

# Nickel

## Bill McCutcheon

The author is with the Minerals and Metals Sector,  
Natural Resources Canada.  
Telephone: (613) 992-5480  
E-mail: [bmccutch@nrca.gc.ca](mailto:bmccutch@nrca.gc.ca)

(This chapter<sup>1</sup> includes some information about cobalt as it relates to nickel; it does not provide a comprehensive review of cobalt.)

## SUMMARY

### WORLD NICKEL DATA

	2002	2003	2004
	(000 t)		
Mine production	1 247	1 264	1 284
Finished production (1)	1 182	1 201	1 250
Usage (consumption)	1 177	1 233	1 242

Source: International Nickel Study Group (INSG), *World Nickel Statistics, June 2004*.

(1) Class I + Class II nickel, which includes production of nickel in chemicals.

Notes: Data have been rounded to the nearest 1000 tonnes. See Tables 8, 9 and 10 in this article for data from 2000 to 2003.

### LME ASK PRICES, 2004

Cash	Month			
	3	15	27	
	(US\$/t)			
Average	13 852	13 765	12 036	10 457
Maximum	17 770	17 660	15 200	13 160
Minimum	10 530	10 495	9 525	8 760

Source: Metalprices.com

Note: Cash ask price = settlement price.

<sup>1</sup> Abbreviations used in this review include: Au Gold; Co Cobalt; Cu Copper; Fe Iron; FeNi Ferronickel; PAL Pressure acid leach; Pd Palladium; Pt Platinum; Ni Nickel; PGMs Platinum group metals.

## CANADIAN DATA

	2002	2003	2004
	(tonnes)		
Ni mine production (1)	189 297	(r) 163 244	(p) 186 546
Ni in concentrates shipped (2)	179 800	(r) 155 475	(p) 175 802
Ni refined production (3)	144 476	124 418	(p) 151 518
Ni usage (4)	18 955	13 010	9 467
Co mine production (1,5)	5 150	4 327	(p) 5 197
Co mineral production (2,5)	2 065	1 842	(p) 2 126
Co metal production (3)	4 303	3 851	(p) 4 673
Co usage (4)	(r) 88	108	(p) 95

Source: Nickel data: Table 2 of *Production of Canada's Leading Minerals*, ISSN 0709-292X, SS # 04-12; available at <http://mmsd1.mms.nrcan.gc.ca/mmsd/data/04MTLY12.pdf>.

Co = cobalt; Ni = nickel; (p) Preliminary.

(1) Metal in concentrates produced from Canadian mines. (2) Recoverable metal in concentrates shipped from Canadian mines. (3) Metal produced whether from domestic or foreign origin. (4) Use includes metal in scrap and other secondary forms. (5) Preliminary Co data rounded to nearest 50 t.

Note: Reader should round to three significant figures.

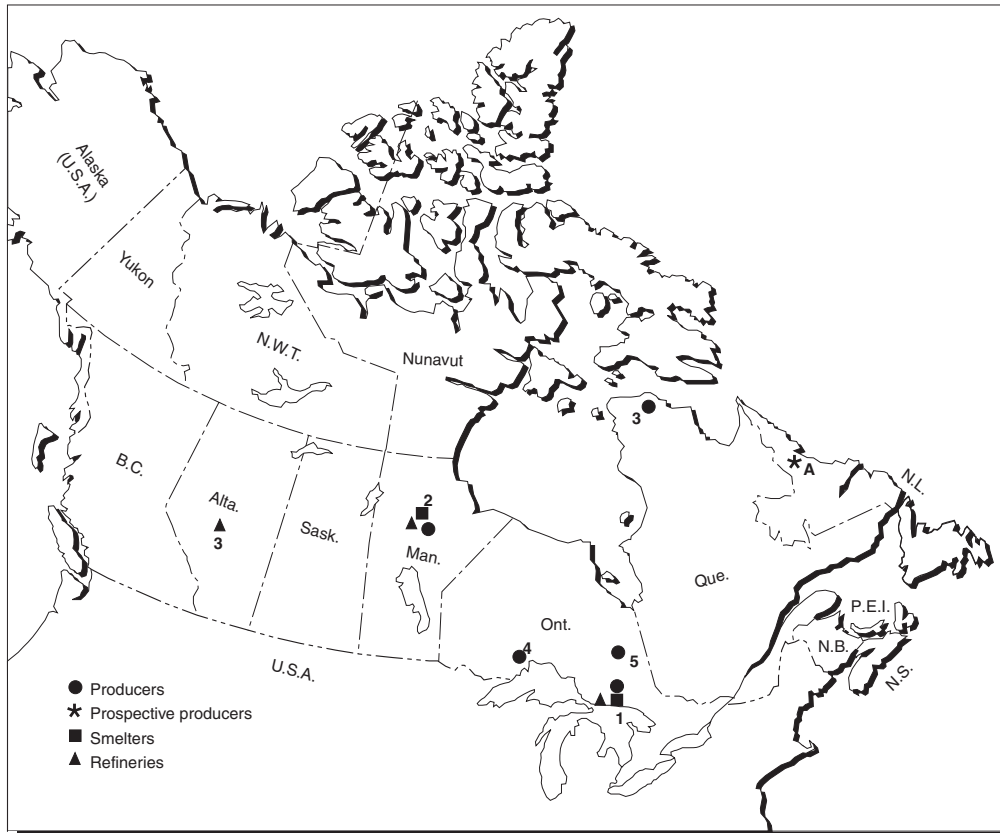
The focus in the 2004 nickel chapter is on Canadian exploration activities and detailed information about the Canadian-listed companies' exploration activities. Some important international events are described in this chapter, but the reader may refer to the web sites of the major producers for more information, as well as to the *2004 Nonferrous Metals Outlook* nickel section published in December 2004 at [www.nrcan.gc.ca/mms/pdf/nfo/nfo04/nick\\_e.pdf](http://www.nrcan.gc.ca/mms/pdf/nfo/nfo04/nick_e.pdf).

## OVERVIEW

The year 2004 was a year of records: the average cash settlement nickel price on the London Metal Exchange (LME) established a new record high, world nickel production and use reached record highs, Inco produced a record amount of nickel as a company and set production records at Thompson (Manitoba) and in Indonesia, and Sherritt's joint-venture refinery produced a record amount of nickel and cobalt.

Nickel is present in various orebodies worldwide. In 2004, according to The Eramet Group, sulphide ores provided about 58% of the primary nickel produced; the

**Figure 1**  
**Nickel and Cobalt in Canada, 2004**



Numbers and letters refer to locations on map above

**PRODUCERS**

- 1. Falconbridge Limited (Fraser, Lindsley, Onaping-Craig, Lockerby)
- 1. Inco Limited (Copper Cliff North, Copper Cliff South, Creighton, Garson, Gertrude, McCreedy/Coleman, Stobie)
- 1. Sudbury Joint Venture (McCreedy West)
- 2. Inco Limited (Thompson, Birchtree)
- 3. Falconbridge Limited (Raglan)
- 4. North American Palladium Ltd. (Lac des Iles)
- 5. Falconbridge Limited (Montcalm)
- 5. Canadian Arrow Mines, Ltd. (Alexo)

**SMELTERS**

- 1. Falconbridge Limited (Falconbridge)
- 1. Inco Limited (Copper Cliff)
- 2. Inco Limited (Thompson)

**REFINERIES**

- 1. Inco Limited (Sudbury)
- 2. Inco Limited (Thompson)
- 3. Sherritt International Corporation (Fort Saskatchewan)

**PROSPECTIVE PRODUCERS**

- A. Inco Limited (Voisey's Bay mine)

remaining 28% came from garnieritic ores (nickel silicates) and 14% from lateritic nickel oxide ores. Nickel laterite ores are tropical soils: the upper portion contains cobalt and is processed by hydrometallurgical means, such as leaching in acid, to recover nickel and cobalt. The lower portion of the soils is generally treated by pyrometallurgical methods to produce ferronickel, but a nickel matte can be produced. The upper part of the profile can be termed a limonitic ore or nickel oxide ore while the lower can be termed a saprolitic ore or saprolite.

Nickel producers tend to be large companies; the mine and refined output of the major producers was shown by Eramet in its 2004 reference document as:

Company	Mine Production	Refined Production
(tonnes)		
Norilsk	240 000	240 000
Inco	220 000	237 000
WMC Resources	88 000	63 000
Falconbridge	80 000	101 000
Eramet	62 000	55 000
Jinchuan	50 000	73 000
BHP Billiton	52 000	80 000
Cubaniquel	41 000	41 000
Other	434 000	373 000
Total (1)	1 267 000	1 264 000

(1) Total refined production is Eramet's estimate and may have drawn on data available after the International Nickel Study Group's April 2005 publication.

Three companies constituted the majority of Canadian nickel production: Inco Limited, Falconbridge Limited, and Sherritt International Corporation. A brief overview of those companies is given below. The location of Canadian nickel operations is shown in Figure 1. More detailed information by province is presented below in the section entitled "Canadian Developments."

**Inco Limited** operated mines, smelters and refineries in Manitoba and Ontario, and continued developing the Voisey's Bay project in Newfoundland and Labrador. The company produced primary nickel and cobalt in its Canadian refineries, sent some of its Sudbury, Ontario, output to its refinery in the United Kingdom for final nickel recovery, and sent nickel oxide sinter from Sudbury to Asia for further processing at refineries in which Inco had some ownership. Inco imported concentrates from Australia to provide additional feed to its smelters in Thompson and Sudbury; details about the amounts and grades of concentrates sent from Australia are available on the web sites of Jubilee Mines NL and LionOre Mining International Ltd. Inco had controlling interest in a nickel laterite operation in Indonesia that produced nickel in matte. That

matte was sent to two refineries in Japan for processing, including one in which Inco had a majority interest. Inco continued development of a large lateritic nickel mine and hydrometallurgical processing facility at its Goro property in New Caledonia.

**Falconbridge Limited** operated mines and concentrators in Quebec and Ontario and a smelter in Ontario. Concentrate from the company's Raglan mine and concentrator in northern Quebec was sent to the company's Sudbury smelter, which also processed nickel concentrate from the company's Sudbury mines and from a new mine near Timmins, Ontario. Falconbridge announced that it would proceed with a major underground exploration program at its Nickel Rim South deposit, intended to develop ore reserves and prepare for a new underground mine. All matte from Falconbridge's Sudbury nickel smelter was sent to the company's refinery in Norway. That refinery also processed matte from a smelter in Botswana and a nickel-cobalt sulphide residue from WMC Resources Ltd. in Australia. Falconbridge continued the feasibility study of a mine and ferronickel smelter in New Caledonia; the company could own 49% of the operation with a New Caledonian company owning the majority share. In September 2004, Noranda Inc. announced that it was negotiating with China Minmetals Corporation to sell all outstanding common shares of Noranda. No agreement was reached and the deal did not take place. Noranda Inc. owned 59% of the common shares of Falconbridge at year-end 2004.

**Sherritt International Corporation** owned 50% of Metals Enterprise; the other partner was General Nickel Company S.A., owned by the Cuban government. Metals Enterprise operated Moa Nickel S.A., a mine and leach plant in Cuba, and The Cobalt Refinery Company Inc., a nickel and cobalt refinery in Fort Saskatchewan, Alberta. All output from the Moa operation was sent to Fort Saskatchewan for refining. The company produced record amounts of nickel and cobalt in 2004.

The average LME cash settlement price for nickel established a record high of US\$13 852/t (US\$6.28/lb), surpassing the former record of US\$6.27/lb established in 1988. Figure 2 shows a graph of daily cash settlement nickel prices in 2004, as well as prices from 1986 to 2004, in current U.S. dollars per tonne (no adjustment for inflation). (Please see Table 11 for a list of prices and a note about errors in price tables in previous nickel chapters.)

At the end of 2004, there seemed to be a general expectation that future demand would continue to outstrip supply as few new projects were scheduled to start up in the 2005-06 period while potential demand is forecast to remain robust, barring economic downturns. Hence, prices were expected to remain above historical levels and above projected future long-term averages into 2006.

## CANADIAN DEVELOPMENTS

Canada was the third-ranking mine producer of primary nickel after Russia and Australia. All Canadian mine production of nickel came from nickel-sulphide ores. These sulphide ores contained other valuable metals that were recovered, such as copper, cobalt, gold and platinum group metals. Canada had no lateritic nickel deposits similar to those existing in Australia, New Caledonia, Brazil or Cuba. Laterite nickel operations did not recover copper, gold or platinum group metals, but some recovered cobalt or iron.

Most Canadian nickel is mined in underground operations. Ore from the mine is crushed and milled, and then the sulphide minerals are separated from non-sulphide minerals by a flotation process. The resulting "concentrate" is then sent to a smelter for processing. Various methods exist to refine nickel to its elemental form; three different technologies for this are employed in Canada. Because nickel is relatively high valued, concentrates can be transported long distances, so smelters need not be located at mine sites. Canadian smelters also import nickel concentrates from Australia and from other countries to supplement domestic feed, thereby reducing unit costs. Some nickel and cobalt in recyclables is used as feed in Canadian smelters. Falconbridge exports the nickel-copper-cobalt matte produced in its Canadian smelter to the company's refinery in Norway for final processing.

While the sulphur in the concentrate provides energy for pyrometallurgical processing, the emissions of sulphur dioxide pose environmental problems. Sulphur dioxide can be captured and made into sulphuric acid or liquid sulphur dioxide. During 2004, new proposed provincial regulations for future sulphur dioxide emission limits were released by Ontario; as well, new proposed federal limits were published in the *Canada Gazette, Part I*.

Canada's nickel mine production was primarily centred in Sudbury, Ontario; Thompson, Manitoba; and Nunavik, Quebec. Further information about public companies listed on Canadian exchanges can be obtained from [www.sedar.com](http://www.sedar.com). Tables 3 and 4 show lists of companies that produce nickel or cobalt or that have nickel or cobalt exploration activities, their web sites where available, and the address on the SEDAR web site where securities filings such as annual reports, annual information forms, quarterly reports, technical reports, and press releases may be obtained.

Canada's nickel production in 2004 was about 187 000 t of nickel contained in concentrates (rounded to the nearest 1000 t), compared to 163 000 t produced in 2003. Canadian shipments of recoverable cobalt in concentrates from Canadian mines were 2126 t in 2004, compared to 1842 t the previous year. In 2003, the nickel and cobalt output of

the largest Canadian producer, Inco, was affected by a three-month strike at the Sudbury operations.

Canadian nickel exports and imports are shown in Tables 1b and 1c. With a higher unit value for nickel in 2004 compared to 2003, Canadian net exports (i.e., value of nickel exports less value of nickel imports) were \$3.5 billion in 2004, up from a value of \$1.7 billion in 2003. The reader is cautioned that official nickel concentrate import data are under investigation and the reader should refer to notes in Table 1c. Details on imports of nickel and cobalt in the form of ash and residue from the leach plant in Cuba to the refinery at Fort Saskatchewan were not fully reported in official Canadian trade statistics and are not correctly shown in Table 1c for 2004.

### Newfoundland and Labrador

Inco reported that its subsidiary, Voisey's Bay Nickel Company Limited, was able to advance the start-up of the US\$980 million, Phase 1 portion of the Voisey's Bay project to late 2005 with first concentrate shipments scheduled for November 2005, compared to July 2006 noted in a technical report dated August 31, 2003. The open-pit mine and concentrator will start operation at 6000 t/d and then increase throughput to 7200 t/d during the latter half of the mining of the pit to compensate for the declining ore grade. The August 2003 technical report for Voisey's Bay showed that average output for the first seven years of production was planned as ore feed of 14.2 Mt grading 3.39% Ni, 2.03% Cu and 0.162% Co. The planned production schedule and destination for nickel in concentrates, as reported by Inco in February 2005, was:

	2006	2007	2008	2009
	(tonnes)			
Recoverable Ni output	49 900	61 200	59 000	59 000
of which % to Sudbury	59	59	58	58
of which % to Thompson	41	41	42	42

Source: Data based upon Technical Report by Inco Limited, August 31, 2003.

Projected output in the first year of operation would be about 48 500 t of nickel in concentrates going to Thompson and Sudbury, rising to about 60 000 t/y for the next five years. At year-end 2004, over 1900 workers were employed at the Voisey's Bay project, including the demonstration plant at Argentia on Newfoundland Island where Inco is to examine the feasibility of processing nickel-cobalt concentrates using a hydrometallurgical process.

Proven plus probable open-pit reserves at the Voisey's Bay project were 32 Mt grading 2.82% Ni, 1.54% Cu and 0.14% Co while indicated underground reserves were

reported as 50 Mt grading 1.66% Ni, 0.78% Cu and 0.10% Co. Expected recovery of the metals in the Ovoid ore (refined metal as a percentage of the metal contained in ore mined) was estimated by Inco as 82% for nickel, 94% for copper and 39% for cobalt. Some of the production from Voisey's Bay will displace external feeds and mine production from Inco's Ontario and Manitoba mines. For the period 2007-09 when Voisey's Bay is to be at full production with an output projected to average 60 000 t/y of recoverable nickel, about 60%, or 36 000 t/y, will represent "additional" production.

## Quebec

Falconbridge operated a mine and concentrator in the Nunavik territory in the Ungava peninsula of northern Quebec. The company recovered nickel, copper and cobalt from a series of high-grade deposits mined by open-pit and underground methods. All ore was processed at the concentrator on site. More information about the metallurgical process, the geology, and the agreement with the Makivik Corporation was posted on Falconbridge's web site at [www.falconbridge.com/our\\_business/nickel\\_raglan.html](http://www.falconbridge.com/our_business/nickel_raglan.html).

Production of metals in concentrate at Raglan in 2004 was reported by Falconbridge as 26 552 t of Ni, 6867 t of Cu and 404 t of Co, compared to production in 2003 of 25 110 t of Ni, 6628 t of Cu and 381 t of Co. No details about the production of palladium or platinum from the Raglan mine were found, but exploration at neighbouring claims showed platinum group elements and gold in the nickel-copper-cobalt mineralization. In late 2004, Phase 1 of the Raglan Optimization Program was approved. This will involve modification of the grinding techniques to increase the concentrator capacity to 1 Mt/y and to handle harder ore. The capital cost of these changes was estimated at US\$28 million, and production in 2005 will be reduced to an estimated 20 700 t of Ni in concentrates. As well, a study was under way at year-end that would increase mill throughput to 1.2 Mt/y.

## Ontario

The Timmins area began nickel production in 2004 with two new operations shipping ore: Falconbridge's Montcalm mine and Canadian Arrow's Alexo property. Historical production of nickel in ore from the Timmins area to 2004 was approximately 28 000 t of nickel contained in 1.45 Mt of ore.

In the fourth quarter of 2004, Falconbridge Limited started up its Montcalm mine located 70 km from Timmins. The ore from the mine was trucked to a special mill circuit at the company's Kidd Metallurgical Site. The concentrate produced there was then sent to Falconbridge's smelter in Sudbury. Falconbridge started commissioning the mill circuit at Kidd in October. Until that circuit was com-

pleted, the company had trucked ore from Montcalm to its Strathcona mill in Sudbury for processing. Falconbridge reported that the mine was completed in December, reaching a capacity of 750 000 t/y before year-end. The Montcalm mine produced 214 000 t of ore grading 1.32% Ni and 0.68% Cu at a daily rate of 2050 t. During 2004, the company reported production of 2152 t of Ni in concentrate, of which 1524 t was produced in the fourth quarter. The company said that Montcalm would mine 750 000 t of ore to produce 9000 t of Ni in 2005. During that year, the company will study the option of increasing production at Montcalm to 1 Mt/y.

**Canadian Arrow Mines, Ltd.** purchased the Alexo property from Legendary Ore Mining Corporation in April 2004. Canadian Arrow produced 17 400 t of ore grading 2.3% Ni, 0.23% Cu and 0.07% Co during 2004 from pits at the Kelex Zone and the Alexo Zone at the Alexo property located 45 km northeast of Timmins, Ontario. During the year, 14 600 t grading 2.14% Ni, 0.26% Cu and 0.07% Co were trucked to Falconbridge's Strathcona mill for processing. Canadian Arrow negotiated an agreement with Falconbridge whereby Canadian Arrow could utilize up to 10% of the Strathcona mill's capacity. Historically, the Alexo mine produced ore and shipped it to Sudbury: about 47 000 t grading 4.5% Ni and 0.48% Cu between 1913 and 1919, 4445 t of ore grading 4.5% Ni and 0.8% Cu in 1943, and 3630 t of ore grading 4.5% Ni and 0.6% Cu in 1944. Provincial approvals for a mining operation at the Alexo mining project were given on January 28, 2005.

**Falconbridge Limited** operated four underground mines, a mill and a smelter in Sudbury in 2004. During the year, a three-week strike at the facilities reduced production below what had been earlier forecasted. Falconbridge's production from its Sudbury mines in 2004 was 22 602 t of Ni, 24 694 t of Cu and 565 t of Co, plus an unstated amount of platinum group elements and precious metals produced from the milling of 2.3 Mt of ore. For comparison, production in 2003 was 21 143 t of Ni, 29 161 t of Cu and 611 t of Co from 2.3 Mt of ore. All ore from the four mines plus development ore from the Montcalm mine near Timmins, Ontario, and the bulk sample ore shipped from the Alexo mine, also near Timmins, was processed at the company's Strathcona mill in Sudbury. Falconbridge closed its Lockerby mine in September, putting it on care and maintenance. This mine produced a total of 8.45 Mt grading 1.79% Ni and 1.07% Cu plus an undisclosed amount of cobalt and precious metals from its start-up until it was closed. Falconbridge and First Nickel Inc. signed a non-binding letter of intent for the sale of the Lockerby mine to First Nickel, but no final agreement was reached by year-end. Production details by mine were published in Falconbridge's annual report, available on the Falconbridge web site or on the SEDAR site. During 2004, the company produced matte containing 18 653 t of Ni from Sudbury feed, 23 849 t of Ni from Raglan feed,

1828 t of Ni from Montcalm feed, and 8265 t of Ni from custom feed. The matte also contained 427 t of Co sourced from Sudbury feed, 313 t of Co from Raglan feed, 50 t of Co from Montcalm feed, and 1048 t of Co from custom feed. Custom feed included nickel or cobalt contained in recyclables. Falconbridge forecasted production from Sudbury at 22 500 t of Ni in 2005.

