



nonferrous metals outlook

DECEMBER 2005



Natural Resources
Canada

Ressources naturelles
Canada

Canada

© Minister of Public Works and Government Services Canada – 2006

Catalogue no. M31-1/2005
ISBN 0-662-69627-1

Additional copies of this publication are available in
limited quantities at no charge from:

Minerals and Metals Sector
Natural Resources Canada
Ottawa, Ontario K1A 0E4

Telephone: (613) 947-6580
Facsimile: (613) 947-4198
E-mail: pchevali@nrca.gc.ca

It is also available on the Internet at:
www.nrca.gc.ca/mms/pubs/nfo_e.htm



This publication is printed
on recycled paper.



PRINTED IN CANADA

Preface

The Minerals and Metals Sector is the focus of federal expertise for mineral and metal commodity information. Within the Sector, the Industry Analysis and Business Development Branch acts as the federal government's main source of in-depth knowledge, intelligence and expertise on mineral and metal commodity markets. One of its tasks is to forecast metal and mineral demand, supply and price.

Within the Branch, the Metal Materials Division is responsible for the major nonferrous metals, precious metals, certain associated minor by-products, and recycled materials such as scrap.

The commodity specialists of the Division maintain close contacts with industry on a wide range of topics and issues. This year-end publication represents a more formal means to disseminate metal market developments through the first three quarters of the year and forecasts to the year 2010. We would appreciate your feedback and encourage you to contact the specialists directly with your comments by telephone, facsimile or electronic mail (telephone numbers and e-mail addresses are provided at the beginning of each chapter). You can also provide feedback to the coordinator of this publication, Patrick Chevalier, at telephone (613) 992-4401, fax (613) 943-8450, or e-mail patrick.chevalier@nrcan.gc.ca.

NOTE TO READER

This Outlook has been prepared based on information available to Natural Resources Canada (NRCan) at the time of writing. The authors and NRCan 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.

Table of Contents

Preface	iii
Introduction	1
Aluminum	3
Copper	9
Gold	17
Nickel	21
Zinc	31
Canadian and World Economic Situation and Outlook	35

Import and Export Tables

1. Canada, Value of Minerals and Mineral Products (Stages 1 to 4), Imports by Commodity, 2003-05	41
2. Canada, Value of Minerals and Mineral Products (Stages 1 to 4), Exports by Commodity, 2003-05	43

Introduction

Brian Smith

Director, Metal Materials Division

Telephone: (613) 992-3784

Facsimile: (613) 943-8450

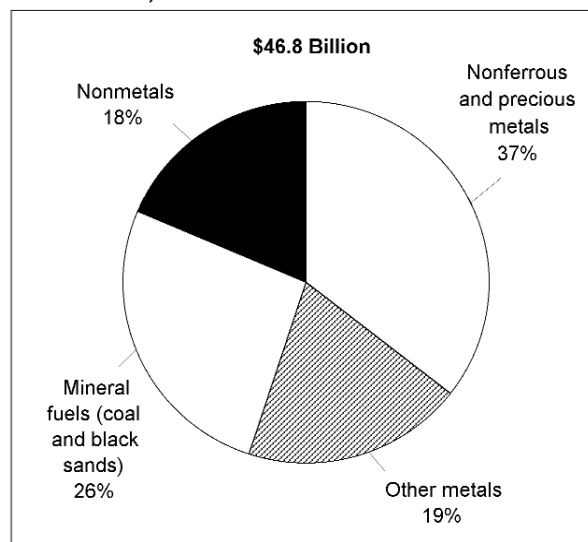
E-mail: brian.smith@nrcan.gc.ca

This outlook for the major nonferrous metals was prepared by staff of the Metal Materials Division in November 2005 and reflects the market conditions and expectations at that time.

Canada was the only Group of Seven (G7) country to report a total government surplus in 2004 and is projected to be the only G7 country to be in surplus again in 2005 and 2006. In terms of growth in the Canadian economy, the Canadian economy (real Gross Domestic Product [GDP]) grew by 3.6% annualized in the third quarter of 2005 following increases of 3.4% in the second quarter and 2.0% in the first quarter. Domestic demand continues to be rooted in favourable fundamentals: low but rising interest rates, record employment levels and high commodity prices, strong demand for our exports, and high personal incomes and corporate profits. Higher interest rates, when they come, will likely slow consumer spending and dampen residential construction activity. Real GDP in Canada is expected to grow by 2.8% in 2005, 2.9% in 2006 and 3.1% in 2007.

The total value of all mineral commodities produced in Canada, including metals, nonmetals and mineral fuels, (including oil sands mining), rose from \$46.8 billion in 2003 to an estimated \$56.6 billion in 2004 (Figure 1). Exports of crude minerals (excluding petroleum and natural gas), coal, smelted and refined outputs, and mineral products contributed \$57.0 billion to the value of Canada's domestic exports in 2004, a 20% increase compared with 2003. This represented 15.5% of Canada's total domestic exports of \$411.8 billion. Metallic mineral and mineral product domestic exports accounted for 75.6% (\$43.1 billion) of the total non-fuel (including coal and coke) value, nonmetal domestic exports (including structural materials) accounted for 19.5% (\$11.1 billion), and coal accounted for 3.3% (\$1.9 billion). The United States remains Canada's principal trading partner with domestic exports of non-fuel minerals and mineral products, including coal,

Figure 1
Value of Canadian Minerals and Metals Production, 2004



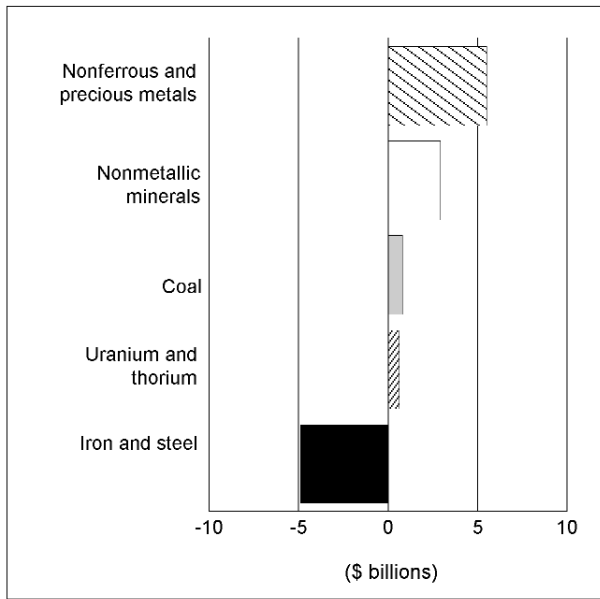
Source: Natural Resources Canada.

to that country valued at \$40.3 billion. Exports to the European Union totaled \$7.2 billion, to Japan, \$1.8 billion, and to Mexico, \$0.4 billion. Canadian imports of non-fuel minerals and mineral products, including coal, increased by 11% to \$52.1 billion, resulting in an overall net balance of merchandise trade (total mineral exports minus total mineral imports) in 2003.

In 2004, nonferrous metals generated a net trade surplus equivalent to about 13% of that of mineral fuels (excluding coal and coke). Canada's overall merchandise export surplus was due in large part to the net surplus generated by the Canadian mining and metals industry. Non-coal fuel minerals generated a net surplus of \$42.5 billion. The major nonferrous and precious metals (including scrap), with exports of \$29.3 billion and imports of \$23.8 billion, generated a net Canadian trade surplus of \$5.5 billion. Other mineral products generated a combined net trade deficit of \$0.6 billion (Figures 2 and 3).

Reviews and forecasts for aluminum, copper, gold, nickel and zinc are included in the following pages. Trade tables

Figure 2
Net Export Earnings, 2004
 Mineral Commodities Net = \$4.9 Billion



Source: Natural Resources Canada.

covering the value of mineral products for 2003, 2004 and the first nine months of 2005 follow these commodity reviews.

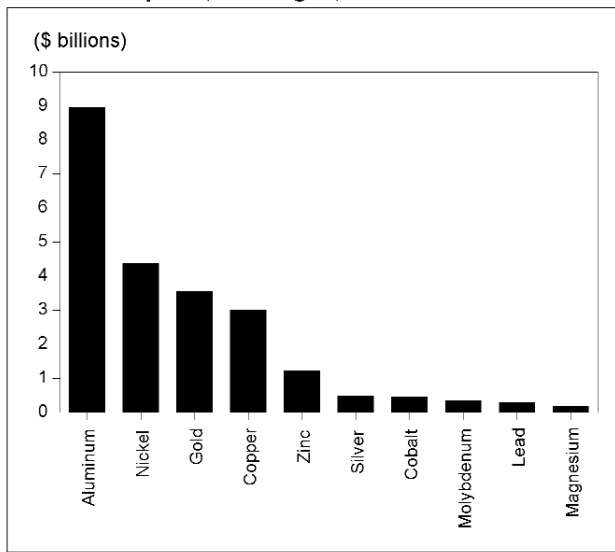
We would appreciate your feedback and encourage you to contact the specialists directly with your comments or questions by telephone, facsimile or electronic mail.

Note: Information in this article was current as of November 15, 2005.

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.

Figure 3
Value of Exports, All Stages, 2004



Source: Natural Resources Canada.

Aluminum

Wayne Wagner

Metal Materials Division

Telephone: (613) 996-5951

E-mail: wayne.wagner@nrca.gc.ca

2004 primary metal production:	\$5.8 billion (e)
World rank (2004):	Third
2004 exports (unwrought):	\$4.9 billion
2004 exports (HS 76)	\$8.8 billion
Installed capacity:	3.06 Mt/y

Canada	2004	2005 (e)	2006 (f)
	(000 tonnes)		
Primary aluminum			
Production	2 590	2 900	3 050
Use	1 050	1 075	1 125

(e) Estimated; (f) Forecast.

Aluminum, in both its pure and alloyed form, is used to make a wide variety of products for the consumer and capital goods markets. Alcan reports¹ that aluminum's largest markets are transportation (31%), packaging (16%), building and construction (18%), electrical (8%), consumer goods (6%), and machinery and equipment (8%). North America accounts for 37% of total Western World demand for aluminum. Asia accounts for 27% and Europe accounts for another 30%.¹

ANNUAL AVERAGE ALUMINUM PRICES, LONDON METAL EXCHANGE (CASH SETTLEMENT)

2002	2003	2004	2005 (f)	2006 (f)
(US\$/t and US¢/lb)				
1 350 (61¢)	1 431 (65¢)	1 716 (78¢)	1 880 (84¢)	2 200 (99¢)

(f) Forecast.

CANADIAN OVERVIEW

- Canada's production of primary aluminum is expected to increase by 12% to 2.89 Mt in 2005 from 2.59 Mt in 2004. Monthly Canadian production statistics can be obtained on Natural Resources Canada's Internet site at http://mmsd1.mms.nrcan.gc.ca/mmsd/production/default_e.asp.
- Aluminerie Alouette Inc. completed a \$1.45 billion investment to expand capacity to 550 000 t/y. The first metal was poured in early 2005 and the last new reduction cell started up in June. This smelter is now the largest in North America. Partners include: Alcan Inc. (40%), Aluminium Austria Metall Québec Inc. (20%), Norsk Hydro ASA (Hydro Aluminium - 20%), Société Générale de Financement du Québec (13.33%), and Marubeni Québec Inc. (6.66%). Further details are available on the company's web site at www.alouette.com.
- Alcan has continued to follow through with its acquisition of Pechiney and strengthening of the new company. It has completed the spin-off of Novelis Inc., the world's largest aluminum rolled products company, and has opened a packaging plant and automotive structures plants in Quebec, in addition to expansions and plans for future opportunities around the world.
- Alcan announced a \$2.1 million contribution towards a new university laboratory for integrated research into aluminum products and processes at the Université du Québec à Chicoutimi (UQAC).
- Alcan continues its efforts in the social and sustainability areas, including its 2005 Alcan Prize for Sustainability, and has taken a leadership role in the Executive Forum on Climate Change. Alcan received a 2005 Globe Award for Environmental Excellence for demonstrating a commitment to sustainable business strategies. Further details on its work are on the company's web site at www.alcan.com.
- The Bécancour smelter (Alcoa 75%, Alcan 25%) restarted production at two of the three potlines that were shut down due to a strike by the Syndicat des Employés de l'Aluminerie de Bécancour, United

¹ www.alcan.com (annual report).

Steelworkers' Local 9700. Alcoa and Alcan have announced that billet production at the Bécancour smelter will be expanded to 234 000 t/y in 2007.

- Alcoa, Nova Pb and St. Lawrence Cement announced a long-term agreement to recycle spent potliner to create a commercial product called CALSiFrit at the Nova Pb secondary lead smelter in Quebec. The project will reduce greenhouse gas emissions by more than 70 000 t (www.alcoa.com/canada/en/news/releases/nova.asp, www.calsifrit.com and www.stlawrencecement.com). NovaPb received the Phoenix award for its work in developing the process to recycle spent potliner. For further information, see (French only) www.phenixdelenvironnement.qc.ca and www.phenixdelenvironnement.qc.ca/html/lf_2005/4.1.html.
- The Aluminium Association of Canada links the Canadian aluminum industry, aluminum users, the public and government. A public awareness campaign has resulted in the distribution of brochures to improve public awareness of issues surrounding aluminum production in Quebec. Further information and links to web sites of Canadian primary aluminum producers can be found on the Association's web site at aia.aluminium.qc.ca.

WORLD OVERVIEW

- China became the largest producer of primary aluminum in the world in 2001 (3.4 Mt). Production increased by 28% in 2002 (to 4.3 Mt), by 25% in 2003 (5.4 Mt) and by 25% in 2004 (6.6 Mt), and is expected to increase a further 20% in 2005 (7.8 Mt).
- After falling in 2004, North American smelter production rates rose in 2005 due to the re-opening of closed smelters and the resolution of a strike. Production has now levelled off at just above 5.4 Mt/y. With no definite plans for new smelters or expansions, the expected closures of Söderberg facilities in the next decade, and high costs for and limited availability of power, production is expected to decline in the longer term.
- Alcan's new activities outside of Canada, in addition to ongoing projects, include: participation in a proposed 325 000-t/y smelter project in Sohar, Oman (with Oman Oil Company S.A.O.C. and Abu Dhabi Water and Electricity Authority); the sale of its controlling interest in Aluminium de Grèce; the opening of a new research facility in Brisbane, Queensland, for alumina research; the closure of a smelter in Lannemezan, France; and an agreement on a potential US\$900 million project to upgrade and expand the Alucam smelter and to construct a new hydro-electric power station in Cameroon.
- As a result of the merger between Noranda Inc. and Falconbridge Limited in 2005, Falconbridge now owns 50% of the Gramercy alumina plant in Gramercy, Louisiana, a 50% stake in the St. Ann Bauxite mine in Jamaica, and 100% of Noranda Aluminum Inc., which owns and operates the New Madrid aluminum smelter in Missouri and four rolling mills in the United States (www.falconbridge.com).
- OMAI Bauxite Mining Inc. (Cambior Inc., 70%, and the Government of Guyana, 30%) is refurbishing its bauxite mine and associated facilities in Guyana to expand its capacity for the production of high-alumina refractory bauxite, mainly for non-metallurgical applications (www.cambior.com).
- Toronto-based Global Alumina Corporation (Global Alumina) continued work to finance and construct a 2.8-Mt/y alumina refinery in the Boké region of Guinea (www.globalalumina.com).
- A number of smelters in more developed countries are facing increased power charges and may be forced to close. However, new and expanded smelters with access to competitively priced power will provide approximately 2 Mt (6%) in new production capacity around the world in 2006, more than offsetting any closures. For details, see the aluminum chapter of the *Canadian Minerals Yearbook* (available on the Internet at www.nrcan.gc.ca/mms/cmy/com_e.html) and the company web sites listed in Table 1.

DEMAND OUTLOOK

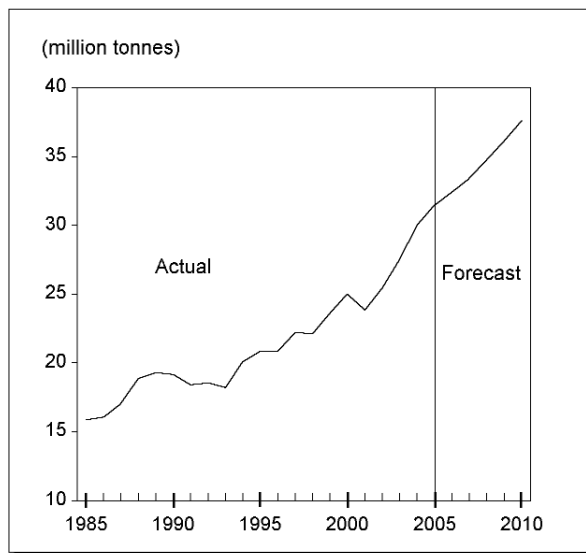
The world's apparent use of primary aluminum is estimated to be approximately 31.5 Mt in 2005, about 5% higher than the 30 Mt used in 2004. In 2006, world demand for aluminum is expected to again continue above its long-term trend of 3% annual growth, depending on the performance of the world economy (Figure 1).

Canada's reported use of all forms of aluminum increased approximately 8% in 2004 to an estimated 1.09 Mt from 1.01 Mt in 2003. Use is expected to increase at a slightly lower rate in 2005. In the longer term, use is expected to increase at a rate of about 3% annually.

CANADIAN AND WORLD PRODUCTION OUTLOOK

Canadian installed capacity for the production of primary aluminum is now 3.06 Mt/y with the completion of the expanded Alouette smelter at Sept Îles, Quebec. With production in 2005 of an estimated 2.9 Mt of primary aluminum, Canada is expected to maintain its rank as the

Figure 1
World Primary Aluminum Use, 1985-2010



Sources: Actual - International Consultative Group on Nonferrous Metal Statistics; Forecast - author.

third largest primary producer after China and Russia. Canada is expected to produce above 3 Mt of primary aluminum in 2006, with a slightly higher amount in 2007 due to capacity creep in existing smelters.

