: Strikes and Lockouts in Canadian Mining and Mineral Manufacturing Industries, 2007–2009[p]

	2007			2008			2009[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
Mining	**6**	**1,433**	**45,580**	**1**	**635**	**17,240**	**1**	**205**	**22,400**
Metals	4	1,313	40,910	1	635	17,240	1	205	22,400
Non-metals	–	–	–	–	–	–	–	–	–
Mineral fuels	–	–	–	–	–	–	–	–	–
Support activities	2	120	4,670	–	–	–	–	–	–
Mineral Manufacturing	**9**	**1,217**	**53,070**	**14**	**1,507**	**47,960**	**10**	**4,749**	**559,970**
Primary metals	6	1,013	39,770	8	959	21,150	7	4,586	536,890
Non-metallic mineral products	3	204	13,300	6	548	26,810	3	163	23,080

p Preliminary – Nil
Source: Human Resources and Social Development Canada, Workplace Information Directorate.

Annex 11: Total Exports of Minerals and Mineral Products by Commodity and Country of Destination, 2009

($000)	U.S.	EUROPEAN UNION (EU-27)	JAPAN	MEXICO	OTHER COUNTRIES	TOTAL
Metals						
Aluminum	6,486,758	342,600	211,889	135,692	473,384	7,650,323
Antimony	226	218	–	–	14,445	14,889
Barium	46	–	–	2,347	1	2,394
Beryllium	21	–	...	–	9	30
Bismuth	588	24	11	–	884	1,507
Cadmium	651	2,453	–	–	5,570	8,674
Calcium metals	1,844	56	28	...	666	2,594
Chromium	13,091	117	–	41	227	13,476
Cobalt	33,321	53,096	71,648	42	163,233	321,340
Copper	2,388,145	245,795	399,119	1,384	1,065,625	4,100,068
Gallium	–	–	–	–	–	–
Germanium	–	–	–	–	–	–
Gold	3,367,811	5,449,781	22,967	9,463	531,001	9,381,023
Hafnium	–	–	–	–	–	–
Indium	–	–	–	–	–	–
Iron and steel	8,529,579	266,839	23,545	255,447	1,238,828	10,314,238
Iron ore	370,197	1,416,733	52,278	–	1,530,246	3,369,454
Lead	427,467	3,072	9,682	40	84,593	524,854
Lithium	284	75	257	–	–	616
Magnesium and magnesium compounds	48,468	716	16	...	664	49,864
Manganese	26,966	342	877	...	7,499	35,684
Mercury	134	1	–	–	8	143
Molybdenum	55,722	86,391	31,773	19,141	57,935	250,962
Nickel	670,854	383,775	56,790	76	2,358,887	3,470,382
Niobium	38,304	78,415	871	–	35,559	153,149
Platinum group metals	105,461	30,269	6,881	116	2,504	145,231
Rare earth metals	536	74	–	–	19	629
Rhenium	–	–	–	–	–	–
Selenium	4,185	6,767	51	–	8,991	19,994
Silicon	77,280	33,561	32	340	13,903	125,116
Silver	669,459	24,534	12,296	80	107,515	813,884
Strontium	5	–	–	–	–	5
Tantalum	126	19	–	–	241	386
Tellurium	4,822	12,964	78	–	4,098	21,962
Thallium	–	–	–	–	–	–
Tin	39,088	284	344	28	252	39,996

Annex 11: Total Exports of Minerals and Mineral Products by Commodity and Country of Destination, 2009 (continued)