Falconbridge announced in March that it was proceeding with the Nickel Rim South underground program to define ore reserves. The US\$368 million program will include a shaft to 1800 m, underground development, and over 100 000 m of drilling over five years targeted at an inferred resource of 13.2 Mt grading 1.7% Ni, 3.5% Cu, 0.04% Co, 4.9 g/t precious metals, and 15 g/t Ag. It was estimated that a further US\$185 million would be required to turn the advanced exploration project into a mine producing about 1 Mt/y and yielding 12 000-15 000 t/y of Ni and 35 000-45 000 t/y of Cu, plus 3.8 to 4.2 t/y of precious metals.<sup>2</sup> First production from Nickel Rim South could begin as early as 2008 with full production achieved in 2010. Falconbridge has other properties in the Sudbury area that may be developed, including the Fraser Morgan and Onaping Depth properties. Fraser Morgan had measured plus indicated resources of 4.9 Mt grading 1.8% Ni, 0.56% Cu and 0.06% Co, plus 2.1 Mt of inferred resources, located between 1.5 and 2.5 km from the existing Fraser mine. The Onaping Depth property had indicated resources of 14.6 Mt grading 2.52% Ni and 1.15% Cu, plus 2.1 Mt of inferred resources. Development of Nickel Rim South could allow the extraction of the Onaping Depth deposit to be planned at a rate of 0.5 Mt/y instead of 1.5 Mt/y as had been previously investigated.

In 2004, Falconbridge's Sudbury smelter's sulphur dioxide emissions were 30% of the province's annual limit of 100 000 t for that facility. During the year, Ontario released a discussion paper about proposed new emission limits for sulphur dioxide in June and Environment Canada published its intention to regulate sulphur dioxide releases in the *Canada Gazette, Part I* in September; both measures would affect Falconbridge's Sudbury smelter. Ontario proposed that emission limits for Falconbridge's Sudbury smelter be reduced to 66 000 t/y for the period 2007 to 2014, and then to 25 000 t/y thereafter. The federal proposals would limit emissions from Falconbridge's Sudbury smelter to 57 000 t/y in the period 2009-15 and to 11 000 t/y thereafter. In 2004, Falconbridge produced 245 000 t of sulphuric acid at its Sudbury plant.

**Inco Limited** operated seven mines, a concentrator, two smelters and a carbonyl nickel refinery in Sudbury, and a cobalt refinery at Port Colborne. All mines but one, the Gertrude open-pit mine, were underground operations.

The ore produced by the mines, plus ore from the Sudbury Joint Venture (see below), was processed at the company's Clarabelle mill. In 2004, Inco mines in Sudbury produced 8.2 Mt grading 1.33% Ni and 1.41% Cu. Production details by mine were published in the company's 10-K report on page 27, available on the company's web site or on the SEDAR site. Inco's recovery factor for nickel for Ontario in 2004 was reported by the company as 77%, meaning that 770 kg of finished nickel were produced from each tonne of nickel contained in the ore, with the remainder contained in tailings or slag. No recovery factor was stated for cobalt from Inco's Ontario ore. For 2004, Inco reported that its Ontario Division produced 91 600 t of finished nickel from its own mines plus an additional 17 700 t of finished nickel sourced from ore and concentrates purchased from others such as ore purchased from the Sudbury Joint Venture (see SJV below), from concentrates imported from Australia, and from recycled materials containing nickel. Nickel from Sudbury was produced in the form of pellets, discs, powder, and nickel oxide sinter; the nickel oxide sinter grades about 75% nickel.

What Inco termed "Ontario" production included nickel produced at its Clydach refinery in the United Kingdom. This refinery used the carbonyl process and was fed by nickel oxide sinter from Sudbury. During 2004, the Clydach output was reported by Inco to have been about 16% of Inco's total primary production of 236 817 t of Ni, or about 37 900 t. The Ontario government requires that metals from ores mined in the province be recovered in Canada unless permission is obtained. Inco's current permit was scheduled to expire at the end of 2005; the company anticipated at the end of 2004 that the province would allow exports after the permit expiration on December 31, 2005.

Inco produced other metals from its Sudbury operations. In 2004, Inco reported in its 10-K form that 92% of its copper production, 88% of its by-product PGMs production, and 48% of its by-product cobalt production was sourced from the company's Ontario mine ores. This amounted to about 115 000 t of copper, 740 t of Co, and 11.5 t of PGMs that were sourced from Ontario ores. Of the total non-tolled PGMs output of Inco's total production, 53% was Pd and 44% was Pt. Inco's gold and silver production (excluding toll-refined material) was reported at 2.5 t and 61.9 t respectively, but no details were found with respect to the origin.

Inco's proven plus probable ore reserves at its Sudbury operations were 177 Mt grading 1.24% Ni, 1.30% Cu, 0.04% Co, 0.72 g/t Pt, 0.79 g/t Pd, and 0.27 g/t Au. Of this, proven plus probable reserves at operating mines were 129 Mt grading 1.29% Ni, 1.46% Cu, 0.04% Co, 0.82 g/t Pt, 0.91 g/t Pd, and 0.32 g/t Au. No grades for silver were found.

<sup>2</sup> Palladium plus platinum plus gold.

Inco produced cobalt metal at its Port Colborne refinery. About 85% of the cobalt produced from Canadian ores was recovered as cobalt metal. The remaining cobalt was produced as an intermediate, probably cobalt oxide. Inco reported cobalt sales (metal plus intermediates) of 1542 t, up from 903 t produced in 2003 when there was a strike at the Sudbury and Port Colborne operations.

To control sulphur dioxide emissions from the smelting of concentrates at Sudbury, Inco produced and delivered 676 000 t of sulphuric acid and liquid sulphur dioxide in 2004. Total sulphur dioxide emissions in 2004 were 79% of the province's annual limit of 265 000 t/y for Inco's Sudbury facilities. This provincial limit will be reduced by one-third to 175 000 t/y by the end of 2006. As part of a program to reduce these emissions, Inco continued a US\$90 million program to install scrubbers for the off-gases from the its fluidized bed roaster. During the year, Ontario released a discussion paper about proposed new emission limits for sulphur dioxide in June, and Environment Canada published its intention to regulate sulphur dioxide releases in the *Canada Gazette, Part I* in September. Both of these measures will affect Inco's Sudbury operations. Ontario proposed that Inco's Sudbury emission limits be reduced to 66 000 t/y by 2015. The federal proposals did not differ from those of Ontario for the period 2009-15, but thereafter proposed an annual limit of 38 000 t/y for Inco's Sudbury operations.

Sudbury will begin to receive concentrate shipments from Voisey's Bay in late 2006; this will allow the company to replace some of the imported and domestically produced concentrate feed to the smelter. In February 2005, when reviewing operations in 2004, Inco forecast its "Ontario" production of finished, or recoverable, nickel (which includes the U.K. refinery output) for the period 2005-09 as:

	2005	2006	2007	2008	2009
	(tonnes)				
Ontario	79 500	79 500	72 500	79 500	79 500
VB feed	–	29 500	36 000	34 000	34 500
External	24 000	7 500	7 000	6 500	6 500
<b>Total</b>	<b>103 500</b>	<b>116 500</b>	<b>115 000</b>	<b>120 000</b>	<b>120 000</b>

Source: Inco Limited.

Note: Data are rounded to nearest 500 t and may not add due to independent rounding.

Of this amount, the U.K. refinery may recover about 38 000-40 000 t/y of finished nickel. This would mean that the planned throughput of the Sudbury plus Clydach refining and nickel oxide sinter capacity will exceed official capacity by 2008.

The **Sudbury Joint Venture (SJV)** was owned 75% by FNX Mining Company Inc. and 25% by Dynatec Corporation. The SJV acquired five properties from Inco, including former producing mines, as of December 2003. In September 2004, the SJV officially opened the McCreedy West mine, which had been producing since late 2003. As of April, the mine had reached its target operating rate of 907 t/d (1000 short tons/day). During the 2004 calendar year, the mine produced 265 000 t grading 1.6% Ni and 0.3% Cu, and about 13 600 t of ore grading 0.6% Ni, 5.7% Cu, and 3 g/t total precious metals (gold plus PGMs). The total payable metals in the ore delivered to Inco's Clara-belle mill was about 3000 t of Ni, 1180 t of Cu, 31 t Co, and about 31 kg of platinum plus palladium and gold. The SJV intended to concentrate on bringing the Levack mine into production and to start production at the PM deposit of the McCreedy West mine in 2005 and 2006, and made a \$10 million commitment to recondition the Levack No. 2 shaft and surface plant by the third quarter of 2005. Ramp-up of production at McCreedy West was anticipated in 2006 with 20 years of production identified at a rate of 907 t/d. In May, a decision was made to proceed with a \$30 million advanced exploration program at the Podolsky 2000 deposit (formerly known as the Norman 2000 deposit). By the end of 2004, work had begun to prepare for the sinking of a 5.25-m-diameter shaft to 750 m in depth and subsequent drilling from underground. A feasibility study of the Podolsky deposit was to be completed by late 2006; if a decision were favourable, then production might begin in 2007. Various technical reports about the five former Inco properties were posted on the SEDAR site of FNX and Dynatec.

**North American Palladium Ltd.** operated an open-pit mine and mill in northwestern Ontario that produced palladium as its main product. The mine mined 4.6 Mt of ore and processed 5.3 Mt of ore to produce 45 700 t of concentrate containing 1960 t of by-product nickel during 2004, up from 1846 t of contained nickel in 2003. The other metals contained in the concentrate were 9.89 t of Pd, 804 kg of Pt and 822 kg of Au, compared to 9.24 t of Pd, 760 kg of Pt and 753 kg of Au in 2003. Cobalt is also contained in the concentrate. In March, the company announced approval of a \$40 million project to develop an underground mine at the site. Construction was started and over 400 m of the access ramp was developed by year-end. First production was scheduled for the last quarter of 2005. As well as the new underground mine, the company also decided to install a new secondary crusher at a cost of \$10 million, which began operation in December 2004. When the underground mine produces at the design capacity of 2000 t/d, the pit production is planned to be reduced to 13 500 t/d. North American Palladium's concentrate was sent to Inco's Sudbury smelter and Falconbridge's Sudbury smelter for processing. The contract with Inco will end in August 2005 and the contract with Falconbridge will end in March 2006.

Exploration activities in Ontario by companies listed on Canadian exchanges are shown in Table 6.

## Manitoba

The only operational nickel facilities in Manitoba in 2004 were those owned by Inco at Thompson. The Thompson facilities consisted of two underground mines, a concentrator, a smelter, an electrolytic nickel refinery, and a cobalt oxide plant. Inco's Thompson and Birchtree mines produced 2.3 Mt grading 1.91% Ni in 2004, compared to 2.0 Mt grading 2.09% Ni in 2003. The concentrate feed from Inco's two Manitoba mines was supplemented with imported material from Australia. During the year, 13 100 t of nickel were produced from "external feed," most or all of which was imported concentrates. In 2005, the smelter was expected to continue to utilize imported concentrates to maintain a production forecast of about 48 500 t of electrolytic nickel. By late 2005 or early 2006, Inco expected to begin to receive concentrates from its Voisey's Bay operation, and that will allow the company to reduce its dependence on imported concentrates, which accounted for about 25% of Thompson's nickel output in 2004. The operation was expected to continue to operate at the 45 000-t/y level until at least 2011 when concentrate supplies to Thompson from Voisey's Bay were expected to cease. For the period 2006-09, Inco forecast that Thompson would produce about 55 000 t/y of finished nickel. A February 2005 presentation of 2004 results forecast Manitoba production of finished, or recoverable, nickel for the period 2005-09 being sourced as:

	2005	2006	2007	2008	2009
	(tonnes)				
Manitoba	37 000	32 000	29 500	29 500	29 500
VB feed	-	20 500	25 500	25 000	24 500
External	11 500	1 500	500	500	500
<b>Total</b>	<b>48 500</b>	<b>53 500</b>	<b>55 500</b>	<b>55 000</b>	<b>54 500</b>

Source: Inco Limited.

Note: Data are rounded to nearest 500 t and may not add due to independent rounding.

Inco began a project to deepen the Birchtree mine in 2000 because output at the Thompson mine was forecast to decline as the mine matured. This US\$48 million Birchtree project was completed in 2004. The quantity of nickel contained in Birchtree ore more than doubled from about 7600 t in 2002 to 15 800 t in 2004. For comparison, the amount of nickel in Thompson ore in 2004 was 28 900 t. Inco's nickel recovery factor, or the amount of nickel in ore that was finally recovered as finished nickel, allowing for losses in concentration and smelting, averaged 86% for Manitoba in 2004. Inco was able to demonstrate that blending the ore from both mines was possible,

not only saving the costs of processing separate streams, but also potentially allowing a higher concentrate grade to be produced. This could allow Inco to use a single furnace, thereby achieving additional costs savings. The existing labour contract at Inco's Thompson operations was scheduled to expire in September 2005.

Inco's proven plus probable ore reserves at the Birchtree plus Thompson mines in Manitoba at year-end 2004 were 27 Mt grading 2.10% Ni and 0.14% Cu. No grades for cobalt, platinum group metals, gold or silver were found.

Sulphur dioxide emissions by Inco's smelter in Thompson were 87% of the province's limit of 220 000 t/y for that facility. During the year, Environment Canada published its intention to regulate sulphur dioxide releases in the *Canada Gazette, Part I* in September. This proposed an emission limit for Inco's Thompson smelter of 174 000 t/y for the period 2009-15 and 12 000 t/y thereafter. Given the long distance from possible sulphur dioxide markets, the regulation could force the adoption of some form of hydrometallurgical technology to reduce sulphur dioxide emissions if the operation is to continue to produce refined nickel.

## Alberta

**Sherritt International Corporation** owned 50% of Metals Enterprise, which operated The Cobalt Refinery Company Inc. in Fort Saskatchewan, Alberta. The refinery produced refined nickel and cobalt metal; about 95% of the refinery feed was from Metal Enterprise's mine and leach plant at Moa Bay, Cuba. At Moa Bay, the company produced a nickel-cobalt sulphide residue by leaching nickel laterite ore. The mine sent limonitic ore to the leaching plant, leaving the underlying saprolitic material in place. In 2004, Metals Enterprise produced record output at its mine in Cuba of 33 534 t of nickel plus cobalt in mixed sulphides, as well as record production of both nickel and cobalt at the Fort Saskatchewan refinery of 31 788 t of Ni and 3326 t of Co. This compared with production of 31 086 t of Ni and 3142 t of Co at Fort Saskatchewan in 2003. The refinery also sold 221 000 t of by-product fertilizer in 2004. Sherritt and its Cuban partner continued to consider a possible expansion of the Moa Bay operation and the Fort Saskatchewan refinery; no decision was announced by year-end.

## Exploration in Canada

The focus of this year's nickel chapter of the *Canadian Minerals Yearbook* is exploration activities in Canada for nickel or cobalt. Table 6 shows a listing of the companies traded on public exchanges in Canada, the name of the property, and the the province or territory in which the property was located. The list does not include all properties or activities, for example, Inco and Falconbridge are believed to have extensive holdings, but incomplete data



are available in the public domain. However, when either company had a joint venture with a publicly traded company, then the details of those activities were shown for the company reporting such details in the public domain. Similarly, the exploration activities of private Canadian corporations or individuals, as well as foreign companies that do not file securities documents in Canada, such as subsidiaries of Anglo American plc, BHP Billiton Plc, or Lonmin plc, were not included. Where data were available, each of the companies having a share of the property were shown in the table. Table 6 includes data for the period from late 2003 to about mid-2005. In some cases, a company may have dropped an option on a property or otherwise disposed of it, but it remains in the table as data about such properties may be of interest. Details about the activities and the status of the various joint ventures, the technical reports about mineral reserves, and feasibility studies, etc., were available from the companies' web sites or from their filings on SEDAR. The reader can refer to Table 5 for the locations of those web sites and for the location of the SEDAR filings.

## INTERNATIONAL EVENTS

Canadian companies also have operations and exploration activities outside of Canada and some of these will be briefly reviewed below. As well, the major events in 2004 at foreign-owned operations outside of Canada will be briefly reviewed. More information can be obtained, as noted above, from the *2004 Nonferrous Metals Outlook* nickel section published in December 2004 at [www.nrcan.gc.ca/mms/pdf/nfo/nfo04/nick\\_e.pdf](http://www.nrcan.gc.ca/mms/pdf/nfo/nfo04/nick_e.pdf).

### Australia

**LionOre Mining International Ltd.** owned nickel operations located in the state of Western Australia. The Emily Ann mine and concentrator sent all nickel in concentrate produced to Inco Limited's smelters in Canada. The concentrator was expanded to 500 000 t/y of feed capacity as of December 2004 to allow it to process future output from the company's Maggie Hays mine, located about 3 km from the Emily Ann operation. During 2004, 332 000 t of ore were processed to produce 7800 t of payable nickel plus 80 t of payable cobalt and 387 t of payable copper. The proven plus probable mineral reserves at Emily Ann at year-end were 0.55 Mt grading 3.0% Ni using a long-term nickel price of US\$3.50/lb and a mine cut-off grade that averaged 1.67% Ni. At Maggie Hays, the probable reserve was 0.475 Mt grading 3.55% Ni at year-end 2004, also using a long-term nickel price of US\$3.50/lb and a cut-off grade of 2.06% Ni. LionOre forecast its payable production for the Maggie Hays and Emily Ann mines at 11 000 t of Ni in 2005.

In December 2004, LionOre completed the acquisition of MPI Mines Limited, which meant that LionOre then con-

trolled 80% of the output from the Black Swan operation, also in Western Australia. The Black Swan operations included the Silver Swan underground mine, an open-pit mine (Black Swan mine), a concentrator, and the Honeymoon Well nickel project. Nearly 300 000 t of ore grading 3.7% Ni were processed in 2004 to yield a concentrate grading about 19% Ni. Concentrates produced at Black Swan were sent to the Harjavalta smelter in Finland and the matte was used as feed at OM Group, Inc.'s Harjavalta nickel refinery, also located in Finland. Proven plus probable reserves at Black Swan at year-end 2004 were 4.26 Mt grading 1.04% Ni; of this, the Silver Swan ore graded 5.51% while the open-pit reserves graded 0.76% Ni. These reserve tonnages were based upon a long-term nickel price of US\$3.50/lb and a cut-off grade of 2.5% Ni for the underground Silver Swan mine and 0.45% Ni for the Black Swan open-pit mine. An expansion of the Black Swan open-pit mine was under way at year-end.

In May 2004, LionOre purchased the metallurgical plant of the Bulong Nickel Project. LionOre paid A\$15 million plus an additional A\$7 million to be paid if the plant were to be recommissioned; the plant had cost A\$300 million to build. LionOre referred to the former Bulong plant as its Avalon hydrometallurgical facility. LionOre expected that a decision on whether to recommission and operate its Avalon plant at a rate of between 20 000 and 40 000 t/y would be made in 2005. In June, LionOre and Western Areas NL announced a nickel off-take agreement for the Forrestania nickel project. The feasibility study of the Honeymoon Well project included an assessment of the potential for hydrometallurgical processing of the ore; LionOre targeted a production rate of between 35 000 and 40 000 t/y of nickel from the Honeymoon Well deposit, which was estimated to have a resource of 1 Mt of contained nickel. The company was also conducting a feasibility study of its Waterloo and Amorac nickel sulphide deposits, both located in Western Australia near LionOre's Thunderbox gold operation.

### Botswana

LionOre Mining International Ltd. owned 85% of the **Tati Nickel Mining Company (Proprietary) Limited**. The Government of Botswana owned the remaining 15%. At Tati, the Phoenix open-pit mine was expanded in 2003, and 2004 was the first year of full production. The new concentrator was designed to process 3.6 Mt/y of ore into about 300 000 t/y of concentrates. Tati Nickel sold its concentrates to Centametal AG, which had a custom smelting agreement with BCL Limited and custom refining contracts with Rio Tinto Zimbabwe and Falconbridge Limited. In 2004, 252 000 t of concentrate grading 6.09% Ni and 4.08% Cu were sent 200 km to BCL Limited, also in Botswana, for smelting. The probable mineral reserves at the Phoenix mine at year-end 2004 were estimated, according to the Australasian JORC Code, as 27 Mt grading 0.60% Ni and 0.32% Cu, using a long-term nickel

price of US\$3.50/lb and a cut-off grade of 0.25% Ni from which payable production was credited as 11 466 t of Ni, 8566 t of Cu, 39 018 oz of Pd and 6701 oz of Pt. Tati's production in 2005 was forecast by LionOre at 13 000 t of payable nickel.

In addition to a smelter, BCL also operated nickel-copper-cobalt mines and a concentrator at Selebi Phikwe. LionOre and the Government of Botswana each owned about 30% of BCL Limited with the remaining 40% held by the public. Matte from BCL was sent to Rio Tinto Zimbabwe Limited's Empress refinery in Zimbabwe and Falconbridge's Nikkelverk refinery in Norway. A pilot plant for LionOre's Activox® process was commissioned in May and operated through the rest of the year, producing refined nickel and refined copper. Information from the 1:170-scale plant was being used by a process design company in a definitive feasibility study of an expanded operation at Tati Nickel. The expansion could result in an operation producing about 18 500 t/y of refined nickel. This study was ongoing at year-end.

## China

Inco owned 49.9% of the **Taiwan Nickel Refining Corporation**, which operated a nickel refinery. Few details were found about the operation of the refinery, which processes nickel oxide from Sudbury. The refinery may be able to increase production after 2007 when additional nickel oxide feed becomes available as the Goro project ramps up.