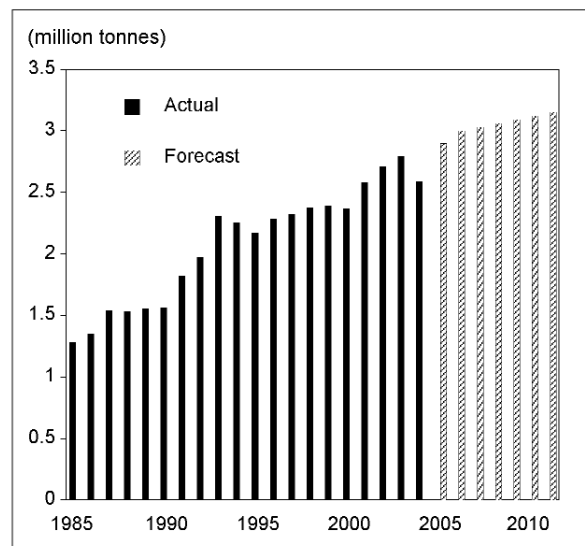
Production growth will flatten over the next few years, depending on production at Kitimat and closures of Söderberg capacity in the next decade (not included in Figure 2), which will lower Canadian installed capacity should modernizations not occur at these facilities. Smelter expansion projects in Quebec are dependent on the construction of new power projects and/or the negotiation of additional long-term power supply contracts.

World production of primary aluminum increased to 29.8 Mt in 2004, up 6% from a revised figure of 28 Mt in 2003. Production is expected to increase by approximately 5% in 2005 to about 31.3 Mt.

The International Aluminium Institute (IAI) indicates that members' world daily average primary aluminum production for the year to October was 65 000 t, up 3200 t/d from a comparable period in 2004. It also reports that the rate for world consolidated production was 87 000 t/d, up from 80 500 t/d at the same time in 2004. Additional information can be obtained from the IAI's web site at www.world-aluminium.org.

IAI reported inventories of unwrought aluminum have remained relatively stable over the last year and were reported at 1.77 Mt in September 2005, down slightly from 1.79 Mt in December 2004. IAI total inventories

Figure 2
Canadian Primary Aluminum Production, 1985-2011



Source: Natural Resources Canada.

have also remained stable and have increased slightly from 3.18 Mt in December 2004 to 3.23 Mt in September 2005. On the other hand, primary aluminum inventories at London Metal Exchange (LME) warehouses have steadily declined throughout the year from 693 000 t in December 2004 to 512 000 t at the end of September 2005.

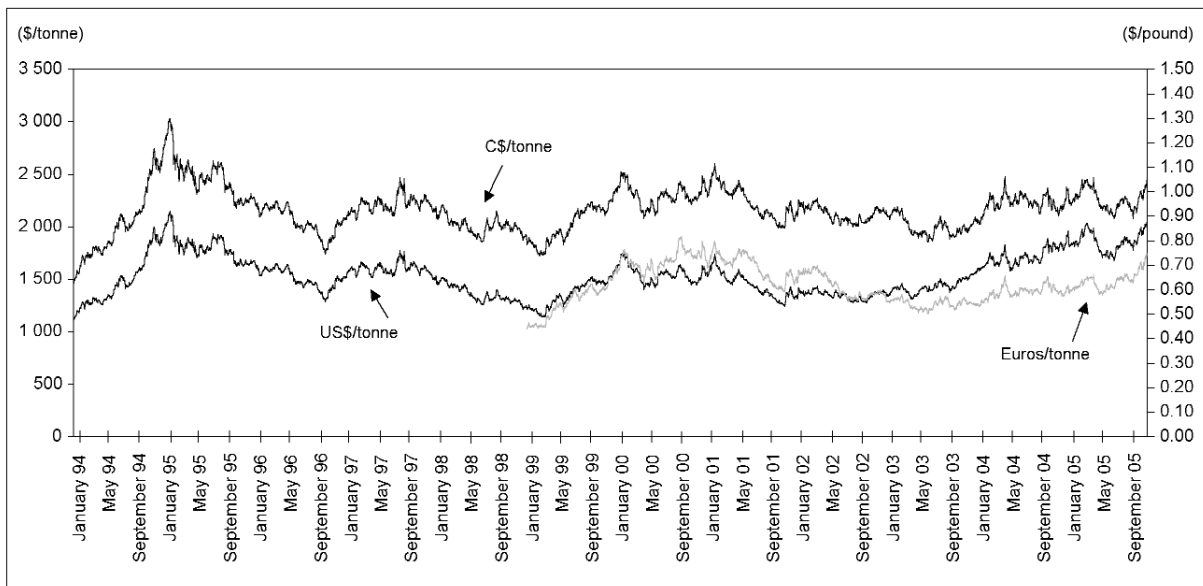
PRICE OUTLOOK

Sales of aluminum, alumina and bauxite are generally valued in U.S. currency. The rapid changes in the relative value of other currencies to the U.S. dollar seen in the last several years have resulted in the potential for diverging outlooks on prices dependent on the currency considered. In general, prices were high in the early and late part of 2005 and were somewhat weaker in mid-year.

In U.S. dollar terms, cash prices set new 10-year highs of US\$2056/t in mid-November 2005. However, current cash prices in Euro equivalents of about €1750/t are still below highs of about €1900 established in September 2000.

Cash prices for primary-grade aluminum on the LME started 2005 at approximately US\$1800/t (83¢/lb) and weakened to approximately US\$1700/t (77¢/lb) in June. Since then, prices have risen to US\$2056/t (93¢/lb) on November 15, a 12% increase for the year. The Canadian currency equivalents for the start of the year are \$2250/t (102¢/lb), and in November were \$2450/t (111¢/lb), representing an increase of about 9%.

Figure 3
Aluminum Prices, 1994-2005



Source: Natural Resources Canada

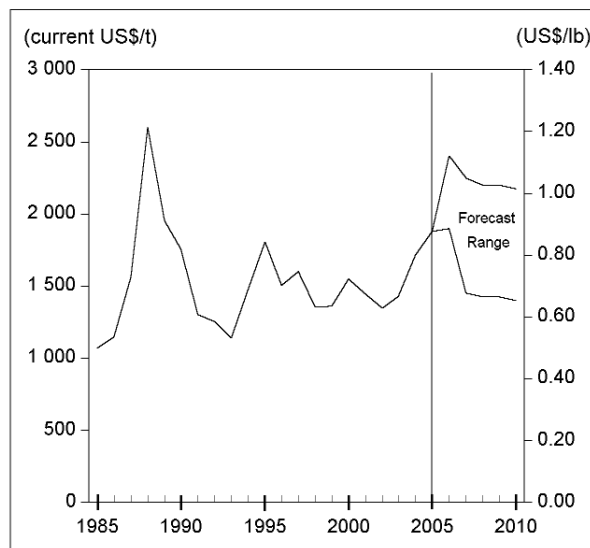
U.S. dollar-denominated prices appear to have broken out of a longer-term price range of between US\$1200 and \$1800/t (55¢ and 82¢/lb) in 2004, and in 2005 reached well above US\$2000/t by mid-November. Given the current strength of demand and pressure from existing higher prices for alumina, aluminum prices are expected to remain strong in 2006. Prices may trade in the range of US\$1900-\$2400/t during 2006, with an average in the order of \$2200/t. On a longer-term basis, however, once Söderberg closures and expansions of existing operations have been completed in China and the expected new alumina and smelting capacity comes on line around the world, prices are likely to soften.

Note: Information in this article was current as of November 15, 2005.

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.

Figure 4
Aluminum Settlement Price, 1985-2010
Annual Average LME Settlement



Source: Metalprices.com.

TABLE 1. COMPANY WEB SITES FOR FURTHER INFORMATION

Company	Web Site Address
Alcan Inc.	www.alcan.com
Alcoa Inc.	www.alcoa.com
Alcoa World Alumina and Chemicals	www.alcoa.com
Aldoga Aluminium Smelter Pty Ltd.	www.aldoga.com
Aluar Aluminio Argentino S.A.I.C.	www.aluar.com.ar
Alum SA Tulsea	www.alumtulcea.com
Alumina do Norte do Brasil S.A.	www.cvrd.com.br
Alumina Limited	www.aluminalimited.com
Alumina Partners of Jamaica	www.kaiseral.com
Aluminerie Alouette Inc.	www.alouette.com
Aluminerie de Bécancour Inc.	www.alcoa.com
Aluminium Association of Canada	www.aia.aluminium.qc.ca
Aluminium Bahrain B.S.C.	www.albasmelter.com
Aluminum Company of Egypt	www.egyptalum.com.eg
Aluminum Corporation of China Ltd.	www.chinalco.com.cn
Atlantsal hf	www.atlantsal.is
Bharat Aluminium Company Limited	www.balcoindia.com
BHP Billiton	www.bhpbilliton.com
Brunei Economic Development Board	www.bedb.com.bn
Cambior Inc.	www.cambior.com
Century Aluminum Company	centuryca.com
Coega Smelter	smelter.csir.co.za
Columbia Ventures Corporation	www.nordural.is
Comalco Limited	www.riotinto.co
Companhia Brasileira de Alumínio	www.aluminiocba.com.br
Companhia Vale do Rio Doce S.A.	www.cvrd.com.br
Corporación Venezolana de Guayana	www.cvg.com
CVG Alcasa	www.aluminio.com.ve
CVG Bauxilum	www.bauxilum.com
CVG Venalum	www.venalum.com.ve
Dubai Aluminium Company Limited	www.dubai.ae
East Hope Group	www.easthope.com.cn
Elkem ASA	www.elkem.com
Federation of Aluminium Consumers in Europe	www.facealuminium.com
Glencor International AG	www.glencore.com
Global Alumina Products Corporation	www.globalalumina.com
Grupo Votorantim	www.votorantim.com.br
Hindalco Industries Limited	www.adityabirla.com
Indian Aluminum Limited.	www.indal.com
International Aluminium Institute	www.world-aluminium.org
KTD L.L.C.	www.ktdal.com
Magyar Aluminium Rt.	www.mal.hu
Marubeni Corporation	www.marubeni.com
Minmetals Nonferrous Metals Co., Ltd.	www.minmetals.com
National Aluminium Company Limited	www.nalcoindia.com
Noranda Inc.	www.noranda.com
Norsk Hydro ASA/Hydro Aluminium a.s.	www.hydro.com
NovaPb	www.novapb.com
Novelis Inc.	www.novelis.com
Ormet Corporation	www.ormet.com
PT. Antam Tbk	www.antam.com/News/news.htm
Queensland Alumina Limited	www.qal.com.au
Russian Aluminium (Rusky Aluminii)	www.rusal.com
Saudi Arabian Mining Company	www.maaden.com.sa
Sherwin Alumina Company	www.sherwinalumina.com
Siberian-Urals Aluminium Company	www.sual.com
Sibirsky Aluminium	www.sibirskyaluminium.com
Slovalco A.S.	www.slovalco.sk
Société Générale de financement du québec	www.sgfqc.com
Sterlite Industries (India) Ltd.	www.balcoindia.com
Talum D. D. Kidricevo	www.talum.si
The Aluminum Association, Inc. (USA)	www.aluminum.org
Tomago Aluminium Pty Ltd.	www.tomago.com.au
Worsley Alumina PTY. LTD	worsley.geo.net.au

Note: Feedback on missing or changed web site addresses would be welcome.

Copper

Maureen Coulas
 Metal Materials Division
 Telephone: (613) 992-4093
 E-mail: maureen.coulas@nrcan.gc.ca

2004 production: \$2.0 billion
 Rank (mine production): 8th
 Exports (concentrates and unwrought): \$1.5 billion

Canada	2003 (p)	2004 (e)	2005 (f)
	(000 t)		
Mine production	557	557	582
Refined production	455	527	534
Refined use	257	368	246

(e) Estimated; (f) Forecast; (p) Preliminary.

Copper's properties, particularly its high electrical and thermal conductivity, good tensile strength, elevated melting point, non-magnetic properties and resistance to corrosion, make it and its alloys very attractive for electrical transmission, water tubing, castings and heat exchangers.

ANNUAL AVERAGE SETTLEMENT PRICES, LONDON METAL EXCHANGE

2001	2002	2003	2004	2005 (f)	2006 (f)
(US\$/t)					
1 578	1 560	1 780	2 868	3 620	3 400

(f) Forecast.

METAL EXCHANGE STOCKS (1)

2003	2004	Q1 05	Q2 05	Q3 05
(000 t)				
806	93	85	43	86

(1) LME, Comex, and Shanghai.

CANADIAN OVERVIEW

Merger Activity

- On March 8, the boards of Noranda Inc. (Noranda) and Falconbridge Limited (Falconbridge) announced their decision to combine the two companies by way of a share exchange (merger). Under the agreement, each Falconbridge shareholder received 1.77 Noranda shares for each Falconbridge share. The new company was renamed Falconbridge Limited.
- In October, the boards of directors of Falconbridge Limited and Inco Limited announced the approval of the acquisition of all the outstanding common shares of Falconbridge by Inco by way of a friendly takeover bid. The combined organization will be known as Inco Limited once the transaction is completed at the end of December. The two companies anticipate realizing approximately US\$350 million/y in cost savings by the end of 2007, mainly from efficiency gains in overlapping operations, particularly in the Sudbury area where both companies operate copper and nickel mines and metallurgical facilities.

Newfoundland and Labrador

- Aur Resources Inc. announced it would develop its **Duck Pond** copper-zinc deposit in Newfoundland and Labrador on a fast-track basis with production expected to begin in late 2006. Aur expects to produce about 18 600 t/y of copper contained in concentrates plus by-products of about 34 000 t/y of zinc, 16 t/y of silver and 127 kg/y of gold over a seven-year period.
- The **Voisey's Bay** mine and concentrator became operational in the August/September period and the first shipments of concentrate were expected to leave Argentina in early November. On October 20, the hydromet demonstration plant became operational and is scheduled to conclude in late 2007, at which time Inco will complete its assessment of the feasibility of using hydromet technology to treat Voisey's Bay nickel concentrates. Construction of the commercial processing plant would begin in 2009 and be completed by the end of 2011. Planned average annual

output from the mine during the first phase of the project is approximately 50 000 t/y of nickel and 38 550 t/y of copper (31 750 t from copper concentrate and 6800 t from nickel concentrate).

Quebec

- Campbell Resources Inc. brought the **Copper Rand** mine back into production in March. The Chibougamau area copper-gold mine was closed in 1997 due to poor economics. Campbell Resources has spent \$58 million on infrastructure renewal, including centralizing milling facilities for both the Copper Rand ore and the nearby Joe Mann mine. Start-up problems, mainly due to poor ground conditions, prevented the company from producing at planned rates. Resulting cash flow problems led to a suspension of development work by mid-year. The mine continues to produce at reduced levels and the company is seeking strategic partners to secure additional capital. Production for the first three quarters was 1655 t of copper and 123 kg of gold. Planned average annual production was 6800 t of copper and 992 t of gold.
- Noranda Inc. announced during the second quarter that it would ramp up production at the **Horne smelter** to 170 000 t/y of anode by the end of 2005. In June 2004, Noranda reduced the processing rate from 840 000 to 630 000 t/y and its anode production from 186 000 to 140 000 t/y to reduce its reliance on low-margin, off-shore concentrates.
- Breakwater Resources Ltd.'s Bouchard-Hébert mine ceased production in February 2005 due to the depletion of economic reserves.

Ontario

- Inco Limited announced in June that it has entered into a long-term agreement with Falconbridge Limited (Falconbridge) under which Inco will send the copper anodes produced at its **Sudbury copper smelter** to the former Noranda Inc.'s **CCR refinery** in Montréal for processing into refined copper and precious metals. Under the 10-year agreement, Falconbridge will purchase and pay Inco for the copper, gold and silver recovered, less treatment and related charges, and Inco will receive back the nickel and platinum group metals recovered from the anodes subject to certain treatment charges. Falconbridge expects to receive between 104 000 and 122 000 t/y of copper in anode form from Inco. Inco had indicated earlier in the year that it would be closing its copper refinery in Sudbury, citing the facility's size and high-cost structure relative to the leading copper refineries as the major factor in the decision.

- A four-week strike at Falconbridge Limited's **Kidd Creek metallurgical division** was resolved on October 30 when workers from two unions ratified a new three-year agreement.

Manitoba/Saskatchewan

- HudBay Minerals Inc. reached an agreement in October with White Pine Copper Refinery Inc. to acquire the **White Pine** copper refinery for US\$13 million. Located in White Pine, Michigan, the refinery processes the anodes produced at HudBay's **Flin Flon copper smelter** into cathode.

British Columbia

- Teck Cominco Limited announced it will proceed with a plan to extend the mine life at the **Highland Valley Copper** mine, near Kamloops, by approximately five years to September 2013. The mine-life extension will be achieved by pushing back the pit wall of the Valley mine to release additional ore. The capital cost of the project is \$40 million.
- Vancouver-based Redcorp Ventures Ltd. announced in May that it will curtail development work on the **Tulsequah** project near Aitlin, B.C., following preliminary results from an ongoing feasibility update study indicating that, due to the combination of increased capital and operating costs estimate, and a reduced resource estimate, additional work will be required in order to develop a financeable project. All work has been put on hold while the company considers options to expand the resource base or reduce capital and operating costs. The deposit contains measured and indicated resources totaling 5.38 Mt with grades of 1.42% copper, 1.32% lead, 6.73% zinc, 2.73 g/t gold and 100.8 g/t silver. Redcorp received a provincial Certificate of Authorization to proceed in November 2004 and a screening-level environmental assessment approval under the *Canadian Environmental Assessment Act* (CEAA) in July 2005.
- The **Mount Polley** mine restarted operations in March 2005 on the strength of positive drilling results at the recently discovered Northeast zone and improved metal prices. During 2004, Imperial Metals updated the reserve estimate for the Northeast, Bell and Springer zones and obtained a permit amendment to include mining of the Northeast zone. Total proven and probable reserves in the Wight, Bell and Springer open pits are 44 Mt grading 0.45% copper and 0.30 g/t gold, which contain approximately 200 000 t of copper and 13 t of gold. The mine life as of February 2005 was 6.75 years.

WORLD OVERVIEW

Brazil

- Companhia Vale do Rio Doce (CVRD) is building a 10 000-t/y plant at a cost of US\$58 million to prove out using hydrometallurgy to process copper sulphide concentrate into copper metal. The plant will use a process developed by Cominco Engineering Services Ltd. (CESL) that is based on pressure oxidation, followed by atmospheric leaching, solvent extraction and copper electrowinning. Feed material will come from the **Sossego** mine, which is expected to start up by the second quarter of 2007 and run for two years. Should the pilot plant prove to be successful, CVRD plans to use the technology to process ore from the much larger **Salobo** deposit, which is scheduled to come on stream in 2009 at a rate of 100 000 t/y of copper.

