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Minerals and Metals Sector

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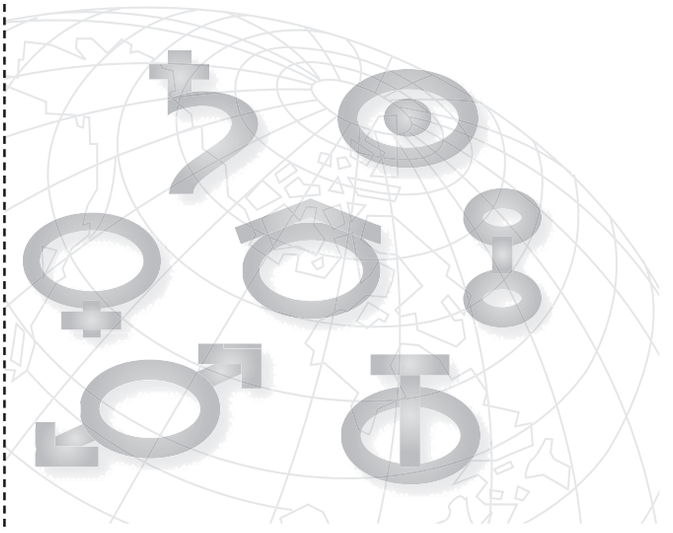
DECEMBER 2002

nonferrous metals outlook



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Preface

The Minerals and Metals Sector is the focus of federal expertise for mineral and metal commodity information. Within the Sector, the Mineral and Metal Policy 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 mineral and metal demand, supply and price.

Within the Branch, the International and Domestic Market Policy Division is responsible for the major base metals, the 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 2006. 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 article). You can also provide feedback to the coordinator of this publication, Patrick Chevalier, at tel. (613) 992-4401, fax (613) 943-8450, or-e-mail pchevali@nrcan.gc.ca.

NOTE TO READER

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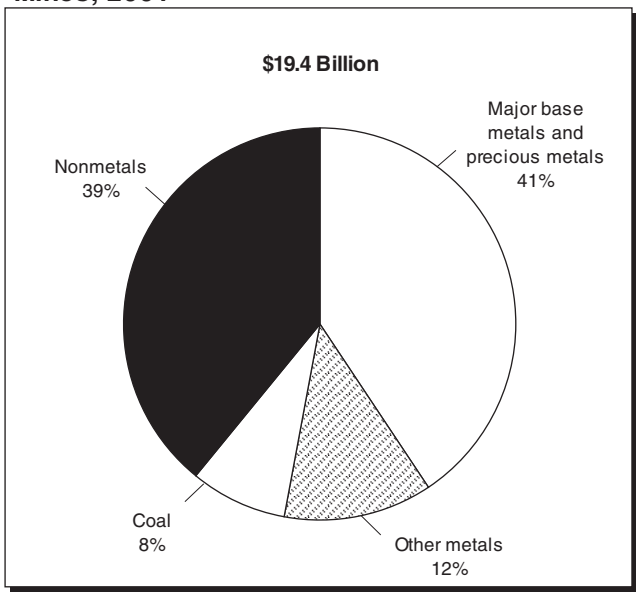
This outlook for the major nonferrous metals was prepared by staff of the International and Domestic Market Policy Division in November 2002 and reflects the market conditions and expectations at that time.

Canada's economy again registered strong growth in 2001 and is expected to continue to show modest growth over the near-term forecast period. Overall real Gross Domestic Product (GDP) increased by 1.5% in 2001. The total value of all mineral commodities produced from domestic sources in Canada, including metals, nonmetals and mineral fuels, declined fractionally from $83.9 billion in 2000 to an estimated $83.8 billion in 2001. This second consecutive high level in the value of mineral production was again primarily due to another strong performance by the fuels sector, especially natural gas shipments. The value of metals and nonmetals from domestic sources declined, with a decrease in the metals sector more than offsetting a slight increase in the value of nonmetals. The value of metals produced from Canadian mines fell by 6.8% in 2001 to $10.2 billion. Significant declines in the value for nickel, copper, zinc, iron ore and cobalt contributed to the 2001 decrease. The value of zinc production was down by 9.6% to $1.4 billion despite a rise in the volume produced.

Exports of crude minerals (excluding petroleum and natural gas), coal, smelted and refined outputs, and mineral products contributed $47.4 billion to the value of Canada's domestic exports in 2001, a 4.3% decline compared with 2000. This represented 12.7% of Canada's total domestic exports of $373.4 billion. Metallic mineral and mineral product domestic exports accounted for 76.2% ($36.1 billion) of the total non-fuel (including coal) value, nonmetal domestic exports (including structural materials) accounted for 19.6% ($9.3 billion), and coal accounted for 4.2% ($2.0 billion). The United States remains Canada's principal trading partner with domestic exports of non-fuel minerals and mineral products, including coal, to that country valued at $36.2 billion. Exports to the European Union totalled $4.6 billion while exports to Japan totalled $1.7 billion and exports to Mexico totalled $0.2 billion. Canadian imports of non-fuel minerals and mineral products, including coal, decreased by 9.0% to $46.6 billion, resulting in a merchandise trade surplus (total mineral exports minus total mineral imports) of $2.2 billion in 2001, compared with a 2000 deficit of $0.3 billion. The value of both total exports and total imports declined in 2001 compared with 2000, although the drop in imports was greater.

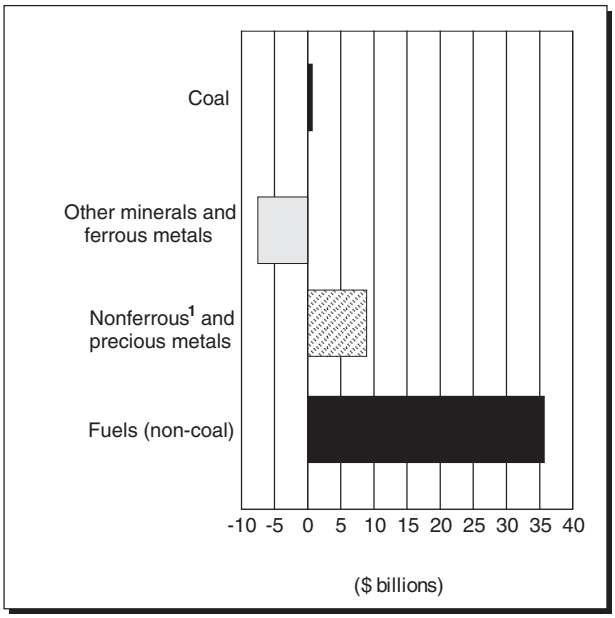
The Canadian economy registered strong growth in the first half of 2002 with a real annualized GDP gain of 5.2%. Most of this growth was posted in the early part of the year with indications towards the end of this period for more modest gains in the third and fourth quarters. Domestic demand remains strong led by consumer spending on services and a pick-up in business investment in machinery and equipment. Strength was seen in a broad range of industries with construction and the automotive

Figure 1
Value of Mineral Production From Canadian Mines, 2001



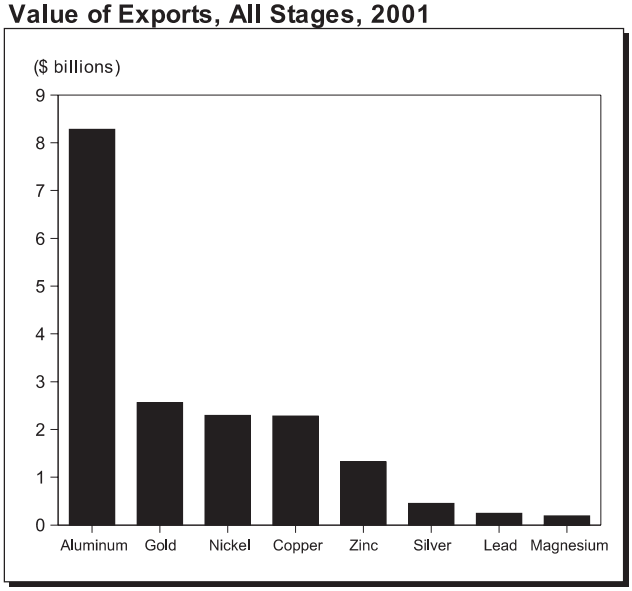
Source: Natural Resources Canada.

Figure 2
Net Export Earnings, 2001
Mineral Commodities Net = $30 Billion



Source: Natural Resources Canada.
[1] Includes aluminum.

Figure 3
Value of Exports, All Stages, 2001



Source: Natural Resources Canada.

sectors leading the way. Real GDP in Canada is expected to grow by about 3.5% in 2002 and by 3.0-3.5% in 2003.

The mining industry remains a vital contributor to Canada's economy. According to data released by Statistics Canada, employment in the Canadian mining industry recorded a 9.7% decline in 2001, falling to 51 200 from 56 700 in 2000. All of the major components of the industry (metal mining, nonmetal mining and coal mining) experienced declines, most notably the metal mining sector where employment declined by nearly 4000 from 29 500 in 2000 to 25 600 in 2001. The decreases can be attributed to the closure of seven mines and the suspension of work at seven other mining operations while only two new mines opened in 2001.

In 2001, nonferrous metals generated a net trade surplus equivalent to about 25% of that of mineral fuels (excluding coal). 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 $35.7 billion. The major nonferrous and precious metals (including scrap), with exports of $18.0 billion and imports of $9.1 billion, generated a net Canadian trade surplus of $8.9 billion. Other mineral products generated a combined net trade deficit of $7.6 billion.

Reviews and forecasts for aluminum, copper, gold, lead, magnesium, nickel and zinc are included in the following pages. Trade tables covering 2000, 2001 and the first ten months of 2002 follow these commodity reviews.