Inco owned 65% of **Jinco Nonferrous Metals Co., Ltd.**, which produced nickel salts in Kunshan City.

## Dominican Republic

**Falconbridge Dominicana, C. por A.** operated a laterite nickel mine and ferronickel smelter in the Dominican Republic. Falconbridge owned about 85% of the company; the Government of the Dominican Republic owned about 10% and Redstone Resources Inc. owned about 4%. Production in 2004 was 29 477 t of Ni in FeNi compared to 27 227 t in 2003. Falconbridge expected to finalize a possible 6500-t/y expansion of the Dominican Republic mine and plant during 2005. The plant generates electricity using imported fuel at its own power plant and, as energy is a high proportion of total operating costs, at times the operation has been shut down temporarily when oil prices were high relative to nickel prices. A decision on whether or not to expand the operation will depend in large part upon the company's view of long-term nickel prices relative to long-term oil prices.

## Indonesia

Inco owned 61% of **PT International Nickel Indonesia Tbk** (PT Inco), which operated a nickel laterite mining

and smelting facility on the island of Sulawesi, Indonesia. Sumitomo Metal Mining Co., Ltd. owned over 20% of PT Inco, with the remaining 18% being owned by public shareholders. Four electric furnace lines processed laterite ore feed to produce nickel matte. The matte is sent to Inco TNC Limited in Japan (owned 67% by Inco Limited) and to Sumitomo's refinery in Japan. PT Inco produced a record 72 200 t of Ni in matte in 2004, compared to 70 200 t in 2003. Sumitomo took 14 716 t of Ni in 2004, compared to 14 307 t in 2003.

In October, Inco announced a 25% expansion of PT Inco to 90 700 t/y of nickel in matte by 2009. The expansion will include a third hydro-electric dam to generate 90 MW of power at a cost of US\$150 million, plus an additional US\$100 million for mine and plant equipment. Inco was also in the early stages of considering additional expansions in Indonesia, including a possible 50 000 t/y Ni in FeNi operation at Bahodopi and a hydrometallurgical plant capable of producing about 45 000 t/y at Sorowako. Drilling for the FeNi operation began; metallurgical testing was planned in early 2006.

## Japan

Inco owned 67% of Inco TNC Limited, which processes nickel in matte from PT Inco to make nickel oxide for use in the stainless steel industry and as feed for refineries in Taiwan and South Korea in which Inco has an interest. Production in 2004 was 60 000 t of Ni in nickel oxide, up from 50 500 t in 2003.

## New Caledonia

Falconbridge Limited and its partner La Société Minière du Sud Pacifique S.A. (SMSP) completed a bankable feasibility study of the Koniambo project in New Caledonia. Saprolite resources at Koniambo were 142 Mt grading 2.13% Ni of measured plus indicated resources, plus inferred resources of 156 Mt grading 2.2% Ni. In addition, there were over 100 Mt of limonitic resources grading over 1.6% Ni. Total costs to develop the mine, smelter and power plant to produce 60 000 t/y of Ni in FeNi were estimated at US\$2200 million, including a 390-MW power plant, plus an additional US\$500 million cost for start-up, financing and interest. SMSP held a 51% interest in the project with Falconbridge owning the remaining 49%. To gain title to the Koniambo orebody, SMSP and Falconbridge will have to complete a technical study and place firm orders for at least US\$100 million by January 1, 2006. Falconbridge and SMSP were expected to secure tax concessions broadly similar to those obtained by Inco for its Goro project (see below).

Inco Limited announced in 2001 that it would proceed with its Goro project in New Caledonia. The decision followed pilot plant testing of Inco's proprietary hydrometallurgical process to produce nickel oxide. By late 2002, the

estimated cost to construct the facilities had escalated by about 40% above the US\$1450 million estimate; Inco halted work in late 2002 to review plans and seek to reduce costs. Inco wrote off US\$200 million of previous expenditures at Goro in mid-2004. In October 2004, Inco announced that the review had been able to reduce costs and that construction would resume with capital expenditures estimated at US\$1890 million. The revised plan targeted production of 60 000 t of Ni in nickel oxide with cobalt output varying between 4300 and 5000 t/y depending upon the mining sequence for a particular year. Production was expected to start in late 2007. The Government of France agreed to provide a *Girardin Act* tax-advantaged lease financing program; the purchase, construction and installation cost of US\$500 million will be paid in three installments. Inco also secured a 15-year tax holiday followed by a 50% tax reduction for five years.

## Norway

Falconbridge sent all matte produced at its Sudbury, Ontario, smelter to its refinery in Norway for processing into refined nickel, copper and cobalt. Precious metals, including platinum group metals, were also recovered from the matte. Not all of the copper produced in Sudbury was refined in Norway because Falconbridge produced a separate copper concentrate from some of the Sudbury ore. This concentrate was then sent to Falconbridge's Kidd metallurgical facilities for smelting and refining. Falconbridge's refinery in Norway also processed other feed, including matte from BCL Limited in Botswana and a nickel-cobalt sulphide feed from the Kwinana refinery in Australia. The refinery was also capable of refining nickel, copper and cobalt from recyclable feeds. Falconbridge reported production at its refinery in 2003 and 2004 as:

Nikkelverk	2003	2004	Capacity
	(tonnes)		
Refined nickel	77 183	71 410	85 000
Refined copper	35 852	35 643	39 000
Refined cobalt	4 556	4 670	4 800
Sulphuric acid	102 133	95 199	115 000

Source: Falconbridge Limited.

Falconbridge has plans to expand production capacity to 100 000 t/y of Ni, 60 000 t/y of Cu and 5000 t/y of Co, but this remained contingent upon economic conditions and the ability to secure sufficient feed.

## South Korea

Inco owned 25% of the Korea Nickel Corporation, which owns a nickel refinery in the Republic of Korea (South Korea). In 2004, the refinery in Korea reportedly produced 28 000 t of nickel in various products for domestic use; the refinery throughput was limited by the availability of nickel oxide feed material imported from Canada, Australia and Japan.

## INTERNATIONAL DEVELOPMENTS BY CANADIAN-LISTED COMPANIES

Canadian-listed companies were engaged in the evaluation of a number of nickel projects outside Canada in 2004 in addition to those noted above. Space does not permit a detailed review of such activities, and the reader should consult the corporate web sites or the SEDAR pages for the companies, as shown in Table 5.

## LARGE NICKEL PRODUCERS

As noted earlier, Inco was the second largest miner and refiner of nickel in the world; Falconbridge ranked as the third largest refiner of nickel. A comprehensive listing of production by mine and plant in 2003 is available in Table 6 (see page 38) in the 2003 nickel chapter of the *Canadian Minerals Yearbook* available on the internet at [www.nrcan.gc.ca/mms/cmty/content/2003/42.pdf](http://www.nrcan.gc.ca/mms/cmty/content/2003/42.pdf). A list of web sites for nickel producers in other countries in 2003 can be found in Table 5 (see page 35) at the same web site.

A brief review of some of the other large producers in 2004 is given below.

**MMC Norilsk Nickel** was the world's leading producer of nickel, producing from mines in the Taimyr peninsula in Siberia and from mines in the Kola peninsula. The company produced 243 000 t of Ni, including 2000 t from purchased sources; cobalt production was 4524 t, including material tolled by other producers in Russia. Most of the nickel mined (85%) came from seven mines operating on three deposits in Siberia; all mines but one were underground mines. Two of the mines, the Oktyabrsky and the Taimyrsky mines, accounted for 81% of the nickel mined by Norilsk in Siberia. In total, Norilsk mined 13.7 Mt grading 1.74% Ni and 3.04% Cu in 2004 from its Siberian mines, compared to 13.1 Mt grading 1.73% Ni and 3.13% Cu in 2003. This ore was fed to nearby concentrators that supplied nickel and copper smelters on site. Norilsk's Siberian smelters produced 207 000 t of recoverable nickel in matte in 2004. Of this, about 80 000 t of recoverable nickel in matte were sent to the company's Severonickel refinery for final processing, leaving 127 000 t of nickel refined in Siberia from the Siberian mines. Included in the

total was 2000 t of nickel in purchased feed in 2004, compared to 1000 t in 2003. No rail or road links from Norilsk to the rest of Russia exist, so the nonferrous metals are transported by ship to market or for further processing. No production data about platinum group metals production were released. The reserves in the Taimyr peninsula at the end of 2004 were 238 Mt grading 2.08% Ni, 3.58% Cu and 0.35 g/t Au; cobalt and PGMs grades were not disclosed. In addition, there were measured and indicated resources of 1419 Mt grading 0.57% Ni, 1.11% Cu and 0.19 g/t Au.

In the northern part of the Kola peninsula near the border with Norway, Norilsk operated four mines producing 6.7 Mt grading 0.70% Ni and 0.30% Cu in 2004, compared to 6.6 Mt grading 0.68% Ni and 0.29% Cu in 2003. The nickel recovered from the company's Kola mines amounted to 36 000 t in 2004, compared to 35 000 t in 2003. The ore was processed to concentrate and smelted in the northern Kola region; the matte was sent to Severonickel for final refining. Severonickel also produced 80 000 t of refined nickel from matte that had been mined and smelted in the Taimyr peninsula. Kola ore reserves at year-end 2004 were 160 Mt grading 0.67% Ni and 0.31% Cu; gold, cobalt and PGMs contents were not disclosed. The Norilsk web site can be found at [www.nornik.ru/en](http://www.nornik.ru/en).

**WMC Resources Ltd.** (WMCR) operated sulphide nickel mines, concentrators, a smelter, and a refinery, all located in Western Australia. The company was the third largest nickel producer of nickel in concentrates but, because it sold significant amounts of nickel in concentrates and nickel in matte to third parties, it only ranked as the sixth largest producer of refined nickel in 2004. WMCR's three mining "camps" in Western Australia were Mt. Keith, Kambalda and Leinster, which together produced a total of 116 000 t of Ni in concentrates. Of this, 88 000 t was derived from WMCR mines and the remaining 28 000 t was from the company's Kambalda mill, which was supplied by third-party ore deliveries largely from properties that had been earlier sold by WMCR to independent mining companies. WMCR produced 98 000 t of Ni in matte at its Kalgoorlie smelter and 63 000 t at its refinery at Kwinana near Perth, Australia. The refinery sent a cobalt-nickel sulphide residue for treatment at a third-party refinery. As WMCR sold 1 inch x 1 inch cut electrolytic cobalt cathodes, one may assume that the third party was Falconbridge's refinery in Norway.

WMCR exported 24 000 t of Ni in matte to Japan (Sumitomo Metal Mining Co., Ltd.) and 6000 t to Finland (OM Group, Inc.). WMCR's contracts to supply matte to Sumitomo will expire by 2005. WMCR signed a three-year agreement to supply 10 000 t/y of Ni in matte to Jinchuan Group Limited for three years starting in 2005; a second contract was signed to supply 15 000 t/y of Ni in matte for six years starting in 2005. In October, Xstrata

Ltd. made a bid to acquire WMCR. Xstrata's final offer for WMCR was made in December with a closing date of January 28, 2005. (Note: In 2005, BHP Billiton offered to purchase WMCR and subsequently completed the acquisition. While the web site for WMC Resources was discontinued in 2005, some information from that site was incorporated into the BHP Billiton web site.)

**BHP Billiton** was the fourth largest producer of finished nickel and the seventh largest miner of nickel. Its operations included a nickel refinery at Yabulu in Queensland and a mine and FeNi smelter in Colombia. The company's Cerro Matoso operation in Colombia produced 48 800 t of Ni contained in FeNi in 2004. The FeNi contained between 37% and 42% Ni.

In March, the company announced a decision to proceed with a major new project of 50 000 t/y of Ni and 1400 t/y of Co. The Ravensthorpe project consists of a new mine and leach plant in Western Australia that will produce an intermediate nickel-cobalt hydroxide. The company will ship the intermediate to its refinery in Queensland for recovery. To handle the additional feed, the refinery will be expanded.

In 2004, the Yabulu refinery had the capacity to process about 3.6 million wet tonnes per year of limonitic ores that were imported from New Caledonia, the Philippines and Indonesia. The refinery leached the nickel and cobalt from the ore in an ammonia-ammonium carbonate solution and then used solvent extraction to recover the elements. The cobalt was produced as a "chemgrade" cobalt material that was 65% cobalt oxyhydroxide and 10% cobalt oxide with the remainder mostly water. In 2004, production was reported as 31 600 t of Ni and 1800 t of Co. The refinery will be expanded to 76 000 t/y of Ni and 3500 t/y of Co in order to accommodate the intermediate feed from the Ravensthorpe project. The expansion at Yabulu is to cost US\$350 million and is expected to start producing nickel metal and cobalt from the Ravensthorpe feed in 2007.

The cost to build the Ravensthorpe mine and leach plant was estimated at US\$1070 million. Three orebodies with a combined resource of 253 Mt grading 0.69% Ni and 0.03% Co will provide feed for over 25 years. The Ravensthorpe ore was judged amenable to upgrading by scrubbing and screening to remove harder silica material that does not contain nickel. Both pressure and atmospheric leaching will be used to extract the nickel and cobalt in a mixed hydroxide. The first shipments of mixed hydroxides to Yabulu were planned for the second quarter of 2007.

BHP Billiton projected its production in 2007 from the Cerro Matoso FeNi operation and the expanded QNI Ltd.'s refinery as 130 000 t of contained nickel. In December following an announcement by Xstrata that it would bid for control of WMC Resources Ltd., BHP

Billiton announced that it too would bid for control of WMC Resources. As of year-end, WMC Resources remained independent, but was acquired by BHP Billiton in 2005. Further information about the company's nickel operations can be obtained from BHP Billiton's web site at [www.bhpbilliton.com](http://www.bhpbilliton.com).

**Le Nickel-SLN** was owned 60% by Eramet, 30% by the three provinces of New Caledonia, and 10% by Nisshin Steel Co. Ltd. of Japan. SLN operated four mines and a smelter in New Caledonia. The smelter also took feed from a fifth mine operated on contract by Société Minière Georges Montagnat S.A. Most of SLN's ore went to the company's smelter with the rest being exported to Japanese FeNi smelters. The smelter typically recovers about 80% of the nickel in the form of FeNi with the remaining 20% as nickel in matte. As part of its program to increase output at the smelter by 25% to 75 000 t/y, SLN successfully commissioned a new furnace at its Doniambo smelter in New Caledonia, producing metal in July. The project was to cost €290 million over the period 2002-06 in order to raise capacity from 61 500 t/y in 2004 to 70 000 t/y by the end of 2004 and to 75 000 t/y by 2007. Because of construction at the Doniambo smelter, production of nickel in FeNi plus matte decreased in 2004 to 55 180 t from 61 523 t in 2003, but was forecast to increase to 70 000 t in 2005. Production by type of output was: Ni in FeNi, 50 666 t in 2003 and 43 016 t in 2004; and Ni in matte, 10 857 t in 2003 and 12 164 t in 2004. In order to support the expanded production at the smelter, the Tiébaghi mine capacity was being increased to 1 million wet tonnes per year; construction of the Tiébaghi ore beneficiation plant started in late 2004 and was scheduled to be completed by the end of 2006. The nickel in matte was sent to Eramet's refinery at Sandouville in France. That refinery's capacity was expanded by late 2004 to 15 000 t/y of Ni to handle the increased matte output from the Doniambo smelter. Production in 2004 was about 9600 t, down 1000 t from the year earlier; however, cobalt recovered at the Sandouville refinery increased to 199 t in 2004 from 181 t in 2003. Eramet's web site can be found at [www.eramet.fr](http://www.eramet.fr).

**Jinchuan Group Limited** commissioned a new 400-t/y electrowinning cobalt unit at its smelter/refinery complex in Gansu Province, China. Jinchuan continued its expansion of the nickel smelting and refining capacity, targeting 90 000 t of Ni and 4500 t of Co in 2005, compared to 71 000 t of Ni and 2200 t of Co in 2004. Jinchuan's refinery expansion project to increase capacity from 80 000 t/y to 130 000 t/y continued through the year; begun in late 2003, it was forecast to be completed in mid-2005. An expansion of cobalt refining capacity by 4000 t/y was under way at year-end. The expansion includes a new 540 000-t/y sulphuric acid plant. Jinchuan has expanded its refined production faster than its mine output largely by importing concentrates from Australia (Fox, Sally Malay) and Spain (Aguablanca). Jinchuan has a web site was at [www.jnmc.com/default.asp](http://www.jnmc.com/default.asp).

**Sumitomo Metal Mining Co., Ltd.** operates the Niigata nickel refinery and the Hyuga ferronickel smelter in Japan; their respective capacities were 36 000 t/y of Ni metal and 21 000 t/y of Ni in FeNi. The refinery produced 32 800 t of nickel metal in 2004, down from 35 000 t in 2003. The refinery feed was sourced from PT International Nickel Indonesia Tbk and WMC Resources in Western Australia. Inco's 10-K reported that 14 700 t of Ni in matte was sent to Sumitomo in 2004. As noted above, starting in 2005, the WMCR matte supply that had gone to Sumitomo will be redirected to Jinchuan. To compensate for the loss of WMCR matte, Sumitomo invested in the construction of a new leaching facility at Coral Bay Nickel in the Philippines. This project was completed in August and was expected to produce about 7000 t of Ni in intermediates in 2005 that will be sent to Sumitomo's refinery. Coral Bay's capacity was designed to be 10 000 t/y of Ni and 700 t/y of Co. Sumitomo's Hyuga smelter produced FeNi from laterite ore imported from New Caledonia, Indonesia, and the Philippines. Production was 21 700 t of Ni in FeNi in 2004 compared to 21 800 t in 2003. Sumitomo has a web site at [www.smm.co.jp/index\\_E.html](http://www.smm.co.jp/index_E.html).

For more details about other nickel events in 2004, the reader may refer to the nickel chapter of Natural Resources Canada's *Nonferrous Metals Outlook*, published in December 2004; it can be found on the Internet at [www.nrcan.gc.ca/mms/pdf/nfo/nfo04/nick\\_e.pdf](http://www.nrcan.gc.ca/mms/pdf/nfo/nfo04/nick_e.pdf).

## NICKEL USE

Stainless steel is the largest single market for nickel, accounting for over 60% of the primary nickel used. When added to steel, chromium reacts with oxygen to form a stable oxide that adheres to the surface and stops further corrosion. The addition of nickel to stainless steels improves the material properties, such as corrosion resistance and weldability, under more severe operating conditions. A "typical" stainless steel contains about 8% nickel and 18% chromium. There are various types of stainless steels, including those that contain less or no nickel, as well as those that contain more nickel. Further details about stainless steels and their applications can be found on the Internet at [www.worldstainless.org](http://www.worldstainless.org).

The International Stainless Steel Forum (ISSF) published data about total stainless and heat-resistant steel production:

- 2001      19.2 Mt
- 2002      20.7 Mt
- 2003      22.8 Mt
- 2004      24.6 Mt

The Specialty Steel Industry of North America presents information about stainless and alloys steels, including

technical and design information; its web site is at [www.ssina.com](http://www.ssina.com). An overview of stainless steel can also be found at [www.ssina.com/overview/intro.html](http://www.ssina.com/overview/intro.html).

In early 2005, Inco estimated that 76% of the world's stainless steel production of 23.5 Mt in 2004 was austenitic stainless steel, or 17.9 Mt that contained an estimated 1.50 Mt of nickel, of which 802 000 t came from primary sources and 701 000 t was from scrap. Thus, about 53% of the total nickel used in austenitic stainless steels was primary metal provided directly by mines and refineries. Inco's estimate for 2003 was 1.43 Mt of nickel in 17.0 Mt of austenitic stainless steels in 2003, of which 801 000 t was primary nickel and 627 000 t was nickel from scrap. The higher prices for nickel in 2004 relative to 2003 were responsible for the increased supply of nickel in scrap as this supply responds relatively more quickly to higher prices than does primary output. Eramet published data later than Inco and its estimates for 2004 were stainless production of 18.3 Mt containing 832 000 t of primary nickel with a scrap ratio of 45.6%.

According to Inco, other alloying and metallurgical uses of primary nickel accounted for an additional 18%, or about 227 000 t, of demand in 2004 of which about 60 000 t was used in low-nickel alloy steels (products containing less than 1% nickel by weight), about 110 000 t was used in nonferrous alloys, and about 50 000 t was used in foundry and casting applications. The nonferrous alloys can contain very high percentages of nickel and can be used in such applications as turbine engines.

Inco's estimates were that electroplating accounted for about 10% of world demand, or about 125 000 t. China (as noted below) was a very important market for nickel plating. Batteries and catalysts were part of the "other uses" category, which accounted for about 110 000 t of primary nickel in 2004. Eramet estimated that rechargeable battery demand accounted for about 3% of world demand in 2004. Nickel used in hybrid cars was included in the "other" category.

Eramet published data about the demand for primary nickel showed a breakdown of:

- Stainless steel, 69%;
- High nickel alloys (25% to 100% nickel), 9%;
- Electroplating, 8%;
- Alloying and foundry (less than 4% nickel), 7%;
- Rechargeable batteries, 3%;
- Coinage, 2%; and
- Other (including catalysts), 2%.

## China

China continued to play an increasingly important role in the nickel and stainless steel market. Nickel demand in China in 2004 was estimated at about 145 000 t. Demand

was forecast to rise to 155 000 t in 2005 and was projected by the Jinchuan Group to reach 250 000 t in 2010. The pattern of demand in China differed from that of the rest of the world, most notably with respect to plating. The plating sector used about 32% of Chinese demand in 2004, or about 45 000 t. When this is subtracted from Inco's estimate of 125 000 t of primary nickel used worldwide in plating in 2004, then non-Chinese usage of nickel for plating accounted for only 7% of world use. The total Chinese nickel industry accounted for 11% of total world demand for nickel but, in the plating sector, China accounted for about 36% of worldwide demand for nickel for plating.