Chile

- Codelco unveiled plans to expand production at its **El Teniente** mine to 300 000 t/d of throughput. The expansion will lift production from 424 000 t/y of copper expected in 2005 to 563 000 t/y in 2020. Codelco also plans to bring the 150 000-t/y **Gaby** SX/EW¹ copper project into production in 2007 at a cost of US\$478 million. China MinMetals may provide capital for the project in exchange for a share of the production. Gaby is an oxide deposit located 100 km south of Chuquicamata and has reserves of 545 Mt at 0.44% copper.

Mongolia

- Ivanhoe Mines released the development plan for its wholly owned **Oyo Tolgoi** copper-gold project. According to the study, the deposit has the potential to produce over 454 000 t/y of copper and 10 t/y of gold over a 35-year mine life. The first stage of the project involves developing an open-pit mine at the near-surface Southern Oyu deposit and a 70 000-t/d processing plant. A decision to initiate a second-stage development of the Hugo North deposit via underground block caving would be taken in year 3. If Stage 2 proceeds, the processing plant would be expanded to 140 000 t/d by year 7. The capital costs for Stage 1 are estimated at US\$1.5 billion. Production could start in 2007.

Peru

- Phelps Dodge Corporation (92.5%) and Compania de Minas Buenaventura S.A.A. (9.2%) launched a US\$850 million expansion project at the **Cerro Verde** SX/EW mine, which will access 907 Mt of sulphide reserves lying below the oxide orebody. A new concentrator will produce 180 000 t/y starting in late 2006. Buenaventura will increase its share in the project to 20% and Sumitomo is taking a 21% stake.

China

- In October, the National Development and Reform Commission (NDRC) issued a document stating that it intends to prevent over-investment and redundant construction in copper smelting projects in a bid to safeguard the sustainable and steady development of the Chinese copper industry. Chinese smelting capacity in 2004 totalled about 2.014 Mt/y and is expected to increase to 2.29 Mt/y in 2005. According to the publication *China Metals Market*, published by Antaika, there are currently 18 ongoing or planned copper smelting projects with a combined capacity of 2.05 Mt/y. In its November monthly report, Antaika stated that if all these projects were to come on stream, Chinese copper smelting capacity would reach 3.7 Mt/y at the end of 2007, a level that approaches the total estimated annual global supply of custom concentrates. In its press release, the NDRC stated it is concerned that the blind investment in the copper smelting industry will put high pressure on copper resources, environment and energy, and will create over-competition in the industry. The statement was short on details, but Antaika reported it was likely that future copper smelting industry policies would be modelled after policies recently put in place to control the aluminum industry and could therefore include the strengthening of approval over brownfield and greenfield projects and the strict control on the export of copper and copper-related products.
- The Metal Recycling Branch of China Nonferrous Metals Industry Association (CNI-A) submitted an application to various Chinese government authorities to remove the current 1.5% tariff on imported copper and aluminum scraps in a bid to promote and develop the domestic recycling industry. According to CNI-A statistics, China used 1.16 Mt of copper scrap (metal content) in 2004, up 14% from 2003.

India

- Birla Copper is doubling the capacity of its **Dahej** smelter/refinery from 250 000 t/y to 500 000 t/y by the end of 2005. At the expanded capacity, Dahej will become the world's largest copper smelter.

¹ SX/EW = solvent extraction/electrowinning.

- Sterlite Industries (India) Ltd. received environmental permits to operate its new 300 000-t/y smelter in the southern port city of **Tuticorin**. The new smelter will replace an existing 180 000-t/y furnace.

United States

- Phelps Dodge Corp. announced that it will spend US\$210 million to construct a commercial-scale copper concentrate leaching and direct electrowinning facility at its copper mine in **Morenci**, Arizona. The facility will employ proprietary pressure leaching technology developed by Phelps Dodge and under demonstration at its copper mine in **Bagdad**, Arizona, to process copper ores containing a mix of primary and secondary copper sulphide minerals. A restart of the idled Morenci concentrator is included in the cost and project development. The new concentrate leaching facilities will be incorporated into the existing leaching and electrowinning complex at Morenci. The production from these facilities, slated for start-up in 2007, will replace an expected decline in Morenci's heap leach output later in the decade.
- A 19-week strike at Asarco LLC's copper operations in the United States ended in November after Asarco and union leaders reached a tentative agreement that extends the previous agreement through to the end of 2006. The tentative deal also includes a successorship clause requiring any potential buyer of the company to recognize the union and to negotiate a new contract before the company is sold. The successorship clause became a key issue for the union after Asarco filed for Chapter 11 bankruptcy protection on August 10. During the strike, the Hayden, Arizona, smelter ran at around 55% capacity and the Amarillo, Texas, rod mill was completely shut. Output in 2005 is expected to be 150 000 t, down 70 000 t from previous estimates.
- Vancouver-based Quadra Mining Ltd. bought the **Carlota** SX/EW copper project in Arizona from Montréal-based Cambior Inc. for US\$37.5 million. Quadra plans to produce 30 000 t/y of cathode over an 11-year mine life starting in 2007.

Japan

- Dowa Mining Co., Ltd. plans to build a 150 000-t/y greenfield furnace in **Kosaka**, adjacent to the company's 72 000-t/y copper smelter. The new plant will process scrap and other secondary materials to produce 19 kinds of nonferrous metals, including copper, nickel, zinc, tin, gold and bismuth. Dowa plans to bring the plant on stream by the end of March 2007.

Spain

- Toronto-based Inmet Mining Corporation acquired a 70% indirect interest in the **Las Cruces** SX/EW project. Expected production is 66 000 t/y over 15 years starting in 2008.

Thailand

- Thai Copper Industries Public Co., Ltd. shut down its **Rayong** copper smelter in Rayong in late July for about three months due to equipment failure and other operating problems. The plant was also down for most of March. As a result, the company revised its 2005 production forecast to 80 000 t of copper, down from 120 000 t. Planned output in 2006 has been revised to 135 000 t from 165 000 t.

Zambia

- Konkola Copper Mines (KCM), controlled by Vedanta Resources plc, formally announced that it will develop the **Konkola Deep** orebody at a cost of US\$400 million. The project, due to be completed in 2009, includes the construction of a new 3-Mt/y concentrator. Copper production is expected to increase from 170 000 t/y to around 350 000 t/y.
- Equinox Minerals Ltd. received environmental approvals, subject to the completion of financing, for its **Lumwana** project. Equinox plans to start work on the US\$483 million project by the end of 2005. Expected average production is 150 000 t/y of copper in concentrate over a 17-year mine life.

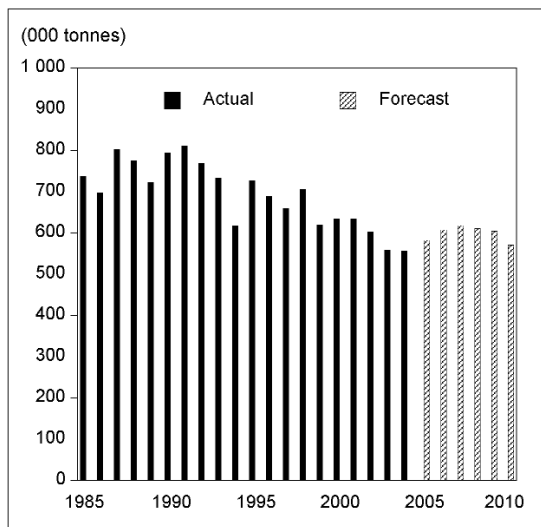
Democratic Republic of Congo

- Phelps Dodge Mining Co. announced it is exercising an option to take a controlling interest in the **Tenke Fungurume** copper-cobalt project. Phelps Dodge will have a 57.5% interest and a subsidiary will be the operator of the project. The other partners are Tenke Mining Corp. (24.75%) and the DRC state-owned mining company Gecamines. According to Phelps Dodge, Tenke Fungurume is one of the largest highest-grade undeveloped copper-cobalt projects in the world. Planned start-up is in 2008 at an initial rate of 50 000-100 000 t/y of copper and 4000-8000 t/y of cobalt.

CANADIAN PRODUCTION OUTLOOK

Following two years of declining production due to closures/shut-downs, Canadian mine production rose in 2004 and 2005 as output from re-starts at Gibraltar, Mount

Figure 1
Canadian Mine Production of Copper,
1985-2010



Source: Natural Resources Canada.

Polley and Copper Rand and the start-up at Voisey's Bay offset closures at Bouchard-Hébert and Louvicourt. Mine production is expected to increase further in 2006 and 2007 as Voisey's Bay reaches full production and Duck Pond comes on stream. Looking to the end of the decade, Canadian copper mine output in 2010 is projected to be lower than in 2000 as output from new mines will not sufficiently replace output from mines that are expected to exhaust their reserves. This forecast could change should the world copper price remain strong over an extended period of time.

Canadian refined production is forecast to increase slightly to 534 000 t in 2005 from 527 000 t in 2004.

MARKET REVIEW AND OUTLOOK

Smelter Treatment and Refining Charges

Spot market concentrate treatment and refining charges (TC/RCs)² continued to trend upward in the first quarter of 2005 thanks to a continuation of the surplus in the global concentrate supply that emerged in 2004. Spot terms achieved by Chinese buyers in April peaked at

² TC/RCs are the amounts charged by smelters to miners to smelt copper concentrates and to produce refined copper. Treatment charges are expressed as a dollar amount per tonne of concentrate received. Refining charges are expressed as a dollar amount per pound of copper contained in the concentrate received. TC/RCs are deducted from the value of the metal in concentrates paid by the smelter to the miner.

around US\$185/t and US18.5¢/lb compared to indicative end-of-2004 buying terms of US\$135/t and US13.5¢/lb. With several smelter maintenance shut-downs completed and the announcement that the new smelter at Tuticorin in India had received approval to start up operations, supply started to ease by mid-year and spot terms began to trend downwards.

Mid-year custom smelting contracts (i.e., July 2005-June 2006) reportedly settled at terms of US\$105-\$110/t and US10.5¢-11.0¢/lb with positive price participation (pp)³ above 90¢/lb in Western Europe, at US\$111-\$112/t and 11.1¢-11.2¢/lb in China, and at US\$112.5-\$115/t and 11.25¢-11.5¢/lb with full positive and negative pp +/-90¢/lb in Japan.

The concentrate market is expected to be more balanced in the second half of 2005 and will likely move into a deficit in 2006 as smelter capacity utilization increases.

Cathode Premiums

Cathode premiums in the major consuming regions trended downwards from 2004 levels. Spot premiums for refined copper c.i.f. Shanghai deliveries were reported to be around US\$120-\$130/t in the first quarter, down \$10-\$20/t from their February 2004 peak. In Europe, spot premiums of US\$30-\$50/t were well below the February 2004 peak levels of \$110-\$125/t, reflecting sluggish demand. U.S. premiums were around US6.0¢-6.5¢/lb over Comex, down about 25% from their mid-May 2004 peak.

Codelco announced a premium for 2006 deliveries to China of US\$128/t, \$10/t lower than the 2005 level. Chile is China's largest source for cathode imports, accounting for 53% of Chinese cathode imports for the period January to September 2005. Codelco has settled its 2006 annual premium for cathode delivery to Europe at US\$105/t, also down \$10/t from the 2004 level.

Supply/Demand Outlook

The International Copper Study Group's (ICSG) November forecast of production (000 t) showed:

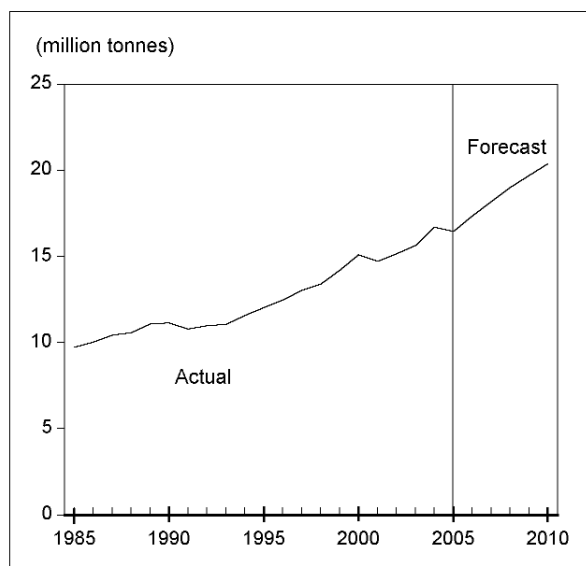
	2003	2004	2005	2006	04/05	05/06
	(000 t)				(%)	
Mine production	13 676	14 527	14 983	15 743	3.1	5.1
Refined production	15 234	15 844	16 344	17 814	3.2	9.0
Copper usage	15 642	16 687	16 450	17 355	-1.4	5.5
Refined copper balance	-408	-843	-122	295		

³ Price participation (PP) is a feature of long-term contracts between smelters and miners of concentrate. For example, if a contract includes price participation above 90¢/lb of copper, it means that miners pay smelters 1¢/lb for every 10¢/lb the copper price is above an agreed threshold price.

After very low growth in mine production in 2002/03, supply has been increasing since 2004 and this should help ease the tightness in the copper market. Supply growth in the first half of 2005 was slower than anticipated due to a series of supply disruptions at several mines and smelters, which took up to 600 000 t of output out of the market according to some estimates. These included strikes (Asarco's U.S. operations, Kidd Creek), technical problems (Collahuasi, Grasberg, Kosaka smelter, Rayong smelter), earthquakes (Quebrada Blanca), and grade flexing in favour of molybdenum at large copper-molybdenum mines. These problems have mostly been resolved, with the possible exception of the Rayong smelter, and supply growth in 2006 is expected to be much stronger than in 2005. The ICSG forecast in November indicates refined production growth of 3.2% in 2005 and 9.0% in 2006.

The ICSG forecasted that world use of refined copper would decrease 1.4% to 16.45 Mt in 2005 from 16.69 Mt in 2004. In 2005, strong growth in China and India was more than offset by declines in use in North America and the European Union. The overall downturn in demand is, in part, due to a slowdown in economic activity, but also due to destocking by copper consumers anxious to avoid rising and volatile prices. In 2006, use is forecast to rise by 5.5%, or by 900 000 t to 17.36 Mt. Stronger growth is anticipated in all consuming regions in 2006 according to the ICSG.

Figure 2
World Refined Copper Usage, 1985-2010



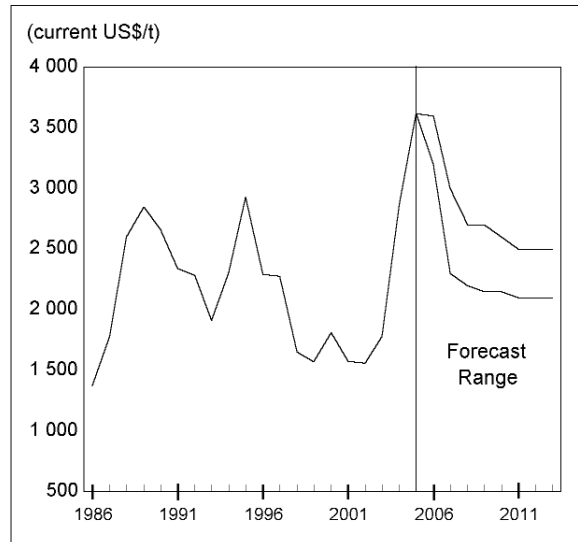
Source: Natural Resources Canada.

PRICE OUTLOOK

A series of very positive fundamentals has sent copper prices to new all-time highs in 2005. The October monthly average settlement price on the London Metal Exchange (LME) for Grade A copper of US\$4059/t (US\$1.84/lb) was 22% higher than the January average price of US\$2368/t (\$1.07/lb). By mid-2005, record high prices and tight supply led some fabricators to substitute copper with other metals (e.g., aluminum in copper tubing applications). On November 18, the LME daily cash settlement price reached US\$4420.50/t, or \$2.00/lb, a new all-time high (in real terms), buoyed by rumours that the Chinese State Reserve Bureau has open short positions of up to 200 000 t of metal on the LME and Shanghai Futures Exchange (SFE). The ICSG forecast a metal balance deficit of around 122 000 t for 2005 at its November regular meeting.

The 2005 average LME price is forecast at US\$3620/t (\$1.64/lb). Given the extremely low level of visible stocks, prices will likely be quite volatile and there could be spikes above US\$4400/t before year-end. For 2006 as a whole, the refined copper supply/demand balance is forecast to swing into a small surplus, and this should lead to a decline in prices. To what level prices will decline in 2006 and beyond will depend on the timing of the expected increase in supply and on demand levels. Based on the supply/demand outlook described above, prices in

Figure 3
Copper Prices, 1986-2013
Annual Average LME Grade A Copper Settlement



Source: Natural Resources Canada.

2006 could range between US\$3200 and \$3600/t (US\$1.45-\$1.63/lb). The main factors supporting prices at the high end of this range are the degree of restocking required by consumers and the extremely low level of commercial and exchange stocks. Beyond 2006, there is a potential for a growing metal surplus as a number of new mine and smelter projects are scheduled to come on stream. Rising stocks will have a dampening effect on prices; consequently, annual average prices are forecast to range between US\$2150 and US\$3000/t (US\$0.98-\$1.36/lb) over the period 2007-10.

More information about Canadian companies is available on the Internet at www.sedar.com/issuers/issuers_en.htm. Canadian monthly copper statistics are available in Table 3 at http://mmsd1.mms.nrcan.gc.ca/mmsd/data/default_e.asp.

For an in-depth review of exploration trends in Canada, see the report entitled *Overview of Trends in Canadian Mineral Exploration (2003)* at www.nrcan.gc.ca/mms/pubs/explor_e.htm.

Notes: Forecasts and projections are subject to change by such factors as changing copper prices, exploration successes or failures, ability to arrange financing, technological developments, and environmental permitting. Information in this article was current as of November 18, 2005.

NOTE TO READER

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.