($000)	U.S.	EUROPEAN UNION (EU-27)	JAPAN	MEXICO	OTHER COUNTRIES	TOTAL
Titanium metal	14,205	2,559	5	350	3,867	20,986
Tungsten	22,150	923	80	–	27,071	50,224
Uranium and thorium	478,326	1,124,450	24,036	2,451	118,393	1,747,656
Vanadium	124,493	148,760	31,415	–	41,351	346,019
Zinc	1,109,012	64,371	14,082	18	237,344	1,424,827
Zirconium	5,959	7,327	593	6	15,486	29,371
Other metals	3,184,692	621,677	51,409	69,657	738,023	4,665,458
Total Metals	**28,300,275**	**10,409,039**	**1,023,051**	**496,720**	**8,888,321**	**49,117,406**
Non-metals						
Abrasives	195,063	10,757	2,043	801	17,450	226,114
Arsenic	–	–	–	–	–	–
Barite and witherite	107	–	–	–	–	107
Boron	1,587	274	–	10	949	2,820
Bromine	407	...	–	–	1	408
Calcium (Industrial minerals)	10	–	–	–	–	10
Cement	550,049	11,888	423	134	9,868	572,362
Chlorine and chlorine compounds	171,520	1,713	...	23	26,891	200,147
Chrysotile (Asbestos)	4,732	417	316	7,013	96,641	109,119
Clay and clay products	49,787	10,554	204	253	6,922	67,720
Diamonds	152,967	1,714,376	28	18,073	49,010	1,934,454
Dolomite	16,484	230	–	–	2,436	19,150
Feldspar	–	–	–	–	1	1
Fluorspar	58,058	147	–	–	1,917	60,122
Glass and glassware products	512,635	27,989	1,493	6,087	35,185	583,389
Granite	38,739	583	51	1	10,185	49,559
Graphite	82,629	7,695	216	891	16,023	107,454
Gypsum	102,371	2,880	3	3	5,922	111,179
Iodine	5,216	836	–	86	2,484	8,622
Lime	48,642	2	–	–	30	48,674
Limestone flux and other limestone	13,763	56	47	–	180	14,046
Marble, travertine and other calcareous stones	43,393	259	1	...	634	44,287
Mica	4,073	426	3,033	34	1,613	9,179
Mineral pigments	97,075	2,898	966	658	8,302	109,899
Nepheline syenite	53,038	7,351	519	19	3,498	64,425

Annex 11: Total Exports of Minerals and Mineral Products by Commodity and Country of Destination, 2009 (continued)

($000)	U.S.	EUROPEAN UNION (EU-27)	JAPAN	MEXICO	OTHER COUNTRIES	TOTAL
Nitrogen	1,378,476	1,518	8,058	7,310	31,333	1,426,695
Olivine	–	–	–	–	–	–
Pearls	2,079	48	10	...	55	2,192
Peat	283,236	1,725	21,393	741	21,629	328,724
Perlite	–	–	–	–	–	–
Phosphate and phosphate compounds	41,260	259	201	385	3,605	45,710
Potash and potassium compounds	2,278,771	17,841	17,945	5,084	1,343,695	3,663,336
Salt and sodium compounds	654,979	8,172	35,624	2,826	38,348	739,949
Sand and gravel	53,870	7	–	–	6,994	60,871
Sandstone	136	–	–	–	22	158
Silica and silica compounds	43,869	3,000	173	40	5,990	53,072
Slate	7,554	15,471	–	–	768	23,793
Sulphur and sulphur compounds	210,765	48	–	9,107	281,735	501,655
Talc, soapstone and pyrophyllite	16,514	48	36	...	62	16,660
Titanium oxides	178,104	6,069	4	–	6,797	190,974
Vermiculite	–	–	–	–	–	–
Other non-metals	450,049	29,104	1,632	3,106	39,290	523,181
Other structurals	155,470	8,152	232	697	8,901	173,452
Total Non-metals	**7,957,474**	**1,892,792**	**94,648**	**63,381**	**2,085,376**	**12,093,671**
Mineral Fuels						
Coal	302,084	584,155	1,792,355	39,233	2,438,340	5,156,167
Coke	52,854	3,679	–	–	3,663	60,196
Total Mineral Fuels	**354,938**	**587,834**	**1,792,355**	**39,233**	**2,442,003**	**5,216,363**
Total Mining Exports	**36,612,687**	**12,889,664**	**2,910,054**	**599,335**	**13,415,700**	**66,427,440**

– Nil ... Amount too small to be expressed

Sources: TRAGS, Natural Resouces Canada; Statistics Canada, May 2010 data release.

Annex 12: Total Imports of Minerals and Mineral Products by Commodity and Country of Origin, 2009