About 40% of Chinese primary nickel use was for the making of stainless steels. However, only about half of the 4.6 Mt of apparent stainless use in China in 2004 was supplied from domestic sources. Thus, nickel also ends up in China in the form of stainless steel, although this is recorded as "use" in the country of fabrication. Chinese stainless steel producers had ambitious expansion plans, aiming to reach over 5 Mt of capacity by 2006 and over 10 Mt by 2007. Not all of the capacity will be for austenitic stainless steel, as the Chinese industry seeks to reduce costs by using substitutes for nickel in stainless steels.

## HEALTH AND ENVIRONMENT

Nickel is valuable compared to other nonferrous metals. For this reason, it is intensively recycled. However, its value means that many of its uses are in long-lived applications so that the lower maintenance and servicing costs over time more than offset the higher initial cost. A long service life means that the amount of obsolete scrap arising after the service life of the nickel-containing item will be low relative to demand due to ongoing demand growth as standards of living and population increase. Much of the scrap arises from the manner in which stainless steels and other metals are fabricated. Because metals and their alloys can be remelted and re-utilized as if new, the manufacturing processes used involve cutting, grinding, shaping, etc., which generate "new" scrap. This new scrap is recycled, thereby keeping total manufacturing costs relatively low. Once nickel is used to make an alloy, such as austenitic stainless steel, it is re-used as that alloy when recycled as generally the costs of re-refining an alloy into separate elements would be uneconomic.

In January 2004, the Nickel Institute (NI) was formed out of the Nickel Development Institute (NiDI) and the Nickel Producers Environmental Research Association (NiPERA). The NI continued work with respect to the Risk Reduction Program in Europe. As well as providing technical information about nickel usage, the NI provided information about nickel with respect to human health and the environment, including topics such as carcinogenicity, dermatitis, and ecotoxicity. The International Agency for

Research on Cancer (IARC) published a monograph in 1997 that reviewed nickel and nickel compounds. Another organization that reviewed data about nickel for carcinogenicity was the American Conference of Governmental Industrial Hygienists, whose recommendations are used by Manitoba and Ontario to regulate occupational exposure limits. In the United States, the National Toxicology Program listed information and classification about nickel at [ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s118nick.pdf](http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s118nick.pdf).

## PRICES AND INVENTORIES

Figure 2 shows nickel prices (LME cash settlement prices) on a daily basis in 2004 and over the period 1986 to 2004. The high, average and low settlement prices are shown on the first page of this chapter. Nickel inventories on the London Metal Exchange began the year at just over 24 000 t, reached a low of 7800 t in July, and ended the year at just under 21 000 t. LME inventories do not represent a complete picture of nickel stocks; in the period 2001-04, producers, fabricators and merchants maintained nickel inventories that combined have averaged between three and four times that contained in the LME warehouses. Inco's five-year review in its 2004 10-K report showed year-end inventories of:

Year	LME Inventory	Producers' Inventories
(tonnes)		
2000	9 878	80 332
2001	19 188	86 812
2002	21 972	78 028
2003	24 072	79 928
2004	20 896	84 102

Source: Inco Limited.

Historical nickel prices are shown in Table 11; please note that in the 1997-2003 nickel chapters of the *Canadian Minerals Yearbook*, average LME settlement prices were incorrect.

More detailed historical price and inventory information is available. Inco published daily price and inventory data back to 2002, and this information is available on Inco's web site at [www.inco.com/customercentre/dailyprice/archive/default.aspx](http://www.inco.com/customercentre/dailyprice/archive/default.aspx).

The U.S. Geological Survey (USGS) showed historical prices at [minerals.usgs.gov/minerals/pubs/commodity/nickel/500798.pdf](http://minerals.usgs.gov/minerals/pubs/commodity/nickel/500798.pdf).

The International Nickel Study Group publishes a monthly bulletin that includes data about prices. Details about the bulletin were available at [www.insg.org/publics.htm](http://www.insg.org/publics.htm).

The London Metal Exchange shows data for the current year on its web site at [www.lme.co.uk](http://www.lme.co.uk) and charges a fee for earlier data. The LME's contract specifications for nickel were posted at [www.lme.co.uk/nickel\\_contractspec.asp](http://www.lme.co.uk/nickel_contractspec.asp) and [www.lme.co.uk/downloads/W027Nickelspec.pdf](http://www.lme.co.uk/downloads/W027Nickelspec.pdf). The LME's list of the acceptable nickel brands was posted at [www.lme.co.uk/nickel\\_brands.asp](http://www.lme.co.uk/nickel_brands.asp).

Price information about nickel, cobalt, other nonferrous metals and stainless steels can also be purchased from [Metalprices.com](http://Metalprices.com) and the *Metal Bulletin*.

## COBALT

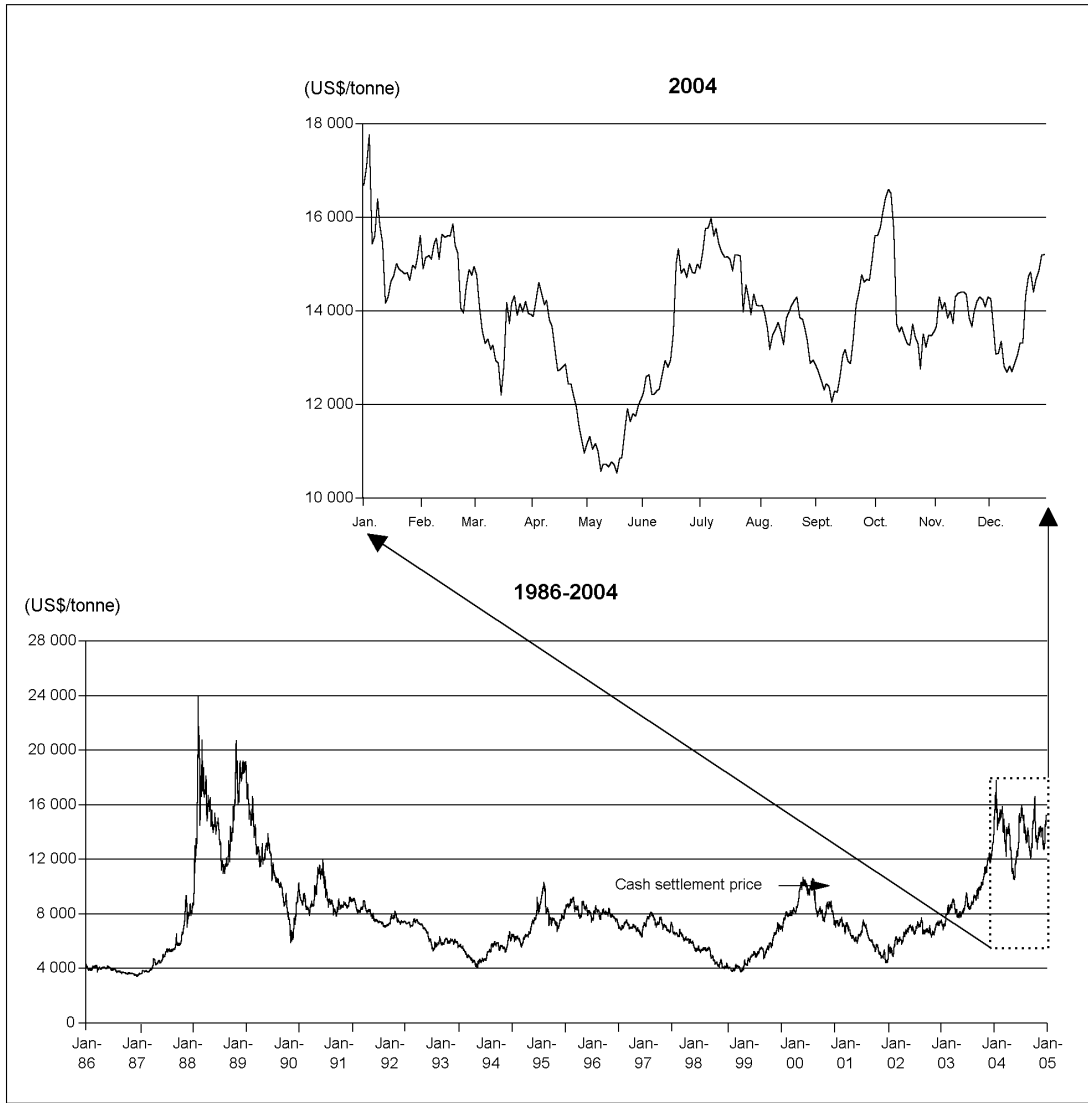
No terminal markets such as the LME exist for cobalt to provide daily prices. *Metal Bulletin* published low and high prices of trades reported for two grades of cobalt metal: 99.3% Co and 99.8% Co. The average low and average high prices for 99.3% Co in 2004 were US\$22.389/lb and US\$23.200/lb. The average low and average high prices for 99.8% Co in 2004 were US\$23.725/lb and US\$24.618/lb. Figure 3 shows the average of the monthly high and low prices reported by *Metal Bulletin* for both 99.3% Co and 99.8% Co. Average monthly cobalt prices for 99.8% Co peaked in February 2004 at US\$27.59/lb or US\$60 800/t (average of low and high quotations) and US\$25.22/lb or US\$55 600/t for 99.3% Co. By December, the average monthly prices were US\$18.07/lb or US\$39 800/t, and US\$17.02/lb or US\$37 900/t, respectively. The significant price increase in 2004 came after a period of declining prices from a peak in February 1996 of US\$29.95/lb or US\$66 000/t for 99.8% Co, and US\$27.84/lb or US\$61 400/t for 99.3% Co.

WMC Resources, purchased in 2005 by BHP Billiton, reported current and historical cobalt sales. These data were available in mid-2005 at the new Internet address of [cobalt.bhpbilliton.com/sales.asp](http://cobalt.bhpbilliton.com/sales.asp) for recent sales and at [cobalt.bhpbilliton.com/auditorsreport.asp](http://cobalt.bhpbilliton.com/auditorsreport.asp) for historical sales since 1999.

## OUTLOOK

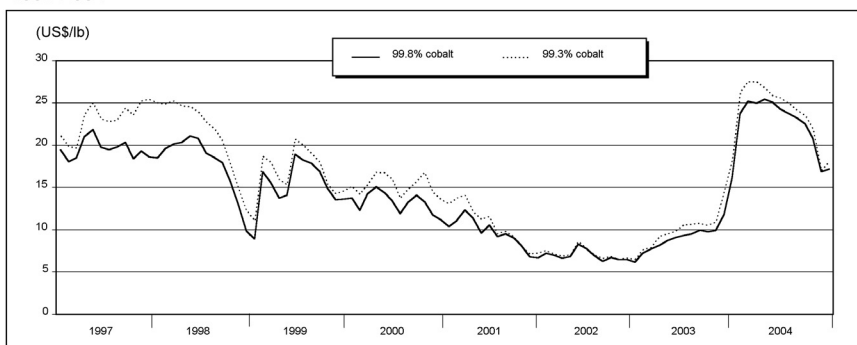
Average nickel prices on the LME reached a record high price in 2004. These higher-than-average prices, even considering a lower-valued U.S. currency, were expected to continue into 2005 and at least early 2006 because, relative to increasing potential demand, only relatively few nickel projects were forecast to be in production before 2007. But higher nickel prices will affect demand and the

**Figure 2**  
LME Cash Settlement Nickel Prices, 1986-2004



Sources: International Nickel Study Group; Reuters; World Bureau of Metal Statistics.  
Conversions: \$2.50/lb = \$5512/t; \$3.00/lb = \$6614/t; \$3.50/lb = \$7716/t; \$4.00/lb = \$8818/t.

**Figure 3**  
Cobalt Prices, Metal Bulletin Monthly Average High and Average Low Prices, 1997-2004



Source: Metal Bulletin.



longer that higher prices are sustained, the greater will be the incentive to substitute for nickel. In stainless steels, some applications that are presently filled by austenitic stainless steels can be filled with other types of stainless steels or other materials. This does not imply that all uses of stainless and high-nickel alloys are at the same risk because some applications require nickel to meet the required service conditions.

Primary nickel competes with nickel in stainless steel scrap for a share of the stainless steel market. This market totalled about 1.5 Mt in 2004, of which slightly over half was furnished from primary sources. As the production capacity of primary facilities was almost fully utilized in 2004, additional efforts may be expected to secure additional tonnages of nickel in scrap to meet rising demand.

In the medium term, high nickel prices face the challenge of increasing substitutions and increased scrap supply, assuming continued sustained world economic growth. Ultimately, the demand for nickel is driven by world industrial production and, if world growth slackens, then demand for nickel can be expected to decline. A slowing of Chinese infrastructure growth, further weakening of the U.S. currency and rising interest rates, or sustained higher energy prices would slow the growth in demand for nickel.

On the supply side, an increasing number of nickel exploration activities were under way, driven by the incentive of higher prices. New nickel projects were being examined in many countries (e.g., Australia, Brazil, Canada, Cuba, Guatemala, New Caledonia and Papua New Guinea) and additional projects are expected to be committed in 2005 and 2006, despite the problems experienced by the nickel laterite projects in Australia at the end of the 1990s and Inco's cost escalations at its Goro laterite project.

In Canada, exploration for nickel was largely concentrated in regions of proven nickel potential: the Ungava region of Quebec, near the Raglan operation, and near Sudbury, Ontario. There were many areas of nickel exploration in Canada; Table 6 shows the activities listed alphabetically by companies listed on Canadian exchanges during the period from late 2003 into 2005. Because of the extensive nickel property holdings of Inco Limited and Falconbridge Limited and the relative lack of information about such properties, only those properties for which information was filed by joint-venture or option partners was shown in Table 6.

Voisey's Bay Nickel was scheduled to start up in late 2005. An expansion at the Raglan operations was also under way. Sherritt International and its Cuban partner were considering an expansion at the Fort Saskatchewan refinery and at the mine/leach plant in Cuba. Falconbridge will start shaft sinking at Nickel Rim South in 2005 in a program to prove ore reserves and, if economic, will develop replacement ore reserves in Sudbury. While

nickel resource and reserve developments appear to be well positioned for the future, the future viability of nickel-processing operations in Canada will be challenged by uncertainty about regulatory actions affecting the emissions of sulphur dioxide and greenhouse gases.

*Note about sources: The information used for this review comes from the news and financial releases of companies, usually available on those companies' web sites or from the securities documents also available on the Internet. Natural Resources Canada is the source of the statistics for Canadian production, use, and shipments. Information about production and use in other countries was found either in national publications of those countries, in the publications of the International Nickel Study Group, or in the press. For additional sources of reference information, readers should consult the 2003 nickel chapter, pages 18 and 19, at [www.nrcan.gc.ca/mms/cmy/content/2003/42.pdf](http://www.nrcan.gc.ca/mms/cmy/content/2003/42.pdf).*

*Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 64. (2) Most information in this review was current as of July 2005. (3) Various Internet sites have been identified in this article – please note that Natural Resources Canada has no control over the content of the web sites of other organizations, which may be modified, updated or deleted at any time. (4) This and other reviews, including previous editions, are available on the Internet at [www.nrcan.gc.ca/mms/cmy/com\\_e.html](http://www.nrcan.gc.ca/mms/cmy/com_e.html).*

#### NOTE TO READERS

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

**TARIFFS**

Item No.	Description	Canada			United States	EU	Japan
		MFN	GPT	USA	Canada	Conventional Rate (1)	WTO (2)
2604.00	Nickel ores and concentrates	Free	Free	Free	Free	Free	Free
2825.40	Nickel oxides and hydroxides	Free	Free	Free	Free	Free	4.8%
7202.60	Ferro-nickel	6.5%	Free	Free	Free	Free	3.3%
7501.10	Nickel mattes	Free	Free	Free	Free	Free	Free
7501.20	Nickel oxide sinters and other intermediate products of nickel metallurgy	Free	Free	Free	Free	Free	Free-44 yen/kg (3)
7502.10	Unwrought nickel, not alloyed	Free	Free	Free	Free	Free	44 yen/kg
7502.20	Unwrought nickel alloys	Free	Free	Free	Free	Free	Free-3% (4)
7503.00	Nickel waste and scrap	Free	Free	Free	Free	Free	Free
7504.00	Nickel powders and flakes	Free	Free	Free	Free	Free	Free-41 yen/kg-3%
7505.11	Bars, rods and profiles of nickel, not alloyed	Free	Free	Free	Free	Free	3%
7505.12	Bars, rods and profiles of nickel alloys	Free	Free	Free	Free	2.9%	3%
7505.21	Nickel wire, not alloyed	Free	Free	Free	Free	Free	3%
7505.22	Wire of nickel alloys	Free	Free	Free	Free	2.9%	3%
7506.00	Nickel plates, sheets, strip and foil	Free	Free	Free	Free	Free-3.3%	Free-3%
7507.00	Nickel tubes, pipes, and tube or pipe fittings	Free	Free	Free	Free	Free-2.5%	Free-3%
7508.00	Other articles of nickel	Free-3%	Free	Free	Free	Free	3%

Sources: Canadian *Customs Tariff*, effective January 2005, Canada Border Services Agency; *Harmonized Tariff Schedule of the United States*, 2005; *Official Journal of the European Union* (October 30, 2004 Edition); *Customs Tariff Schedules of Japan*, 2004.

(1) The customs duties applicable to imported goods originating in countries that are Contracting Parties to the General Agreement on Tariffs and Trade or with which the European Community has concluded agreements containing the most-favoured nation tariff clause shall be the conventional duties shown in column 3 of the Schedule of Duties. (2) WTO rate is shown; lower tariff rates may apply circumstantially. (3) Free except for nickel oxide sinters containing by weight not less than 88% nickel, for which the tariff rate is 44 yen/kg, and nickel oxide containing by weight not more than 1.5% copper, for which the tariff rate is 3%. (4) The tariff rate of 3% applies to nickel alloys other than those containing by weight less than 50% nickel and not less than 10% cobalt.

## TARIFFS

Item No.	Description	Canada			United States	EU	Japan
		MFN	GPT	USA	Canada	Conventional Rate (1)	WTO (2)
2605.00	Cobalt ores and concentrates	Free	Free	Free	Free	Free	Free
2822.00	Cobalt oxides and hydroxides, commercial cobalt oxides	Free	Free	Free	Free	4.6%	Free
2827.34	Cobalt chloride	4%	3%	Free	Free	5.5%	3.3%
2833.29.00.40	Cobalt sulphate	Free	Free	Free	Free	5.3%	Free
2836.99.10.30	Cobalt carbonates for use in the manufacture of animal or poultry feeds, glues or adhesives, optical fibres or optical fibre bundles or cables, typewriter or similar ribbons, polymers in primary forms or profile shapes or sheets of plastics; cobalt carbonates to be employed as drilling mud or additives therefor in drilling for minerals, natural gas, oil or water	Free	Free	Free	Free	5.5%	3.3%
2836.99.90.20	Other cobalt carbonates	3.5%	3%	Free	Free	5.5%	3.3%
2915.23.10	Cobalt acetates for use as petroleum refining catalysts, or for use in the manufacture of animal or poultry feeds, glues or adhesives, optical fibres or optical fibre bundles or cables, typewriter or similar ribbons, polymers in primary forms or profile shapes or	Free	Free	Free	Free	5.5%	3.9%
2915.23.90	Other cobalt acetates	5.5%	3%	Free	Free	5.5%	3.9%
8105.00	Cobalt mattes and other intermediate products of cobalt metallurgy; cobalt and articles thereof, including waste and scrap						
8105.20	Unwrought cobalt; powders						
8105.20.10	Powders; unwrought cobalt, not alloyed	Free	Free	Free	Free	Free	Free
8105.20.90	Other	3%	Free	Free	Free	Free	Free
8105.30	Waste and scrap	Free	Free	Free	Free	Free	Free
8105.90	Other	3%	Free	Free	Free	3%	Free
8105.90.00.10	Cobalt bars and rods, not alloyed	3%	Free	Free	Free	3%	Free
8105.90.00.90	Other	3%	Free	Free	Free	3%	Free

Sources: Canadian Customs Tariff, effective January 2005, Canada Border Services Agency; Harmonized Tariff Schedule of the United States, 2005; Official Journal of the European Union (October 30, 2004 Edition); Customs Tariff Schedules of Japan, 2004.

(1) The customs duties applicable to imported goods originating in countries that are Contracting Parties to the General Agreement on Tariffs and Trade or with which the European Community has concluded agreements containing the most-favoured-nation tariff clause shall be the conventional duties shown in column 3 of the Schedule of Duties. (2) WTO rate is shown; lower tariff rates may apply circumstantially.

TABLE 1a. CANADA, NICKEL PRODUCTION BY PROVINCE, 2002-04

	2002		2003		2004 (p)	
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
<b>MINE OUTPUT</b>						
Nickel content of concentrates produced	189 297	..	163 244	..	186 546	..
<b>SHIPMENTS</b>						
(recoverable content of nickel in concentrates shipped from Canadian mines)						
Quebec	24 693	264 580	25 168	345 707	28 085	516 988
Ontario	117 455	1 258 534	92 235	1 266 946	115 883	2 133 180
Manitoba	37 652	403 437	38 072	522 955	37 916	697 959
Total	179 800	1 926 552	155 475	2 135 608	181 884	3 348 128
Finished nickel output = refined nickel in various shapes in Class I, plus Class II nickel (as defined by the international Nickel Study Group), which includes nickel oxide sinter						
	144 476	..	124 418	..	148 938	..

Sources: Natural Resources Canada; Statistics Canada.  
.. Not available; (p) Preliminary.

Note: Numbers may not add to totals due to rounding.