TABLE 1. COMPANY WEB SITES FOR FURTHER INFORMATION

Company	Web Site Address
CANADA	
Agnico Eagles Mines Limited	www.agnico-eagle.com
Aur Resources Inc.	www.aurreources.com
Barrick Gold Corporation	www.barrick.com
Billiton Metals Canada Inc. (see BHP Billiton)	www.bhpbilliton.com
Breakwater Resources Ltd.	www.breakwater.ca
Callinan Mines Limited	www.callinan.com
Campbell Resources Inc.	www.ressourcescampbell.com
DRC Resources Corporation	www.drcresources.com
Expatriate Resources Ltd.	www.expatriateresources.com
Falconbridge Limited	www.falconbridge.com
Getty Copper Corporation	www.gettycopper.com
Highland Valley Copper (see Teck Cominco)	www.teckcominco.com
HudBay Minerals Inc.	www.hudbayminerals.com
Imperial Metals Corporation	www.imperialmetals.com
Inco Limited	www.inco.com
Inmet Mining Corporation	www.inmetmining.com
North America Palladium Ltd.	www.napalladium.com
Northgate Minerals Corporation	www.northgateminerals.ca
Placer Dome Inc.	www.placerdome.com
Redcorp Ventures Ltd.	www.redcorp-ventures.com
Taseko Mines Limited	www.tasekominco.com
Teck Cominco Limited	www.teckcominco.com
Voiseys Bay Nickel Company Limited	www.vbnc.com
AUSTRALIA	
M.I.M. Holdings Limited	www.mim.com.au
WMC Resources Ltd	www.wmc.com
BELGIUM	
Umicore Group (Olen refinery/Pirdop smelter)	www.um.be

TABLE 1 (cont'd)

Company	Web Site Address
BRAZIL	
Companhia Vale do Rio Doce (CVRD)	www.vale.com.br
Chile Antofagasta Holdings	www.aminerals.cl
Corporación Nacional del Cobre de Chile	www.codelco.com
Compañía Minera Doña Inés de Collahuasi	www.collahuasi.cl
Empresa Nacional de Minería (ENAMI)	www.enami.cl
Minera Escondida Limitada	www.escondida.cl
CHINA	
Jiangxi Copper Company Limited	www.jxcc.com
Jinchuan Group Limited	www.jnmc.com
Yunnan Copper Industrial Corp. Ltd.	www.yunnan-copper.com
INDIA	
India Birla Copper	www.birlacopper.com
Hindustan Copper Ltd. (HCL)	www.hindustancopper.com
INDONESIA	
Freeport-McMoRan Copper & Gold Inc.	www.fcx.com
JAPAN	
Dowa Mining Co., Ltd.	www.dowa.co.jp
Furukawa Electric Co., Ltd.	www.furukawa.co.jp
Mitsubishi Materials Corporation	www.mmc.co.jp
Mitsubishi Group	www.mitsubishi.or.jp
Mitsui & Co., Ltd.	www.mitsui.co.jp
Nippon Mining & Metals Co., Ltd.	www.nikko-metal.co.jp
Nittetsu Mining Co., Ltd.	www.nittetsukou.co.jp
Onahama Smelting and Refining Co., Ltd.	www.group.mmc.co.jp
Sumitomo Metal Mining Co., Ltd.	www.smm.co.jp
KOREA	
LG-Nikko Copper Inc.	www.lgnikko.com
MEXICO	
Grupo México S.A. de C.V.	www.gmexico.com
PAPUA NEW GUINEA	
Ok Tedi Mining Limited	www.oktedi.com
PERU	
Centromín Peru S.A.	www.centromin.com.pe
Southern Peru Copper Corporation	www.southernperu.com
PHILLIPINES	
Phillipine Associated Smelting & Refining Corp.	www.pasar.net.ph
POLAND	
KGHM Polska Miedz S.A.	www.kghm.pl
RUSSIA	
MMC Norilsk Nickel	www.normik.ru
UNITED KINGDOM	
Anglo American plc	www.angloamerican.co.uk
BHP Billiton Plc	www.bhpbilliton.com
Rio Tinto plc	www.riotinto.com
UNITED STATES	
ASARCO Incorporated	www.asarco.com
Kennecott Utah Copper Corporation	www.kennecott.com
Phelps Dodge Corporation	www.phelpsdodge.com

Gold

Patrick Chevalier
 Metal Materials Division
 Telephone: (613) 992-4401
 E-mail: patrick.chevalier@nrcan.gc.ca

2004 mine production: \$2.2 billion
 World rank: Eighth
 Exports: \$3.6 billion

Canada	2003	2004	2005 (f)
	(tonnes)		
Production	140.9	128.7	125

(f) Forecast.

Gold is valued for its rarity, lustrous beauty, ductility, high resistance to corrosion, and conductivity. It has been treasured for its decorative and monetary value for at least 8000 years. Gold has a high density, its weight being equal to 19.3 times an equivalent volume of water. The main industrial uses for gold are in jewellery (83%) and electronics (8%). Gold bullion coins, such as the Maple Leaf coin, are also important products.

ANNUAL AVERAGE PRICES, LONDON BULLION MARKET ASSOCIATION

2002	2003	2004	2005 (f)	2006 (f)
(London PM, US\$/oz)				
309.68	363.32	409.17	440	520

(f) Forecast.

CANADIAN OVERVIEW

- In October, Toronto-based Barrick Gold Corporation made an unsolicited offer to acquire all of the outstanding shares of Vancouver-based Placer Dome Inc. Included in the US\$9.2 billion bid, Vancouver-based Goldcorp Inc. agreed to acquire Placer's Campbell, Porcupine and Musselwhite gold mines in Ontario and the La Coipa silver mine in Chile, as well as Placer's Canadian exploration and reclamation properties.
- Richmond Mines Inc. continued development work on its East Amphi project in northwestern Quebec. Some 26 500 t of development ore was processed at the Camflo mill during the year. A decision on whether to put the East Amphi property into production is expected by year-end.
- Citing rising costs and the strength of the Canadian dollar, River Gold Mines Ltd. announced that it would adopt a new mining plan at the Eagle River mine near Wawa, Ontario, that involved cutting operations, employment and production in half to 1.12 t/y in 2006.
- Open-pit development at the Pamour mine near Timmins, Ontario, was completed earlier this year and started producing gold in June. The Pamour mine is jointly owned by Kinross Gold Corporation (49%) and Placer Dome (CLA) Limited (51%) under the Porcupine Joint Venture.
- Cambior Inc. entered into an agreement with Aurizon Mines Ltd. to purchase its remaining 50% interest in the Sleeping Giant gold mine north of Amos, Quebec, for a cash purchase price of \$5 million.
- Century Mining Corporation restarted production at the Sigma mine open pit at Val-d'Or, Quebec, in the first quarter of 2005. According to company reports, the Sigma-Lamaque Complex contains 139 t of gold in resources, of which 27 t have been upgraded to reserves.

WORLD OVERVIEW

- Placer Dome plans to go ahead with the Cortez Hills project in Nevada (together with 40% partner Rio Tinto plc) and the Pueblo Viejo project in the Dominican Republic. Placer Dome also reached an agreement in principle to sell its interests in the Cerro Casale project in Chile to project partners Bema Gold Corporation and Arizona Star Resources Corp.
- Barrick's Lagunas Norte (Alto Chicama) mine in Peru achieved start-up in June, ahead of schedule and under budget. The mine is expected to produce about 17 t of gold in 2005. Gold production is expected to average about 25 t/y for the first three full years. Based on existing reserves of 283 t, the minimum mine life is expected to be 10 years.
- Barrick's Veladero mine in Argentina poured its first gold in September. The mine has an expected 17-year mine life and is expected to produce about 22 t/y in the first three years of operation.
- Glamis Gold started production at its Marlin mine in Guatemala in November. The mine will produce 622 kg of gold in 2005 and the company expects to produce 7.8 t of gold and more than 93 t of silver in 2006.
- The new Tulawaka mine in Tanzania started production in March. The project is a joint venture between Barrick (70%) and Montréal-based Northern Mining Explorations Ltd. (30%).
- The much-anticipated Dubai Gold and Commodities Exchange (DGCX) was officially launched at the end of November, becoming the world's newest commodities exchange and the first such marketplace in the Middle East.

MARKET OUTLOOK

Gold fundamentals continued to strengthen throughout 2005 with strong physical demand for gold in key Asian and Middle East markets. Fabricated demand for gold jewellery increased by about 2% in 2004 and is expected to rise again in 2005 by another 3% to 2750 t. While only accounting for 8% of the total fabricated demand for gold, the electronics industry is the second largest market for gold after jewellery. Gold's high electrical conductivity, its malleability, and its resistance to corrosion have made it an important component in the manufacture of a wide range of electronic products and equipment, including computers, telephones, cellular telephones, and home appliances. Some 357 t will be used in 2005, with Japan

expected to lead the way in the market, accounting for 135 t or 61% of the demand.

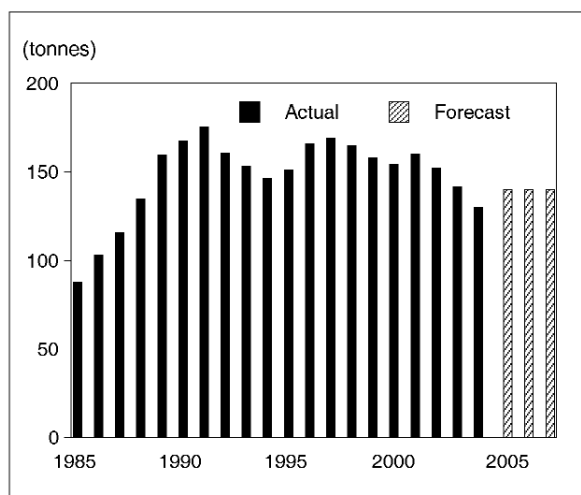
On the investment side, the rise in oil prices and the risk of inflation have provided added incentives for investors to put their money into gold. The introduction of gold exchange traded funds (ETFs) in recent years has made it easier for investors to invest in gold. Demand for gold coins and ETFs is expected to rise in 2005 and to remain strong in 2006.

CANADIAN PRODUCTION OUTLOOK

In 2004, Canadian gold production totalled 128.7 t, a decrease of 14% compared to the 2003 total of 149.9 t. The reduction in production resulted primarily from a number of mine closures in Newfoundland and Labrador, Quebec, Ontario, Manitoba, and the Northwest Territories. For the first nine months of 2005, Canada produced some 92.5 t of gold, down just under 6% over the same period in 2004. Production declines were recorded in all provinces and territories over the first nine months of 2005, with the exception of Ontario, which recorded a 3% increase.

About 90% of Canada's gold production comes from hard-rock underground and open-pit gold mines. The remainder is from base-metal mines and from placer mining operations. Much of the decline in production over the first nine months of 2005 was the result of closures at gold mines in late 2004 and early 2005. A number of projects are currently under review to either restart old mines or to develop new deposits.

Figure 1
Mine Production of Gold in Canada, 1985-2007



Source: Natural Resources Canada.

PRICE OUTLOOK

Gold prices made an impressive recovery throughout 2005, rising above the US\$490/oz barrier towards the end of November, the highest level seen in 18 years. On average, the price of gold was up 7% over the same period in 2004, reaching a year-to-date average of US\$437/oz at the end of November. In real terms, however, adjusting for the declining value of the U.S. dollar, the 1988 high of US\$483.90/oz is equivalent to \$850/oz today, and the all-time high of \$850/oz in January 1980 would be worth \$2142/oz.

While the price rise in U.S. dollar terms is welcome news for producers, the net effect of the stronger Canadian dollar against the U.S. dollar, coupled with higher energy and other operating costs at some Canadian mines, muted the good news somewhat. The year-to-date average gold price in Canadian dollar terms was virtually unchanged from 2004 at about \$530/oz at the end of November 2005. Gold traded in the \$510-\$530/oz range for most of the year, finally breaking above \$550/oz in late September and rallying towards \$580/oz at the end of November.

Low interest rates and the record current account deficit in the United States continued to put downward pressure on the U.S. dollar in 2005. This in turn put upward pressure on gold prices. The renewal of the agreement by central banks to limit sales, de-hedging by producers, the risk of inflation and higher energy prices, and lower mine output all combined with strong physical demand to support higher gold prices. The liberalization of gold markets in China and India is expected to increase investor demand in both of these important markets. Merger and acquisition activity will likely also continue in 2006 as large producers continue to seek to increase their market share.

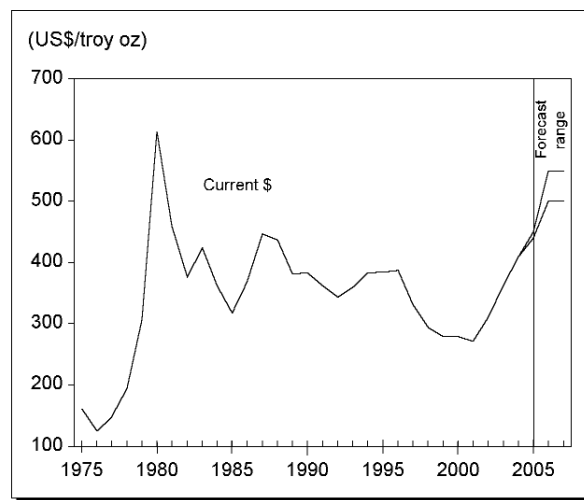
Gold is expected to average about US\$440/oz in 2005. Having breached the \$500/oz barrier at the end of November, many analysts are now predicting that gold prices will continue to rise over the coming year and possibly reach the \$600 range by year-end, with an annual average of about US\$520/oz.

Note: Information in this article was current as of November 15, 2005.

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.

Figure 2
London Bullion Market Association Annual
Average Gold Prices, 1975-2007



Source: Natural Resources Canada.

TABLE 1. COMPANY WEB SITES FOR FURTHER INFORMATION

Company	Web Site Address
Agnico Eagle Mines Limited	www.agnico-eagle.com
Aurizon Mines Ltd.	www.aurizon.com
Aur Resources Inc.	www.aurreources.com
Barrick Gold Corporation	www.barrick.com
Bema Gold Corporation	www.bema.com
Breakwater Resources Ltd.	www.breakwater.ca
Callinan Mines Limited	www.callinan.com
Cambior Inc.	www.cambior.com
Campbell Resources Inc.	www.ressourcescampbell.com
Centerra Gold Inc.	www.centerragold.com
Century Mining Corporation	www.centurymining.com
Claude Resources Inc.	www.claudereresources.com
Falconbridge Limited	www.falconbridge.com
Goldcorp Inc.	www.goldcorp.com
HudBay Minerals Inc.	www.hudbayminerals.com
IAMGOLD Corporation	www.iamgold.com
Imperial Metals Corporation	www.imperialmetals.com
Inco Limited	www.inco.com
Inmet Mining Corporation	www.inmet-mining.com
Johnson Matthey Plc	www.matthey.com
Kinross Gold Corporation	www.kinross.com
Kirkland Lake Gold Inc.	www.klgold.com
Miramar Mining Corporation	www.miramarmining.com
Newmont Mining Corporation	www.newmont.com
Northern Mining Explorations Ltd.	www.xnord.com
Northgate Minerals Corporation	www.northgateminerals.ca
Placer Dome Inc.	www.placerdome.com
Richmont Mines Inc.	www.richmont-mines.com
River Gold Mines Ltd.	www.rivergoldmine.com
Royal Canadian Mint	www.mint.ca
Teck Cominco Limited	www.teckcominco.com

TABLE 2. GOLD MARKETS

Company	Web Site Address
Dubai Gold and Commodities Exchange	www.dgcx.ae
London Bullion Market Association	www.lbma.org.uk
Multi Commodity Exchange of India	www.mcxindia.com
New York Mercantile Exchange (NYMEX)	www.nymex.com
Shanghai Gold Exchange	www.sge.sh
The London Gold Market Fixing Ltd.	www.goldfixing.com
Tokyo Commodities Exchange (TOCOM)	www.tocom.or.jp

Nickel

Bill McCutcheon

Metal Materials Division

Telephone: (613) 992-5480

E-mail: bill.mccutcheon@nrcan.gc.ca

(Abbreviations used in this article include: *e* = Estimated; *f* = Forecast; *p* = Preliminary; Ni = nickel; Cu = copper; Co = cobalt; FeNi = ferronickel; LME = London Metal Exchange; 6 mo. = January to June; 9 mo. = January to September; conc. = concentrate.)

2004 mine production: \$3.3 billion
 World rank: Second (mine production)
 2004 exports: \$4.3 billion

Canada	2004	2005 (f)	2006 (f)
	(000 tonnes)		
Mine production	187	166	220
Refined production (1)	152	142	165
Use/consumption (2)	9	9	10

(f) Forecast.

(1) Refined includes nickel in salts, oxides, etc. (2) Use includes nickel in scrap.

Nickel's resistance to corrosion, high strength over a wide temperature range, appearance, and suitability as an alloying agent make it useful in a wide variety of applications. Markets for primary nickel include stainless steel (65%), nickel-based alloys, electroplating, alloy steels, foundry products, batteries, and copper-based alloys. Nickel is intensively recycled; nearly 50% of nickel used to make stainless steels comes from nickel in stainless steel scrap.

ANNUAL AVERAGE SETTLEMENT PRICES, LONDON METAL EXCHANGE

	2003	2004	2005 (f)	2006 (f)
US\$/t	6 772	9 640	13 852	14 600
US¢/lb	3.07	4.37	6.28	6.62

(f) Forecast.

CANADIAN OVERVIEW

- The three most significant events for the Canadian nickel industry in 2005 were: the joint agreement whereby Inco Limited would acquire Falconbridge Limited, the start-up of Voisey's Bay, and the planned 50% expansion at the Fort Saskatchewan refinery.
- Inco** offered to buy all **Falconbridge** shares, subject to regulatory approvals, to form the "new Inco" worth US\$24 billion; the offer was set to close in late December 2005. Cost-cutting of US\$350 million/y by 2007 was forecast at the combined companies' Sudbury operations. Combined Ni production was projected to increase from 333 000 t in 2005 to 447 000 t in 2009, including tolled production at Falconbridge's refinery in Norway.
- Voisey's Bay Nickel** (owned by Inco) started up with milestones of: August 20, ore mining; September 12, mill processing; and October 20, start-up of the hydrometallurgical demonstration plant at Argentia. Concentrates left the mine in mid-November for Inco's smelters in Thompson and Sudbury. Thompson will receive over two thirds of the nickel in all concentrates. Voisey's Bay production was scheduled at 50 000 t of finished nickel in 2006, likely rising to 60 000 t in 2007. Over half of the projected output of Voisey's Bay in the 2007-09 period will represent "additional"

production, with the rest displacing purchased feed or reductions in Inco's output at existing mines. The start-up at Voisey's Bay let Inco agree to send 8300 t of Ni in concentrates to OMG in Finland for tolling from September 2005 to June 2006; a further 21 000 to 25 000 t/y of Ni in concentrates between July 2006 and June 2009 may follow.