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

CANADIAN BASE-METAL PRODUCTION IN 2002 AND 2001

Company	Mine	Copper Production 2002 9-Month	Copper Production 2001 9-Month	Copper Production Change	Zinc Production 2002 9-Month	Zinc Production 2001 9-Month	Zinc Production Change	Lead Production 2002 9-Month	Lead Production 2001 9-Month	Lead Production Change	Nickel Production 2002 9-Month	Nickel Production 2001 9-Month	Nickel Production Change
		(t)		(%)	(t)		(%)	(t)		(%)	(t)		(%)
Agnico Eagle (1,2)	La Ronde	2 297	1 324	73	43 534	49 621	-12						
Aur/Teck/Noranda	Louvicourt	33 141	38 979	-15	15 629	12 214	28						
Boliden (8)	Myra Falls	4 262	11 325	62	33 258	48 046	-31						
Breakwater	Bouchard-Hébert	4 359	5 606	-22	37 736	30 660	23						
Breakwater (10)	Nanisivik				49 514	35 284	40						
Campbell (5)	Joe Mann	175		n.a.									
Falconbridge (8)	Sudbury	23 721	13 912	71							21 200	17 031	24
Falconbridge	Raglan	4 678	5 158	-9							17 493	18 201	-4
Falconbridge	Kidd	32 784	28 498	15	79 824	53 976	48						
Highland Valley	HVC	137 100	138 500	-1									
Imperial Metals	Huckelberry	25 391	26 875	-6									
Inco (est. Cu only) (3)	Canada	80 000	85 000	-6									
Inco Ni only (6)	Sudbury										77 111	67 132	15
Inco Ni only (6)	Thompson										32 659	36 288	10
Inmet	Troilus	5 500	5 900	-7									
Les Mines Selbaie (2)	Selbaie	7 883	8 700	-9									
Noranda Inc.	Brunswick	6 524	6 514	0.2	206 817	226 046	-9	19 042	20 940	-8			n.a.
Noranda Inc. (4)	Mattagami	5 373	6 530	-18	63 064	66 738	-6						
North American Palladium	Lac des Iles	1 813	862	110							935	454	106
Northgate	Kemess	92 873	93 284	-0.4									
Teck Cominco (9)	Polaris			-13	78 400	89 900	-13	17 500	23 400	-25			
Operations total for 9-month data		467 874	476 967	-2	607 776	612 485	-1	36 542	44 340	-18	149 398	139 106	7

Company	**Mine**	**Copper Production 2002 6-Month**	**Copper Production 2001 6-Month**	**Copper Production Change**	**Zinc Production 2002 9-Month**	**Zinc Production 2001 9-Month**	**Zinc Production Change**
		(t)		(%)	(t)		(%)
HBMS	Flin Flon area	42 700	36 000	19	47 400	33 000	44
Operations total for 6-month data		42 700	36 000	19	47 400	33 000	44
Barrick Gold	Bousquet No 2	data not reported					

CANADIAN BASE-METAL PRODUCTION IN 2002 AND 2001 (cont'd)

Company	Smelter/Refinery	Copper Production 2002 9-Month	Copper Production 2001 9-Month	Change	Zinc Production 2002 9-Month	Zinc Production 2001 9-Month	Change	Lead Production 2002 9-Month	Lead Production 2001 9-Month	Change	Nickel Production 2002 9-Month	Nickel Production 2001 9-Month	Change
			(t)	(%)		(t)	(%)		(t)	(%)		(t)	(%)
SMELTING/REFINING													
(includes production from secondary sources)													
Smelting													
Noranda Inc.	Gaspé smelter	29 612	82 965	-64									
Noranda Inc.	Horne smelter	116 653	136 957	-15									
Falconbridge	Kidd smelter	108 139	95 734	13									
Falconbridge (8)	Sudbury smelter	14 073	12 119	16							39 749	39 137	2
Inco (3,6)	Sudbury smelter	80 000	85 000	-6							77 111	67 132	15
Inco (6)	Thompson smelter										32 659	36 288	-10
Teck Cominco	Trail smelter							56 000	45 500	23			
Operations total for 9-month data		348 477	412 775	-16				56 000	45 500	23	149 519	142 557	5
HBMS - 6-month total	Flin Flon smelter	42 700		19									
Refining													
Noranda Inc.	CCR refinery	184 640	238 131	-22									
Inco Limited (3,6)	Sudbury refinery	80 000	85 000	-6							77 111	67 132	15
Inco Limited (6)	Thompson refinery										32 659	36 288	-10
Falconbridge	Kidd refinery	110 467	93 000	19	106 717	104 169	2						
Teck Cominco (11)	Trail operations				193 900	106 000	83						
Operations total for 9-month data		375 107	416 131	-10	300 617	210 169	43				109 770	103 420	6

n.a. Not applicable.

(1) Reports in short tons, converted. (2) Payable tonnes, reported -- data shown here are contained metal. (3) Outlook for calendar year refined copper production less outlook for 4th-quarter production; includes some scrap plus only recoverable portion of copper in concentrates. (4) Bell Allard mine. (5) Joe Mann mine did not operate in 2001. (6) Includes 18 100 t imported Ni in concentrates from Australia in 2002; most believed to have gone to Thompson; Ni production reported as finished nickel in Ontario and Manitoba divisions. (7) Myra Falls closed December 2001 to March 2002. (8) Falconbridge Sudbury had a strike from August 2001 to February 2002. (9) Mine shut September 4 after ore exhausted; plant removal and reclamation under way. (10) Nanisivik ceased mining operations September 30, 2002. (11) Trail operations shut August 2002 and from July to September 2001.

Aluminum

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2001 primary metal production: $5.8 billion[e]
World rank: Fourth
2001 exports (unwrought): $4.9 billion
Installed capacity: 2.7 Mt/y

Canada	2001	2002 (e)	2003 (f)
		(000 tonnes)	
Production	2 600	2 700	2 700
Use of primary aluminum	747	800	800

(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. Aluminum's largest markets are transportation (30%), packaging (18%), building and construction (19%), electrical (9%), consumer goods (7%), and machinery and equipment (6%). North America uses the largest amount of all regions in the world, accounting for 31% of total world demand. Asia accounts for 28% and Europe accounts for another 25%.

AVERAGE (THREE-MONTH) ALUMINUM PRICES, LONDON METAL EXCHANGE

1999	2000	2001	2002 (f)
	(US$/t)		
1 360 (62¢/lb)	1 550 (70¢/lb)	1 440 (65¢/lb)	1 350 (61¢/lb)

(f) Forecast.

CANADIAN OVERVIEW

- Canada's production of primary aluminum is expected to increase by 5% to 2.7 Mt in 2002 from 2.583 Mt in 2001 resulting from full production at Alcan's new 400 000-t/y smelter at Alma, Quebec. 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 plans to invest $1.4 billion to expand capacity to 550 000 t/y. Preliminary work has begun and the first metal is expected in early 2005 with full capacity expected later in the year. Partners in the smelter include Alcan Inc. (40%), Aluminium Austria Metall Québec (20%), Norsk Hydro ASA (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.

- Alcoa (www.alcoa.com) continued investigating the possibility of expansions at its existing smelters, including all three of its smelters in Canada. Alcoa participated in discussions on power with the Quebec government and Hydro-Québec, and obtained a block of power to upgrade the Baie Comeau smelter. Discussions continue on a doubling of the Lauralco smelter.

- Alcan's 275 000-t/y Kitimat smelter continued to suffer from low water levels in the Nechako Reservoir. The smelter had been operating at a rate of 180 000 t/y when the company announced in June that it would start bringing 60 000 t of capacity back on line. (Alcan has a web site at www.alcan.com.)

- Alcoa Inc. and the Province of Newfoundland and Labrador have now terminated discussions on a possible hydro-electric power expansion and a possible aluminum smelter located in that province (www.alcoa.com and www.gov.nf.ca).

- The Alberni Aluminium Company has been formed to proceed with work towards the development of a US$1.5 billion aluminum smelter that will produce 360 000 t/y (www.bchydro.bc.ca, www.albernir-egion.com, and www.ktdal.com).

- The aluminum industry has signed both general and company-specific agreements on the reduction of greenhouse gases with the Quebec government (http://aia.aluminium.qc.ca and www.gouv.qc.ca).

- The Aluminium Association of Canada links the Canadian aluminum industry, aluminum users, the public and government. Further information and links to web sites of Canadian primary aluminum producers can be found on the Association's site at http://aia.aluminium.qc.ca.

WORLD OVERVIEW

- Power costs have declined from their highs in the western United States and about 0.3 Mt/y of primary aluminum capacity has been restarted. However, about 1 Mt/y of approximately 3.8 Mt/y of capacity remains affected. The timing of restarts is still uncertain.

- Smelters in Brazil have returned to full production after reducing production in 2001 due to a lack of rainfall.

- Smelter expansions/closures under way, proposals, and studies reported include:

Country/Project/Company	Comments
Argentina – Aluar	Deferred 140 000-t/y expansion.
Australia – Aldoga consortium	Proposed 500 000-t/y smelter near Gladstone. Feasibility studies under way.
Australia – Boyne Island	Proposal to expand by 200 000 t/y deferred.
Australia – WMC Limited/Alumina Limited	Transfer of aluminum interests.
Bahrain – Aluminium Bahrain	Expansion of 250 000 t/y in capacity under way.
Bahrain – Aluminium Bahrain	Agreement with Alcoa on study of 250 000-t/y expansion by 2005 to total capacity of 1 Mt/y.
Brazil – Albras	Expanded facilities now operating at 405 000 t/y.
Chile – Alumysa, Noranda	Environmental studies conducted for new 440 000-t/y smelter and hydro-electric facilities.
China – Aluminium Corp. of China (Chalco)	Waiting for approvals on proposal to triple the capacity of the Pingguo aluminum smelter to 355 000 t/y by 2006.
China – Henan Wanji Aluminium	Completed expansion of capacity from 60 000 t/y to 180 000 t/y.
China – Jiamusi Aluminium Smelter	Seeking investors for 100 000-t/y expansion.
China – Lanzhou Aluminum Co.	Completed expansion of capacity to 200 000 t/y. Cooperation agreement with Pechiney for study of new 260 000-t/y smelter.
China – Mianchi Smelter	Expansion of smelter under way - 55 000 t/y.
China – Qingtongxia Aluminium Co. – Alcan	Alcan signed MOU with Qingtongxia on purchase of 50% of smelter and option on a 150 000-t/y expansion.
Ghana – Volta smelter – Kaiser Aluminum Corp.	80 000-t/y reduction in production expected in 2003 due to low water levels.
Iceland – Isal smelter – Alcan	Studies under way for possible expansion.
Iceland – Alcoa	Project studies under way on new 322 000-t/y smelter after Joint Action Plan signed in April. Replaces Noral project.
India – Nalco Angul smelter	100 000-t/y expansion under way. First metal in August. Partial privatization under way.
Mozambique – Mozal smelter	Construction of 250 000-t/y expansion underway.
Russia, Alucom – Taishet	Pilot plant for 300 000-t/y smelter.
Russia, Irkutsk – Russian Aluminium	500 000-t/y smelter proposal.
Russia, Sayanogorsk – Russian Aluminium	290 000-t/y expansion approved. Construction to start in 2003.
Sarawak, Bintulu – Dubai Aluminium	500 000-t/y smelter proposal.
South Africa, Hillside – BHP Billiton	Construction of 130 000-t/y expansion under way.
Unknown – Aluminium Pechiney	Seeking partners for a proposed new AP50 – 460 000-t/y smelter, likely in South Africa.