($000)	U.S.	EUROPEAN UNION (EU-27)	JAPAN	MEXICO	OTHER COUNTRIES	TOTAL
Metals						
Aluminum	2,540,701	208,152	5,009	20,273	1,669,550	4,443,685
Antimony	2,267	367	17	160	7,363	10,174
Barium	476	3,812	114	...	611	5,013
Beryllium	387	2	–	–	9	398
Bismuth	806	795	...	44	420	2,065
Cadmium	234	53	...	5	291	583
Calcium metals	46,646	2,964	130	2	1,517	51,259
Chromium	9,061	5,189	33	258	29,889	44,430
Cobalt	11,394	4,748	64	–	8,660	24,866
Copper	1,510,498	125,697	6,540	51,457	761,254	2,455,446
Gallium	25	1	5	–	–	31
Germanium	9,346	792	...	–	64	10,202
Gold	2,099,086	426,175	15	287,415	4,185,719	6,998,410
Hafnium	7	9	–	–	–	16
Indium	1,581	59	559	–	272	2,471
Iron and steel	10,535,008	1,635,584	608,858	610,890	3,402,611	16,792,951
Iron ore	299,306	2,680	...	24	921	302,931
Lead	324,917	22,074	2,703	16,950	69,580	436,224
Lithium	23,812	4,765	3,911	66	19,888	52,442
Magnesium and magnesium compounds	62,839	6,544	2,209	1,704	78,182	151,478
Manganese	151,900	3,983	1,607	5,539	93,848	256,877
Mercury	565	189	16	...	933	1,703
Molybdenum	80,764	876	7	3	2,860	84,510
Nickel	150,653	66,983	5,624	251	282,196	505,707
Niobium	1,443	2,096	–	–	24,104	27,643
Platinum group metals	104,025	45,048	26	...	121,906	271,005
Rare earth metals	384	59	633	...	688	1,764
Rhenium	23	2	–	–	–	25
Selenium	342	1,141	2,013	118	640	4,254
Silicon	14,424	914	101	37	47,079	62,555
Silver	423,372	117,028	757	85,874	632,101	1,259,132
Strontium	44	391	–	269	18	722
Tantalum	644	27	...	–	24	695
Tellurium	17	74	2,625	–	11,972	14,688
Thallium	9	–	–	–	–	9
Tin	18,339	2,272	1,553	719	43,474	66,357

Annex 12: Total Imports of Minerals and Mineral Products by Commodity and Country of Origin, 2009 (continued)

($000)	U.S.	EUROPEAN UNION (EU-27)	JAPAN	MEXICO	OTHER COUNTRIES	TOTAL
Titanium metal	59,194	13,243	1,717	2,134	33,302	109,590
Tungsten	7,463	3,418	32	–	1,575	12,488
Uranium and thorium	75,662	40,085	...	–	543,681	659,428
Vanadium	5,612	273	–	–	8,368	14,253
Zinc	200,775	18,424	95	18,306	64,196	301,796
Zirconium	48,871	3,465	475	1	3,372	56,184
Other metals	5,537,402	978,566	223,470	771,011	2,596,418	10,106,867
Total Metals	**24,360,320**	**3,749,019**	**870,918**	**1,873,513**	**14,749,557**	**45,603,327**
Non-metals						
Abrasives	147,435	74,436	9,068	4,868	82,237	318,044
Arsenic	70	1	16	–	181	268
Barite and witherite	7,027	274	10	–	4,946	12,257
Boron	21,959	443	193	4	6,263	28,862
Bromine	3,512	7	–	–	1,500	5,019
Calcium (Industrial minerals)	6,698	1	–	–	576	7,275
Cement	282,508	18,579	830	1,664	61,208	364,789
Chlorine and chlorine compounds	61,022	4,417	686	1,215	9,459	76,799
Chrysotile (Asbestos)	83,059	3,303	5,240	3,228	20,045	114,875
Clay and clay products	300,080	199,668	19,350	53,545	491,984	1,064,627
Diamonds	81,910	66,297	46	14	347,527	495,794
Dolomite	9,383	17	–	–	67	9,467
Feldspar	342	–	–	–	1	343
Fluorspar	14,494	12,555	22	8,416	30,012	65,499
Glass and glassware products	1,625,747	188,944	17,078	67,335	377,920	2,277,024
Granite	12,734	25,672	31	19	110,194	148,650
Graphite	233,560	63,696	29,550	2,783	91,917	421,506
Gypsum	154,383	647	84	1,424	1,657	158,195
Iodine	4,880	11	3,867	–	5,606	14,364
Lime	9,745	108	5	3	118	9,979
Limestone flux and other limestone	24,777	219	–	–	554	25,550
Marble, travertine and other calcareous stones	22,703	39,006	1	2,039	66,223	129,972
Mica	6,228	1,192	604	12	1,168	9,204
Mineral pigments	113,336	10,839	2,448	3,004	9,851	139,478
Nepheline syenite	35	–	–	–	–	35

Annex 12: Total Imports of Minerals and Mineral Products by Commodity and Country of Origin, 2009 (continued)