- **Sherritt International** and the Cuban government each own half of Metals Enterprise. Feed from their Moa operation in Cuba was refined at their nickel-cobalt refinery in Alberta. Sherritt and Cuba agreed on a US\$450 million expansion; mine and refinery output will be increased from 34 000 t/y Ni+Co to 49 000 t/y with each party funding 50% of the costs. Construction is scheduled to begin in early 2006, commissioning in November 2007, and production in the first quarter of 2008. In 9 mo. 2005, the refinery produced 24 100 t of Ni and 2574 t of Co in the same period. The Fort Saskatchewan refinery produced a quarterly record 8698 t of Ni and 906 t of Co in the second quarter of 2005.
- **Liberty Mines**, formerly Liberty Minerals, announced plans to re-open the Redstone mine near Timmins, Ontario. Liberty signed a contract to supply concentrates to Jilin Jien Nickel in China. In January, **Canadian Arrow** obtained permission from the Ontario government to mine the Alexo deposit. The mine shipped 8400 t of ore @ 1.81% Ni, 0.18% Cu, and 0.07% Co to Falconbridge's Strathcona mill in the first half of 2005. Open-pit mining was completed by September; the company intended to ship a further 6000 t of stockpiled ore before the end of 2005.
- **Noranda Inc.** successfully acquired Falconbridge Limited; the companies merged in mid-year under the name Falconbridge. **Falconbridge** operates three mines in the Sudbury basin in Ontario, the Raglan mine in northern Quebec, and the Montcalm mine near Timmins, Ontario. Shaft sinking at the Nickel Rim South advanced exploration project near Sudbury began in April. **First Nickel Inc.** started production at the Lockerby mine, bought from Falconbridge; ore deliveries to Falconbridge were to begin before year-end and production was scheduled to reach 700 t/d by the first quarter of 2006. In 9 mo. 2005, Falconbridge produced 40 100 t of Ni from its mines and 47 100 t of Ni in matte from its Sudbury smelter (including purchased feed from the Alexo mine).
- In Sudbury, Ontario, **Inco** targeted finished Ni output from Sudbury at 98 000-100 000 t (including perhaps 40 000 t that is refined in the United Kingdom). During a maintenance shut-down, Inco installed concentrate handling facilities for Voisey's Bay feed and expanded the acid plant. Processing of external feed will drop once Voisey's Bay concentrate feed is processed. Expected recoverable Ni in external feed was forecast at 7700 t of Ni in 2006 and at between 6400 and 6800 t/y of Ni through to 2009. Inco forecast its cobalt production at 1725 t; in 2004, Sudbury ore accounted for 48% of Inco's by-product cobalt production, compared to 32% from Thompson ore.
- In Manitoba, the union at **Inco's** Thompson operation negotiated a new three-year contract with Inco through mid-September 2008. Inco announced approval of the 1-D Lower project at the Thompson mine in late August. Development will begin in 2006 with first production starting in 2008. This US\$34 million project will produce 90 000 t of Ni over eight years. When Thompson processes Voisey's Bay nickel concentrates, the need for Ni in external feed will decline to about 500 t/y. Thompson produced 37 000 t of refined Ni in 9 mo. out of a target of 49 400 t for 2005.
- In return for a 27% share in **FNX Mining, Dynatec** sold both its 25% share in **the Sudbury Joint Venture** (SJV) and its 50% share in Aurora Platinum to FNX Mining. Shaft sinking at the Podolsky deposit reached 238 metres by the end of July. Reconditioning of the Levack No. 2 shaft was under way. In the first half of 2005, SJV shipped 176 000 t of ore to Inco's Clara-belle mill, an increase of 36% compared to the same period a year earlier.
- **North American Palladium** produced Ni as a by-product from its palladium operation near Thunder Bay, Ontario. Development continued at the company's \$52 million underground mine; when operational by the end of 2005, it will supplement production from the open pit.
- **URSA Major** commissioned a full feasibility study of its Shakespeare deposit located 70 km west of Sudbury, Ontario, for a 2900-t/d operation trucking ore to a Sudbury mill. URSA and North American Palladium negotiated an agreement whereby North American Palladium can earn a 60% interest in the property. Probable reserves were put at 7.3 Mt @ 0.37% Ni, 0.39% Cu, 0.024% Co and 0.97 g/t Pt+Pd+Au. The full feasibility study was expanded in September to examine a 4500-t/d mill at the deposit. The study was expected to be completed by the end of 2005.
- Many companies were involved in nickel exploration in Canada; the main areas of exploration were the Sudbury area in Ontario, the northern Ungava region of Quebec, northern Manitoba, and the Timmins area of Ontario. Canadian-listed companies with exploration activities were included in the 2004 nickel chapter of the *Canadian Minerals Yearbook*.

WORLD OVERVIEW

Australia

- **BHP Billiton's** Ravensthorpe project costs rose by about 30%, to US\$1340 million for the mine and leach plant in Western Australia and US\$460 million for the Yabulu refinery expansion in Queensland. The original March 2004 cost estimate totalled US\$1400 million for the mine, leach plant, and refinery expansion. Shipping mixed hydroxides from Ravensthorpe containing 50 000 t/y of Ni and 1500 t/y of Co should start in the second quarter of 2007 with metal production starting in the third quarter.
- **WMC Resources** (WMCR) reported that the last shipment of Mt. Keith concentrate to OMG was in March, the same month as the first matte shipment to Jinchuan in a six-year 120 000-t Ni in matte contract. After out-bidding Xstrata, BHP Billiton completed its acquisition of WMCR and it was delisted.
- In 9 mo., **Minara** produced at an annualized rate of 27 300 t/y, slightly below its 2004 rate. Plans for a fifth autoclave costing US\$450 million to boost production were deferred pending demonstrated stable plant operation.
- **OMG** planned to increase output in 2005 at its Cawse facility by 25% over 2004 output (unstated); the intermediate was sent to OMG's refinery in Finland. In addition to this, OMG sourced Ni concentrates from Black Swan (LionOre, 20% OMG) where a 50% expansion to 13 000 t of Ni in concentrates was announced.
- **LionOre** produced Ni concentrates from its Emily Ann mine and shipped them to Inco's Canadian smelters. In late 2005, LionOre will start its nearby Maggie Hayes mine. Inco also sourced concentrates from **Jubilee's** mine in Western Australia. With Voisey's Bay concentrates being sent to Inco's Thompson and Sudbury smelters in late 2005, Inco announced an agreement with OMG whereby the latter would toll Ni in concentrates starting in September 2005 (see below). LionOre bought the idled Bulong refinery and was expected to make a decision in 2005 on whether to refurbish it as a 20 000- to 40 000-t/y Activox refinery. **Tectonic Resources'** RAV 8 mine was mined out in September having delivered 456 000 t grading 3.47% Ni containing 15 800 t of Ni to the Kambalda mill during the life of the mine; the feasibility study had been based upon 165 000 t of ore @ 5.83% Ni containing 9600 t of Ni.

Indonesia

- Inco anticipated starting construction of a new 90-MW hydro-electric dam and generating facility in 2005.

The dam construction is the key to **PT Inco's** expansion to 90 700 t/y by 2009. PT Inco produces a matte containing 78% Ni and 2% Co that is sent to Japan for refining by Inco and Sumitomo. Inco announced plans to drill the Balodopi deposit in 2005 and then do metallurgical testing in 2006 for a pre-feasibility study of a 50 000-t/y FeNi operation. Inco also was considering a mine and 45 000-t/y Goro-type leach operation for its Pomalaa deposit. **PT Antam's** FeNi II smelter was idled for six months for maintenance and repair; the company expected to produce 7400 t of Ni in FeNi, including 600 t of toll smelted by **Pamco** in Japan. Total ore production for the first nine months of 2005 was 2.5 Mt (wet) compared to 3.0 Mt (wet) for the same period in 2004.

- In November, **Weda Bay** announced a contract to update the 2002 pre-feasibility study of its Halmahera laterite project, complete additional drilling, and expand bench-scale metallurgical testing. Weda Bay's measured resources were 16 Mt @ 1.27% Ni and 0.18% Co; indicated resources were 139 Mt @ 1.47% Ni and 0.08% Co. Weda Bay terminated a supply contract with OMG and retired its debt to OMG by paying US\$2.5 million in September.

New Caledonia

- Ore production to August totalled 3 Mt of garnieritic ore and 1.2 Mt of lower-grade lateritic ore. Garnieritic ore was either exported or used by **SLN** to make 8000 t of Ni in matte and 35 100 t of Ni in FeNi during the period. Lower-grade ore was sent to the Yabulu refinery in Queensland. SLN announced that it would not meet its forecast production of 65 000 t of Ni in FeNi and matte due to industrial discord; SLN produced at an annualized rate of 63 900 t/y for the first nine months.
- **Falconbridge** and **SMSP** were expected to make a decision before year-end on whether to proceed with the Koniambo project, a 60 000-t/y Ni in FeNi mine/smelter, although media reports in November suggested a delay of up to six months. In August, it was reported that while France was reportedly ready to provide tax benefits of US\$630 million and loan guarantees of US\$300 million for the Koniambo project, Falconbridge was seeking additional financing. The costs for the mine, smelter and infrastructure, including a 390-MW power plant, were projected at US\$2200 million, with an additional US\$500 million for financing, working capital and other costs. In June, the possibility of Chinese interests providing some financing in return for product off-take was raised.
- In April, **Sumitomo Metal Mining** and **Mitsui & Co.** purchased a 21% interest in **Inco's** Goro project through a joint venture, Sumic Nickel Netherlands.

The US\$1878 million Goro project plant is scheduled to start production in 2007, with output forecast at 52 000 t/y of Ni in nickel oxide in 2009. Capacity is projected at 60 000 t/y of contained Ni with Co output varying between 4300 and 5000 t/y. The three provinces of New Caledonia obtained a 10% share of Goro. In 2001, New Caledonia instituted a 15-year tax holiday followed by taxation at half of prevailing rates for metallurgical plants such as those at Goro and Koniambo. With respect to taxes, an Inco technical document completed in December 2002 about Goro filed on SEDAR stated France then levied only a 5% withholding tax on disbursements from France to Canada, and that dividends and other payments received from countries with which Canada has a Double Taxation Treaty were exempt from further taxation under Canadian law.

Papua New Guinea

- In October, **China Metallurgical Construction Group Corporation** (MMC) agreed to take an 85% share in the Ramu project in **Papua New Guinea**. A resource of 143 Mt @ 1.01% Ni and 0.1% Co was expected to produce 33 000 t/y of Ni. All permits for the project were in place. **Jilin Jien Nickel** (see below) contracted to help MMC finance the project.

Philippines

- **Coral Bay Nickel** started up its plant in April; the plant will produce 7000 t of Ni in intermediates to be refined at Sumitomo's refinery in Japan. Coral Bay was built with a capacity of 10 000 t/y of Ni and 700 t/y of Co in intermediates, and plans were being examined to double capacity. **Crew Gold** signed an MOU with **Jilin Jien Nickel** for the Mindoro laterite deposit where further resource definition and a definitive feasibility study may be completed. A pre-feasibility study in 1998 examined processing Mindoro laterite ore by high-pressure leaching with a capacity of 40 000 t/y of Ni and 3050 t/y of Co with by-product production of 126 000 t/y of ammonium sulphate. **MBMI Resources** signed an MOU with **Zhejiang Huaguang Smelting Group** whereby the latter will invest in the MBMI laterite orebodies in the Philippines. Zhejiang operates FeNi plants in China.

Botswana

- BCL operated a mine, mill and smelter with production in 2004 of 2.5 Mt of ore. Smelter output in 2004 was 54 500 t of matte (including feed from Tati) containing 22 300 t of Ni, 223 t of Co, and copper. In February, the Mines Minister forecast that BCL's reserves would last at least until 2012. **LionOre** announced an expansion from 3.6 Mt/y to 5 Mt/y at its 85%-owned Tati operation in Botswana that will raise output to

14 600 t/y of payable Ni effective in the third quarter of 2006. Tati's concentrate was sent to BCL's smelter. LionOre continued pilot testing of its Activox process, which produced Ni and Cu metal; LionOre also continued its study of a plant to produce 20 000 t/y of Ni at Tati. This process may have possible application at the Nkomati operation in South Africa (see below) as well as in Australia (see above).

Madagascar

- **Dynatec** acquired **Phelps Dodge's** interest in the Ambatovy project in January. In February, Dynatec released the results of the feasibility study of the US\$2250 million Ambatovy project in Madagascar (including infrastructure, contingency and owner's cost) that could produce 60 000 t/y of Ni and 5600 t/y of Co with 186 000 t/y of by-product ammonium sulphate. In May, **Impala** and Dynatec agreed to jointly develop the project on a 50:50 basis. In August, an agreement was announced whereby **Sumitomo** would take a 25% share of the project with Impala and Dynatec each retaining 37.5%.

South Africa

- **LionOre** purchased a 50% share of the Nkomati operation. LionOre and **African Rainbow Minerals** were evaluating plans to expand production to 17 000 t/y of Ni metal using the Activox process being piloted at Tati in Botswana with PGMs in a leach residue to be sent to PGMs producers for recovery.
- **Falconbridge** and **Barrick** finalized a JV for the Kabanga deposit planning US\$50 million in work, including drilling and studies. The inferred resources as of April 2005 were 26 Mt @ 2.6% Ni. The announcement of the JV noted a possible production rate of 2 Mt/y of ore producing 30 000-35 000 t/y of concentrates, with at least 50% of the concentrates processed at Falconbridge's Sudbury smelter. Falconbridge reported that drilling was two thirds completed and engineering studies were nearly half done for a scoping study due in early 2006.

Americas

- **CVRD** announced in July that it would proceed with the Vermelho project, a nickel laterite mine and high-pressure acid leach plant to be built in the Carajás region of Brazil. The US\$1200 million operation will produce 46 000 t/y of Ni and 2800 t/y of Co starting in the fourth quarter of 2008. Vancouver-based **Canico Resource Corp.** received permission to build its Onça-Puma project located in Pará state. A favourable feasibility study was announced in August for a US\$762 million single-line FeNi mine/plant starting up in early 2008 followed by a second US\$352 million

line two years later. Both lines would be fed by 2.6 Mt/y of ore from proven plus probable reserves of 78 Mt ore grading 1.8% Ni. Planned output was targeted at 30 500 t of Ni in FeNi in year three (after the start-up of the first line), reaching 53 000 t/y by years six and seven. In mid-September, CVRD made an offer to acquire Canico; in November, CVRD increased its offer.

- **Moa Bay in Cuba** will expand production by 50% to provide 49 000 t/y of recoverable Ni+Co in sulphide residues to the Fort Saskatchewan refinery; both facilities were owned equally by Sherritt and the Cuban government. Cuba and **China Metallurgical Construction Group** signed an MOU to invest US\$600 million to build a FeNi smelter and mine at Las Cararimocas to produce 68 000 t/y of FeNi. Cuba forecast national Ni+Co production for 2005 as 76 000 t (including Moa Bay production). The government stated that a new conveyor system at the René Ramos Latour plant would raise production capacity from 10 000 to 17 000 t/y (presumably contained Ni+Co).
- **Skye Resources** started a feasibility study of its Fenix project located at the former Exmibal property in **Guatemala** to examine a 22 700-t/y Ni in FeNi plant targeting production for 2008. Nickel laterite resources were 63 Mt @ 1.84% Ni. Skye filed a patent application for an atmospheric sulphuric acid leach process to produce an intermediate NiCo hydroxide from nickel laterite ore. Phase 2 of pilot testing of the process was expected to finish in 2005. **Jaguar Nickel** conducted drilling programs and got additional exploration licences for properties, also near the former Exmibal plant. Jaguar was planning a FeNi operation after pilot plant testing showed unfavourable economics for a chloride leaching process.
- **PolyMet Mining** completed the acquisition of the ore processing plant of LTV Steel Mining Company, a former iron ore producer in Minnesota, U.S.A. Metallurgical testing on a bulk sample using the company's hydrometallurgical process was completed and a full feasibility study was expected by March 2006. The project is based upon flotation of a bulk concentrate and processing by the PlatSol process to yield about 7800 t/y of by-product Ni in hydroxides that will also contain Co. **Franconia Minerals** continued work on its Birch Lake deposit, also in Minnesota, where inferred resources were 51 Mt @ 0.675% Cu, 0.211% Ni and 0.01% Co, plus 1.65 g/t Au+Pd+Pt. The company commissioned bench-scale pressure leaching tests of flotation concentrate using the PlatSol process. Franconia acquired the Beaver Bay JV located 3 km from its Birch Lake deposit and planned to drill the Maturi target. A preliminary economic assessment of Birch Lake looked at an underground mine with a concentrator and hydrometallurgical facility producing

2250 t/y of by-product Ni plus Cu, and precious metals. **Kennecott** may invest US\$100 million in its Eagle project. The company intended to complete a pre-feasibility study and start a feasibility study in 2005; total resources at Eagle were stated in 2004 as 5 Mt @ 3.68% Ni, 3.06% Cu and 0.1% Co.