- Bauxite mine and alumina plant proposals and changes reported include:

Country/Company/Project	Comments
Australia – Rio Tinto – Comalco	1.4-Mt/y alumina refinery at Gladstone in central Queensland to start production in 2004.
Australia – WMC Limited/Alumina Limited	Alumina interests transfered to new operating company.
Brazil – CVRD – Alunorte refinery	Expansion by 350 000 t/y due on stream in early 2003. Feasibility study for further 1-Mt/y expansion under way.
Brazil – CVRD – Bauxite mine in Para State	Studies under way for potential 5-Mt/y mine.
China – Chalco	Waiting for approvals on proposal to double the capacity of the Pingguo refinery to 850 000 t/y in 2003.
China – Mianchi	Seeking financing – proposal for 600 000-t/y refinery.
India – Gujarat	750 000-t/y alumina refinery delayed pending power supply.
India – Alcan, Indal	Utkal project restarted, initial capacity 1.5 Mt/y, second stage to 3 Mt/y.
Jamaica – Alpart – Kaiser Aluminum	200 000-t/y expansion of refinery approved.
Suriname – Paranam Alcoa/BHP Billiton	250 000-t/y expansion of refinery approved.
United Kingdom – Burntisland – Alcan	120 000-t/y chemical alumina refinery closed.
Venezuela – Bauxilium	Expanding by 350 000 t/y.

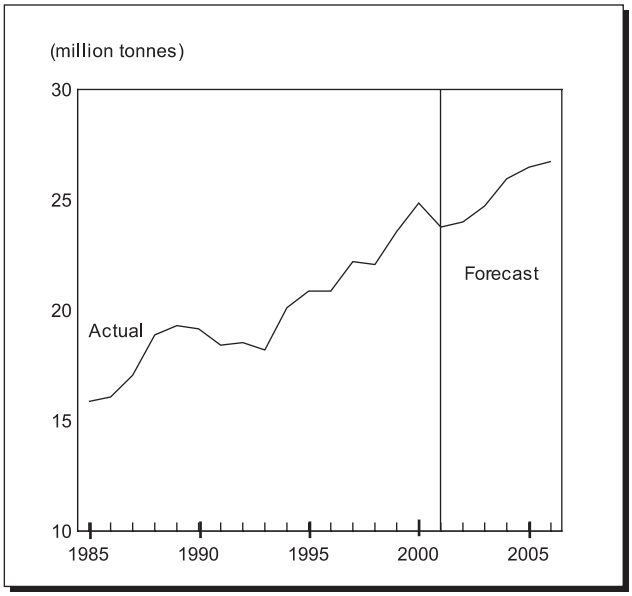
- Incremental expansions, generally at lower levels, continue in Chinese aluminum and alumina production. Aluminium Corp. of China (Chalco) issued shares in a public offering, in part to fund further expansion of its interests. Initiatives to reduce emissions may require modernization of Soderberg plants and slow the rate of growth as older plants are replaced.

DEMAND OUTLOOK

The world's apparent use of primary aluminum is estimated to be approximately 24.6 Mt in 2002, about 4% higher than the 23.8 Mt used in 2001. In 2003, world demand for aluminum, dependent on the world economy, is expected to be at or below its long-term trend of 3% annual growth. In the longer term, aluminum's long-term annual growth of 1-3% is expected to continue through the middle part of this decade. The transportation and packaging markets are expected to lead the increase in demand for aluminum.

Canada's reported use of primary aluminum increased in 2001 to 735 931 t from a revised figure of 722 496 t in 2000, and is expected to increase to 750 000 t in 2002. In the longer term, use is expected to increase at a rate of 2-5% annually. In the past, these figures have contained some amounts of run-around scrap, which have been removed from amounts reported for 2000 and 2001.

Figure 1
World Primary Aluminum Use, 1985-2006



Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.

CANADIAN AND WORLD PRODUCTION OUTLOOK

Canadian installed capacity for the production of primary aluminum is now 2.7 Mt/y with the completion and ramp-up in production from Alcan's new smelter at Alma. Canadian production rates will remain near this level for the next two years depending on production at Kitimat. With the announced expansion of the Alouette smelter and modernization of Alcoa's Baie Comeau smelter, capacity is expected to be above 3 Mt/y in late 2005.

Studies are under way on several brownfield expansions and greenfield smelters and, should positive decisions result, this capacity could increase in the longer term. Other smelter expansion projects in Quebec (at A.B.I. and Lauralco) are dependent on the negotiation of additional long-term power supply contracts with Hydro-Québec. Decisions and the results of work on possible new capacity in British Columbia are still pending.

Canada is expected to produce approximately 2.7 Mt of primary aluminum in 2002 and a similar amount in 2003. Primary production in 2001 of 2.6 Mt had an estimated value of $5.8 billion, ranking Canada fourth after China, Russia and the United States.

World production of primary aluminum increased to an estimated 24.7 Mt in 2001, up slightly from a revised figure of 24.5 Mt in 2000. Production is expected to increase to more than 26 Mt in 2002.

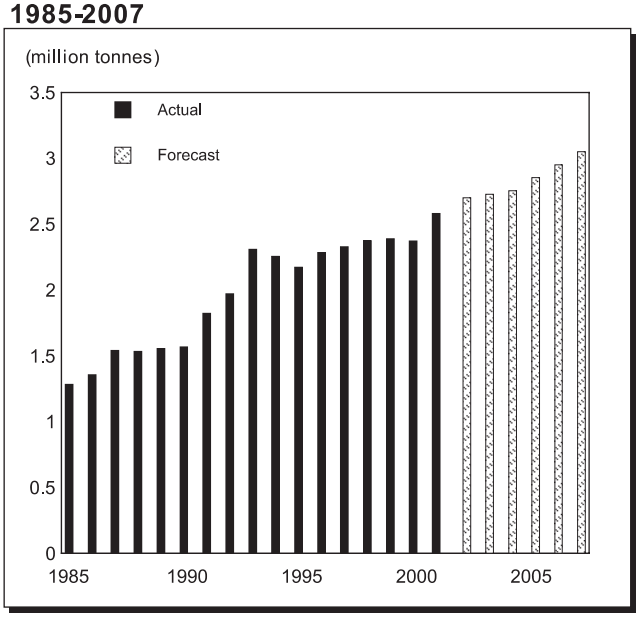
The International Aluminium Institute (IAI) indicates that members' world daily average primary aluminum production for the year to October was 57 900 t, up 1600 t/d from a comparable period in 2001, reflecting restarts in North and South America and expansions elsewhere in the world. Additional information can be obtained from the IAI's web site at www.world-aluminium.org.

IAI inventories of unwrought aluminum have fallen over the last year and were reported at 1.54 Mt in October, down from 1.74 Mt in October 2001. IAI total inventories have similarly fallen from 3.08 Mt last October to 2.86 Mt in October 2002. On the other hand, primary aluminum inventories at the London Metal Exchange (LME) have increased steadily throughout the year from 0.8 Mt in January to 1.3 Mt at the end of October.

PRICE OUTLOOK

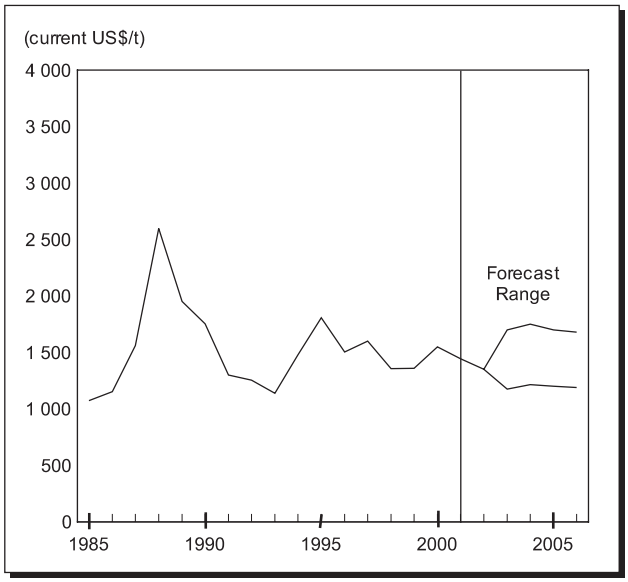
Cash prices for primary grade aluminum remained weak in the early part of the year but now appear to have stabilized. LME cash prices started the year at approximately US$1325/t (60¢/lb), declined to around US$1285/t (58¢/lb) in July, and have since risen to US$1375/t (63¢/lb) in November.

Figure 2
Canadian Primary Aluminum Production, 1985-2007



Source: Natural Resources Canada.

Figure 3
Aluminum Settlement Price, 1985-2006
Annual LME Settlement



Sources: Natural Resources Canada; http://metalprices.com (Internet site).

At the time of writing, prices appeared to have stabilized from the declines seen since early 2000. Prices have started to show some strength and, if the economies of the world increase in 2003, increased demand could result in stronger prices in the short term. If the economy remains at current levels, the prices can be expected to remain in the mid-to-lower part of their longer-term price range of between US$1200 and $1800/t (55¢ and 82¢/lb, likely in the range of 60¢-65¢). Daily metal prices can be obtained from various news services, journals and newspapers, as well as from the LME's web site at www.lme.co.uk and from http://metalprices.com.

Note: Information in this article was current as of November 1, 2002.

NOTE TO READERS

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Copper

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2001 production: $1.52 billion
World rank (mine production): Sixth
Exports (concentrates and unwrought): $1.3 billion

Canada	2001 (p)	2002 (e)	2003 (f)
		(000 t)	
Mine production	632	605	587
Refined production	565	600	600
Refined use	257	260	250

(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. Copper is the most efficient conductor of electrical power, signals and heat of all the industrial metals. In Canada, more than half of the refined copper used annually is for electrical applications, mostly in wire.

ANNUAL AVERAGE SETTLEMENT PRICES, LONDON METAL EXCHANGE

1998	1999	2000	2001	2002 (e)
		(US$/t)		
1654	1 572	1 813	1 578	1 555

(e) Estimated.