($000)	U.S.	EUROPEAN UNION (EU-27)	JAPAN	MEXICO	OTHER COUNTRIES	TOTAL
Nitrogen	118,442	44,611	171	258	118,681	282,163
Olivine	525	–	–	–	4	529
Pearls	5,633	1,514	1,702	2,512	15,051	26,412
Peat	4,010	700	–	–	3,751	8,461
Perlite	11,526	3,031	–	...	2	14,559
Phosphate and phosphate compounds	397,611	9,723	45	1,145	9,924	418,448
Potash and potassium compounds	50,858	3,644	467	199	13,602	68,770
Salt and sodium compounds	302,028	22,574	315	10,038	104,905	439,860
Sand and gravel	15,720	60	1	61	950	16,792
Sandstone	1,893	221	–	–	2,589	4,703
Silica and silica compounds	100,900	18,918	5,371	372	14,536	140,097
Slate	1,663	210	–	1	11,452	13,326
Sulphur and sulphur compounds	23,520	379	27	203	943	25,072
Talc, soapstone and pyrophyllite	11,881	450	140	–	420	12,891
Titanium oxides	136,009	10,991	2,296	12,476	10,680	172,452
Vermiculite	3,624	555	–	–	1,855	6,034
Other non-metals	603,703	51,734	5,786	8,265	63,790	733,278
Other structurals	59,397	13,450	3,003	1,292	27,808	104,950
Total Non-metals	**5,076,569**	**893,097**	**108,450**	**186,394**	**2,122,161**	**8,386,672**
Mineral Fuels						
Coal	820,946	17,741	225	43	271,903	1,110,858
Coke	44,179	535	–	–	27,771	72,485
Total Mineral Fuels	**865,124**	**18,276**	**225**	**43**	**299,674**	**1,183,343**
Total Mining Imports	**30,302,014**	**4,660,393**	**979,593**	**2,059,950**	**17,171,392**	**55,173,341**

– Nil ... Amount too small to be expressed

Sources: TRAGS, Natural Resouces Canada; Statistics Canada, May 2010 data release.

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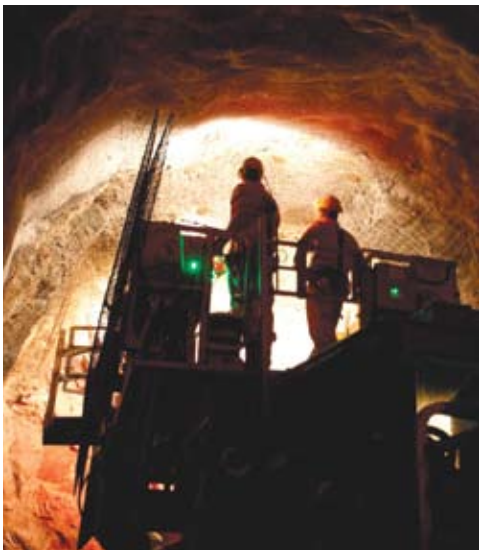

The Canadian Mining Industry at a Glance

	2004	2005	2006	2007	2008	2009
Mining industry GDP ($ billion)	39.5	40.0	40.0	41.9	40.3	32.0
Percentage of total Canadian GDP (%)	3.8	3.8	3.7	3.4	3.3	2.7
Value of mineral production ($ billions)	24.3	27.4	34.2	40.6	47.0	32.2
Synthetic crude production value ($ billions)	8.6	9.2	14.8	18.0	25.2	N/A
Synthetic crude production (million cubic metres)	26.7	21.9	28.8	39.9	38.0	N/A
Number of mining establishments	757	859	801	766	841	961
Mineral extraction employment (thousands)	45	46	47	51	59	51
Total mining industry employment (thousands)	357	356	367	363	351	307
Metal prices – copper (cents per pound)	129	168	309	322	313	234
Metal prices – gold ($ per ounce)	409	445	604	697	872	973
Mineral exploration/appraisal spending ($ millions)	1,178	1,305	1,912	2,831	3,280	1,747
Mining industry capital expenditures ($ billions)	7.2	7.4	8.3	10.1	11.3	9.1
Oil sands capital expenditures ($ billions)	6.3	9.8	12.2	16.8	19.2	13.2
Mining industry payments to governments ($ billions)	4.7	5.5	8.2	9.9	11.5	5.4
Stock of foreign direct investment ($ billions)	20.9	22.6	38.2	59.1	59.2	74.1
Stock of canadian direct investment abroad ($ billions)	44.5	47.7	61.5	55.8	66.7	55.8

N/A Not available

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