Eurasia

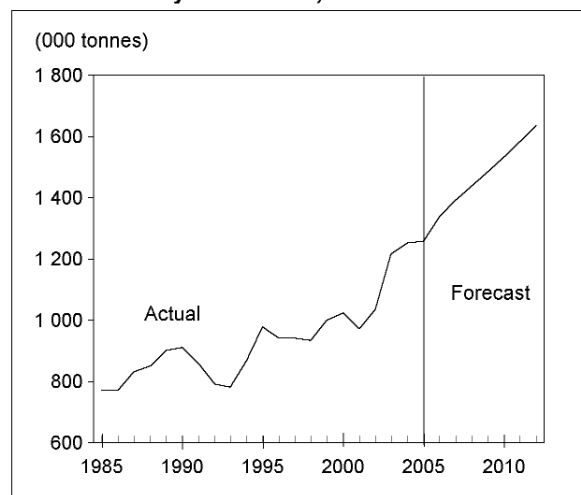
- **Jilin Jien Nickel** in China will increase capacity from 8000 to 15 000 t/y if it can obtain sufficient feed. Jilin signed an MOU with Crew for the development of the Mindoro laterite deposit (see above) and agreed to provide China Metallurgical Construction Corp. with funding of about US\$23 million towards the development cost of the Ramu deposit in Papua New Guinea (see above). Jilin signed an agreement with Liberty Mines for concentrates from the Redstone mine near Timmins, Ontario (see above). In July, **Jinchuan Group** opened new smelting facilities (1 Mt/y of concentrates); Jinchuan targeted 93 000 t of Ni production in 2005, 102 000 t of Ni in 2006, and 150 000 t/y of Ni and 10 000 t/y of Co by 2008. The increases will require increasing mining and mineral concentration capacity from 5.5 Mt/y to at least 10 Mt/y and the construction of a new Ni smelter. **Ausmelt Limited** of Australia won a contract for the new smelter (1 Mt/y of concentrates). In July, Jinchuan imported nickel in matte from WMCR, now BHP Billiton (see above), as well as concentrate from **Rio Narcea** in Spain and from **Sally Malay** and **Fox Resources**, both in Australia.
- The **Ferronikeli** mines and FeNi smelter based in Glogovac in Kosovo were sold to a subsidiary of Eurasian Mineral Resources, a private company, for €30.5 million. The sale included minimum staffing and investment provisions and was to be finalized by mid-January 2006. Production could possibly begin in the second quarter of 2006. In 2004, the Kosovo Trust Agency put capacity as 12 000 t/y of Ni in FeNi.
- Production at **OMG's** nickel refinery at Harjavalta, Finland, was limited by the availability of Ni feed (see WMCR note above). In 2005, OMG cut planned production from about 45 000 t to 41 000 t of Ni, or to less than 75% of capacity (55 000-57 000 t/y) compared to 50 000 t of Ni produced in 2004. As noted above, OMG received new feed from the Black Swan expansion, increased intermediates from Cawse, and 8300 t of Ni in concentrates to be tolled for Inco between September 2005 and June 2006, with an agreement in principle for OMG to toll refine 21 000-25 000 t/y of Ni in concentrates on behalf of Inco from July 2006 to June 2009. OMG was expected to operate its refinery at capacity, or at about 56 000 t/y of Ni, by mid-2006. Boliden smelts concentrates for OMG's refinery; it processed 204 000 t in 2004.

- **Norilsk Nickel** was the largest nickel producer; its nine-month production totaled 181 000 t of Ni, maintaining its 2004 rate of Ni output. During 2005, Norilsk received permission to publish PGMs production data. Norilsk's production target for 2005 was 240 000-250 000 t of Ni, 96 t of Pd and 23 t of Pt, plus copper and cobalt excluding production from its American Stillwater subsidiary.
- **European Nickel** started a heap leach test in October 2004 at its Çaldag deposit in Turkey. By June, recovery of Ni and Co in an intermediate hydroxide had surpassed 50%. The company targeted construction of a full-scale plant beginning in early 2006 with first production in early 2007. Mineable reserves were increased by nearly 30% to 36 Mt @ 1.3% Ni, thereby allowing targeted output of 21 000 t/y of contained Ni. **BHP Billiton** was the largest shareholder and had the right to 50% of the output from the project; BHP Billiton can process the intermediates at its Yabulu refinery.
- **Oriel Resources** completed a JORC compliant resources estimate of its Shevchenko project in Kazakhstan. Resources were 107 Mt @ 0.84% Ni laterite ore using a 0.6% Ni cut-off. A feasibility study was delayed and was expected to be completed by the first quarter of 2006. Metallurgical testing of bulk samples indicated that FeNi grading about 20% Ni could be produced from the deposits. Capital cost estimates were about US\$375 million for a project to produce about 31 000 t/y of Ni in FeNi. **Bekem Metals** bought **Kyzyl Main Mamyt LLT**, a Kazak company that owns the Kempirsai laterite deposit.
- **Asian Mineral Resources** reached an agreement to increase its ownership of the Ban Phuc sulphide property in Vietnam to 90%. A preliminary assessment showed five-year production of 21 000 t of Ni in concentrate based upon processing of 1 Mt grading 2.47% Ni and 1.08% Cu.

DEMAND OUTLOOK

The International Stainless Steel Forum forecasted 2005 stainless steel production at 25 Mt, an increase of 1.8% over 2004. Over half of the projected production will come from Asia, with Western Europe accounting for 36%. Inco presented a forecast in its third-quarter 2005 teleconference that 75% of stainless production would be austenitic with scrap providing over 49% of Ni used in making stainless steels. Inco forecast Ni use in stainless production at 1.48 Mt, of which 749 000 t was from primary sources and 731 000 t was from scrap, compared to 1.45 Mt used in 2003, of which 804 000 t was from primary material and 650 000 t was from scrap. Higher costs for austenitic stainless have prompted substitution away

Figure 1
World Primary Nickel Use, 1985-2012



Source: Natural Resources Canada.

Note: This is an average forecast; yearly actuals will differ from the trend.

from traditional stainless grades for certain applications. In 2004, over 80% of primary nickel was used in metallurgical alloying, including making stainless steels. While long-term trends can be projected, actual demand will be determined by world industrial production and affected by the adjustment to higher oil prices. A long-term growth rate of over 3%/y is forecast. Nickel use in Canada is expected to remain in the 9000- to 12 000-t/y range, including scrap.

CANADIAN PRODUCTION OUTLOOK

More than half of the Voisey's Bay production will represent additional Canadian mine output. Much of the imported concentrates will be displaced to Finland (see above). Falconbridge continued a program to increase capacity at its Raglan operation. Manitoba's nickel production may face increasing challenges once the Thompson smelter can no longer use Voisey's Bay concentrates as feed. The challenge will be compounded by the imposition of new lower sulphur dioxide emission limits, given the distance from acid markets. Figure 2 shows a forecast for Canadian nickel mine production, drawing upon a forecast given by Inco and Falconbridge in October.

PRICE OUTLOOK

Production cuts by stainless steel producers in the second half of 2005 resulted in rising inventories on the LME. Prices in 2005 remained well above long-term averages,

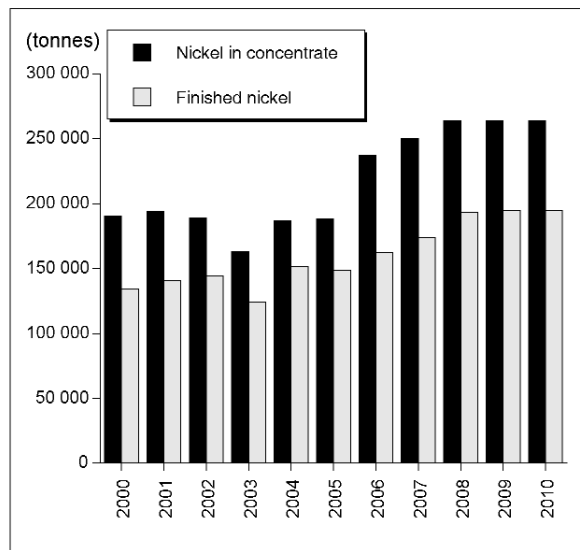
even with the decline in the second half of the year. The longer the period of higher prices, the greater will be the incentive for substitution away from important nickel uses compounded by increasingly attractive investment opportunities in nickel production. Together these trends will bring back a cycle of lower nickel prices. Prices for 2006 are projected to average US\$13 250/t (US\$6/lb) ± about US\$650/t as the effect of stainless steel cutbacks and scrap supply continue to dominate in the first half of the year. Nevertheless, new capacity investments are expected to continue and prices are expected to decline thereafter.

Note: Information in this article was current as of November 18, 2005.

NOTE TO READERS

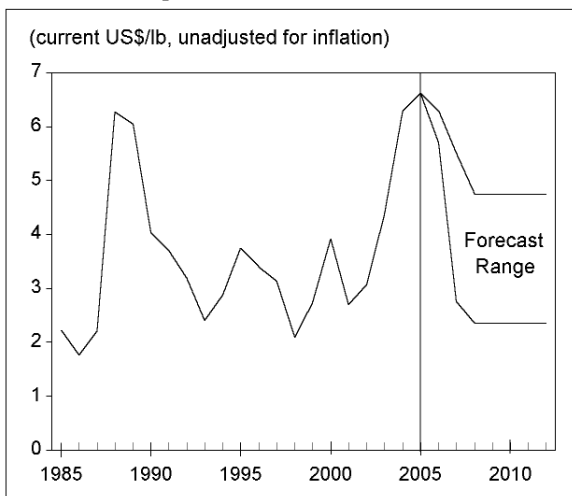
The intent of this document is to provide general information and to elicit discussion. It is not intended as a reference, guide or suggestion to be used in trading, investment, or other commercial activities. The author and Natural Resources Canada make no warranty of any kind with respect to the content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

Figure 2
Canadian Nickel Output, Historical and Projected, 2000-2010



Source: Natural Resources Canada.

Figure 3
Nickel Prices, 1985-2012
Annual Average LME Cash Settlement



Source: Natural Resources Canada.

TABLE 1. COMPANY WEB SITES FOR FURTHER INFORMATION

Company	Web Site Address
Adelaide Resources	www.adelaideresources.com.au
African Rainbow Minerals	www.arm.co.za
Albidon	www.albidon.com
Allegiance Mining	www.allegiance-mining.com.au
Altius Minerals Corporation	www.altiusminerals.com
Anglo American	www.angloamerican.co.uk
Anglo Platinum Limited	www.angloplatinum.com
Apex Minerals	www.apexminerals.com
Asian Mineral Resources	www.asianminres.com
Aurora Platinum	www.auroraplatinum.com
Austminex	www.austminex.com.au
Australian Mines	www.australianmines.com.au
Bell Resources Corporation	www.bellresources.com
Belvedere Resources	www.belvedere-resources.com
BHP Billiton	www.bhpbilliton.com
Blackstone Ventures	www.blv.ca/s/Home.asp
Boliden AB	www.boliden.com
Breakaway Resources	www1.breakawayresources.com.au
Callinan Mines	www.callinan.com
Canadian Arrow Mines	www.canadianarrowminesltd.com
Canadian Royalties	www.canadianroyalties.com/en
Canico Resource Corp.	www.canico.com/s/Home.asp
Compass Resources	www.compassnl.com
Consolidated Minerals	www.consminerals.com.au
Cornerstone Capital Resources	www.cornerstoneresources.com
Costamin Resources	www.costaminresources.com
Cougar Minerals	www.cougarmetals.com.au
Cream Minerals	www.creamminerals.com
Crew Gold Corporation	www.crewgroup.com
Crowflight Minerals	www.crowflight.com
Cullen Resources	www.cullenresources.com.au
Discovery Nickel	www.discoverynickel.com.au
Donner Minerals Ltd.	www.donner-minerals.com
Dynatec Corporation	www.dynatec.ca/
East West Resources	www.eastwestres.com
Eramet Group	www.eramet.fr
European Nickel	www.enickel.co.uk
Falcon Minerals	www.falcon.indigo.net.au
Falconbridge	www.falconbridge.com
First Narrows Resources	www.uno.ca
First Nickel Inc.	www.firstnickel.com
FNX Mining Company	www.fnxmining.com
Fox Resources	www.foxresources.com.au
Franconia Minerals	www.franconiaminerals.com
Geostar Metals	www.geostarmetals.com
Goldmarca	www.goldmarca.com
Hallmark Consolidated	www.hallmarkconsolidated.com
Heron Resources	www.heeronresources.com.au
Highland Pacific	www.highlandspacific.com
Impala Platinum Holdings	www.implats.co.za
Inco Limited	www.inco.com
Independence Group	www.independencegold.com.au
Jaguar Nickel	www.jaguarnickel.com
Jervois Mining	www.jervoismining.com.au
Jilin Jien Nickel Industry Co.	www.jlnickel.com.cn
Jinchuan Group	www.jnmc.com
Jubilee Mines	www.jubileemines.com.au
Kennecott Minerals	www.kennecottminerals.com/Eagle-Project
Knight Resources	www.knightresources.ca

TABLE 1 (cont'd)

Company	Web Site Address
Liberty Mineral Exploration	www.libertymineral.com
LionOre Mining International	www.lionore.com
Maple Minerals	www.mapleminerals.com
MBMI Resources	www.mbmresources.com
Metallica Minerals	www.metallicaminerals.com.au
Minara Resources	www.minara.com.au
Mincor Resources	www.mincor.com.au
Mirabela Nickel	www.mirabelanickel.com.au
Mithril Resources	www.mithrilresources.com.au
MMC Norilsk Nickel	www.nornik.ru/en
Mondo Minerals	www.mondominerals.com
MPI Mines Ltd	www.mpimines.com.au
Mustang Minerals	www.mustangminerals.com
Nickel Australia	www.nickelaustralia.com.au
North American Palladium	www.napalladium.com
Nuinsco Resources	www.nuinsco.ca
OM Group	www.omgi.com
Oriel Resources	www.orielresources.com
Pacific North West Capital	www.pfncapital.com
PacRim Resources	www.pacrim-resources.com
Pioneer Nickel	www.pioneernickel.com.au
Platinum Group Metals	www.platinumgroupmetals.net
PolyMet Mining	www.polymetmining.com
PT Antam Tbk	www.antam.com
Randsburg International Gold Corp.	www.randsburgdiamonds.com
Reliance Mining	www.reliancemining.com.au
ReLode Limited	www.relude.com.au
Resolute Mining	www.resolute-ltd.com.au
Resource Mining Corporation	www.resmin.com.au
Ressources Appalaches Inc.	www.ressourcesappalaches.com
Rio Narcea Gold Mines	www.rionarcea.com
Rio Tinto plc	www.riotinto.com
Rox Resources	www.roxresources.com.au
Sally Malay Mining	www.sallymalay.com
Sherritt International Corp.	www.sherritt.com
Sino Mining International	www.sinogold.com.au
Skye Resources	www.skyeresources.com
Starfield Resources	www.starfieldres.com
Sultan Minerals	www.sultanminerals.com
Tectonic Resources	www.tectonicres.com.au
Tenant Creek Gold	www.tennantcreekgold.com.au
Thundelarra Exploration	www.thundelarra.com
Titan Resources	www1.titanresources.com.au
Ursa Major International	www.ursamajorminerals.com
Valgold Resources	www.valgold.com
View Resources	www.viewresources.com.au
Voisey's Bay Nickel Company	www.vbnc.com
Votorantim Metais	www.vmetais.com.br/homecnt.htm
Wallbridge Mining	www.wallbridgeminig.com
Weda Bay Minerals	www.wedabay.com
Western Areas	www.westernareas.com.au
Westonia Mines	www.westoniamines.com.au
WMC Resources	www.wmc.com
Zimbabwe Platinum Mines	www.zimplats.com

Zinc

Patrick Chevalier
 Metal Materials Division
 Telephone: (613) 992-4401
 E-mail: patrick.chevalier@nrcan.gc.ca

2004 mine production: \$1.0 billion
 World rank: Second (metal production)
 2004 exports: \$1.21 billion

Canada	2003	2004 (e)	2005 (f)
	(000 t)		
Mine output	788	788	660
Refined metal production	761	804	790
Usage	146	152	150

(e) Estimated; (f) Forecast.

Zinc is used in the automotive and construction industries for the galvanization of steel and manufacture of die-cast alloys, in the production of brass, in semi-manufactures such as rolled zinc, and in chemical applications. Promising new applications for zinc are in the manufacture of zinc-air batteries and in galvanized steel studs as an alternative to wood in residential construction. Recycled zinc has become an increasingly important source of the metal in recent years. Recycled zinc includes high-purity refined zinc, remelted zinc of a purity less than 98.5% zinc, and zinc scrap used in the production of zinc alloys. Canada currently produces only a minor amount of recycled zinc exclusively from recycled feeds in primary zinc smelters. However, refined zinc from the processing of electric arc furnace dusts or from the de-zincing of galvanized steel scrap may become important in the future.

ANNUAL AVERAGE SETTLEMENT PRICES, LONDON METAL EXCHANGE FOR SPECIAL HIGH GRADE ZINC

2001	2002	2003	2004	2005 (f)	2006 (f)
(US\$/t)					
886.27	778.56	828.39	1 047.83	1 350	1 550

(f) Forecast.

CANADIAN OVERVIEW

- A strike at Teck Cominco's Trail lead and zinc smelters, which started in July, ended when union members ratified a new three-year contract in October.
- The strike at Falconbridge's Kidd Creek metallurgical complex was settled in October when the workers signed a new three-year collective agreement. Mining was not affected by the strike and, following an initial shut-down, the mill was restarted, in part using management labour.
- Aur Resources Inc. is developing the Duck Pond copper-zinc deposit in Newfoundland and Labrador on a fast-track basis with production expected to begin in late 2006. The mine will produce about 18 600 t of copper contained in concentrates annually, plus by-products of about 34 000 t/y of zinc, 16.7 t/y of silver and 128 kg/y of gold over the mine's seven-year life.
- In June, Noranda and Falconbridge agreed to the terms of their amalgamation. The new combined company, known as Falconbridge Limited, is the third largest zinc producer in the world. The combined operations include the Brunswick mine, General Smelting, the Kidd Creek smelter, Noranda Income Fund-CEZ refinery (25% interest), and the Antamina mine (33.75% interest) in Peru.