CANADIAN OVERVIEW

Canadian copper mines do not mine just copper. Rather, copper can be the principal metal mined; other by-product metals produced at Highland Valley Copper are molybdenum, gold and silver (1860 t, 65 t and 500 kg, respectively, in 2001). Other mines produce copper as a by-product of zinc, gold or nickel production (the Bouchard-Hébert, Troilus or Thompson mine, respectively). In other mines, copper is an important co-product (Falconbridge's Kidd operation).

- **Newfoundland and Labrador:** Voisey's Bay Nickel Company and the Province of Newfoundland and Labrador reached an agreement to proceed with the development of the Voisey's Bay deposit. Shipments of copper production are expected to commence in 2006. Aur Resources acquired the Duck Pond deposit (5.2 Mt grading 3.3% Cu, 5.8% Zn, 0.9% Pb, 59 g/t Ag and 0.8 g/t Au of proven plus probable reserves); projected production is 14 500 t/y of copper in concentrate grading 24% Cu over 10 years.

- **Quebec:** Noranda's Gaspé smelter was permanently closed on March 28 after having been put on standby in November 2001 while the company examined alternatives. At Noranda's Horne smelter, workers went on strike on June 18; since that time, Noranda has operated the smelter at reduced capacity. Noranda's CCR refinery is affected by the reduced feed. Breakwater Resources conducted underground exploration at its closed Langlois mine. Agnico-Eagle's mine expansion at La Ronde continued, with the mill reaching an operating rate of 6350 t/d (7000 st/d). Drilling has shown that gold and copper grades increase with depth. The Penna shaft extends to a depth of 2250 m and is believed to be the deepest in the Western Hemisphere.

- **Ontario:** Falconbridge continued exploration of its Nickel Rim South deposit. Falconbridge expressed the desire to cooperate with Inco in seeking cost reductions in Sudbury, perhaps using Inco's Victor shaft for the Nickel Rim South deposit; Inco shelved the Victor project after getting agreement to proceed with Voisey's Bay. Falconbridge continued to develop Mine D at its Kidd Creek zinc-copper integrated operation. Noranda

increased its ownership of Falconbridge from 58.4% by spending $64 million in the third quarter. Inco operated its Ontario division without a summer shutdown this year.

- **Manitoba/Saskatchewan:** HBMS proceeded with development of its $200 million "777" mine located in Flin Flon. The 1530-m shaft is expected to be commissioned at the end of 2002. The mine is expected to start ore production in late 2003 and to reach full production of 2750 t/d in the third quarter of 2004. As announced earlier, HBMS closed its Ruttan mine in Leaf Rapids and 350 jobs were lost.

- **British Columbia:** BHP Billiton plc wants to sell its 33.6% share of Highland Valley Copper; after an Environmental Assessment, the mine received permission to divert groundwater into a nearby creek, thereby stabilizing pit walls and permitting the mine to stay open until 2009. Northgate will drill 34 000 m for a feasibility study of the Kemess North project, due in 2003. Boliden's Myra Falls operation, which closed in December 2001, re-opened in late March; costs have been cut by 20%. Taseko wants to build a hydrometallurgical refinery and re-open its Gibraltar mine; a $110 million refinery producing 30 000 t/y of copper metal from copper concentrates has been studied. In November, Redcorp Ventures was awaiting a decision by the B.C. government for a Project Approval Certificate (PAC) for the Tulsequah Chief zinc-gold-silver-copper project with planned copper production of 10 400 t/y. The Court quashed the original PAC and remitted the question back to ministers for a decision.

WORLD OVERVIEW

The International Copper Study Group's (ICSG) November forecast of production in Mt showed:

Copper Forecast	2001	2002	2003
		(Mt)	
Cu in concentrate	11.0	10.8	11.4
SXEW (1)	2.6	2.7	2.7
Primary refined	13.7	13.7	13.8
Secondary refined	1.9	1.9	2.0
Total refined	15.6	15.7	15.8
Refined use (consumption)	14.8	15.1	15.7

Source: International Copper Study Group, November 2002.
(1) SXEW = copper produced by solvent extraction and electrowining.

Treatment and refining charges (TCRCs, or the price charged to smelt copper concentrates and to produce refined copper) declined to very low levels in 2002 because low copper prices resulted in mine closures. This meant that smelters had to compete for concentrate feeds. By July, spot contracts had declined to US$35/t and US3.5¢/lb. BHP Billiton will consolidate its concentrate sales through one organization, giving it a 35% share of the world concentrate export market. In China, five smelter/refinery groups combined to negotiate purchases of copper concentrates through the China United Copper Co. Ltd.; these five operations produced over half of China's refined production in 2001 and so together import a large amount of concentrates. TCRCs are expected to rise when the Escondida mine increases its output of concentrates.

Some Production Cutbacks for 2002

- Codelco, 106 000 t;
- Amarillo, 95 000 t;
- Tintaya, 90 000 t;
- Escondida, 80 000 t.

Some Permanent Closures in 2002

- Gaspé smelter, 190 000 t/y;
- San Manuel mine/SXEW, 122 000 t/y.

Some Planned Production Increases

(000 t/y Cu)

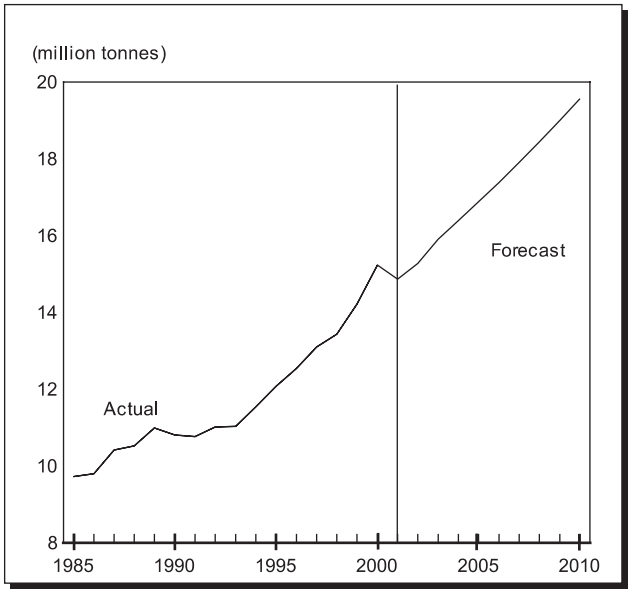
El Teniente	From 340 to 450	By 2004
Mt. Isa	From 223 to 400	By 2006
Jiangxi	From 220 to 375	By 2003
Tongling	From 270 to 310	By 2003
Yunnan	From 150 to 250	By 2003
Daye	From 110 to 150	In 2002
Harjavalta	From 170 to 250	In 2004
Pori	From 125 to 250	In 2004
Caletones	From 380 to 435	By 2005
Escondida Norte	From 0 to 80	By 2004
Altonorte	From 400 to 800	By 2003
Olympic Dam	From 235 to 600	Unknown

Codelco released an environmental impact statement of its smelting/refining project at Mejillones in Chile; the US$1.25 billion operation would produce 1.4 Mt/y of cathode and start up in 2005.

DEMAND OUTLOOK

The ICSG forecast in November (above) that demand would increase to 15.1 Mt in 2002 from 14.8 Mt in 2001; in subsequent years, use is forecast to rise to 15.7 Mt and 16.4 Mt in 2003 and 2004, respectively. Future demand will depend upon economic activity such as capital investment and construction.

Figure 1
World Refined Copper Use, 1985-2010



Source: Natural Resources Canada.

CANADIAN PRODUCTION OUTLOOK[1]

A number of copper mines are likely to close, having depleted their ore reserves; such mines include (see the table at the end of the Introduction for production in 2002):

- Bousquet, in 2002;
- Selbaie, in 2003;
- Louvicourt, in 2005?;
- Bouchard-Hébert, in 2005-2006; and
- Brunswick, in 2008?

Copper producers that are likely to start up include (pending approvals in many cases):

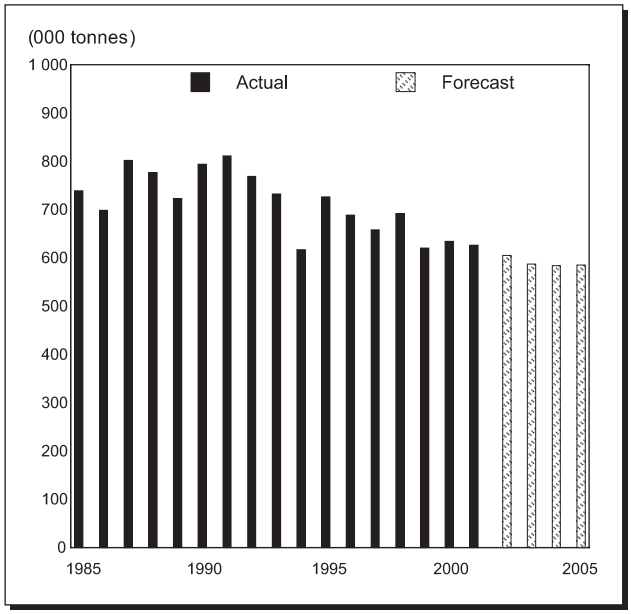
- Copper Rand 5000, in 2003;
- Montcalm, in 2004?;
- Duck Pond, in 2005-2006; and
- Voisey's Bay, in 2006.

Copper mines that may start up if prices increase or if costs can be decreased include:

- Langlois;
- Mt. Milligan;
- Corner Bay;
- Mt. Polley;
- Izok Lake; and
- Gibraltar.

Construction of a 30 000-t/y hydrometallurgical refinery at the Gibraltar mine is also under consideration. Redcorp is awaiting a decision by the B.C. government about its planned Tulsequah Chief mine (see above). As Voisey's Bay nickel-cobalt concentrates begin to be smelted at Inco's Canadian operations, copper and nickel output from Inco's other Canadian operations will decrease.

Figure 2
Canadian Mine Production of Copper, 1985-2005



Source: Natural Resources Canada.

PRICE OUTLOOK

The LME settlement price for Grade A copper varied between US$1421/t on January 3 and US$1680/t on June 6; for the year, it appears likely to average US$1556/t or US70.6¢/lb. LME inventories began 2002 at 799 500 t, peaked at 980 075 t on May 2, and then declined to less than 870 000 t by mid-November. Prospects for 2003 appear to be brighter than for 2002, perhaps averaging US$1750/t, due in part to the cutbacks at a number of producers, provided that Chinese offtake continues unabated and that producers do not rush to bring idled capacity on stream with better prices. As with many other metals, the

[1] Forecasts and projections are subject to change by such factors including changing copper prices, exploration successes or failures, ability to arrange financing, technological developments, and environmental permitting.

continued expansion of the Chinese economy and its associated demand for metal imports is a key factor in determining market balances. Some warning signs such as rising inventories of finished goods in China may be a temporary hiatus in the economic expansion; if not, and if growth slows, copper prices will decline.