TABLE 1b. CANADA, NICKEL EXPORTS, 2002-04

	2002		2003		2004 (p)		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
2604.00.40	Nickel ores and concentrates (nickel content)						
	United States	...	4	22	118	-	
2825.40	Nickel oxides and hydroxides (weight of material, not nickel content)						
	China	126	1203	206	2 094	295	3 885
	Malaysia	8	80	108	1 210	293	3 241
	Germany	-	-	266	2 072	313	3 180
	Japan	62	250	99	900	278	3 117
	United States	164	1052	...	4	22	332
	Other	153	956	32	356	88	906
	Total	747	5734	1426	14 304	1804	21 148
2827.35	Nickel chlorides (weight of material, not nickel content)						
	Norway	-	-	19	69	-	-
2833.24	Nickel sulphates (weight of material, not nickel content)						
	United Kingdom	356	8 203	293	2 145	471	926
	Other	-	-	-	-	-	5
	Total	356	8 203	293	2 145	472	931
3815.11	Catalysts and other reaction initiators, reaction accelerators and catalytic preparations with nickel or nickel compounds as the substance (weight of material, not nickel content)						
	United States	1 514	607	258	138	11	19
	Germany	-	-	30	4	-	-
	Total	1 514	607	288	142	11	19
7204.21	Stainless steel waste and scrap (weight of material, not nickel content)						
	United States	55 964	53 067	56 194	59 445	97 768	151 395
	Netherlands	314	77	477	540	14 144	25 722
	India	523	635	893	938	7 677	15 025
	Italy	-	-	-	-	5 937	10 593
	China	4 870	3 626	680	736	3 202	4 004
	Germany	51	130	133	152	863	1 885
	United Kingdom	-	-	97	149	851	1 377
	Japan	202	314	254	365	520	1 277
	South Korea	40	56	763	1 053	639	1 103
	Taiwan	942	900	1 221	1 466	26	24
	Other	62 906	58 805	60 712	64 844	131 627	212 405
	Total	62 940	58 828	60 864	64 949	132 085	213 370
7501.10	Nickel mattes (nickel content)						
	Norway	53 135	614 008	49 185	652 154	61 115	1 116 312
	China	-	-	-	-	...	4
	Total	53 135	614 008	49 185	652 154	61 115	1 116 316
7501.20	Nickel oxide sinters and other intermediate products of nickel metallurgy (weight of material, not nickel content)						
	United Kingdom	37 492	382 630	32 806	393 715	39 612	551 827
	South Korea	8 761	85 511	5 670	64 092	7 337	92 000
	United States	1 547	12 323	85	827	1 524	21 461
	Belgium	689	8 172	905	12 881	602	8 538
	Taiwan	2 145	24 001	302	3 593	221	3 333
	China	-	-	-	-	113	1 390
	Total	50 634	512 637	39 768	475 108	49 409	678 549
7502.10	Nickel unwrought, not alloyed (nickel content)						
	Luxembourg	240	2 480	48	625	-	-
	United States	48 193	507 010	35 537	417 012	54 493	971 464
	China	1 836	20 599	4 709	69 356	11 281	209 628
	Hong Kong	8 168	88 010	8 852	123 227	10 506	196 406
	Belgium	8 711	91 318	11 924	154 977	8 740	157 727
	United Kingdom	3 877	41 604	5 573	73 811	8 241	123 761
	Netherlands	5 627	59 850	5 485	73 256	6 735	119 815
	Taiwan	4 902	55 171	5 511	79 256	5 599	105 482
	Japan	2 827	29 491	3 460	45 951	3 404	62 622
	South Korea	1 750	18 848	2 983	42 148	3 225	59 214
	Spain	1 628	17 608	1 920	24 750	3 273	55 809
	Singapore	2 646	28 081	1 131	14 943	2 436	44 389
	Italy	2 836	30 866	1 306	18 210	1 491	25 389
	Thailand	797	8 775	1 004	13 796	863	16 557
	India	558	6 380	431	6 573	962	16 066

TABLE 1b (cont'd)

		2002		2003		2004 (p)	
		(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
7502.1 (cont'd)	Turkey	–	–	–	–	426	7 142
	Mexico	–	–	–	–	220	4 155
	Switzerland	36	387	660	8 346	156	2 733
	Gibraltar	–	–	–	–	120	2 326
	Iran	–	–	–	–	144	2 285
	North Korea	–	–	–	–	78	1 376
	Germany	–	–	–	–	60	1 068
	Philippines	98	1 133	48	679	42	820
	Other	134	1 520	708	9 025	600	10 608
	<b>Total</b>	<b>95 662</b>	<b>1 017 366</b>	<b>92 446</b>	<b>1 192 175</b>	<b>124 205</b>	<b>2 215 976</b>
7502.20	Nickel unwrought, alloyed (weight of material, not nickel content)						
	China	2 918	33 928	1 607	21 175	–	–
	Hong Kong	1 867	19 751	605	7 811	–	–
	India	201	2 139	383	5 085	–	–
	South Korea	1 040	11 664	200	2 565	–	–
	Other	6 026	67 482	2 795	36 636	–	–
	<b>Total</b>	<b>6 198</b>	<b>69 105</b>	<b>2 795</b>	<b>36 644</b>	<b>30</b>	<b>628</b>
7503.00	Nickel waste and scrap (weight of material, not nickel content)						
	United States	1 888	5 919	2 502	9 643	3 606	19 155
	Netherlands	103	234	–	–	213	1 896
	Germany	–	–	180	1 055	163	654
	Other	1 991	6 153	2 682	10 698	3 982	21 705
	<b>Total</b>	<b>2 087</b>	<b>6 699</b>	<b>2 711</b>	<b>10 813</b>	<b>4 110</b>	<b>22 433</b>
7504.00	Nickel powders and flakes, alloyed and unalloyed (weight of material, not nickel content)						
	United States	4 416	70 633	3 704	61 210	4 731	97 567
	Japan	2 186	25 172	1 754	26 156	5 154	96 861
	China	42	448	89	1 401	1 130	20 824
	South Korea	357	3 902	292	4 038	492	11 925
	Taiwan	207	2 118	157	2 286	570	11 625
	Belgium	258	2 304	874	11 718	621	10 852
	Brazil	9	134	8	178	255	4 862
	Netherlands	149	1 640	3	51	213	4 074
	Hong Kong	...	24	1	26	171	2 855
	Germany	83	1 047	33	475	71	1 504
	United Kingdom	25	2 436	115	2 476	247	956
	Luxembourg	273	2 892	63	816	21	240
	Other	14 074	131 755	15 168	143 040	25 750	329 988
	<b>Total</b>	<b>8 148</b>	<b>114 419</b>	<b>7 169</b>	<b>112 006</b>	<b>13 831</b>	<b>267 274</b>
7505.11	Bars, rods and profiles of nickel, not alloyed (nickel content)	...	...	14	135	...	5
7505.12	Bars, rods and profiles of nickel alloy (weight of material, not nickel content)	3	112	7	143	10	164
7505.21	Nickel wire, not alloyed (weight of nickel wire plus coating if any, not nickel content)						
	United States	–	–	15	360	1	33
7505.22	Wire, nickel alloy (weight of alloy plus coating, if any; not nickel content)						
	United States	5	168	87	1 565	24	553
	Other	–	7	17	132	3	27
	<b>Total</b>	<b>5</b>	<b>175</b>	<b>104</b>	<b>1 697</b>	<b>27</b>	<b>580</b>
7506.00	Nickel plates, sheets, strip and foil	25	866	12	159	38	394
7507.00	Tubes, pipes and tube or pipe fittings alloyed and unalloyed (weight of material, not nickel content)						
	United States	..	1 779	..	2 535	..	3 245
	Czech Republic	–	–	–	–	..	2 764
	Other	–	1 102	–	1 548	–	3 287
	<b>Total</b>	<b>..</b>	<b>2 881</b>	<b>..</b>	<b>4 083</b>	<b>..</b>	<b>9 296</b>
7508.00	Other articles of nickel (weight of material, not nickel content)						
	United States	..	14 026	..	10 480	..	7 403
	United Kingdom	..	33	..	1 145	..	64
	Other	–	1 328	–	668	–	472
	<b>Total</b>	<b>..</b>	<b>15 387</b>	<b>..</b>	<b>12 293</b>	<b>..</b>	<b>7 939</b>
	<b>Total exports</b>	<b>..</b>	<b>2 427 031</b>	<b>..</b>	<b>2 579 497</b>	<b>..</b>	<b>4 555 055</b>

Sources: Natural Resources Canada; Statistics Canada.

– Nil; .. Not available; ... Amount too small to be expressed; (p) Preliminary.

Note: Numbers may not add to totals due to rounding

TABLE 1c. CANADA, NICKEL IMPORTS, 2002-04

	2002		2003		2004 (p)		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
2604.0000.20	Nickel ores and concentrates (nickel content)						
	Australia (1)	73 365	109 487	20 190	173 619	53 907	282 869
	South Africa	—	—	414	4 531	10 410	62 809
	Germany	6 179	12 177	5 808	13 483	10 543	23 992
	United States	10 774	6 281	10 316	7 121	11 380	5 766
	Other	21	71	127	428	—	—
	Total	90 339	128 016	36 855	199 182	86 240	375 436
	<b>(NOTE: Trade data for 2604.00.00.20 imports are believed to be incorrect in 2002 and 2003. Reader should refer to footnote (1) in this table and page 38.4 of text.)</b>						
2620.90	Ash and residues (weight of material, not nickel content; material also includes significant cobalt value and note that 2004 data are incomplete) (2)						
	Cuba	62 005	272 743	70 726	345 162	26 806	254 886
2825.40	Nickel oxides and hydroxides (weight of material, not nickel content)						
	Finland	177	2 046	41	535	41	699
	United States	1 713	899	1 104	238	893	254
	Other	1	7	112	209	475	912
	Total	1 891	2 952	1 257	982	1 409	1 865
2827.35	Nickel chlorides (weight of material, not nickel content)						
	United States	70	441	580	3 742	292	1 913
	Other	102	683	140	693	145	816
	Total	172	1 124	720	4 435	437	2 729
2833.24	Nickel sulphates (weight of material, not nickel content)						
	United States	2 382	5 284	9 209	19 614	10 504	24 762
	Belgium	172	579	324	1 091	313	1 397
	Other	343	905	190	575	81	424
	Total	2 897	6 768	9 723	21 280	10 898	26 583
3815.11	Catalysts and other reaction initiators, reaction accelerators and catalytic preparations with nickel or nickel compounds as the substance (weight of material, not nickel content)						
	Luxembourg	136	6 073	—	—	—	—
	Belgium	2	15	67	2 324	510	15 493
	United States	337	4 458	369	7 651	435	9 182
	France	...	1	7	179	337	2 813
	United Kingdom	61	947	20	331	158	2 559
	Denmark	61	1 801	20	569	80	1 798
	Germany	176	2 068	155	2 132	66	1 122
	Other	70	1 080	65	630	152	1 248
	Total	843	16 443	703	13 816	1 738	34 215
7202.60	Ferronickel (weight of material, not nickel content)						
		15	77	—	—	47	245
7204.21	Stainless steel scrap (weight of material, not nickel content)						
	United States	34 411	32 567	36 530	38 534	32 857	29 000
	Other	362	368	310	323	607	418
	Total	34 773	32 935	36 840	38 857	33 464	29 418
7501.10	Nickel mattes (nickel content)						
	Botswana	—	—	1 075	13 387	471	8 796
	Other	928	4 921	—	1	47	149
	Total	928	4 921	1 075	13 388	518	8 945
7501.20	Nickel oxide sinters and other intermediate products of nickel metallurgy (weight of material, not nickel content)						
	Botswana	—	—	—	—	2 873	10 901
	Belgium	—	—	598	1 135	1 030	4 551
	Other	802	2 495	155	847	4	39
	Total	802	2 495	753	1 982	3 907	15 491
7502.10	Nickel unwrought, not alloyed (nickel content)						
	Finland	261	2 442	249	3 331	405	7 855
	Norway	970	10 009	513	6 882	540	6 883
	United Kingdom	94	1 131	130	1 541	541	6 183
	Spain	—	—	—	—	163	2 815
	Russia	54	597	65	908	105	1 986
	Canada	41	487	20	271	121	1 515
	Other	186	1 856	82	1 275	29	487
	Total	1 606	16 522	1 059	14 208	1 904	27 724
7502.20	Nickel unwrought, alloyed (weight of material, not nickel content)						
	Russia	665	3 915	1 079	5 987	691	3 414
	United States	255	2 229	111	1 473	848	3 246
	Other	36	403	177	1 824	42	895
	Total	956	6 547	1 367	9 284	1 581	7 555

TABLE 1c (cont'd)

	2002		2003		2004 (p)		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
7503.00	Nickel waste and scrap (weight of material, not nickel content)						
	United States	20 983	48 316	14 559	40 448	20 502	51 184
	Finland	...	...	69	480	269	1 386
	France	57	345	259	1 376	106	1 306
	Japan	7	53	511	1 021	196	1 244
	United Kingdom	307	2 119	199	1 349	180	1 163
	Norway	70	457	225	1 413	579	1 153
	Other	132	489	423	1 509	704	2 865
	Total	21 556	51 779	16 245	47 596	22 536	60 301
7504.00	Nickel powders and flakes, alloyed and unalloyed (weight of material, not nickel content)						
	Australia	673	6 478	469	6 023	837	10 024
	United States	360	4 350	256	4 210	221	4 523
	Russia	27	366	105	1 402	126	2 324
	Germany	211	2 853	69	564	5	65
	Other	119	1 758	235	3 097	141	1 956
	Total	1 390	15 805	1 134	15 296	1 330	18 892
7505.11	Bars, rods and profiles of nickel, not alloyed (nickel content)						
	Other	15	303	11	210	10	214
7505.12	Bars, rods and profiles of nickel alloy (weight of material, not nickel content)						
	United States	630	14 563	555	10 374	542	11 745
	Other	99	1 899	112	1 745	104	2 197
	Total	729	16 462	667	12 119	646	13 942
7505.21	Nickel wire, not alloyed (weight of nickel wire plus coating if any, not nickel content)						
	Other	56	665	43	569	95	1 077
7505.22	Wire, nickel alloy (weight of alloy plus coating, if any, not nickel content)						
	United States	430	5 789	349	7 052	175	4 658
	Germany	75	1 256	141	2 343	134	2 479
	Sweden	87	1 609	92	1 697	87	1 683
	United Kingdom	88	1 345	51	816	38	666
	Other	71	1 103	58	872	41	894
	Total	751	11 102	691	12 780	475	10 380
7506.00	Nickel plates, sheets, strip and foil (weight of material, not nickel content)						
	United States	592	12 603	446	9 204	476	13 416
	Germany	260	5 083	183	3 349	115	2 763
	Other	33	758	36	812	110	1 931
	Total	885	18 444	665	13 365	701	18 110
7507.00	Tubes, pipes and tube or pipe fittings alloyed and unalloyed (weight of material, not nickel content)						
	United States	551	13 013	716	15 601	483	15 200
	Norway	444	5 440	559	7 352	490	9 152
	Japan	514	17 805	33	1 208	10	444
	Sweden	15	228	86	1 096	18	386
	France	63	2 103	12	540	2	54
	Other	171	3 778	170	3 067	99	2 086
	Total	1 758	42 367	1 576	28 864	1 102	27 322
7508.00	Other articles of nickel (weight of material, not nickel content)						
	United States	710	11 445	608	10 208	433	12 690
	France	33	451	50	830	99	1 925
	Other	325	3 842	306	3 194	293	3 239
	Total	1 068	15 738	964	14 232	825	17 854
	Total imports	244 455	724 779	206 374	872 386	340 620	1 048 224

Sources: Natural Resources Canada; Statistics Canada.

– Nil; . . . Amount too small to be expressed; (p) Preliminary.

(1) Australian exports to Canada for 2002 and 2003 were reported as 18 600 t and 20 900 t, respectively (INSG *World Metal Statistics*, June 2004, p. 25) and the author believes that the Australian data for 2002 are more representative of the nickel contained in concentrates imported by Canada from Australia than are the Canadian trade data. Further, there are errors in the reporting of "nickel concentrates" from the United States and Germany as neither country has primary nickel production; either the classification or the country of origin is incorrect and thus it is uncertain whether the tonnage is gross or contained nickel. This has been an ongoing inaccuracy. (2) Nickel and cobalt are in an artificial nickel-cobalt sulphide made at an acid leach plant in Cuba using nickel-cobalt oxide as feed. The values reflect both the nickel and cobalt contents. Data for 2004 are incomplete.

Note: Numbers may not add to totals due to rounding.

**TABLE 1d. CANADA, HISTORICAL NICKEL  
PRODUCTION AND USE, 1988-2004**

	Production (1)	Use (2)
	(tonnes)	
1988	216 589	9 250
1989	200 899	10 421
1990	196 225	8 410
1991	192 258	(a) 13 322
1992	186 383	15 528
1993	188 080	(a) 17 384
1994	149 886	20 746
1995	181 820	20 973
1996	192 649	24 504
1997	190 529	19 447
1998	208 301	19 787
1999	186 236	22 527
2000	190 793	24 976
2001	194 058	17 735
2002	189 297	18 955
2003	163 244	13 010
2004 (p)	189 182	..

Sources: Natural Resources Canada; Statistics Canada.

.. Not available; (p) Preliminary.

(a) Increase in number of companies being surveyed.

(1) Refined nickel and nickel in oxides and salts produced, plus recoverable nickel in matte and concentrates exported. Data for 1987-2004 are nickel contained in concentrates produced.

(2) Use of metallic nickel, all forms (refined metal, nickel in ferronickel oxides and salts, and other forms of nickel including nickel in purchased scrap) as reported by users on the Natural Resources Canada survey "Nickel Use."

Note: Metals are used in industrial and consumer applications; unlike fuel oil or agricultural commodities, metals are not "used up" or "consumed"; instead, they are recycled. For this reason, the word "use" has replaced "consumption" in this chapter, where appropriate.



**TABLE 1e. CANADA, CUPRONICKEL, NICKEL-SILVER, STAINLESS STEELS, AND NICKEL-CADMIUM AND NICKEL-IRON BATTERIES, 2003 AND 2004**

	2003		2004	
	(tonnes)	(\$000)	(tonnes)	(\$000)
<b>STAINLESS STEEL SEMI-FABRICATED ITEMS</b> (excludes scrap)				
<b>Exports – Total For Each HS Class</b>				
7204.29	111 622	31 836	224 264	65 910
7210.90	10 759	7 792	4 037	2 838
7220.20	4 083	14 565	4 490	17 204
7222.11	2 024	4 584	226	823
7222.19	353	1 262	334	1 782
7222.20	3 398	15 989	751	4 309
7222.30	3 361	13 356	936	1 985
Total exports	135 599	89 384	235 038	94 849
<b>Imports – Total For Each HS Class</b>				
7204.29	173 940	45 578	618 209	61 514
7210.90	9 785	19 794	7 217	20 456
7212.50.90.13	3 218	8 895	3 857	8 440
7222.11	2 414	8 982	2 990	15 158
7222.19	2 446	9 431	3 507	14 941
7222.20.10	83	388	114	740
7222.20.90	9 496	34 370	10 401	46 198
7222.30.00.11	124	663	227	1 144
7222.30.00.19	290	1 121	864	4 022
Total imports	201 797	129 220	647 386	172 614
Net exports of stainless steels	-66 197	-39 836	-412 348	-77 765
<b>CUPRO-NICKEL AND NICKEL-SILVER SEMI-FABRICATED GOODS</b> (nickel-silver is a copper-nickel-zinc alloy)				
<b>Exports – Total For Each HS Class</b>				
7403.23	1	10	101	927
7407.22	311	2 159	256	1 990
7408.22	14	235	10	224
7409.40	74	157	116	173
7411.22	5 189	39 222	4 996	45 184
Total exports	5 590	41 783	5 480	48 499
<b>Imports – Total For Each HS Class</b>				
7403.23.00.10 to 7403.23.00.40	17	60	18	67
7407.22.11 to 7407.22.29.10	199	847	423	2 635
7408.22.10 to 7408.22.90.30	99	329	270	858
7409.40.00.11 to 7409.40.00.40	85	495	89	548
7411.22.00.10 to 7411.22.00.30	616	4 021	438	2 931
Total imports	1 017	5 752	1 238	7 038
Net exports of cupro-nickel and nickel-silver	4 573	36 031	4 241	41 461
<b>ELECTRIC ACCUMULATORS</b> (nickel-cadmium and nickel-iron batteries)				
<b>Exports – Total For Each HS Class</b>				
8507.30 Ni-Cd batteries	79	4 572	121	3 631
8507.40 Ni-Fe batteries	56	126	26	81
Total exports	135	4 698	147	3 712
<b>Imports – Total For Each HS Class</b>				
8507.30 Ni-Cd batteries	26 223	40 090	5 503	40 897
8507.40 Ni-Fe batteries	12	880	151	847
Total imports	26 235	40 970	5 653	41 744
Net exports of Ni-Cd and Ni-Fe batteries	-26 100	-36 272	-5 506	-38 032

Source: Natural Resources Canada.

Note: Numbers may not add to totals due to rounding.

**TABLE 2a. CANADA, COBALT PRODUCTION BY PROVINCE, 2002-04**

	2002		2003		2004 (p)	
	(kilograms)	(\$000)	(kilograms)	(\$000)	(kilograms)	(\$000)
<b>MINE OUTPUT</b>	5 147 712	..	4 327 108	..	5 197 229	..
<b>SHIPMENTS</b>						
Quebec	329 532	7 888	325 207	10 656	342 000	24 711
Ontario	1 397 258	33 446	1 139 671	37 344	1 342 956	97 033
Manitoba	338 153	8 094	376 708	12 344	440 892	31 856
<b>Total</b>	<b>2 064 943</b>	<b>49 428</b>	<b>1 841 586</b>	<b>60 343</b>	<b>2 125 848</b>	<b>153 599</b>
Refined (1)	4 303 055	..	3 851 444	..	4 673 075	..

Sources: Natural Resources Canada; Statistics Canada.