WORLD OVERVIEW

- Four consecutive years of concentrate deficits have resulted in depleted producer stocks, forcing a number of custom smelters to cut output. With feed in tight supply, mine production losses take on added importance and create difficulties for smelters.
- Korea Zinc announced that the Onsan smelter will produce about 30 000 t less than targeted for this year.
- Vancouver-based EuroZinc is spending US\$5.2 million to develop a zinc circuit at its Neves Corvo copper mine in Portugal to process zinc-rich ore zones. The company plans to modify a former tin concentrator circuit to produce 25 000 t/y of zinc in concentrate by June 2006.
- Toronto-based HudBay Minerals plans to re-open the Balmat zinc mine in New York state in the second quarter of 2006. The mine, which has been on care and maintenance since 2001, has reserves of 1.86 Mt grading 11% zinc and resources of 1.39 Mt grading 12.9% zinc. Expected output of 60 000 t/y of zinc in concentrate will be processed at the Noranda Income Fund electrolytic refinery at Valleyfield, Quebec.
- In April 2005, Coeur d'Alene Mines Corporation acquired the silver reserves and production of the Endeavor mine in Australia for US\$38.5 million. CBH Resources declared force majeure on concentrate deliveries from the Endeavor mine following a rockfall in October. Lost production during the fourth quarter of 2005 and first quarter of 2006 is estimated at 17 000 t of zinc in concentrate. As a result, Endeavor will limit supply to Zinifex's Hobart smelter and Toho Zinc.
- The Antamina mine in Peru announced that production of contained zinc will fall by around 40 000 t in 2006 due to mine scheduling issues.
- Zinc smelter Padaeng Industry Public is reducing its reliance on imported concentrate by increasing production from its integrated zinc mines at Mae Sot in Thailand. The company, which is 41% owned by Umicore, is seeking to enhance its competitive position in the face of a tight concentrate market and a reduction in the import duty for zinc from 10% in 2003 to 5.5% effective in 2005.
- Hindustan Zinc Limited (HZL) will build an additional 170 000-t/y electrolytic zinc smelter at Chanderiya, India, identical to the one completed last May. The addition will bring HZL's total zinc production capacity to 579 000 t/y by early 2008.

- China-based Shuikoushan Nonferrous Metals Group and Taizhou Huatian Industry Company, as well as Russia-based IFK Metropol, will begin developing the Ozyomoye deposit in the Russian Republic of Buryatia in 2006. The deposit has proven reserves of 128.2 Mt grading 7% zinc, 1.25% lead and 37.6 g/t silver.
- Black Angel Mining is planning to re-open the Black Angel mine in Greenland, which closed in 1990. The 3-Mt resource includes 347 000 t of readily mineable ore at current high zinc prices.

LEADING WORLD ZINC PRODUCERS

Producers		Producers	
Zinc in Concentrate	2004	Zinc in Metal	2004
	(000 t)		(000 t)
China	2 264	China	2 519
Australia	1 298	Canada	805
Peru	1 209	Japan	635
Canada	791	South Korea	669
United States	739	Spain	523

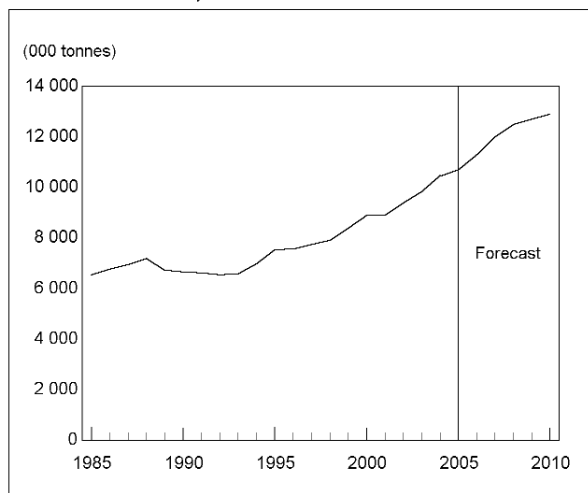
Source: International Lead and Zinc Study Group.

DEMAND OUTLOOK

According to the International Lead and Zinc Study Group (ILZSG), global demand for refined zinc metal in 2005 is expected to be at a similar level to that in 2004 at 10.52 Mt. However, in 2006, demand is expected to rise in all the main regions, resulting in an overall expansion of global usage of 5.7% to 11.12 Mt. A further increase in China of 9.8% will be due primarily to the continued rapid rise in galvanized steel consumption which, over the period 1984 to 2004, is estimated to have grown from half a million tonnes to over 10 Mt/y. On the supply side, ILZSG expects that global zinc mine supply will increase by 3.6% to 10.05 Mt in 2005 followed by a further rise of 4.2% to 10.47 Mt in 2006. The rises are largely due to recent expansions and mine openings in Australia, China and India.

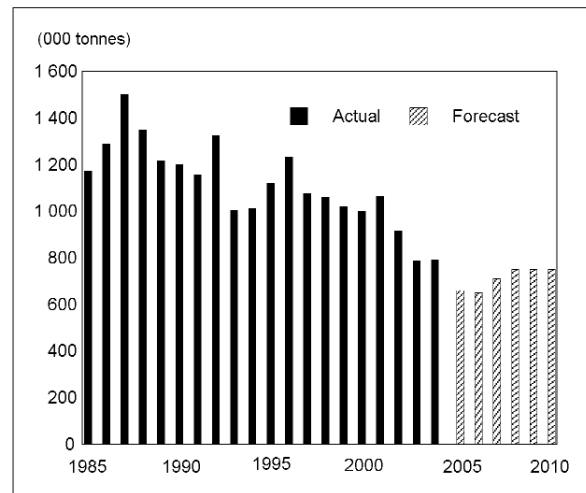
Taking into account the forecasts by ILZSG member countries for supply, demand and trade, as well as releases from the U.S. Defense National Stockpile, it is anticipated that the Western World refined zinc market will remain in deficit both this year and next. The expected size of the shortfall this year is 272 000 t, rising to 430 000 t in 2006.

Figure 1
World Zinc Use, 1985-2010



Source: Natural Resources Canada.

Figure 2
Canadian Mine Production of Zinc, 1985-2010



Source: Natural Resources Canada.

CANADIAN PRODUCTION OUTLOOK

Zinc mine production fell sharply in 2004 as a result of mine closures at Bell-Allard and Selbaie, and closures in 2005 at Louvicourt and Bouchard-Hébert, all located in the province of Quebec. Mine output in the first nine months of 2005 was 14% lower than during the same period in 2004.

Labour disruptions at both the Trail and Kidd Creek refineries are expected to result in slightly lower refined zinc metal production in Canada of 790 000 t for 2005, down from the 804 000 t produced in 2004.

PRICE OUTLOOK

While prices for most of the base metals had started to recover earlier in the current price cycle, zinc prices remained subdued through most of the first half of the year. However, the situation changed dramatically in the second half of the year when cash settlement prices on the London Metal Exchange (LME) staged a price rally starting in July that continued through to the end of November, rising from the year low of \$1175/t to reach \$1732/t.

While reported consumer stocks remained relatively stable at between 290 000 and 300 000 t for most of 2005, stocks on the LME declined from 629 000 t at the start of the year to just under 440 000 t by the end of November, despite a large delivery in June that saw stocks rise 100 000 t in two days.

Prices are expected to continue to reflect the current depletion of zinc concentrate inventory from a lack of mine supply and surging demand. Zinc concentrate treatment charges are expected to fall to record lows. This, combined with smelter bottlenecks, should support higher prices through to 2007/08. Prices are forecast to average about US\$1350/t in 2005 and to rise to an average \$1550/t in 2006.

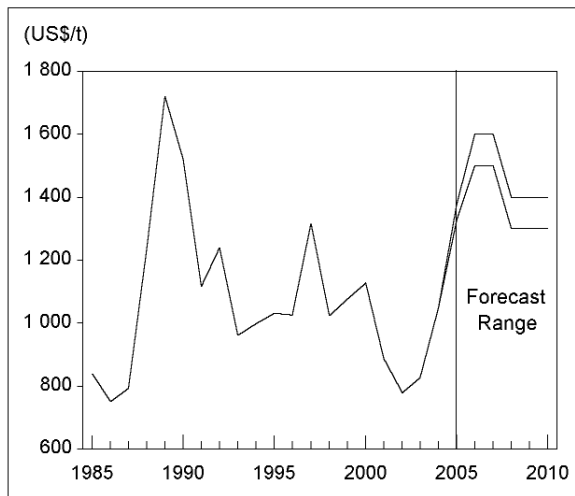
Beyond 2008, continued growth in galvanizing markets, combined with good growth overall for principal zinc markets, is expected in the remainder of the forecast period with annual average zinc prices ranging from US\$1200 to \$1400/t through to 2010.

Note: Information in this article was current as of November 30, 2005.

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.

Figure 3
Zinc Prices, 1985-2010
 Annual Average LME Cash Settlement



Source: Natural Resources Canada.

TABLE 1. WEB SITES FOR FURTHER INFORMATION

Company	Web Site Address
Agnico Eagle Mines Limited	www.agnico-eagle.com
American Galvanizers Association	www.galvanizeit.org
Aur Resources Inc.	www.aurresources.com
Breakwater Resources Ltd.	www.breakwater.ca
Callinan Mines Limited	www.callinan.com
Campbell Resources Inc.	www.ressourcescampbell.com
Canadian Zinc Corporation	www.canadianzinc.com
EuroZinc Mining Corporation	www.eurozinc.com
Falconbridge Limited	www.falconbridge.com
HudBay Minerals Inc.	www.hudbayminerals.com
Imperial Metals Corporation	www.imperialmetals.com
Inmet Mining Corporation	www.inmet-mining.com
International Lead and Zinc Study Group	www.ilzsg.org
International Zinc Association	www.iza.com
London Metal Exchange	www.lme.co.uk
Northgate Minerals Corporation	www.northgateminerals.ca
Teck Cominco Limited	www.teckcominco.com
Yukon Zinc Corporation	www.yukonzinc.com

Canadian and World Economic Situation and Outlook

Greig Birchfield

Minerals and Mining Statistics Division

Telephone: (613) 992-1470

E-mail: greig.birchfield@nrcan.gc.ca

In the third quarter of 2005, the Canadian economy (real Gross Domestic Product) grew by an annualized 3.6%, following increases of 3.4% in the second quarter and 2.0% in the first quarter. The third-quarter growth rate is the highest since the second quarter of 2004. The third-quarter increase brings Canada's real GDP (annual rate in chained 1997 dollars) to \$1 162 865 million (\$1 385 940 million nominal dollars), compared to \$1 124 428 million in 2004 (\$1 290 185 million nominal). Overall, real growth in 2005 should come in at about 2.8% and accelerate slightly to about 2.9% in 2006 as a possible slowdown in domestic demand will likely be offset by improved global market prospects.

Factors that influenced the Canadian economy in 2005 include continuing high commodity prices, high energy prices, low but rising interest rates, a strong Canadian dollar, strong demand for Canadian exports, especially to China and the United States, record employment levels, and high personal incomes and corporate profits.

Another factor of note is that Canada was the only Group of Seven (G7) country to report a total government surplus in 2004 and is projected to be the only G7 country to be in a surplus situation again in 2005 and 2006.

The U.S. economy grew at a 4.3% annualized rate in the third quarter of 2005, compared to a 3.8% real growth rate in the first quarter and a 3.3% increase in the second quarter. Components that contributed to the third-quarter increase were: increased consumer spending on goods and services, increased business investment in equipment and software, increased federal government spending, and increased residential fixed investment spending. Inventories were being drawn down, but at a slower pace than in the previous quarter. These positive contributors to third-quarter growth were partially offset by a slowdown in exports. Following a real growth rate of 4.2% in 2004, growth in 2005 is expected to slow somewhat to 3.6-3.7% and to about 3.5% in 2006 as rising interest rates and

record consumer debt loads begin to affect consumer demand.

As in 2004, the strength of the Canadian dollar in 2005 and how the Canadian economy has responded to it is the big story. Indeed, the Bank of Canada, in its *Autumn 2005 Review*, devoted the entire issue to exchange rates and the Canadian economy. As of this writing, the Canadian dollar is trading above US\$0.85, a level not seen since early 1992. This strength appears to be underpinned by fundamental factors, including high prices for crude oil, natural gas, and other commodities such as copper. Also influencing the dollar's strength is Canada's generally solid economic performance. The Canadian dollar is expected to remain at about the US\$0.85 level through 2006.

Although exchange rates can influence many facets of the economy, they are felt most directly through international trade. The current appreciation of the Canadian dollar began in early 2003. While there are other factors that affect trade levels, it is worth noting that, following the first quarter of 2003, the value of exports of goods declined from \$106.3 billion to under \$100 billion for each of the remaining quarters of 2003. Since then, the export sector has adjusted well to the dollar's strength, helped in large measure by high energy values. In fact, record energy export values in the third quarter of 2005 lifted the total value of exports of goods in that quarter to a record \$116.2 billion, surpassing the previous record of \$112.5 billion reached in the fourth quarter of 2000. In addition to the energy sector, the automotive sector saw sales to the United States increase as a result of buyer incentives. Also faring well were the resource sector and the agricultural and fish sectors. The forestry sector continued to lag though, as exports declined for the fifth consecutive quarter. The forest industry suffers from a number of difficulties. Higher energy costs have increased manufacturing and transportation costs. The rise in the Canadian dollar has reduced profits as forestry products are sold in U.S. dollars (as are many other products). Punitive duties from the United States have also hurt. These factors are compounded by weak pulp and paper prices, declining demand for photocopy paper, and overcapacity.

Already strong in North America and most of Asia, global economic momentum also appears to be benefiting from the Japanese and European recoveries. With this back-

ground, Canada's export sector may be expected to continue to expand by over 5% in 2006.

Although the higher value of the Canadian dollar has a dampening effect on import prices, imports of goods increased \$1.1 billion in the third quarter to reach a record level (\$97.4 billion) for the third consecutive quarter. Like exports, the value of imports of energy products increased because of higher prices. Automotive product imports, particularly vehicle parts, also increased in the third quarter. Canada's relatively stronger dollar makes U.S.-made machinery and equipment less expensive.

The trade surplus reached \$18.8 billion in the third quarter of 2005, the fourth highest value on record and the highest since the second quarter of 2004.

China is becoming an increasingly important trading partner with Canada. In 2004, China was Canada's fourth leading country of destination. Exports to that country totaled \$1.4 billion and China was the second leading importer to Canada with goods totaling \$3.3 billion.

Rising energy sector and metal commodity prices have had a significant positive impact on corporate profits, especially for the mining and mineral fuel industries. Corporate profits in the third quarter of 2005 increased by 5.4%, stronger than the second quarter's 3.3%. As interest rates rise and commodity prices decline from their present lofty levels, corporate profit growth may be expected to slow somewhat in 2006. Corporate profits have contributed an increasing share to total GDP, rising from 11% in 2002 to 14% in the third quarter of 2005.

Strong corporate profits and relatively low dividend payouts have allowed corporations to build up substantial cash reserves, which in turn may be used for further investment in machinery and equipment. Business investment may be expected to increase in 2006 by more than 7%, compared with an estimated 10% in 2005.

In an effort to stem inflation, the Bank of Canada began raising its key overnight interest rate in September 2005, the first increase in the rate since October 2004. A 25-basis-point increase in September was followed by further 25-point increases in both October and December, bringing the rate to 3.25%. Further increases are expected until the rate reaches at least 4% in the middle of 2006.

The All-Items Consumer Price Index (CPI) spiked in September 2005, increasing 3.4% compared to a year earlier. This hefty increase was primarily the result of energy price increases resulting from shortages caused by Hurricane Katrina. Energy prices declined quickly (but were still at high levels) as supplies came back on stream, resulting in a reduced increase in the CPI in October of 2.6%. The Bank is concerned about inflationary pressures for several reasons, although its interest rate policies are

designed to counteract these pressures and keep inflation under control. Energy prices are much higher and, while they may decline somewhat, will likely remain high. Meanwhile, home prices and property taxes are both up. Canada's low unemployment rate has begun to accelerate wage gains, while tight capacity utilization rates may lead to price increases by manufacturers (although with global competition, these increases may be limited). Also, higher fuel and other energy costs may filter through into higher prices for other goods.

The core inflation rate, which excludes eight volatile components (including fuel), reached 1.7% in October. Although this is below the 2% Bank target, it will be closely monitored.

Overall for 2005, the All-Items CPI will likely reach about 2.2%, above the 2004 level of 1.8%, but well within the Bank's target range of 1-3%. Given the Bank's policy thrust, inflation should remain under control, possibly increasing by a little less than 2% in 2006.

Consumer spending slowed in the third quarter of 2005. Spending increased by 0.6% in the third quarter compared to 0.8% in the second and 1.6% in the first. Increased expenditures for electricity and new motor vehicles were offset by declines in purchases of clothing and household furnishings, the latter at least partially caused by a decline in new housing construction. Personal disposable income accelerated to 1.6% in the third quarter compared to 1.3% in the previous quarter and 4.2% above year-ago levels. Given Canada's tight labour force, healthy income growth may be expected for a while yet. Even so, rising interest rates and high debt levels may begin to slow the increase in consumer expenditures, especially for durable goods. Consumer expenditure increases for 2005 should approach 4% and slow to less than 3% in 2006.

The third-quarter personal savings rate remained below 0% for the third successive quarter, but improved from -0.6% in the second quarter to -0.2% in the third. Given the combination of higher interest rates, increased disposable income and a likely reduction in the pace of consumer spending, the savings rate may be expected to once again reach positive territory.

After several months of moderate growth, employment jumped by 69 000 in October and a further 31 000 in November, bringing total gains over the last 12 months to 250 000, mostly in full-time employment. The unemployment rate, which was below 7% in each month of 2005 except January and February, declined to 6.4% in November, its lowest level in over three decades. While job growth should remain fairly robust, the tight employment situation leaves little room for further strong gains. The unemployment rate for 2006 will likely average about 7%, slightly higher than the 2005 average of about 6.8%.

The U.S. economy showed surprising strength in the third quarter of 2005, with the GDP (annual rate in chained 2000 dollars) reaching US\$11 206.1 billion (US\$12 601.0 billion nominal dollars), 3.7% above the same quarter in 2004. Growth in the U.S. economy should approach a respectable 3.6% in 2005, although less than the 4.2% growth rate registered in 2004. The acceleration of GDP growth in the third quarter (a 4.3% annualized increase compared to 3.3% in the second quarter) primarily reflected a smaller decrease in private inventory investment and an acceleration in personal consumption expenditures and federal government spending. Consumer spending, which represents about 70% of economic activity, grew by 4.2% during the quarter. These positive factors were partially offset by a deceleration in exports, an upturn in imports, and a deceleration in state and local spending. Also, corporate profits fell 3.4% in the third quarter compared to a 4.6% increase during the second quarter. Much of that decline is linked to insurance payouts related to Katrina. The impact of Hurricane Katrina will likely be negative for fourth-quarter growth, but then positive in the first half of 2006 as clean-up and rebuilding efforts take hold.