ADDITIONAL INFORMATION

Additional information about Canadian companies is available on the Internet at www.sedar.com/issuers/issuers_en.htm. Canadian monthly copper statistics are available at http://mmsd1.mms.nrcan.gc.ca/mmsd/data/default_e.asp. (Click on the file format of your choice. Copper statistics are located in Table 3.)

Note: Information in this article was current as of November 20, 2002.

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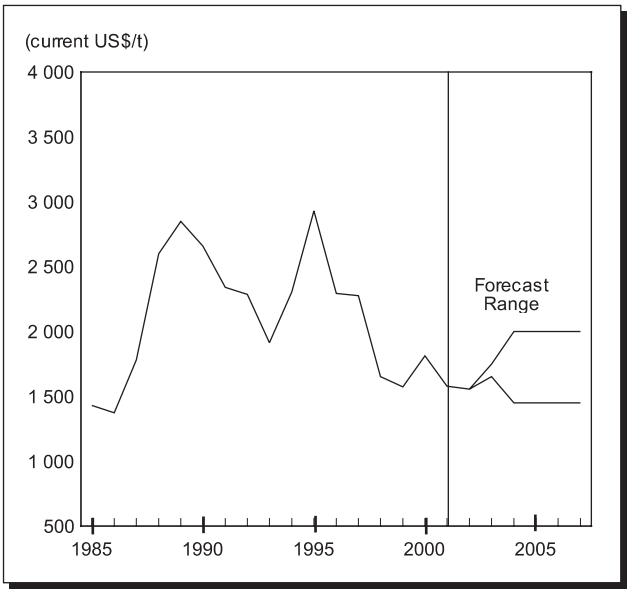
Figure 3
Copper Prices, 1985-2007
Annual LME Settlement



Source: Natural Resources Canada.

Gold

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2001 mine production: $2.11 billion
World rank: Seventh
Exports: $2.22 billion (includes exports from recycled products and public and private reserves)

Canada	2001	2002	2003 (f)
	(000 tonnes)		
Production	160	153	154

(f) Forecast.

Gold is valued for its rarity, lustrous colour, malleability, 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 (78%) and electronics (5%). Gold bullion and coins, such as the Maple Leaf coin, are also important products.

ANNUAL AVERAGE SETTLEMENT PRICES, LONDON BULLION MARKET ASSOCIATION

1999	2000	2001	2002 (e)
	(US$/troy oz)		
279	279	271	308

(e) Estimated.

CANADIAN OVERVIEW

- For the second consecutive year, Goldcorp Inc. will produce more than 15 t of gold (500 000 oz) at the Red Lake mine at a direct production cost of close to US$65/oz; this will place the mine, for the second year running, among the leading Canadian gold producers for volume of gold produced and among the producers with the lowest production costs in the world.

- In May, Kirkland Lake Gold Inc. (formerly Foxpoint Resources Ltd.) resumed processing operations at the Macassa mill using tailings and ore from surface inventories on the old Teck-Hugues and Lakeshore mining properties. The company is currently installing the equipment and services needed to restart mining activities in the upper levels of the Macassa mine, where it expects to initially produce about 7000 oz of gold per month early in 2003.

- In January 2002, McWatters Mining Inc. (then under the protection of the *Companies' Creditors Arrangement Act)* had its restructuring plan accepted by its creditors and shareholders. Under this plan, the company transferred all of the Sigma-Lamaque property to a limited partnership in which it holds a 60% interest with SOQUEM INC. holding the other 40% interest. The Sigma-Lamaque mine will go into production in early 2003 and will have a production capacity of nearly 150 000 oz/y over six years.

- In October, Agnico-Eagle Mines Limited completed work to expand its mill facilities at the LaRonde mine to 7000 t/d. With this expansion, annual gold production will increase to nearly 400 000 oz, a production level that could be reached in 2004. The ore at LaRonde also contains commercial ore-grade zinc, copper and silver, which will place this mine among those with the lowest production costs in Canada when the credits obtained for these metals are taken into account.

- In the first quarter of 2002, mining activities resumed at the Beaufor mine operated by Richmont Mines Inc. The mine had been closed in August 2000 as a preventive measure due to instability in the mine pillars.

Securing the mine and modernizing the Camflo mill, where the ore is processed, required an investment of $5 million.

- Campbell Resources Inc. has resumed operations at the Joe Mann mine. The company expects to produce nearly 35 000 oz of gold in 2002 and could produce over 50 000 oz in 2003. It is also mobilizing to restore the Copper Rand property at Chibougamau to production status with a view to starting mining activities in 2004.

- Miramar Mining Corporation and Hope Bay Gold Corporation Inc. have decided to merge. They each held a 50% interest in the Hope Bay property, which contains a number of high-grade gold deposits. The merger will expedite the start of production on these deposits, which are located in Nunavut.

- Two mines ceased operations due to ore depletion: McWatters' Kiena mine and Barrick Gold Corporation's Bousquet mine. McWatters carried out an exploration program at Kiena to identify new economic reserves; it is also looking into the possibility of using the mill to process ore from the nearby East-Amphi property.

- Placer Dome North America and Kinross Gold Corporation have decided to set up a joint venture to which their respective mining properties will be transferred. These properties are in the Porcupine district in Ontario. A subsidiary of Placer Dome will manage the new company, which will operate the Hoyle Pond and Dome mines. The combined production will be around 13 or 14 t/y. Placer Dome will hold 51% of the new company and Kinross will hold 49%.

WORLD OVERVIEW

- Gold-producing companies continued at an even greater pace with their industry consolidation that began a few years ago. Early in the year, Newmont Gold Company acquired Normandy Mining Ltd. of Australia. Later, Placer Dome took possession of Aurion Gold – a new corporation that resulted from the merger in 2001 of two Australian companies, Delta Gold Mining Corp. and Goldfields Limited. There were also mergers or proposals for mergers between TVX Gold Inc., Kinross Gold Corporation and Echo Bay Mines Ltd., between Glamis Gold Ltd. and Francisco Gold Corp., between Repadre Capital Corporation and IAMGOLD Corporation, between Meridian Gold Inc. and Brancote Holdings Plc, and between Bema Gold Corporation and EAGC Ventures Corp.

- Despite all these mergers, the gold sector remains relatively fragmented. Over the past five years, the proportion of gold production from the 10 largest producers increased from 47% in 1998 to about 55% in 2002.

- After setting a new record in terms of quantity produced in 2001, global gold mine production began a slow decline that could last for a few years. This drop in production, combined with the buyback of a portion of the mining companies' hedging programs, is the main cause of the rise in the price of gold in 2002. Mine production is expected to be around 2540 t, a reduction of more than 60 t and, when combined with gold sales and loans by central banks, recycled gold, and sales by investors, results in a global gold supply that will reach nearly 3700 t, a slight decrease from the previous year.

- Demand for gold, mainly from jewellery, electronics and the investment sector, fell slightly in 2002. The significant increase in the price of gold substantially reduced demand from the jewellery sector. This major decrease was offset by the buyback by mining companies of a portion of their hedging programs, which maintained the price of gold at higher levels than had been forecast for 2002. Buyback activities are expected to continue in 2003.

- In 2002, China continued its policy of liberalizing the gold sector in its territory. It now intends to authorize direct participation by foreign corporations in mining and has inaugurated a new exchange in Shanghai where gold will be traded freely, ending 50 years of absolute government control over the price of gold.

- Barrick Gold Corporation has discovered a major deposit on its Alto Chicama property in Peru. The results of initial exploration work indicate gold resources of over 7.3 million oz. The similarities between this deposit and the Pierina deposit, located 175 km from the discovery, already promise a mine with very low production costs. Barrick is confident it can expand these resources even further and is expecting to devote nearly $35 million in exploration expenditures to this property. The property could be brought into production by 2005 at an initial production capacity of 500 000 oz/y.

MARKET OUTLOOK

World mine production, which has been rising for nearly 20 years, began to decline in 2002, thus entering a downward cycle that could last three or four years. The weakness in the price of gold in recent years has led to a drop in exploration expenditures, which in turn has lowered the number of economic deposits discovered. The decline in gold production as a result of mine closures cannot be completely mitigated by mine capacity expansion or by the

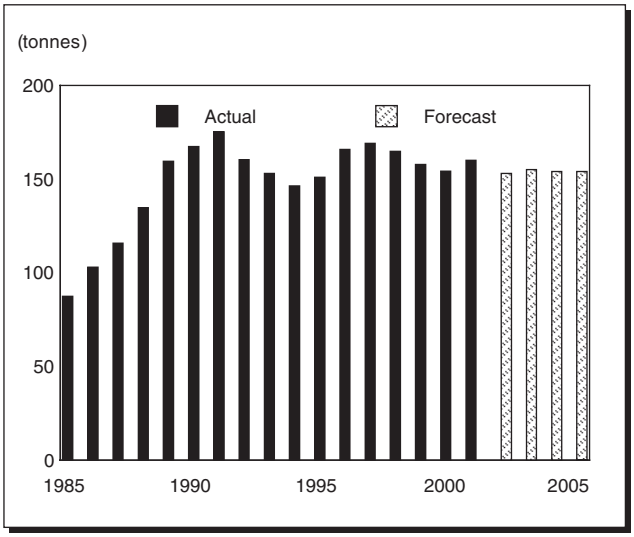
start-up of production at new deposits. Until 2004, when the *Washington Agreement* expires, gold sales and loans by central banks – another important element in the gold supply – are expected to remain at more or less the same level as in the past two years.

World demand grew more than 35% over the last decade, mainly because weakness in the price of gold led to an increase in demand by jewellers who specialize in gold jewellery. World gold demand for jewellery and electronics is expected to resume its upward trend as soon as economic conditions are favourable again.