.. Not available; (p) Preliminary.

Notes: Numbers may not add to totals due to rounding. Mine output is cobalt content of concentrates produced.

**TABLE 2b. CANADA, COBALT EXPORTS, 2002-04**

	2002		2003		2004 (p)	
	(kilograms)	(\$000)	(kilograms)	(\$000)	(kilograms)	(\$000)
2605.00 Cobalt ores and concentrates. (cobalt content)						
Other	-	-	-	-	103 244	436
2822.00 Oxides and hydroxides; commercial cobalt oxides (weight of material, not cobalt content)						
United Kingdom	287 374	7 232	300 479	6 485	127 085	2 725
Other	-	-	-	-	1 200	57
<b>Total</b>	<b>287 374</b>	<b>7 232</b>	<b>300 479</b>	<b>6 485</b>	<b>128 285</b>	<b>2 782</b>
2915.23 Cobalt acetates (weight of material not cobalt content)	-	-	4	..	-	-
8105.20 Cobalt mattes and other intermediate products; powders						
United Kingdom	80 000	2 038	16 000	367	-	-
Japan	1 704 195	41 804	1 488 904	47 208	2 081 573	137 599
Norway	1 703 295	37 706	1 795 698	42 182	2 156 612	127 555
Netherlands	620 200	14 723	542 000	17 657	815 750	53 232
United States	889 704	25 061	492 862	13 015	1 124 158	47 919
Singapore	533 550	12 644	674 000	20 511	410 840	27 904
Belgium	382 771	11 943	442 642	14 447	628 954	26 040
Taiwan	190 470	4 725	180 205	5 801	234 000	16 334
China	19 173	994	80 694	1 998	149 000	5 387
Thailand	-	-	-	-	15 000	1 010
Hong Kong	150 000	3 464	23 000	503	10 000	432
South Korea	20 949	855	3 928	172	16 500	264
Other	170 949	4 319	26 928	675	26 500	696
<b>Total</b>	<b>6 301 307</b>	<b>156 124</b>	<b>5 740 433</b>	<b>163 873</b>	<b>7 647 387</b>	<b>443 991</b>
8105.30 Cobalt waste and scrap						
United States	41 800	311	25 337	307	73 453	1 203
8105.90 Cobalt and articles thereof, n.e.s.						
Japan	10 041	120	120 000	3 533	-	-
United States	19 922	5 355	23 759	5 423	29 509	5 134
Germany	8 584	1 536	6 239	1 062	13 865	2 203
Netherlands	-	-	21 000	622	147	29
Other	6 933 195	177 803	6 251 523	183 969	8 215 361	476 683
<b>Total</b>	<b>42 931</b>	<b>7 363</b>	<b>183 994</b>	<b>11 250</b>	<b>83 215</b>	<b>7 953</b>
<b>Total exports</b>	<b>6 673 412</b>	<b>171 030</b>	<b>6 250 247</b>	<b>181 915</b>	<b>8 035 584</b>	<b>456 365</b>

Sources: Natural Resources Canada; Statistics Canada.

- Nil; (p) Preliminary.

Note: Numbers may not add to totals due to rounding.

TABLE 2c. CANADA, COBALT IMPORTS, 2002-04

	2002		2003		2004 (p)	
	(kilograms)	(\$000)	(kilograms)	(\$000)	(kilograms)	(\$000)
2605.00	Cobalt ores and concentrates (cobalt content)					
	Congo	20 167	1 061	407 684	584	–
	Norway	–	–	523 719	765	–
	Other	40 595	705	48 659	859	8 579
	Total	60 762	1 766	980 062	2 208	8 579
2822.00.00.10	Cobalt hydroxides (weight of material, not cobalt content)					
	United States	5 697	336	25 196	830	36 608
	Other	824	38	1 100	62	2 500
	Total	6 521	374	26 296	892	39 108
2822.00.00.20	Cobalt oxides (weight of material, not cobalt content)					
	Other	16 936	936	2 538	81	5 544
2822.00.00.30	Commercial cobalt oxides (weight of material, not cobalt content)					
	Other	808	15	2 369	47	8 934
2827.34	Cobalt chlorides (weight of material, not cobalt content)					
	United States	20 605	318	57 546	898	74 358
	Other	428	5	1 631	23	3 229
	Total	21 033	323	59 177	921	77 587
2833.29.00.40	Cobalt sulphate (weight of material, not cobalt content)					
	United States	41 443	609	9 822	156	313 033
	Other	26 444	297	18 404	221	22 741
	Total	67 887	906	28 226	377	335 774
2836.99.10.30	Cobalt carbonates (weight of material, not cobalt content)					
	Other	..	225	..	383	..
2836.99.90.20	Other cobalt carbonates (weight of material, not cobalt content)					
	United States	5 529	124	4 567	100	30 511
	Other	5 197	106	1 539	35	4 887
	Total	10 726	230	6 106	135	35 398
2915.23	Cobalt acetates (weight of material not cobalt content)					
	United States	13 531	153	33 743	374	138 163
	Other	–	–	91	1	18 690
	Total	13 531	153	33 834	375	156 853
8105.20.10.10	Cobalt powders					
	Australia	441 328	8 023	370 000	8 448	469 728
	United States	50 289	2 402	37 739	1 786	72 579
	Belgium	1 309	70	24 208	941	16 792
	South Africa	13 382	364	14 050	264	10 947
	Other	22 170	786	33 948	1 021	15 273
	Total	534 478	11 808	600 117	13 265	585 319
8105.20.10.20	Unwrought cobalt, not alloyed					
	Zambia	–	–	503	14	–
	Russia	4 094	95	53 491	1 332	40 097
	United States	7 874	380	4 152	221	8 859
	Other	35 131	864	813	41	2 997
	Total	47 099	1 339	58 959	1 608	51 953
8105.20.90	Other					
	Botswana	–	–	37 380	1 129	16 380
	Other	2 797	125	1 851	99	5 032
	Total	2 797	125	39 231	1 228	21 412
8105.30	Cobalt waste and scrap					
	Japan	15 017	19	172 260	440	287 196
	Congo	–	–	–	–	272 679
	United States	190 784	784	329 896	907	423 871
	Germany	590 595	663	21 982	175	2 844
	Other	523	8	13 667	32	351 060
	Total	796 919	1 474	537 805	1 554	1 337 650
8105.90.00.10	Cobalt bars and rods, not alloyed					
	United States	8 363	654	17 913	1 567	22 278
	Other	201	13	301	16	212
	Total	8 564	667	18 214	1 583	22 490
8105.90.00.90	Cobalt and articles thereof, n.e.s.					
	United States	34 201	4 096	35 739	3 840	40 861
	Other	1 901	103	5 705	289	4 478
	Total	36 102	4 199	41 444	4 129	45 339
	Total imports	1 624 163	24 540	2 434 378	28 786	2 731 940

Sources: Natural Resources Canada; Statistics Canada.

– Nil; .. Not available; (p) Preliminary.

Notes: Numbers may not add to totals due to rounding. Imports of cobalts in residues from Cuban leaching operations are discussed in Table 1c, note 2.

**TABLE 2d. CANADA, COBALT PRODUCTION, TRADE AND USE, 1988-2004**

	Concentrate Shipments (1)	Processed Cobalt Exports (2)	Cobalt Oxide and Hydroxide Exports (6)	Cobalt Ore and Concentrate Exports (3)	Cobalt Oxide and Hydroxide Imports (4)	Use (5)
	(tonnes)					
1988	2 398	3 062	953	98	37	159
1989	2 344	3 262	371	22	33	147
1990	2 184	3 039	391	–	72	194
1991	2 171	3 456	459	–	42	166
1992	2 223	2 963	489	–	64	205
1993	2 150	3 581	394	–	52	187
1994	1 846	3 922	204	–	81	193
1995	2 016	4 227	–	–	41	148
1996	2 150	4 488	632	–	33	147
1997	2 168	5 829	526	–	39	136
1998	2 262	6 592	457	–	45	146
1999	2 014	6 311	224	10	114	130
2000	2 022	4 987	335	–	103	127
2001	2 112	5 009	356	–	126	94
2002	2 065	6 386	287	–	24	92
2003	1 842	5 950	300	–	31	88
2004 (p)	2 126	7 804	128	103	54	..

Sources: Natural Resources Canada; Statistics Canada.

– Nil; .. Not available; (p) Preliminary.

(1) Production includes recoverable cobalt in concentrates shipped. Beginning in 1988, exports and imports are based on the new Harmonized System and may not be in complete accordance with previous method of reporting. (2) Processed cobalt includes all forms classified in HS code 8105.10 (intermediate forms such as cobalt in matte, unwrought cobalt, alloyed cobalt, waste or scrap of cobalt, cobalt powders) plus all forms classified in HS code 8105.90 (cobalt and articles thereof, not elsewhere specified). (3) Cobalt content. From 1975 to 1988, cobalt recovered in Canada from domestic concentrate plus exports of payable cobalt in concentrate. Starting in 1989 to date, recoverable cobalt in concentrates shipped. (4) Gross weight. Producers' domestic shipments of refined cobalt plus imports of refined shapes. (5) Use of cobalt in metal, oxides and salts; available data as reported by user. (6) Cobalt oxide and hydroxide exports include HS code 2822.00.

**TABLE 3. CANADIAN NICKEL PRODUCERS, SOURCES FOR MORE CORPORATE INFORMATION VIA THE INTERNET**

Full Corporate Name	Corporate/SEDAR Web Site
Canadian Arrow Mines, Ltd. (1)	<a href="http://www.canadianarrowmines.com">www.canadianarrowmines.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008534">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008534</a>
Dynatec Corporation (2)	<a href="http://www.dynatec.ca">www.dynatec.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008191">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008191</a>
Falconbridge Limited (3)	<a href="http://www.falconbridge.com">www.falconbridge.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000376">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000376</a>
FNX Mining Company Inc. (2)	<a href="http://www.fnxmining.com">www.fnxmining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008610">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008610</a>
Inco Limited	<a href="http://www.inco.com">www.inco.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001084">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001084</a>
LionOre Mining International Ltd. (4)	<a href="http://www.lionore.com">www.lionore.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000389">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000389</a>
North American Palladium Ltd.	<a href="http://www.napalladium.com">www.napalladium.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003026">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003026</a>
Sherritt International Corporation	<a href="http://www.sherritt.com">www.sherritt.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002460">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002460</a>

(1) Bulk samples totalling 14 700 t shipped to Falconbridge's Strathcona mill during 2004. (2) FNX and Dynatec own the Sudbury Joint Venture. (3) Noranda Inc. acquired >90% of Falconbridge in May 2005. (4) Operates mines and concentrators in Australia and Botswana; sends concentrate to Canada from Australian operations.

Note: SEDAR changed its web page addresses for company listings since 2002; it is possible to go to [www.sedar.com](http://www.sedar.com), then click on "English," then "Company Profiles," then the first letter of the company name to search for a company's documents.

**TABLE 4. CANADIAN-LISTED COMPANIES WITH NICKEL OR COBALT EXPLORATION/PROPERTIES IN CANADA**

Company Name	Corporate/SEDAR Web Site
Aavdex Corporation	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009282">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009282</a>
Abitex Resources Inc.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003760">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003760</a>
Acrex Ventures Ltd.	<a href="http://www.acrexventures.com">www.acrexventures.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008365">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008365</a>
Alberta Star Development Corp.	<a href="http://www.alberta-star.com">www.alberta-star.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00016991">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00016991</a>
Altius Minerals Corporation	<a href="http://www.altiusminerals.com">www.altiusminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008222">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008222</a>
Amador Gold Corporation	<a href="http://www.amadorgoldcorp.com">www.amadorgoldcorp.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007733">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007733</a>
AntOro Resources Inc.	<a href="http://www.antoro.com">www.antoro.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005470">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005470</a>
Argosy Minerals Inc.	<a href="http://www.argosyminerals.com.au">www.argosyminerals.com.au</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004317">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004317</a>
Atikwa Minerals Corporation	<a href="http://www.atikwaminerals.com">www.atikwaminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00012084">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00012084</a>
Augyva Mining Resources Inc.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008311">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008311</a>
Aurora Platinum Corp.	<a href="http://www.auroraplatinum.com">www.auroraplatinum.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007930">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007930</a>
Avalon Ventures Ltd.	<a href="http://www.avalonventures.com">www.avalonventures.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007482">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007482</a>
Bayfield Ventures Corp.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005661">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005661</a>
Beaufield Consolidated Resources Inc.	<a href="http://www.beaufield.com">www.beaufield.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003575">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003575</a>
Becker Gold Mines Ltd.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003502">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003502</a>
Bell Resources Corporation	<a href="http://www.bellresources.com">www.bellresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00011748">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00011748</a>
Benton Resources Corp.	<a href="http://www.bentonresources.ca">www.bentonresources.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00021465">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00021465</a>
Big Red Diamond Corporation	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020174">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020174</a>
Bitterroot Resources Ltd.	<a href="http://www.bitterrootresources.com">www.bitterrootresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007506">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007506</a>
Blackstone Ventures Inc.	<a href="http://www.blv.ca">www.blv.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004803">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004803</a>
Brigadier Gold Limited	<a href="http://www.brigadiergold.com">http://www.brigadiergold.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008190">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008190</a>
Boulder Mining Corporation	<a href="http://www.bouldermining.com">www.bouldermining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005374">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005374</a>
Brilliant Mining Corp.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00016629">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00016629</a>
Buchans River Ltd.	<a href="http://www.newlab.nf.ca">www.newlab.nf.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004513">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004513</a>
Buck Lake Ventures Ltd.	<a href="http://www.bucklakeventures.com">www.bucklakeventures.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006157">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006157</a>
Cabo Mining Enterprises Corp.	<a href="http://www.cabo.ca">www.cabo.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007803">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007803</a>
Callinan Mines Limited	<a href="http://www.callinan.com">www.callinan.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008418">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008418</a>

TABLE 4 (cont'd)

Company Name	Corporate/SEDAR Web Site
Canadian Arrow Mines, Ltd.	<a href="http://www.canadianarrowmines.com">www.canadianarrowmines.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008534">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008534</a>
Canadian Royalties Inc.	<a href="http://www.canadianroyalties.com">www.canadianroyalties.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00011318">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00011318</a>
CanAlaska Ventures Ltd.	<a href="http://www.canalaska.com">www.canalaska.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004003">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004003</a>
Canadian Golden Dragon Resources Ltd.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005265">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005265</a>
Candorado Operating Company Ltd.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005927">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005927</a>
Canplats Resources Corporation	<a href="http://www.canplats.com">www.canplats.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005580">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005580</a>
Cascadia International Resources Inc.	<a href="http://www.cascadiaintl.com">www.cascadiaintl.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007723">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007723</a>
Castillian Resources Corp.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005184">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005184</a>
Celtic Minerals Ltd.	<a href="http://www.celticminerals.com">www.celticminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005786">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005786</a>
Champion Bear Resources Ltd.	<a href="http://www.championbear.com">www.championbear.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003964">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003964</a>
Columbia Yukon Explorations Inc.	<a href="http://www.columbiayukon.com">www.columbiayukon.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003976">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003976</a>
Commander Resources Ltd.	<a href="http://www.commanderresources.com">www.commanderresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005681">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005681</a>
Consolidated Big Valley Resources Inc.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004087">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004087</a>
Consolidated Gold Win Ventures Inc.	<a href="http://www.v-cgw.com">www.v-cgw.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005626">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005626</a>
Consolidated Venturex Holdings Ltd.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005156">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005156</a>
Cornerstone Capital Resources Inc.	<a href="http://www.cornerstoneresources.com">www.cornerstoneresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00013027">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00013027</a>
Coronation Minerals Inc.	<a href="http://www.coronationminerals.com">www.coronationminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008455">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008455</a>
Cream Minerals Ltd.	<a href="http://www.creamminerals.com">www.creamminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005825">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005825</a>
Cross Lake Minerals Ltd.	<a href="http://www.crosslakeminerals.com">www.crosslakeminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004771">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004771</a>
Crowflight Minerals Inc.	<a href="http://www.crowflight.com">www.crowflight.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008749">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008749</a>
Cypress Development Corp.	<a href="http://www.cypressdevelopmentcorp.com">www.cypressdevelopmentcorp.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005657">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005657</a>
CZM Capital Corp.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00013475">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00013475</a>
Donner Minerals Ltd.	<a href="http://www.donner-minerals.com">www.donner-minerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005954">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005954</a>
Dynatec Corporation	<a href="http://www.dynatec.ca">www.dynatec.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008191">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008191</a>
East West Resource Corporation	<a href="http://www.eastwestres.com">www.eastwestres.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005565">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005565</a>
Exploration Azimut Inc.	<a href="http://www.azimut-exploration.com">www.azimut-exploration.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003284">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003284</a>
Falconbridge Limited	<a href="http://www.falconbridge.com">www.falconbridge.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000376">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000376</a>

TABLE 4 (cont'd)

Company Name	Corporate/SEDAR Web Site
Fancamp Exploration Ltd.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004414">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004414</a>
Fieldex Exploration Ltd.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008738">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008738</a>
First Nickel Inc.	<a href="http://www.firstnickel.com">www.firstnickel.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020780">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020780</a>
Flag Resources (1985) Limited	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010501">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010501</a>
FNX Mining Company Inc.	<a href="http://www.fnxmining.com">www.fnxmining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008610">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008610</a>
Fortune Minerals Limited	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002470">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002470</a>
Freeport Resources Inc.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006031">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006031</a>
Freewest Resources Canada Inc.	<a href="http://www.freewest.com">www.freewest.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003457">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003457</a>
Fronteer Development Group Inc.	<a href="http://www.fronteergroup.com">www.fronteergroup.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00011769">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00011769</a>
Gallery Resources Limited	<a href="http://www.gallery-gold.com">www.gallery-gold.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004386">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004386</a>
Geocore Exploration Inc.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007841">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007841</a>
Globex Mining Enterprises Inc.	<a href="http://www.globexmining.com">www.globexmining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002319">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002319</a>
Golconda Resources Ltd.	<a href="http://www.golcondaresources.com">www.golcondaresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010507">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010507</a>
Goldbrook Ventures Inc.	<a href="http://www.goldbrookventures.com">www.goldbrookventures.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002244">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002244</a>
Gold City Industries Ltd.	<a href="http://www.gold-city.net">www.gold-city.net</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004819">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004819</a>
Golden Briar Mines Limited	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010503">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010503</a>
Golden Chalice Resources Inc.	<a href="http://www.goldenhalicerresources.com">www.goldenhalicerresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008485">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008485</a>
Golden Valley Mines Ltd.	<a href="http://www.goldenvalleymines.com">www.goldenvalleymines.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00015953">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00015953</a>
Goldeye Explorations Limited	<a href="http://www.pathcom.com/~goldeye/">www.pathcom.com/~goldeye/</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008688">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008688</a>
Goldrea Resources Corp.	<a href="http://www.goldrea.com">www.goldrea.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007842">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007842</a>
Gossan Resources Limited	<a href="http://www.gossan.ca">www.gossan.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007669">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007669</a>
Gowest Amalgamated Resources Ltd.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000162">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000162</a>
Green Valley Mine Incorporated	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005832">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005832</a>
Hard Creek Nickel Corporation	<a href="http://www.hardcreeknickel.com">www.hardcreeknickel.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010348">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010348</a>
Hinterland Metals Inc.	<a href="http://www.hinterlandmetals.com">www.hinterlandmetals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008226">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008226</a>
Hornby Bay Exploration Limited	<a href="http://www.hornbybay.com">www.hornbybay.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009750">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009750</a>
Inco Limited	<a href="http://www.inco.com">www.inco.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001084">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001084</a>

TABLE 4 (cont'd)

Company Name	Corporate/SEDAR Web Site
Inlet Resources Ltd.	<a href="http://www.inlet-resources.com">www.inlet-resources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007533">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007533</a>
Inspiration Mining Corporation	<a href="http://www.inspirationmining.com">www.inspirationmining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005581">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005581</a>
International CHS Resource Corporation	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008898">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008898</a>
International Silver Ridge Resources Inc.	<a href="http://www.silverridgeresources.com">www.silverridgeresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008008">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008008</a>
Jilbey Gold Exploration Ltd.	<a href="http://www.jilbey.com">www.jilbey.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002322">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002322</a>
Kenrich-Eskay Mining Corporation	<a href="http://www.kenrich-eskay.com">www.kenrich-eskay.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005759">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005759</a>
Kinbauri Gold Corp.	<a href="http://www.kinbauri-gold.com">www.kinbauri-gold.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004130">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004130</a>
Knight Resources Ltd.	<a href="http://www.knightresources.ca">www.knightresources.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008735">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008735</a>
KWG Resources Inc.	<a href="http://www.kwg-resources.com">www.kwg-resources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002301">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002301</a>
Lakewood Mining Co. Ltd.	<a href="http://www.lakewoodmining.com">www.lakewoodmining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005830">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005830</a>
Landore Resources Inc.	<a href="http://www.landore.com">www.landore.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008466">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008466</a>
L.E.H. Ventures Ltd.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005829">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005829</a>
Liberty Mineral Exploration Inc.	<a href="http://www.libertymines.com">www.libertymines.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009151">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009151</a>
Limerick Mines Limited	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020904">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020904</a>
Lithic Resources Ltd.	<a href="http://www.lithicresources.com">www.lithicresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00011649">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00011649</a>
Little Mountain Resources Ltd.	<a href="http://www.littlemountain.ca">www.littlemountain.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00013639">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00013639</a>
Loubel Exploration Inc.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008670">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008670</a>
Louvicourt Gold Mines Inc.	<a href="http://www.louvicourtgoldmines.com">www.louvicourtgoldmines.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010600">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010600</a>
Manicouagan Minerals Inc.	<a href="http://www.manicouaganminerals.com">www.manicouaganminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00017383">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00017383</a>
Maple Minerals Corp.	<a href="http://www.mapleminerals.com">www.mapleminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004027">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004027</a>
Marathon PGM Corporation	<a href="http://www.marathonpgm.com">www.marathonpgm.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020574">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020574</a>
Marum Resources Inc.	<a href="http://www.marumresources.com">www.marumresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002021">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002021</a>
Matamec Explorations Inc.	<a href="http://www.matamec.com">www.matamec.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010148">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010148</a>
MBMI Resources Inc.	<a href="http://www.mbmresources.com">www.mbmresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007765">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007765</a>
Melkior Resources Inc.	<a href="http://www.melkior.com">www.melkior.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003797">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003797</a>
MetalCORP Limited	<a href="http://www.metalcorp.ca">www.metalcorp.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002399">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002399</a>
Metanor Resources Inc.	<a href="http://www.metanor.ca">www.metanor.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00019972">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00019972</a>