The pace of consumer expenditure increases is likely to slow in 2006. Over the last couple of years, a large portion of consumer spending was the result of a rapid appreciation of real estate assets, allowing consumers to access this through home equity lines of credit. Higher interest rates, record debt loads and a slowing of house price appreciation will likely reduce consumer expenditure increases to an average of about 3% in 2006, with the effect most pronounced during the second half of 2006.

The U.S. Consumer Price Index increased 0.2% in October 2005 from the month earlier, lower than the energy-related 1.2% spike registered in September, bringing the year-over-year increase in the CPI to 4.3%. While core inflation, with energy and food removed from the Index, also increased by 0.2% in October, the annual change remained at about 2%, a rate that has been maintained for several months, thus indicating that energy prices have not yet passed through to other prices. The Federal Reserve's monetary tightening policy is designed to curb inflationary pressures and has been successful so far. Since the middle of 2004, the Federal Reserve has raised the key federal funds rate 12 times from 1% to the current 4%. Recent data regarding GDP growth, employment levels, wage gains, and production capacity suggest that the Federal Reserve will continue raising rates until the middle of 2006 to at least 4.5%.

Non-farm payroll employment grew by 215 000 in November, bringing growth for the first 11 months of 2005 to 1.84 million. Job growth was widespread, with substantial gains made in the construction and service industries. Even the manufacturing sector gained 11 000 jobs in November, compared to a six-month

average loss of 5200 jobs. The year-over-year increase in average hourly earnings reached 3.2% compared to 3% in October, and the unemployment rate remained at 5%. The jobless rate has fluctuated very narrowly from 4.9% to 5.1% since May 2005. As the U.S. economy is expected to slow somewhat during the latter part of 2006, the unemployment rate may be expected to rise to about 5.4% towards year-end and to average a little over 5% for 2006.

Widening U.S. budget deficits and the U.S. current account deficit are two concerns with respect to the U.S. economy that were highlighted, most recently by Alan Greenspan, outgoing Chairman of the Federal Reserve. While both are risks to future U.S. growth, Mr. Greenspan believes the budget deficit is the more serious concern. Rising retirement and medical costs pose threats to future economic prospects. The deficit did narrow by US\$94 billion in the fiscal year ended September 30 to US\$318.6 billion after tax cuts and spending increases pushed the deficit to 3.5% of GDP, or a record US\$412.8 billion a year earlier. But economists at Goldman Sachs & Co. and Lehman Brothers Inc. believe rising federal spending and slower tax receipts will push the deficit up to US\$425 billion in the current fiscal year. Mr. Greenspan suggests that spending cuts and not tax increases are the best approach to lowering the deficit.

The current account deficit is less of a problem as the U.S. interest rate policy and strong economic growth make investment in U.S. assets attractive to foreign investors, enabling the U.S. to finance its deficit relatively easily.

Economic growth in China and the United States are both major contributors to the global economy. Over the first half of 2005, real GDP growth in China advanced 9.5%, the same rate as in both 2003 and 2004. Exports continue to be a big part of this, although increased consumer spending is beginning to contribute a larger share. This pace of growth is likely to slow only modestly over the next couple of years, but risks associated with the Chinese real estate market (measures have been introduced to curb mortgage lending) and the banking sector's huge portfolio of bad loans may precipitate a more rapid slowdown.

At a meeting of the Group of Seven (G-7) industrial nations in early December 2005, officials urged the Chinese government to make its currency more flexible. China's yuan had been pegged to the U.S. dollar until July 2005 when it was pegged to a basket of currencies. This allowed its exchange rate to increase in value by 2.1%. G-7 officials argued that this was insufficient and that more was needed to help cut the U.S. trade gap and aid economic growth in Europe and Japan. The Chinese finance minister made no commitments regarding further currency flexibility.

In Japan, real GDP is likely to reach at least 2% in 2005, the second straight year of 2% or higher growth, and to

continue at about that rate in 2006. High levels of energy efficiency in Japan allowed it to weather the energy price shock relatively well. The re-election of the Japanese prime minister in 2005 has given him a strong mandate to pursue much-needed structural reforms. Mounting public spending pressures associated with an ageing population may require fiscal tightening, although monetary policy is expected to remain relatively moderate in order to combat deflation. The CPI is expected to decline by 0.2% in 2005 and to barely get into positive territory in 2006.

Growth in India remained robust in 2005 with the continued expansion in services, including information technology, and accelerating industrial production. For 2005, output will likely expand by about 7%, then cool in 2006 to around 6.5%.

Growth in other emerging Asian economies is expected to become more dependent on Chinese demand as high energy prices and the prospect of slower U.S. growth will likely cut into their growth rates. In the ASEAN-4 (Indonesia, Thailand, the Philippines and Malaysia), the high cost of energy is putting upward pressure on inflation and affecting consumer spending. ASEAN growth rates are expected to decline to about 4.8% in 2005 from 5.8% in 2004, before rebounding to over 5% again in 2006. For Asia generally, excluding Japan, growth is expected to moderate to just less than 7% in 2005 (from 7.9% in 2004) and to about 6.7% in 2006, depending, of course, on China's economic performance.

The European Central Bank (ECB), in a move designed to keep inflation in check, raised its key interest rate in early December 2005 by a quarter of a percent to 2.25%. The rate had remained at 2% since June 2003. The Bank stated, however, that the increase was not the first in a series, but that rates will remain accommodative. Inflation in the EU rose to 2.6% in September 2005, compared to 2.2% the previous September, on the heels of higher energy prices. The ECB inflation guideline is just below 2%. Some economists and government officials questioned the rate hike, however, believing that growth in the European economy is still fragile and that the inflation is driven by energy costs, not domestic demand. With domestic demand stagnant, the EU remains too reliant on exports. Consumer spending in Germany, Europe's largest economy, fell for the third quarter in a row.

The ECB expects inflation of about 2.1% in 2006. It also projects growth to accelerate to 1.9% in 2006 compared to 1.4% in 2005.

According to the International Monetary Fund (IMF), the Latin American region continues to benefit from strong commodity prices and is projected to grow 4% and 3.75% in 2005 and 2006, respectively. There are downside risks though. Key among the external risks is the possibility of a sharper-than-expected slowdown of growth in key trading partners or international trade, possibly triggered by a

continued surge in oil prices and/or rising protectionist sentiment. The region also remains vulnerable to an abrupt tightening of global financial market conditions as debt ratios still remain high in many countries and there remains a high dependence on exchange-rate-linked and short-term instruments. However, strong export growth and improved macro-economic policies should help sustain the region's expansion.

Global growth appears to have slowed somewhat in 2005 to 4.3% from 5.1% in 2004. World output is expected to increase a further 4.3% in 2006. Global expansion has continued to be led by the United States and China, growth projections in most other regions being marked downward. Monetary policy stances are becoming more differentiated with countries such as Canada and the United States raising rates, Japan keeping rates on hold, and the Bank of England reducing rates. Partly as a result of this, movements in currencies have varied widely with, for example, the Canadian dollar appreciating and the yen and euro depreciating.

Global current account imbalances remain. The U.S. deficit is the most notable. Notable on the surplus side are Japan, China, Middle East oil exporters, and the Commonwealth of Independent States.

Global inflation has picked up slightly due to higher oil prices, but remains at moderate levels. Among the major industrial nations, core inflation appears generally contained, although rising unit labour costs, especially in the United States, need to be watched. Inflationary pressures have risen somewhat more in emerging markets – there could be a danger of overheating economies in some countries with large external surpluses.

Sources: Bank of Canada; Bloomberg; Finance Canada; International Monetary Fund; Organization for Economic Cooperation and Development; Statistics Canada; TD Economics; United States Bureau of Economic Analysis; United States Bureau of Labor Statistics; and comments and reports on aspects of the Canadian and world economic situation and outlook in *The Globe and Mail Report on Business* and *The Financial Post*.

Note: Information in this article was current as of early December 2005.

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.

Import and Export Tables

**TABLE 1. CANADA, VALUE OF MINERALS AND MINERAL PRODUCTS
(STAGES 1 TO 4), IMPORTS BY COMMODITY, 2003-05**

	2003	2004	2005 (a)
	(\$'000)		
METALS			
Aluminum	4 543 091	5 004 254	4 152 883
Antimony	8 279	11 187	8 549
Barium	4 788	5 158	4 729
Beryllium	612	762	493
Bismuth	1 255	1 964	1 179
Cadmium	1 228	1 676	1 052
Calcium	48 829	49 928	38 295
Chromium	54 319	56 293	49 189
Cobalt	28 788	65 488	44 044
Copper	1 578 309	2 318 395	2 033 315
Gallium	44	80	25
Germanium	4 601	4 361	3 888
Gold	1 052 626	1 909 335	2 054 923
Hafnium	297	228	138
Indium	715	3 731	2 904
Iron and steel	15 208 199	18 274 720	15 307 752
Iron ore	326 448	431 891	506 831
Lead	334 283	386 006	302 702
Lithium	69 023	85 448	52 477
Magnesium and magnesium compounds	176 643	214 016	142 236
Manganese	255 471	371 468	262 142
Mercury	3 347	2 666	751
Molybdenum	59 069	136 339	197 547
Nickel	465 752	707 924	549 303
Niobium	17 850	20 310	12 558
Platinum group	297 800	311 841	232 971
Rare earth	13 124	11 168	3 000
Rhenium	25	49	151
Selenium	1 234	3 297	1 704
Silicon	100 152	120 278	58 101
Silver	190 707	364 438	208 560
Strontium	1 173	815	623
Tantalum	803	991	601
Tellurium	359	697	2 831
Thallium	-	1	-
Tin	49 501	65 017	46 748
Titanium	61 520	74 363	96 765
Tungsten	9 127	10 808	11 513
Uranium and thorium	216 509	294 648	320 273
Vanadium	15 607	27 918	53 059
Zinc	284 922	321 579	231 057
Zirconium	42 174	48 588	36 145
Other	10 659 132	11 131 377	8 152 799
Total metals	36 187 735	42 851 501	35 186 806
NONMETALS			
Abrasives	388 034	391 552	287 122
Arsenic	416	526	491
Asbestos	104 575	116 593	85 499
Barite and witherite	9 921	8 451	9 997
Boron	33 538	30 365	22 942
Bromine	2 166	2 935	3 021
Calcium (Industrial minerals)	5 207	6 647	6 605
Cement	240 078	253 228	216 971
Chlorine and chlorine compounds	61 387	63 675	52 002

TABLE 1 (cont'd)

	2003	2004	2005 (a)
	(\$000)		
NONMETALS (cont'd)			
Clay and clay products	1 113 141	1 148 839	873 449
Diamonds	522 389	528 959	353 102
Dolomite	7 491	7 736	6 087
Feldspar	229	257	192
Fluorspar	52 327	53 494	36 637
Glass and glassware products	2 416 288	2 458 691	1 773 610
Granite	88 251	97 807	85 514
Graphite	410 917	403 414	261 696
Gypsum	85 146	89 872	67 465
Iodine	14 610	13 118	11 552
Lime	9 914	9 104	8 482
Limestone flux and other limestone	25 195	22 893	19 841
Marble, travertine and other calcareous stones	73 161	81 534	68 287
Mica	14 012	11 898	8 768
Mineral pigments	160 736	171 842	132 584
Nepheline syenite	21	48	9
Nitrogen	284 172	215 468	149 107
Olivine	994	761	608
Pearls	19 290	21 716	18 092
Peat	2 010	2 420	2 197
Perlite	17 144	16 893	13 408
Phosphate and phosphate compounds	422 489	405 772	280 519
Potash and potassium compounds	38 959	34 944	31 397
Salt and sodium compounds	283 568	283 626	245 287
Sand and gravel	15 221	15 699	12 745
Sandstone	3 098	3 899	3 766
Silica and silica compounds	172 268	156 536	115 027
Slate	13 022	15 489	12 783
Sulphur and sulphur compounds	28 338	22 669	18 238
Talc, soapstone and pyrophyllite	20 174	19 026	13 664
Titanium oxides	274 811	265 002	206 252
Vermiculite	8 929	8 112	5 660
Other nonmetals	582 050	615 533	518 549
Other structurals	84 673	94 527	77 548
Total nonmetals	8 110 360	8 171 570	6 116 772
FUELS			
Coal	1 028 893	1 113 179	1 033 216
Coke	105 901	196 443	114 827
Natural gas	1 823 221	2 582 678	2 895 183
Natural gas by-products	101 847	131 650	108 310
Petroleum	17 987 539	21 427 632	21 785 075
Other	520 676	554 288	427 242
Total fuels	21 568 077	26 005 870	26 363 853
Total mining imports (including fuels)	65 866 172	77 028 941	67 667 431
Total non-fuel mining imports	44 298 095	51 023 071	41 303 578
Total mining imports (including coal and coke)	45 432 889	52 332 694	42 451 621
Total economy imports	335 962 483	355 710 676	283 158 906

Sources: Natural Resources Canada; Statistics Canada.

– Nil; (e) Estimated.

(a) First nine months of 2005.

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

**TABLE 2. CANADA, VALUE OF MINERALS AND MINERAL PRODUCTS
(STAGES 1 TO 4), TOTAL EXPORTS BY COMMODITY, 2003-05**

	2003	2004	2005 (a)
	(\$000)		
METALS			
Aluminum	8 285 062	8 948 477	7 271 776
Antimony	959	1 073	1 175
Barium	1	53	174
Beryllium	—	5	85
Bismuth	661	3 316	911
Cadmium	4 393	5 101	5 412
Calcium	4 295	6 321	4 676
Chromium	21 766	24 136	16 669
Cobalt	183 822	460 048	249 086
Copper	2 108 646	3 014 561	2 848 692
Gallium	—	—	—
Germanium	1 253	1 482	707
Gold	2 851 363	3 550 455	3 237 945
Hafnium	—	—	—
Indium	—	—	—
Iron and steel	10 789 925	12 809 856	10 410 176
Iron ore	1 061 506	944 044	1 038 999
Lead	205 112	287 941	224 194
Lithium	2 728	4 505	1 912
Magnesium and magnesium compounds	212 693	190 785	147 011
Manganese	53 325	55 541	25 797
Mercury	55	35	126
Molybdenum	136 856	353 875	523 572
Nickel	2 533 608	4 377 244	3 109 497
Niobium	54 619	57 757	41 061
Platinum group	64 167	78 630	63 022
Rare earth	473	408	164
Rhenium	—	—	—
Selenium	4 741	9 263	16 145
Silicon	90 854	106 551	87 154
Silver	455 427	482 212	388 387
Strontium	88	—	—
Tantalum	331	399	447
Tellurium	2 504	3 241	2 910
Thallium	—	—	—
Tin	10 891	21 129	13 110
Titanium	24 717	30 892	32 332
Tungsten	28 290	12 367	8 596
Uranium and thorium	867 460	944 194	1 431 707
Vanadium	84 234	94 430	76 947
Zinc	1 062 055	1 225 959	963 100
Zirconium	18 595	15 742	10 678
Other	5 031 784	5 322 129	4 053 387
Total metals	36 259 259	43 444 157	36 307 739
NONMETALS			
Abrasives	243 318	256 757	189 460
Arsenic	32	—	—
Asbestos	191 162	170 177	93 854
Barite and witherite	5 154	5 723	3 023
Boron	1 606	1 581	1 678
Bromine	106	139	348
Calcium (Industrial minerals)	30	13	1
Cement	803 519	787 012	569 050
Chlorine and chlorine compounds	181 370	186 835	127 990
Clay and clay products	89 979	110 110	82 799
Diamonds	1 649 667	2 054 706	1 092 168
Dolomite	34 961	36 293	24 374
Feldspar	88	—	357

TABLE 2 (cont'd)

	2003	2004	2005 (a)
	(\$000)		
NONMETALS (cont'd)			
Fluorspar	58 337	66 965	45 404
Glass and glassware products	1 136 378	1 137 525	834 796
Granite	89 933	93 132	58 049
Graphite	90 465	94 552	88 021
Gypsum	175 247	207 861	162 028
Iodine	8 536	7 039	6 275
Lime	21 071	22 140	20 892
Limestone flux and other limestone	26 321	26 208	15 396
Marble, travertine and other calcareous stones	19 618	22 259	19 302
Mica	11 362	11 557	9 020
Mineral pigments	126 920	144 902	120 053
Nepheline syenite	60 257	61 589	50 440
Nitrogen	942 598	1 175 039	1 163 689
Olivine	—	—	—
Pearls	3 433	4 879	2 603
Peat	257 917	255 052	217 875
Perlite	—	—	—
Phosphate and phosphate compounds	21 630	51 760	40 670
Potash and potassium compounds	1 934 593	2 180 258	2 111 476
Salt and sodium compounds	558 887	535 064	416 015
Sand and gravel	54 214	51 359	43 390
Sandstone	85	73	233
Silica and silica compounds	32 316	40 828	37 061
Slate	21 044	34 330	33 672
Sulphur and sulphur compounds	285 057	456 979	498 506
Talc, soapstone and pyrophyllite	26 624	26 153	16 584
Titanium oxides	189 387	175 700	167 121
Vermiculite	—	—	—
Other nonmetals	436 787	459 155	347 287
Other structurals	161 767	181 586	127 804
Total nonmetals	9 951 776	11 133 290	8 838 764
FUELS			
Coal	1 676 372	1 868 799	2 428 504
Coke	14 043	65 974	80 274
Natural gas	26 085 808	27 040 437	23 863 557
Natural gas by-products	2 017 233	2 148 944	1 500 840
Petroleum	31 303 420	37 694 912	32 186 289
Other fuels	380 516	461 143	333 557
Total fuels	61 477 392	69 280 209	60 393 021
Total mining exports (including fuels)	107 688 427	123 857 650	105 539 525
Total non-fuel mining exports	46 211 035	54 577 442	45 146 505
Total mining exports (including coal)	47 901 450	56 512 215	47 655 282
Total economy exports	380 865 959	411 801 811	319 263 664

Sources: Natural Resources Canada; Statistics Canada.

— Nil; (e) Estimated.

(a) First nine months of 2005.

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