CANADIAN PRODUCTION OUTLOOK

By the end of 2001, Canada had produced over 9300 t of gold since official production was first recorded in 1858 (reference: *Canadian Minerals Yearbook: 1999 Review and Outlook*). Canadian gold production is expected to reach 153 t in 2002, which is 4%, or 7 t, less than in 2001. This production decline is primarily due to closures and the suspension of activities by nine gold producers in 2001. The production start-ups announced in 2002 are expected to result in a net increase of 2-3 t in 2003, even taking the closure of two mines into account. For the following years, mine production is forecast to be between 152 and 155 t. Any significant growth in Canadian gold production over the coming years is expected to come essentially from mine capacity expansions or from the resumption of production at existing mines.

Figure 1
Mine Production of Gold in Canada, 1985-2005



Source: Natural Resources Canada.

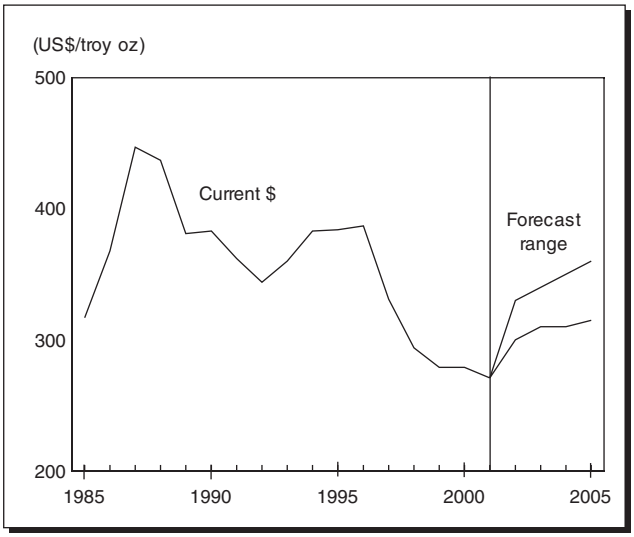
PRICE OUTLOOK

In 2002, the average price of gold began what could become a new upward trend lasting for several years. For 2002, the average price is expected to settle around US$308/troy oz, which compares with US$271/troy oz in 2001 and US$279/troy oz in 2000. The decline in mine production, the stabilization of gold sales from the official sector, and especially the buyback by mining companies of a portion of their hedging programs, led to a sustainable price increase that few analysts had anticipated. The drop in demand from jewellery due to the economic slowdown was more than offset by gold purchases under these hedging programs.

The anticipated decrease in the global gold supply in 2003, combined with stable or slightly increased demand, is expected to continue the pressure to maintain the price of gold within the price range reached in 2002. Over the next few years, the price of gold is forecast to vary between US$310 and US$360/troy oz and could even exceed this maximum for a brief period. A higher price level may be reached if global demand comes under new pressure stemming from the liberalization of the gold trade in China and from possible successes brought on by the advertising campaign begun by gold producers.

Note: Information in this article was current as of November 30, 2002.

Figure 2
London Bullion Market Association Gold Prices, 1985-2005



Source: Natural Resources Canada.

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Lead

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2001 mineral production: $108.3 million
World rank
(metal production): Seventh
2001 exports: $243.7 million

Canada	2001	2002 (e)	2003 (f)
		(000 t)	
Mine production	154	90	80
Refined production	231	258	260
Use (refined)	55	62	65

(e) Estimated; (f) Forecast.

Lead-acid batteries for automotive, industrial and consumer purposes account for about 75% of the world's demand for lead. Lead's corrosion-resistant nature also makes it suitable for applications in sheeting for roofing purposes, while its radiation attenuation properties prevent the emission of harmful radiation from television, video and computer monitors. Certain dispersive or readily bioavailable uses, such as lead in gasoline, in piping for drinking water systems, and in household paints, have been or are being phased out in Canada and in certain other countries due to health concerns.

ANNUAL AVERAGE SETTLEMENT PRICES, LONDON METAL EXCHANGE

1998	1999	2000	2001	2002 (e)
		(US$/t)		
528.4	502.2	454.2	476.0	452.0

(e) Estimated.

CANADIAN OVERVIEW

- Teck Cominco Limited's Polaris mine on Little Cornwallis Island, Nunavut, closed on September 3 after 21 years of operation due to ore reserve depletion. Work has started on mine decommissioning and rehabilitation, which is expected to be completed by October 2004. The mine produced some 666 000 t of lead in concentrates over its life.

- The Nanisivik mine on northwestern Baffin Island, Nunavut, closed at the end of September after 26 years of operation. The mine, owned and operated by CanZinco Ltd., a wholly owned subsidiary of Breakwater Resources, was closed due to a combination of ore reserve depletion and weak prices.

- Teck Cominco Limited temporarily closed its Trail, British Columbia, smelter for the month of August to cut production in response to weak market conditions.

- Noranda announced in early December that annual lead production at its Belledune smelter would be reduced by 22% in 2003. Low treatment charges and the generally weak forecast for the lead market were cited as the reasons for the company to operate the smelter on an eight-month seasonal basis, while shutting down for four consecutive months each year, beginning in July 2003.

- Recycled lead producer Nova Pb, Inc. received environmental approvals to recycle aluminum pot liners no longer needed by aluminum smelters. This new recycling activity will require the use of a rotary kiln previously devoted to lead smelting. As a result, Nova's lead smelting capacity will decrease from the current 100 000 t/y to 50 000 t/y.

WORLD OVERVIEW

- BHP Billiton will close its Pering lead-zinc mine in South Africa at the end of 2002. The announcement reflects weak market conditions for zinc.

- Outokumpu resumed production at its Tara zinc mine in Ireland in mid-September after ceasing operations in

November 2001. The company expects to mine some 800 000 t of ore by the end of 2002. For 2003, the mine expects to produce 2.6 Mt of ore.

- The Doe Run Resources Corporation avoided bankruptcy by reaching a deal with its bondholders. The Herculaneum smelter continued to operate at 62% of its operating capacity in an effort to reduce costs and produce specialty alloys.

- U.S.-based lead recycler and lead-acid battery producer, Exide Technologies, and its three U.S. subsidiaries (Exide Delaware, Exide Illinois, and Royal Battery Distributors) filed for Chapter 11 of the United States Bankruptcy Code in April. Operations outside the United States were not affected.

- The Lead Industries Association, Inc., based in the United States, closed in April as a result of insufficient insurance to cover litigation. Established in 1928, the Association had been named as a co-defendant in a number of law suits, many of which were related to the use of lead in paint.

LEADING WORLD LEAD PRODUCERS

Producers Lead in Concentrate	2002 (e)	Producers Lead in Metal	2002 (e)
	(000 t)		(000 t)
Australia	670	United States	1 335
China	550	China	1 200
United States	450	Germany	380
Peru	290	United Kingdom	370
Mexico	142	Australia	300
Canada	95	Japan	280
Morocco	75	Canada	260

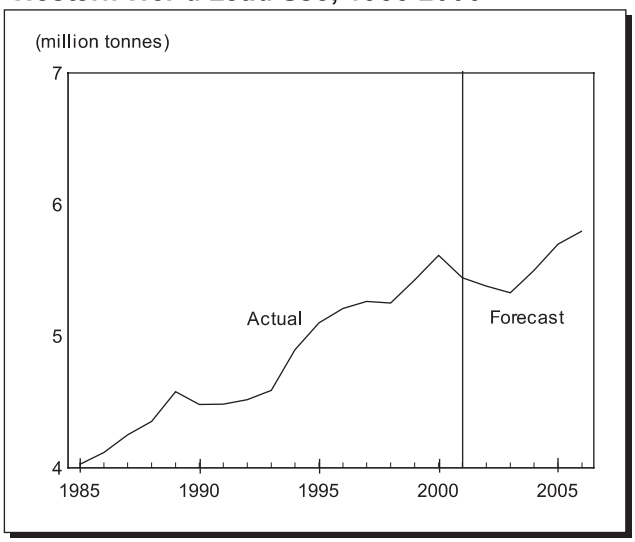
(e) Estimated.

DEMAND OUTLOOK

According to the International Lead and Zinc Study Group (ILZSG), demand for refined lead metal in the United States is expected to decline by 6.8% in 2002 and by a further 2.5% in 2003, due mainly to a fall in demand for industrial batteries used in the telecommunications and information technologies (IT) sectors. This reduction is expected, however, to be balanced by rises in Asia of 4.0% in 2002 and 3.9% in 2003, driven by continued robust growth in China. As a consequence, the Group is not expecting any major short-term fluctuations in overall world demand for refined lead metal, which is forecast to decline by 0.6% in 2002 and then to rise by 1.1% in 2003.

Over the long term, lead demand is expected to maintain an average annual growth rate of 1.5-2.0%. The battery sector will continue to account for most of the growth, with the newly industrialized nations of Southeast Asia expected to continue to record the most rapid growth as the vehicle population expands.

Figure 1
Western World Lead Use, 1985-2006



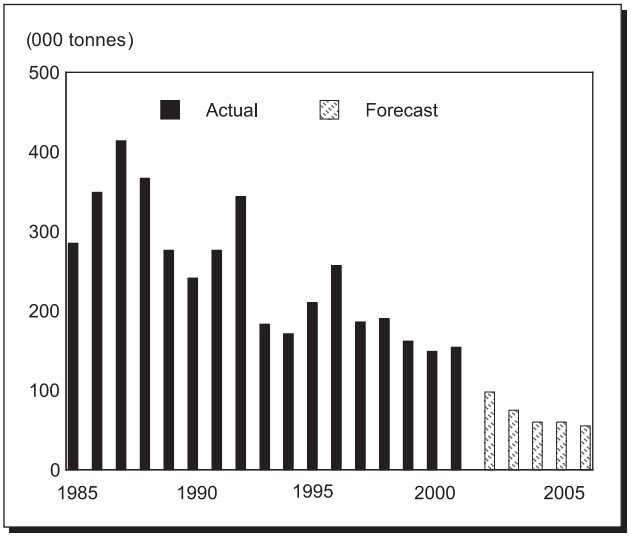
Source: Natural Resources Canada.

CANADIAN PRODUCTION OUTLOOK

Refined production of lead in Canada is expected to be 14% higher in 2002 compared to 2001, primarily due to the return to normal levels of production at Teck Cominco's Trail smelter in British Columbia.