TABLE 4 (cont'd)

Company Name	Corporate/SEDAR Web Site
Mid-North Resources Limited	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003794">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003794</a>
Millstream Mines Ltd.	<a href="http://www.millstreammines.com">www.millstreammines.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005299">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005299</a>
Minera Capital Corporation	<a href="http://www.mineracapital.com">www.mineracapital.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00014969">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00014969</a>
Moneta Porcupine Mines Inc.	<a href="http://www.monetaporcupine.com">www.monetaporcupine.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003301">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003301</a>
Montoro Resources Inc.	<a href="http://www.montororesources.com">www.montororesources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003980">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003980</a>
Mountain Lake Resources Inc.	<a href="http://www.mountain-lake.com">www.mountain-lake.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008613">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008613</a>
Murgor Resources Inc.	<a href="http://www.murgor.com">www.murgor.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003477">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003477</a>
Mustang Minerals Corp.	<a href="http://www.mustangminerals.com">www.mustangminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009674">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009674</a>
Namex Explorations Inc.	<a href="http://www.namex-explorations.com">www.namex-explorations.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008289">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008289</a>
NDT Ventures Ltd.	<a href="http://www.northair.com/ndt/">www.northair.com/ndt/</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005637">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005637</a>
Nikos Explorations Ltd.	<a href="http://www.nikosexplorations.com">www.nikosexplorations.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005215">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005215</a>
Normabec Mining Resources Ltd	<a href="http://www.normabec.com">www.normabec.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008017">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008017</a>
Nortec Ventures Corp.	<a href="http://www.nortecventures.com">www.nortecventures.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00014829">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00014829</a>
North American Gem Inc.	<a href="http://www.northamericangem.com">www.northamericangem.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005772">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005772</a>
North American Palladium Ltd.	<a href="http://www.napalladium.com">www.napalladium.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003026">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003026</a>
Northern Abitibi Mining Corp.	<a href="http://www.naminco.ca">www.naminco.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003808">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003808</a>
Northern Platinum Ltd.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005278">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005278</a>
Northern Shield Resources Inc.	<a href="http://www.northern-shield.com">www.northern-shield.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007505">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007505</a>
Novawest Resources Inc.	<a href="http://www.novawest.com">www.novawest.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005245">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005245</a>
Nuinsco Resources Limited	<a href="http://www.nuinsco.ca">www.nuinsco.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001232">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001232</a>
N.W.T. Copper Mines Limited	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003180">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003180</a>
Ontex Resources Limited	<a href="http://www.ontexresources.com">www.ontexresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004446">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004446</a>
Pacific North West Capital Corp.	<a href="http://www.pfncapital.com">www.pfncapital.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009850">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009850</a>
Pelangio Mines Inc.	<a href="http://www.pelangio.com">www.pelangio.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009350">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009350</a>
Pele Mountain Resources Inc.	<a href="http://www.pelemountain.com">www.pelemountain.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009154">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009154</a>
PGM Ventures Corporation	<a href="http://www.pgm-ventures.com">www.pgm-ventures.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008954">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008954</a>
Platinex Inc.	<a href="http://www.platinex.com">www.platinex.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00014019">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00014019</a>

TABLE 4 (cont'd)

Company Name	Corporate/SEDAR Web Site
Platinum Group Metals Ltd.	<a href="http://www.platinumgroupmetals.net">www.platinumgroupmetals.net</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00015722">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00015722</a>
Prize Mining Corporation	<a href="http://www.prizemining.com">www.prizemining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009195">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009195</a>
ProAm Explorations Corporation	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006218">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006218</a>
Quinto Technology Inc.	<a href="http://www.quintotechnology.com">www.quintotechnology.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005199">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005199</a>
Rainy River Resources Ltd.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009470">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009470</a>
Randsburg International Gold Corporation	<a href="http://www.randsburgdiamonds.com">www.randsburgdiamonds.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007812">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007812</a>
Rare Earth Metals Corp.	<a href="http://www.rareearthmetals.net">www.rareearthmetals.net</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00016934">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00016934</a>
RCOM Venture Corp.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005649">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005649</a>
Red Dragon Resources Corp.	<a href="http://www.reddragonresources.com">www.reddragonresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00022260">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00022260</a>
Resolve Ventures Inc.	<a href="http://www.resolveventures.com">www.resolveventures.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00019823">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00019823</a>
Ressources Appalaches Inc.	<a href="http://www.ressourcesappalaches.com">www.ressourcesappalaches.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007835">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007835</a>
Ressources Minières Pro-Or Inc.	<a href="http://www.pro-or.com">www.pro-or.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007622">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007622</a>
Richview Resources Inc.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00012223">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00012223</a>
Romios Gold Resources Inc.	<a href="http://www.romios.com">www.romios.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005847">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005847</a>
Santoy Resources Ltd.	<a href="http://www.santoy.ca">www.santoy.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008986">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008986</a>
Seymour Exploration Corp.	<a href="http://www.seymourexploration.com">www.seymourexploration.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007781">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007781</a>
Sirios Resources Inc.	<a href="http://www.sirios.com">www.sirios.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003759">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003759</a>
Spider Resources Inc.	<a href="http://www.spiderresources.com">www.spiderresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002302">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002302</a>
Starcore International Ventures Ltd.	<a href="http://www.starcore.com">www.starcore.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009020">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009020</a>
Starfield Resources Inc.	<a href="http://www.starfieldres.com">www.starfieldres.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009374">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009374</a>
Starfire Minerals Inc.	<a href="http://www.starfireminerals.ca">www.starfireminerals.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007965">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007965</a>
Stratagold Corporation	<a href="http://www.stratagold.com">www.stratagold.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020012">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020012</a>
Strategic Metals Ltd.	<a href="http://www.strategicmetalsltd.com">www.strategicmetalsltd.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005622">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005622</a>
Strongbow Exploration Inc.	<a href="http://www.strongbowexploration.com">www.strongbowexploration.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020943">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020943</a>
Sultan Minerals Inc.	<a href="http://www.sultanminerals.com">www.sultanminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005824">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005824</a>
Superior Canadian Resources Inc.	<a href="http://www.superiorcanadian.com">www.superiorcanadian.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00014630">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00014630</a>
Teck Cominco Limited	<a href="http://www.teckcominco.com">www.teckcominco.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001787">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001787</a>

**TABLE 4** (cont'd)

Company Name	Corporate/SEDAR Web Site
Tearlatch Resources Limited	<a href="http://www.tearlach.ca">www.tearlach.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008290">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008290</a>
Temex Resources Corp.	<a href="http://www.temexcorp.com">www.temexcorp.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005513">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005513</a>
Terex Resources Inc.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005324">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005324</a>
Thundermin Resources Inc.	<a href="http://www.thundermin.com">www.thundermin.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00011375">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00011375</a>
Tom Exploration Inc.	<a href="http://www.tomexploration.com">www.tomexploration.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008739">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008739</a>
Tyhee Development Corp.	<a href="http://www.tyhee.com">www.tyhee.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002950">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002950</a>
UC Resources Ltd.	<a href="http://www.ucresources.net">www.ucresources.net</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005648">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005648</a>
United Reef Limited	<a href="http://www.unitedreef.com">www.unitedreef.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003166">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003166</a>
Uravan Minerals Inc.	<a href="http://www.uravanminerals.com">www.uravanminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010457">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010457</a>
URSA Major Minerals Incorporated	<a href="http://www.ursamajorminerals.com">www.ursamajorminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00014604">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00014604</a>
ValGold Resources Ltd.	<a href="http://www.valgold.com">www.valgold.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003649">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003649</a>
Virginia Gold Mines Inc.	<a href="http://www.virginia.qc.ca/">www.virginia.qc.ca/</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003269">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003269</a>
Volcanic Metals Exploration Inc.	<a href="http://www.vmexplore.com">www.vmexplore.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004321">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004321</a>
Vulcan Minerals Inc.	<a href="http://www.vulcanminerals.ca">www.vulcanminerals.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003997">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003997</a>
VVC Exploration Corporation	<a href="http://www.vvcexploration.com">www.vvcexploration.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007564">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007564</a>
Wallbridge Mining Company Limited	<a href="http://www.wallbridgeminig.com">www.wallbridgeminig.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010252">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010252</a>
Western Prospector Group Ltd.	<a href="http://www.westernprospector.com">www.westernprospector.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00013097">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00013097</a>
Western Warrior Resources Inc.	<a href="http://www.westernwarrior.ca">www.westernwarrior.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010924">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010924</a>
Wyn Developments Inc.	<a href="http://www.wyndevelopments.ca">www.wyndevelopments.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005960">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005960</a>

Note: SEDAR changed its web page addresses for company listings since 2002; it is possible to go to [www.sedar.com](http://www.sedar.com), then click on "English," then "Company Profiles," then the first letter of the company name.

**TABLE 5. CANADIAN-LISTED COMPANIES WITH NICKEL OR COBALT EXPLORATION/PROPERTIES OUTSIDE CANADA**

Company Name	Corporate/SEDAR Web Site	Country
Adastra Minerals Inc.	<a href="http://www.am-min.com">www.am-min.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001891">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001891</a>	Congo
Altai Resources Inc.	<a href="http://www.altairesources.com">www.altairesources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001899">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00001899</a>	Philippines
Argosy Minerals Inc.	<a href="http://www.argosyminerals.com.au">www.argosyminerals.com.au</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004317">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004317</a>	Burundi
Asian Mineral Resources Limited	<a href="http://www.asianminres.com">www.asianminres.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020615">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020615</a>	Vietnam
Baja Mining Corp.	<a href="http://www.bajamining.com">www.bajamining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006177">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006177</a>	Mexico
Barrick Gold Corporation	<a href="http://www.barrick.com">www.barrick.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000923">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000923</a>	Tanzania
Belvedere Resources Ltd.	<a href="http://www.belvedere-resources.com">www.belvedere-resources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005717">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005717</a>	Finland
Blackstone Ventures Inc.	<a href="http://www.blv.ca">www.blv.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004803">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004803</a>	Norway
Caledonia Mining Corporation	<a href="http://www.caledoniamining.com">www.caledoniamining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003202">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003202</a>	Zambia, Congo
Canico Resource Corp.	<a href="http://www.canico.com">www.canico.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003862">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003862</a>	Brazil
Cantex Mine Development Corp.	<a href="http://www.cantex.ca">www.cantex.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010333">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010333</a>	Yemen
Castillian Resource Corp.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005184">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005184</a>	Brazil
CMQ Resources Inc.	unknown <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008560">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008560</a>	Finland
Crew Gold Corporation	<a href="http://www.crewdev.com">www.crewdev.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003140">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003140</a>	Philippines
Diamond Fields International Ltd.	<a href="http://www.diamondfields.com">www.diamondfields.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009000">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009000</a>	Greenland, Norway
Dynatec Corporation	<a href="http://www.dynatec.ca">www.dynatec.ca</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008191">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008191</a>	Madagascar
Falconbridge Limited	<a href="http://www.falconbridge.com">www.falconbridge.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000376">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00000376</a>	New Caledonia
First Quantum Minerals Ltd.	<a href="http://www.first-quantum.com">www.first-quantum.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006237">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006237</a>	Congo
FNX Mining Company Inc.	<a href="http://www.fnxmining.com">www.fnxmining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008610">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008610</a>	Guinea
Formation Capital Corporation	<a href="http://www.formcap.com">www.formcap.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007056">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007056</a>	United States
Franconia Minerals Corporation	<a href="http://www.franconiaminerals.com">www.franconiaminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020669">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00020669</a>	United States
Goldstake Explorations Inc.	<a href="http://www.goldstake.com">www.goldstake.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003881">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003881</a>	Australia
Jaguar Nickel Inc.	<a href="http://www.jaguarnickel.com">www.jaguarnickel.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002498">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002498</a>	Guatemala
Maple Minerals Corp.	<a href="http://www.mapleminerals.com">www.mapleminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004027">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004027</a>	Guinea
MBMI Resources Inc.	<a href="http://www.mbmresources.com">www.mbmresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007765">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00007765</a>	Philippines
Melkior Resources Inc.	<a href="http://www.melkior.com">www.melkior.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003797">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003797</a>	Congo

TABLE 5 (cont'd)

Company Name	Corporate/SEDAR Web Site	Country
Nevada Star Resource Corp.	<a href="http://www.nevadastar.com">www.nevadastar.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005617">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005617</a>	United States
New Pacific Metals Corp.	<a href="http://www.newpacificmetals.com">www.newpacificmetals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006180">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006180</a>	China
Oriel Resources plc	<a href="http://www.orielresources.com">www.orielresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00021844">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00021844</a>	Kazakhstan
Orsa Ventures Corp.	<a href="http://www.orsaventures.com">www.orsaventures.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008193">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00008193</a>	China
PacRim Resources Ltd.	<a href="http://www.pacrim-resources.com">www.pacrim-resources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003977">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003977</a>	Solomon Islands
Platinum Group Metals Ltd.	<a href="http://www.platinumgroupmetals.net">www.platinumgroupmetals.net</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00015722">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00015722</a>	South Africa
PolyMet Mining Corp.	<a href="http://www.polymetmining.com">www.polymetmining.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005277">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005277</a>	United States
Quaterra Resources Inc.	<a href="http://www.quaterraresources.com">www.quaterraresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005703">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005703</a>	United States
Rio Narcea Gold Mines, Ltd.	<a href="http://www.rionarcea.com">www.rionarcea.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003729">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00003729</a>	Spain
Rubicon Minerals Corporation	<a href="http://www.rubiconminerals.com">www.rubiconminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009365">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009365</a>	Congo
Scandinavian Gold Limited	<a href="http://www.scandinaviangold.com">www.scandinaviangold.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00019980">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00019980</a>	Finland
SKN Resources Ltd.	<a href="http://www.sknresources.com">www.sknresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006210">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00006210</a>	China
Skye Resources Inc.	<a href="http://www.skyeresources.com">www.skyeresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005296">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005296</a>	Guatemala
Solid Resources Ltd.	<a href="http://www.solidresources.com">www.solidresources.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009435">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009435</a>	Spain, Italy
Tenke Mining Corp.	<a href="http://www.tenke.com">www.tenke.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002898">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00002898</a>	Congo
Uganda Gold Mining Ltd.	<a href="http://www.ugandagold.com">www.ugandagold.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009073">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00009073</a>	Uganda
Uruguay Mineral Exploration Inc.	<a href="http://www.uruguayminerals.com">www.uruguayminerals.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004014">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00004014</a>	Uruguay
Wallbridge Mining Company Limited	<a href="http://www.wallbridgemin.com">www.wallbridgemin.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010252">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00010252</a>	United States
Weda Bay Minerals Inc.	<a href="http://www.wedabay.com">www.wedabay.com</a> <a href="http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005738">www.sedar.com/DisplayCompanyDocuments.do?lang=EN&amp;issuerNo=00005738</a>	Indonesia

Note: SEDAR changed its web page addresses for company listings since 2002; it is possible to go to [www.sedar.com](http://www.sedar.com), then click on "English," then "Company Profiles," then the first letter of the company name.

**TABLE 6. EXPLORATION ACTIVITIES IN CANADA BY CANADIAN-LISTED COMPANY, (1)  
EXCEPT FOR THOSE OF INCO LIMITED OR FALCONBRIDGE LIMITED**

Company Name	Province/Territory	Project Name
Aavdex Corporation	Quebec	Ungava area claims
Abitex Resources Inc.	New Brunswick	St. Stephen
	Quebec	Lac Noir
Acrex Ventures Ltd.	Quebec	Raglan Ungava claims
Alberta Star Development Corp.	Northwest Territories	Longtom
Altius Minerals Corporation	Newfoundland and Labrador	Michikamau Nickel, Plateau (Taylor Brook)
Amador Gold Corp.	Ontario	Ajax, Kell, Silver Strike
AntOro Resources Inc.	Ontario	Lac des Iles
	Quebec	Douglas Harbour, Frank and Glass, Hamelin
Argent Resources Ltd.	Ontario	Timmins Offsets
Argosy Minerals Inc.	Ontario	Lac Panache
Atikwa Minerals Corporation	Ontario	Norpax
Augyva Mining Resources Inc.	Quebec	Lac Yasinski
Aurora Platinum Corp.	Ontario	AEM Abitibi, Footwall, Foy Joint Venture (Nickel Lake, Wisner, Crazy Creek), Landsdowne House-Fishtrap Lake, Lavoie Lake, Montcalm, Nickel Lake Joint Venture, North Range, Timmins MegaTEM
	Quebec	Abitibi (Midrim/Belleterre/Angliers/Geoffroy), Geoffroy, Temiscamingue JV (Belleterre and Midrim)
Avalon Ventures Ltd.	Nova Scotia	Lower Mount Thom, Mount Thom
	Northwest Territories	Mazenod Lake (Diane Lake)
	Ontario	Mussy Lake
Bayfield Ventures Corp.	Quebec	Lac Letendre
Beafield Consolidated Resources Inc.	Manitoba	Thompson claims
	Quebec	Ungava Raglan
Becker Gold Mines Ltd.	Ontario	Montcalm Nickel
Bell Resources Corporation	Manitoba	Fox River
	Ontario	Falcon
Benton Resources Corp.	Newfoundland and Labrador	LJG
Big Red Diamond Corporation	Ontario	Nordica
Bitterroot Resources Ltd.	Quebec	Mistassini
Black Pearl Minerals Consolidated Inc.	Ontario	Nickel Offsets
Blackstone Ventures Inc.	Ontario	Kenbridge
Boulder Mining Corporation	Quebec	Raglan-Breakaway, Raglan-Colts
Brigadier Gold Limited	Ontario	Big Trout Lake
Brilliant Mining Corp.	Newfoundland and Labrador	Michikamau, Ossak West, Ossak East, Scoop
Buchans River Ltd.	Newfoundland and Labrador	Okak
Buck Lake Ventures Ltd.	Ontario	Buck Lake, East Dog River
Cabo Mining Enterprises Corp.	British Columbia	Harrison Lake Nickel Copper
	Ontario	Cobalt, Skead
Callinan Mines Limited	Manitoba	Cal Claim, Fox River, Phillips Lake, Pine Lake
Canadian Arrow Mines, Ltd.	Ontario	Alexo, Hart, Kelex, Mann Trend, McWatters (agreement for sale to Canadian Arrow pending), North Swayze
Canadian Golden Dragon Resources Ltd.	Ontario	Norton Lake, Seagull
Canadian Royalties Inc.	Manitoba	TNB South
	Ontario	Montcalm
	Quebec	Expo-Ungava, Gamache, Lac Felix, Lockout, Mequillion, Mesamax, Raglan-Colts, South Trend, TK, Tootoo
CanAlaska Ventures Ltd.	Newfoundland and Labrador	Konrad, VBE-1
CanAlaska Ventures Ltd. (cont'd)	Quebec	Glitter Lake, Raglan area
Candorado Operating Company Ltd.	British Columbia	Harrison Lake
Canplats Resources Corporation	Ontario	Giekie
Cascadia International Resources Inc.	Ontario	Norton Lake
	Quebec	Dragon's Eye, Echo and Bravo (Raglan), Kosmos, Thunder Block, True North
Celtic Minerals Ltd.	Newfoundland and Labrador	West Voisey's Bay
Champion Bear Resources Ltd.	Ontario	Eagle Rock, Halcyon, Iron Mask, Parkin
Columbia Yukon Explorations Inc.	Manitoba	Hebner Lake
Commander Resources Ltd.	Newfoundland and Labrador	Adlatok 1, Sadie, Sally, Sarah Lake, South Voisey's Bay
	Nunavut	Fox 2/Bravo

TABLE 6 (cont'd)