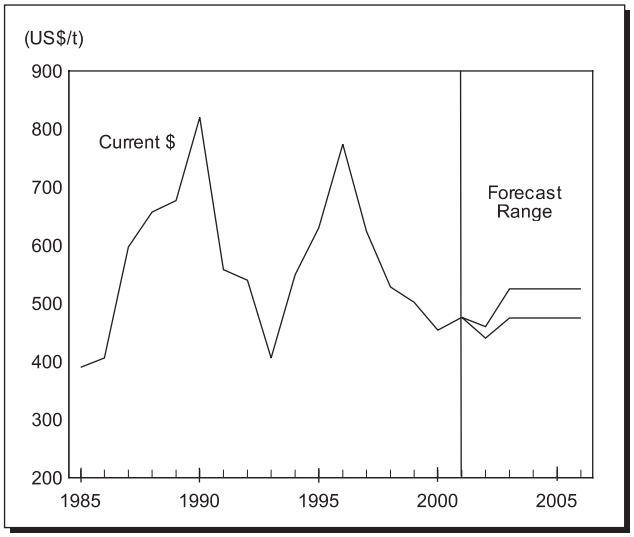
Canadian lead mine production in 2002 is forecast to decline by about 42% from the level in 2001 as a result of the closure of the Sullivan mine in British Columbia at the end of 2001 and the closure of the Polaris and Nanisivik mines in Nunavut in the third quarter of 2002. Mine production is expected to decline a further 10% in 2003.

Figure 2
Canadian Mine Production of Lead, 1985-2006



Source: Natural Resources Canada.

Figure 3
Lead Prices, 1985-2006
Annual LME Settlement



Source: Natural Resources Canada.

PRICE OUTLOOK

Cash London Metal Exchange (LME) settlement prices for lead traded within the range of between US$450 and $500/t over the year. Prices peaked at US$538/t in early January and then fell to reach a minimum for the year of US$402.50/t in October. Prices rallied somewhat to trade in the $450/t range by the end of November. Overall, lead prices are expected to average about US$450/t for the year. LME stocks followed a steady rise from a minimum of 97 000 t at the start of January and rose to a peak of 197 400 t in early August. They then continued a slow downward decline to reach 180 175 t at the end of November, still almost double the amount in January.

Taking information supplied by its member countries and their industry advisors into consideration, including releases from the U.S. National Defense Stockpile, the ILZSG's October forecast indicated that the supply of refined lead metal will exceed usage in the Western World by a modest amount in both 2002 and 2003. The net result on prices is that they are expected to average about US$460/t in 2002. In the longer term, prices are expected to average between US$500 and $550/t to the year 2005.

Note: Information in this article was current as of December 5, 2002.

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Magnesium

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2001 Primary metal production capacity: $255 million[e]
World rank: Second
Exports: $176 million

	1999	2000	2001	2002 (f)
		(tonnes)		
Primary metal production capacity (1,e)	49 000	50 500	59 500	70 000
Exports (HS 8401)	49 747	47 181	43 292	38 000
Imports (HS 8401)	38 377	34 588	33 507	30 000

(e) Estimated; (f) Forecast.
(1) Canadian magnesium production data are confidential due to the limited number of companies reporting. This number is based on published capacity for primary metal. Note that other published estimates of Canadian magnesium productions include significant quantities of recycled material.

Magnesium's main application is as an alloying agent for aluminum, which accounts for close to 45% of magnesium shipments. The next most important use for magnesium metal is for die-cast products. Growth in magnesium die-cast products used in automotive and consumer goods is largely due to weight savings of about 30% compared to aluminum. The third largest market for magnesium is as a deoxidizing and desulphurizing agent in the ferrous industry. Chemical applications include pharmaceutical products, perfumes and pyrotechnics.

ANNUAL AVERAGE PRICES, METALS WEEK (U.S. SPOT WESTERN MEAN)

1998	1999	2000	2001	2002 (e)
		(US$/lb)		
1.59	1.55	1.37	1.25	1.22

(e) Estimated.

CANADIAN OVERVIEW

- Construction of Magnola Metallurgy Inc.'s 58 000-t/y magnesium metal plant at Danville, Quebec, is finished and commissioning of the electrolytic cells is nearing completion. Progress on solving start-up problems is well under way and the plant was operating 23 of 24 cells in October. The company planned to reach commercial production in late 2002 or early 2003. It subsequently announced the impending interim closure of the plant. Further information can be found on Noranda Magnesium's web site at www.norandamagnesium.com.

- Primary production at Norsk Hydro ASA's Magnesium Division Bécancour facility was to be increased in 2002 to 48 000 t/y from 45 000 t/y through debottlenecking. The plant also has a recycling facility with a capacity of 10 000 t/y, but that facility was reported as operating at 75% of capacity due to a shortage of scrap. Future capacity increases at Bécancour will be evaluated based upon market needs and profitable returns. Hydro Magnesium does not expect any large-scale increases to be initiated in the short term. Further information is available on the Internet at www.magnesium.hydro.com.

- Timminco Limited expected to complete work to develop dual casting capability in the third quarter of 2002.

- Canada's two largest magnesium producers have developed new magnesium alloys for use in higher temperature applications. Further information can be obtained from the Noranda Magnesium web site at www.norandamagnesium.com and from Hydro Magnesium's web site at www.magnesium.hydro.com.

- Globex Mining Enterprises Inc. has continued work on its Timmins area magnesium-talc deposit 13 km south of Timmins, Ontario. Hatch Associates of Canada completed a scoping study in October 2001, which indicated good economic potential for a proposed $1.5 billion project with a smelter located west of Rouyn-Noranda, Quebec. The company has worked to raise funds to conduct the recommended full bankable

feasibility study with an expected cost of US$12 million. Further details are available on the Internet at www.globexmining.com.

- Leader Mining International Inc. continued studies for a smelter based on the Cogburn ultramafic intrusive near Hope, British Columbia. Work has included: diamond drilling, initial environmental permitting, infrastructure studies, and bench-scale testing on composite samples. The company has signed a technology transfer agreement with the State Research and Design Titanium Institute of Zaprozhye, Ukraine (STI), and the Russian National Aluminium-Magnesium Institute (VAMI). Further details are available on the Internet at www.leadermining.com.

WORLD OVERVIEW

- The major factor in magnesium markets remains the increased production and export of magnesium from China. Production and export levels in 2002 are expected to be similar to those in 2001. Pressure on markets from this production has resulted in a general decrease in the price of magnesium over the last several years.

- The recent closures of the 42 000-t/y Porsgrunn magnesium smelter in Norway, the 18 000-t/y Marignac magnesium smelter in France, and the 38 000-t/y Northwest Alloys magnesium smelter in Addy, Washington, have taken almost 100 000 t/y of capacity out of production. Markets are now starting to react to these closures as the price of Chinese magnesium appears to be firming up, perhaps signalling a bottom (www.alcoa.com, www.magnesium.hydro.com and www.pechiney.com).

- Magnesium Corporation of America (Magcorp), after filing in 2001 for protection from its creditors under Chapter 11 of the Bankruptcy Code, was sold in 2002 to U.S. Magnesium LLC, another subsidiary of Renco Group. The company is modernizing equipment at its 43 000-t/y smelter in Rowley, Utah, after considerable pressure to clean up its site and to reduce emissions. Work was expected to be completed in early 2003. Modernization of the plant is expected to eventually increase its capacity to 56 000 t/y (www.magnesiumcorp.com).

- Australian Magnesium Corporation (AMC) started construction of a 90 000-t/y plant at Stanwell, Queensland, in August. The company has accelerated the ramp-up in metal production. It is now expected to start in late 2004 to reach full capacity in 2006. AMC has decided to use newer Alcan Ex2 cell technology for the plant. These cells have a higher capacity for production of magnesium than the older versions of this technology. For further information, see the company's web site at www.austmg.com and Australian government sites at www.minister.industry.gov.au and www.qld.gov.au.

- Mt. Grace Resources NL continued work on its Northern Territory Batchelor magnesium project 85 km south of Darwin. Although tests of the Mintek demonstration plant were reported as being a success, a lack of energy availability in the Darwin region may result in a change in location for the project. Further information is available on the Internet at www.mtgrace.com.

- Magnesium International Limited (formerly Pima Mining NL - Samag project) completed its bankable feasibility study and continues work on a proposed metal plant based on magnesite deposits located near Leigh Creek in the Willouran Ranges region of South Australia. The company continued work on financing and contracting options (www.mgil.com.au).

- Magnesium Alloy Corporation continued work on its Kouilou project in the Republic of the Congo (Brazzaville) and has signed a Memorandum of Understanding with Eskom Enterprises (Pty) Limited, the state energy commission in South Africa. The agreement defines the steps to establish a power contract and includes studies on the power infrastructure requirements. The company also signed an agreement with Stinnes Metall GmbH on the purchase of metal produced by the project (www.magnesiumalloy.ca).

DEMAND OUTLOOK

Magnesium use is expected to increase to over 550 000 t/y in the last half of this decade. Growth will result from demand for magnesium in aluminum alloys and die-cast automotive parts, although the rate of growth will be dependent on the general economy, prices, and price stability. Magnesium continues to face stiff competition from other materials, including aluminum, steel and plastics, in the all-important automotive parts sector. New applications and increased awareness of the advantages of magnesium in certain applications are growing, particularly in the automotive industry.

In Canada, the reported use of magnesium increased from a revised 40 154 t in 2000 to 44 925 t in 2001, due in part to an increased number of companies reporting. It should be noted that previously published figures on use have included some run-around scrap, which have been removed from data for 1999 through to 2001. Work is nearing completion on confirming and removing these amounts from data.

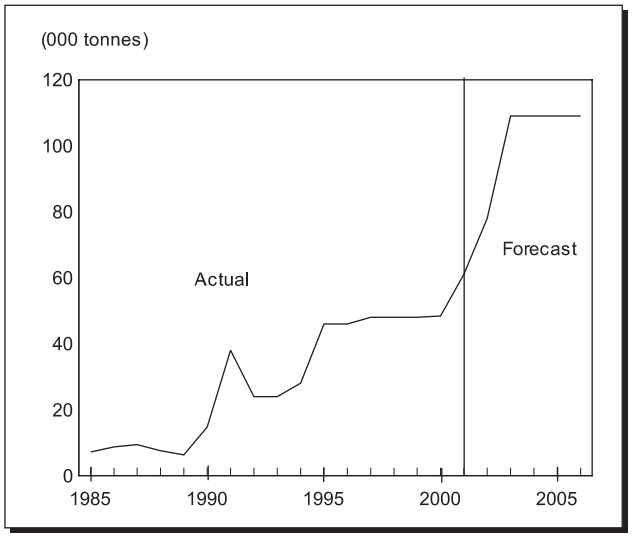
CANADIAN AND WORLD PRODUCTION OUTLOOK

In 2002, Canada was the second largest producer of primary magnesium in the world after China.