Company Name	Province/Territory	Project Name
Consolidated Big Valley Resources Inc.	Ontario	LRD
Consolidated Gold Win Ventures Inc.	Quebec	Raglan
Consolidated Venturex Holdings Ltd.	Manitoba	Hebner Lake
	Ontario	Denison, Distal-Foy, Harty, Harty-Leinster, Rivers Option
Cornerstone Capital Resources Inc.	Newfoundland and Labrador	Konrad
Coronation Minerals Inc.	Nunavut	Coppermine River
	Yukon	Wellgreen
Cream Minerals Ltd.	Manitoba	Big Claims, Stephens Lake
Crowflight Minerals Inc.	Manitoba	Bowden, Gonlin, Halfway, Resting, Bucko, Burntwood, Birchtree South, Birchtree North, Airport, Moak, Strong, Resting Lake
	Ontario	AER Kidd, Airport, Copenhagen, Marble Mountain, Mystery Offset Dyke, Peter's Roost
Cypress Development Corp.	Newfoundland and Labrador	South Voisey Bay
CZM Capital Corp.	Quebec	Lorraine
Donner Minerals Ltd.	Manitoba	Stephens Lake
	Newfoundland and Labrador	South Voisey Bay
	Nunavut	Rainbow
	Quebec	West Raglan
Dynatec Corporation	Ontario	SJV-Kirkwood, SJV-Levack, SJV-PM deposit (in McCreedy mine), SJV-Podolsky, SJV-Victoria
East West Resource Corporation	Ontario	Eva Kitto, Havoc Lake, Norton Lake, Pebble, Seagull
Exploration Azimut Inc.	Quebec	De Romer, Gillet Lake, Retty
Fancamp Exploration Ltd.	Quebec	Lac Mechant, Manicuagan
Fieldex Exploration Ltd.	Quebec	Laforce, Midrim JV (Temiscamingue)
First Nickel Inc.	Ontario	Bowell, Dundonald, Foy Mouth, Kamiskotia, Lockerby, Morgan-Lumsden
Flag Resources (1985) Limited	Ontario	Cobalt Hill, Rathburn Lake, Wolf Lake
FNX Mining Company Inc.	Ontario	SJV-Kirkwood, SJV-Levack, SJV-PM deposit (in McCreedy mine), SJV-Podolsky, SJV-NICO deposit
Fortune Minerals Limited	Northwest Territories	NICO deposit
Freeport Resources Inc.	Newfoundland and Labrador	Cabot Lake, Notakwanon River
Freewest Resources Canada Inc.	Ontario	Lizar
	Quebec	Murdoch
Fronteer Development Group Inc.	Northwest Territories	Longtom
Gallery Resources Limited	Newfoundland and Labrador	Cabot Lake, Harp Lake, Okak Bay, Shabogamo
Geocore Exploration Inc.	Newfoundland and Labrador	Voisey's Bay West
Globex Mining Enterprises Inc.	Ontario	Smith-Zulapa
	Quebec	Bilson-Cubric, DW
Golconda Resources Ltd.	Saskatchewan	Peter Lake
Gold City Industries Ltd.	British Columbia	Old Nick
Goldbrook Ventures Inc.	Newfoundland and Labrador	South Voisey Bay
	Quebec	Belanger, Masuparia, Nuvilik, Scott, Ubex, Ungava-Central and South East, VVC, Wakeham (Inlet)
Golden Briar Mines Limited	Ontario	Rathburn Lake
Golden Chalice Resources Inc.	Ontario	Langmuir
	Yukon	Burwash
Golden Valley Mines Ltd.	Quebec	Marymac, Shoot Out East, West Shoot Out
Goldeye Explorations Limited	Ontario	Fawcett
Goldrea Resources Corp.	Quebec	Ungava
Gossan Resources Limited	Manitoba	Bird River
Gowest Amalgamated Resources Ltd.	Quebec	Lac Méchant
Green Valley Mine Incorporated	British Columbia	Woods Claims
Hard Creek Nickel Corporation	British Columbia	Turnagain Nickel
Hinterland Metals Inc.	Quebec	Lorraine
Hornby Bay Exploration Limited	Manitoba	Ace
Inlet Resources Ltd.	Quebec	Wakeham
Inspiration Mining Corporation	Ontario	Langmuir
International CHS Resource Corporation	Ontario	Nickel Offsets
International Silver Ridge Resources Inc.	Newfoundland and Labrador	Cabot Lake, Cabot Lake South

TABLE 6 (cont'd)

Company Name	Province/Territory	Project Name
Jilbey Gold Exploration Ltd.	Newfoundland and Labrador	Voisey's Bay West Block
Kenrich-Eskay Mining Corporation	Ontario	Langmuir South
Kinbauri Gold Corp.	Quebec	Laniel
Knight Resources Ltd.	Quebec	West Raglan
KWG Resources Inc.	Ontario	Kitchie Lake
L.E.H. Ventures Ltd.	Ontario	Geordie Lake
Lakewood Mining Co. Ltd	British Columbia	Woods Claim
Landore Resources Inc.	Ontario	Auden, Junior Lake (and Lamaune Lake), West Graham
Liberty Mineral Exploration Inc.	Ontario	McAra Lake, McWatters, Redstone
Limerick Mines Limited	Ontario	Bear Shanty Lake, Fawcett, Limerick
Lithic Resources Ltd.	Ontario	Roaring River
Little Mountain Resources Ltd.	Quebec	Lac Felix, West Shoot Out
Loubel Exploration Inc.	Quebec	Blondeau
Louvicourt Gold Mines Inc.	Quebec	Villebon
Manicouagan Minerals Inc.	Quebec	Baie du Nord, Manicougan
Maple Minerals Corp.	Ontario	Eva-Kitto, Lac Des Iles River
Marathon PGM Corporation	Ontario	Marathon
Marum Resources Inc.	Quebec	B-20
Matamec Explorations Inc.	Quebec	Vulcain
MBMI Resources Inc.	Ontario	Copper Prince
Melkior Resources Inc.	Quebec	Delta-Kenty
MetalCORP Limited	Ontario	Big Lake, North Rock
Metanor Resources Inc.	Ontario	Wahnapipei
Mid-North Resources Limited	Manitoba	Burntwood River
Millstream Mines Ltd.	Ontario	Airport, Falcon Gold, Potter
Minera Capital Corporation	Quebec	Raglan
Moneta Porcupine Mines Inc.	Ontario	Denton-Thornloe, Kelly Lake, Loveland Twp.
Montoro Resources Inc.	New Brunswick	Malachite Property
	Quebec	Gamache, South Trend/Overtime
Mountain Lake Resources Inc.	Nova Scotia	Frenchvale
	Ontario	Hong Kong
Murgor Resources Inc.	Quebec	La Trève
Mustang Minerals Corp.	Manitoba	Maskwa (through subsidiary Global Nickel Inc.), Mayville JV
	Ontario	Adams Nickel, Bannockburn, East Bull Lake PGM, Manchester Lease, River Valley
N.W.T. Copper Mines Limited	Ontario	Jacobus
NomeX Explorations Inc.	Ontario	Burnish Creek, Post Creek, Wilder Property, Woods Creek
NDT Ventures Ltd.	Newfoundland and Labrador	South Voisey Bay
Nikos Explorations Ltd.	Ontario	Bellevue
Normabec Mining Resources Ltd	Quebec	Pincourt
Nortec Ventures Corp.	Newfoundland and Labrador	TL
North American Gem Inc.	Ontario	Crayfish
North American Palladium Ltd.	Manitoba	Bird River, Lynn Lake Gabbro
	Ontario	Haines Gabbro, Legris Lake, Shebandowan
Northern Abitibi Mining Corp.	Newfoundland and Labrador	South Voisey Bay
Northern Platinum Ltd.	Ontario	Ajax
	Yukon	Wellgreen
Northern Shield Resources Inc.	Ontario	High Bank Lake
Novawest Resources Inc.	Quebec	Cape Smith, Raglan, Thunder
Nuinsco Resources Limited	Manitoba	Bucko, Mel, Minago
	Ontario	FedNor, Rainy River (includes #34 zone)
	Quebec	Lac Rocher
Ontex Resources Limited	Ontario	Faymar
Pacific North West Capital Corp.	Ontario	Agnew Lake, River Valley, Union Bay, West Timmins
	Quebec	Glitter Lake, Lac Manitou
Pelangio Mines Inc.	Ontario	Lake Louise
Pele Mountain Resources Inc.	Ontario	Timmins Nickel
PGM Ventures Corporation	Ontario	Thierry mine
Platinex Inc.	Ontario	Big Trout Lake
Platinum Group Metals Ltd.	Ontario	Faries Lake, Lakemount, Moshkinabi Lake, Seagull
Prize Mining Corporation	Nunavut	Muskox
ProAm Explorations Corporation	Ontario	Agnew, Samuel's Lake
Quinto Technology Inc.	Quebec	Lac Jourdain, Lac Paradis-Lac Gray, Nickel Bay, Rivière Vallant



TABLE 6 (cont'd)

Company Name	Province/Territory	Project Name
Rainy River Resources Ltd.	Ontario	Rainy River
Randsburg International Gold Corporation	Ontario	Flett, McClintock, Temagami Greenstone Belt-Kanichee
Rare Earth Metals Corp.	Manitoba	Assean Lake, Lynn Gabbro Nickel-Copper, South Bay
RCOM Venture Corp.	Quebec	Raglan
Resolve Ventures Inc.	Quebec	Acrex, East Shoot Out, Shoot Out, Ubex, Ungava Scott
Ressources Appalaches Inc.	Quebec	Lac Méchant, Propriété B20, B-2 (Inco)
Ressources Minières Pro-Or Inc.	Quebec	Lac Ewart, Ménarick
Richview Resources Inc.	Ontario	Thierry
Romios Gold Resources Inc.	Ontario	Baldwin-Shakespeare, Sudbury West Basin
Santoy Resources Ltd.	Newfoundland and Labrador	Hawk Ridge
Seymour Exploration Corp.	Manitoba	Lynn Lake
	Ontario	Wakami
Sirios Resources Inc.	Quebec	Murdoch, Val-d'Or
Spider Resources Inc.	Ontario	Kitchie Lake
Starcore International Ventures Ltd.	Northwest Territories	Mazenod Lake
Starfield Resources Inc.	Nunavut	Ferguson Lake
Starfire Minerals Inc.	Ontario	Carman Bay, Langmuir South, Triple Crown
Stratagold Corporation	Yukon	Canalask
Strategic Metals Ltd.	Yukon	Burwash
Strongbow Exploration Inc.	Northwest Territories	Anki
Sultan Minerals Inc.	Manitoba	Big Claims, Stephens Lake
Superior Canadian Resources Inc.	Ontario	Sim Lake
Tearlatch Resources Limited	Ontario	Beilhartz, Tracanelli options, Mystery Offset
Teck Cominco Limited	Ontario	Diadem, Temagami Copper
Temex Resources Corp.	Ontario	Brett, Diadem, Platina
Texas T Minerals Inc.	Quebec	Colts
Thelon Ventures Ltd.	Quebec	Raglan/Ungava
Thundermin Resources Inc.	Quebec	Lac Pelletier
Tom Exporation Inc.	Quebec	Belleterre, Blondeau, Kelley Lake, Laverlochère
Tyhee Development Corp.	Northwest Territories	Cameron Bay, Cobalt (near Port Radium), Longtom, Terra Silver
UC Resources Ltd.	Newfoundland and Labrador	South Voisey Bay
	Quebec	Raglan 1 and Raglan 2 Claims
United Reef Limited	Ontario	Nickel Offsets
UraVan Minerals Inc.	Northwest Territories	Boomerang
	Saskatchewan	Rottenstone
URSA Major Minerals Incorporated	Ontario	Agnew, Shakespeare
ValGold Resources Ltd.	Manitoba	Big Claims, Stephens Lake
Virginia Gold Mines Inc.	Quebec	Gayot
Volcanic Metals Exploration Inc.	Quebec	Beaufield, Goldrea
Vulcan Minerals Inc.	Newfoundland and Labrador	TL
VVC Exploration Corporation	Quebec	Raglan
Wallbridge Mining Company Limited	Manitoba	Lynn Lake
	Nova Scotia	Lower Mt. Thom, Mt. Thom
	Ontario	Blake River, Blezard, Cascaden, Copper Cliff Offset, Creighton South, Davidson Lake, Drury, Foy, Froid-Stobie Northeast, Frost Lake, Hong Kong, Milnet, Parkin, Rudy's Lake, Skynner, Timmins area, Trill, Victor East, Wakami, Windy Lake, Wisner, Worthington
Western Prospector Group Ltd.	Ontario	Lakemount
Western Warrior Resources Inc.	Ontario	Warclub Lake
Wyn Developments Inc.	Northwest Territories	Easter Island (Duffy 1 & 2; Easter 1, 2 and 3), Hearne Channel (Coni)
	Nunavut	Ferguson Lake

Notes: This list presents information found about nickel or cobalt exploration activities/holdings in Canada by property by public companies listed on Canadian exchanges found from public Internet sources, including provincial/territorial public documents. Note that Inco Limited and Falconbridge Limited are not listed; their holdings are believed to be extensive; a partial listing of those activities/properties is not offered here. At some properties, the nickel or cobalt content could be low and recovery may not be planned. Not all properties contain both nickel and cobalt. The period of interest for this listing is approximately late 2003 to mid-2005; other options or transfers or disposition of any property may have expired or have been granted to others. There is no guarantee that the information presented here is correct. Exploration activities on other properties may have occurred, and corrections or additions may be sent to the author by e-mail at [bmccutch@nrcan.gc.ca](mailto:bmccutch@nrcan.gc.ca).

**TABLE 7. CANADIAN NICKEL PROCESSING CAPACITY, 2004**

	Smelter	Refinery
	(t/y of contained nickel)	
Falconbridge Limited Sudbury, Ontario	72 000	n.a.
Inco Limited		
Sudbury, Ontario (1)	100 000	59 000
Sudbury, Ontario (2)	18 000	n.a.
Thompson, Manitoba (3)	n.a.	55 000
The Cobalt Refinery Company Inc. Fort Saskatchewan, Alberta	n.a.	32 000

Source: Natural Resources Canada.

n.a. Not applicable.

(1) Smelter feed capacity increased to 4540 t/d (5000 st/d) in 2003.

(2) Produces nickel oxide sinter. (3) Thompson smelter capacity listed at 63 000 t/y in 2001.

**TABLE 8. TOP SIX PRODUCERS OF MINE NICKEL, (1) 2000-2004**

	2000	2001	2002	2003	2004
	(000 tonnes)				
Russia	235	235	235	240	240
Australia	165	205	205	180	170
Canada	190	195	190	165	185
New Caledonia	120	120	100	110	120
Indonesia	100	100	120	145	145
Cuba	70	75	75	80	80
Subtotal	880	930	930	920	940
Top 6 as a % of total	75%	76%	74%	73%	73%
World total	1 175	1 225	1 250	1 260	1 285

Source: INSG *World Nickel Statistics* (June 2004).

(1) Ni content of sulphide concentrates or Ni content of lateritic ore mined.

Notes: Totals may not add due to independent rounding. The INSG data are shown in their publication to nearest 1000 t, but author has rounded data to nearest 5000 t for this table.

**TABLE 9. TOP SIX PRODUCERS OF PRIMARY NICKEL, 2000-2004**

	2000	2001	2002	2003	2004
	(000 tonnes)				
Russia	220	250	240	260	260
Japan	160	155	160	165	170
Australia	110	130	130	130	125
Canada	135	140	145	125	15
Norway	60	70	70	75	70
China	50	50	55	65	75
Subtotal	735	795	800	820	715
Top 6 as a % of total	68%	69%	68%	68%	57%
World total	1 080	1 160	1 185	1 200	1 250

Source: INSG *World Nickel Statistics* (April 2005).

Note: Totals may not add due to independent rounding. The INSG data are shown in their publication to nearest 1000 t, but author has rounded data to nearest 5000 t for this table.

**TABLE 10. TOP SIX USERS OF PRIMARY NICKEL, 2000-2004**

	2000	2001	2002	2003	2004
	(000 tonnes)				
Japan	200	160	190	195	195
China	60	85	95	125	140
United States	150	130	120	120	125
Germany	105	110	110	100	100
South Korea	90	75	85	95	105
Taiwan	90	80	90	95	85
Subtotal	695	640	690	730	750
Top 6 as a % of total	62%	58%	59%	59%	60%
World total	1 125	1 105	1 175	1 235	1 240

Source: INSG *World Nickel Statistics* (April 2005).

Note: Totals may not add due to independent rounding. The INSG data are shown in their publication to nearest 1000 t, but author has rounded data to nearest 5000 t for this table.

**TABLE 11. AVERAGE ANNUAL NICKEL PRICES, 1981-2004**

Year	Settlement Price	Converted to US\$/lb
	(US\$/t)	
1981	5 985	2.71
1982	4 808	2.18
1983	4 695	2.13
1984	4 783	2.17
1985	4 987	2.26
1986	3 887	1.76
1987	4 849	2.20
1988	13 822	6.27
1989	13 337	6.05
1990	8 894	4.03
1991	8 163	3.70
1992	7 000	3.18
1993	5 283	2.40
1994	6 344	2.88
1995	8 237	3.74
1996	7 500	3.40
1997	6 916	3.14
1998	4 617	2.09
1999	6 015	2.73
2000	8 641	3.92
2001	5 948	2.70
2002	6 772	3.07
2003	9 640	4.37
2004	13 852	6.28

Source: *World Nickel Statistics*.

Notes: Values in this table have been changed because some cash prices had been incorrectly shown as settlement prices or because of errors converting into US\$ from sterling. The settlement price until February 1986 is denominated in U.K. sterling; hence, the exchange rate used can affect the calculated US\$ price. Different US\$ average prices may be cited in various sources for a year. This table uses the INSG data published in *World Nickel Statistics* Monthly Bulletins of October 1992, October 1997 and May 2005, except for 1988. For 1988, the value of US\$13 822/t was calculated first by converting the January daily prices in £/t to US\$/t using the *Metal Bulletin* closing exchange rate, then using those values and the published US\$/t values for February to December to calculate a yearly average, which differs by US2¢/lb from values published by the USGS. LME cash prices in US\$/lb for 1983-98 from *Platts Metals Week* are available from the USGS at <http://minerals.usgs.gov/minerals/pubs/commodity/nickel/500798.pdf>.

**TABLE 12. AVERAGE MONTHLY NICKEL PRICES, SETTLEMENT PRICE,  
1999-2004**

	1999	2000	2001	2002	2003	2004
	(US\$/t)					
January	4 272	8 314	6 999	6 047	8 030	15 337
February	4 630	9 658	6 528	6 033	8 627	15 153
March	5 015	10 284	6 138	6 541	8 382	13 723
April	5 106	9 731	6 334	6 962	7 914	12 853
May	5 403	10 134	7 064	6 764	8 334	11 123
June	5 198	8 415	6 645	7 123	8 858	13 540
July	5 704	8 168	5 940	7 146	8 866	15 032
August	6 452	8 010	5 525	6 720	9 355	13 686
September	7 031	8 642	5 030	6 644	9 969	13 277
October	7 325	7 683	4 828	6 808	11 052	14 411
November	7 953	7 344	5 082	7 317	12 091	14 053
December	8 087	7 319	5 268	7 197	14 170	13 776
	(converted to US\$/lb)					
January	1.94	3.77	3.17	2.74	3.64	6.96
February	2.10	4.38	2.96	2.74	3.91	6.87
March	2.27	4.66	2.78	2.97	3.80	6.22
April	2.32	4.41	2.87	3.16	3.59	5.83
May	2.45	4.60	3.20	3.07	3.78	5.05
June	2.36	3.82	3.01	3.23	4.02	6.14
July	2.59	3.70	2.69	3.24	4.02	6.82
August	2.93	3.63	2.51	3.05	4.24	6.21
September	3.19	3.92	2.28	3.01	4.52	6.02
October	3.32	3.48	2.19	3.09	5.01	6.54
November	3.61	3.33	2.31	3.32	5.48	6.37
December	3.67	3.32	2.39	3.26	6.43	6.25

Source: INSG, various issues of *World Nickel Statistics*.

Note: Conversion to US\$/lb by dividing US\$/t price by 2204.62 lb per tonne.

**TABLE 13. REFINED COBALT PRODUCTION AND STOCKPILE DELIVERIES, 1998-2004**

Company	1998	1999	2000	2001	2002	2003	2004
(tonnes)							
<b>PRODUCTION OF COMPANIES BELONGING TO THE COBALT DEVELOPMENT INSTITUTE</b>							
China (a)	1 200	1 200	1 200	1 470	1 842	(e) 4 576	(e) 8 000
OMG	5 250	6 200	7 700	8 100	8 200	7 990	7 893
Falconbridge	3 851	4 009	3 433	3 314	3 993	4 556	4 670
Norilsk	3 700	4 000	4 100	4 600	4 200	4 654	4 524
Chambishi (b)	5 011	3 946	2 316	2 789	4 344	4 570	3 769
ICCI	2 640	2 770	2 855	2 943	3 065	3 141	3 225
Umicore	1 200	950	1 110	1 090	1 135	1 704	2 947
Mopani Copper	–	–	1 026	1 876	1 800	2 050	2 022
Murrin Murrin	–	83	925	1 452	1 838	2 039	1 979
QNI	1 395	1 539	1 520	1 818	1 863	1 800	1 900
CTT	241	470	1 200	1 200	(r) 1 354	(r) 1 431	1 593
Inco	1 740	1 420	1 470	1 450	1 480	1 000	1 562
Brazil	364	630	792	889	960	1 097	1 155
Gécamines	4 490	5 180	4 320	3 199	2 149	1 200	735
South Africa	320	320	320	252	250	(e) 285	(e) 300
Kasese	–	77	420	634	450	–	457
Sumitomo	329	221	311	350	354	379	429
India	120	120	206	250	270	255	545
Eramet	172	180	204	199	176	181	199
Bulong	–	79	192	203	200	–	–
Subtotal	32 023	33 394	35 621	38 078	39 923	42 908	47 904
<b>STOCKPILE DELIVERIES</b>							
DLA	2 310	1 679	3 083	1 893	1 284	1 987	1 632
<b>TOTAL COBALT AVAILABILITY</b>							
Grand total	34 333	35 073	38 704	39 971	41 207	44 895	49 536

Source: Data reproduced with permission of the Cobalt Development Institute from *Cobalt News* issues of April 2001, April 2002, April 2004, April 2005. Table rearranged in order of descending production for 2004.

"Refined cobalt" includes:

All cobalt units whether in metal or chemicals that are derived from feed requiring further refining.

Production from Likasi and lower-grade production from Moroccan mines are not counted as "feed" or as production.

– Nil; (e) Estimated; (r) Revised.

(a) Chinese production excludes that produced by Umicore in China, which is included in their figure in the table.

(b) Represents total Zambian production in 1998.

ICCI = International Cobalt Company Inc. (marketed by Sherritt International Corporation)

OMG = OM Group, Inc.

CTT = La Compagnie de Tifnout Tiranimine

DLA = Defense Logistics Agency

Gécamines = La Générale des Carrières et des Mines

Mopani Copper = Mopani Copper Mines plc (a JV comprising the Mufilira mine/smelter/refinery plus the Nkana mine and cobalt plant)

Umicore was formerly Union Minière.