Canadian primary magnesium production increased dramatically with the opening of Hydro Magnesium's 40 000-t/y primary magnesium plant at Bécancour in 1990. Installed Canadian primary nameplate capacity has since remained stable, but has now increased due to the ramping up of Magnola Metallurgy's 58 000-t/y plant at Danville, Quebec, and a debottlenecking of Hydro Magnesium's Bécancour plant, which was expected to reach a capacity of 48 000 t/y in 2002. Canadian primary magnesium production capacity is expected to have risen to approximately 70 000 t/y in 2002.

A number of projects around the world, primarily focussed in Australia, could, if all constructed, significantly increase magnesium production. World primary magnesium production is expected to rise from an estimated 460 000 t in 2000 to more than 550 000 t/y by 2006.

Figure 1
Canadian Primary Production Capacity of Magnesium, 1985-2006



Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metals Statistics.

PRICE OUTLOOK

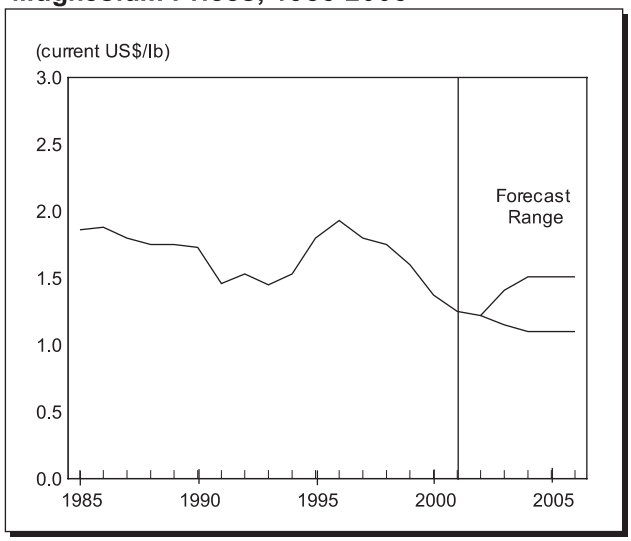
Prices for primary magnesium remained relatively weak for the early part of the year as markets did not react to closures in Western plants. Prices for magnesium, as published by *Metals Week*, again trended downward through the year. The U.S. Spot Western Mean price started the year at US$1.25/lb and decreased to below $1.20/lb late in the year, while the mean U.S. dealer import price decreased from US$1.08/lb to $1.03/lb.

Norsk Hydro Magnesium reduced its European producer price for magnesium alloy to €2.50/kg from €2.62/kg early in 2002. The company also announced that it would not continue to issue a European producer price for pure magnesium.

Sales of Chinese magnesium on a spot basis, f.o.b. China, at the beginning of the year were reported at US$1200-$1300/t. Sales were reported in late 2002 as taking place at US$1400/t for pure magnesium with prices for alloy above US$1600/t.

Reductions in the capacity of Western smelters, unless countered by an increase in production in China, may result in an increase in price for pure magnesium metal over the near term. On a longer-term basis, should many project proposals be successful at raising financing, increases in capacity may result in the availability of newer, possibly lower-cost, supply of metal. Prices are expected to remain near their current levels and will remain historically weak, likely in the bottom-to-mid part of a US$1.10-$1.50/lb range over the medium term until use catches up with production rates and stockpiles.

Figure 2
Magnesium Prices, 1985-2005



Source: *Metals Week* (U.S. Spot Western Mean).

Note: Information in this article was current as of November 1, 2002.

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Nickel

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(Abbreviations used in this article include: **e** Estimated; **f** Forecast; **p** Preliminary; Ni = nickel; FeNi = ferronickel; LME = London Metal Exchange; conc. = concentrate. Production data are for January to September 2002 unless otherwise noted; data in brackets are for the same period in 2001.)

2001 production: $1.8 billion**p**
World rank: Third
2001 exports: $1.7 billion

Canada	2001	2002 (e)	2003 (f)
		(000 tonnes)	
Mine production	194	182	190
Refined production	141	145	148
Use	11	11	12

(e) Estimated; (f) Forecast.

Nickel's resistance to corrosion, high strength over a wide temperature range, pleasing appearance, and suitability as an alloying agent make it useful in a wide variety of applications. Markets for primary nickel include stainless steel (64%), nickel-based alloys, electroplating, alloy steels, foundry products, batteries, and copper-based alloys. Nickel is intensively recycled; between 45% and 48% of nickel used to make stainless steels is in the form of stainless steel scrap.

ANNUAL AVERAGE SETTLEMENT PRICES, LONDON METAL EXCHANGE

1998	1999	2000	2001	2002 (e)
		(US$/t and US$/lb)		
4 617	6 015	8 641	5 948	6 795
2.09	2.73	3.92	2.70	3.08

(e) Estimated.

CANADIAN OVERVIEW

- January-September mine production = 139 200 t (139 700 t); January-September refined production = 106 200 t (100 600 t).
- **Falconbridge's Sudbury** operations produced 21 200 t (17 000 t) of Ni in conc. and 39 700 t (39100 t) of Ni in matte. The **Raglan** mine produced 17 500 t (18 200 t) of Ni in conc. Falconbridge is considering using Inco's idle **Victor** shaft to access Nickel Rim South where exploration showed inferred resources of 4.6 Mt grading 2.2% Ni and 4.9% Cu plus precious metals. A feasibility study for the **Montcalm** property near Timmins, Ontario, is expected by the first quarter of 2003 and mining could start in 2004; the capacity is to be 8000 t/y.
- **Voisey's Bay: Inco** and the Province of Newfoundland and Labrador reached an agreement allowing the development of the Voisey's Bay orebody. Infrastructure work began in 2002, construction is to start in 2003, and initial mine production is scheduled for 2006. Concurrent with mine development, Inco will continue R&D work on a new hydrometallurgical process for treating sulphide nickel-cobalt conc. A legal agreement between Inco and the Province was concluded on September 30 and is available on the Internet.[1]
- **Inco's Sudbury** operations did not shut down for a summer vacation. Inco put the **Victor Deep** project on indefinite hold after the initial Voisey's Bay agreement was announced. In **Thompson**, workers negotiated a new contract in September. Production did not meet target in Thompson due to concentrate blending and mine production problems.
- **Sherritt International** owns 50% of the **Metals Enterprise JV** with **Cubaniquel**; they operate a refinery at Fort Saskatchewan, Alberta, and a mine and leach plant at Moa Bay in Cuba.

[1] The 14.9-Mb document detailing the agreement between Inco Limited and the Province of Newfoundland and Labrador can be found on the Internet at www.sedar.com/csfsprod%2Fdata33%2Ffilings%2F00485302%2F00000001%2Fe%3A%5CINCO%5C2002%5C8Koct8.pdf.

- At **Canmine**'s hydrometallurgical refinery at Cobalt, Ontario, commissioning of the autoclave was completed in April. Financial problems interrupted the ramp-up; the refinery was put on care and maintenance in August. Canmine continued its restructuring and refinancing program into late 2002.

- **North American Palladium's** new 15 000-t/d expansion had crusher problems; the new mill averaged 13 500 t/d of ore during the year. Production of by-product Ni from January to September was 893 t (462 t).

- **LionOre Mining International** has no Canadian operations but has become a significant Ni producer. LionOre purchased **Anglo American**'s 43% of **Tati Nickel** in Botswana, increasing its ownership to 85%. In addition, LionOre acquired Anglo's interests in **BCL**, which operates Ni-Cu-Co mines and a smelter in Botswana. The Tati expansion of the **Phoenix mine** reached full production by late November with annualized payable production at 12 500 t/y of Ni; the **Selkirk mine** exhausted its ore reserves in September. Tati's concentrates are smelted at **BCL**, also in Botswana. The BCL smelter was shut down in April for repairs after furnace problems. Matte from BCL is refined at **Nikkelverk** and **Empress**, and the problem affected those refineries. In Australia, LionOre's **Emily Ann mine** started up in the first quarter of the year and commissioning was completed in June. Output for 2002 is scheduled at 5700 t of payable Ni; thereafter, 6700 t/y payable. Inco purchases the conc. and has it smelted at WMC.

WORLD OVERVIEW

- **Norilsk** released production data for the first time since 1996. Recent Ni production was: in 2001, 223 000 t; in 2000, 217 000 t; and in 1999, 209 000 t. Recent Co production was: in 2001, 4600 t; in 2000, 4100 t; and in 1999, 4000 t. Norilsk may release mineral reserves data before year-end. Norilsk used 60 000 t of nickel as collateral for a US$200 million loan for three years.

- **Titan Resources** closed its **Radio Hill** mine in September after depleting economic reserves. **Tectonic Resources** extended operations at **RAV 8** from July to December by finding more ore. **Jubilee Gold** continued developing an underground mine to replace the **Cosmos** open pit, which is to be mined out in 2003; the new **Cosmos Deeps** mine is expected to last until 2007, producing 10 000 t/y of Ni in conc. Inco purchases the Cosmos conc. and smelts it in Canada. Effective July 1, **Outomkumpu** sold its **Black Swan** mine and **Honeymoon Well** property to a consortium owned by **MPI** and **OMG**. Outokumpu continued its withdrawal from nickel; besides selling Australian properties, Outokumpu's Norwegian mine, **Nikkel og Olivin**, was shut in October after exhausting its ore reserves.

- **China: Jinchuan Nickel** sought new feed sources for its 50 000-t/y facility; it is forecast to produce 55 000 t in 2003. Jinchuan will take the entire output of **Sally Malay** in Australia, or 8000 t/y of Ni in conc., starting in 2004. **Titan** and Jinchuan will form a joint venture to apply Titan's BioHeap™ process to Jinchuan's ore.

- **Oceania**: In **Indonesia**, **PT Inco** will produce 59 000 t of Ni in matte in 2002; furnace #3 was shut down for relining. **Inco's Goro** project in New Caledonia is under construction, albeit delayed. Costs for the 55 000-t/y Ni, 4500-t/y Co high-pressure hydrometallugical leach project may rise 15% from US$1.45 billion and start-up could be delayed until 2005. Inco secured tax holidays and concessional financing for its project. **BRGM** will sell its 15% share in Goro to Inco, and Inco will sell 25% to a **Sumitomo**-led consortium. Inco said also that 5% will go to New Caledonia and 5% to the South Province of New Caledonia. Also in New Caledonia, Falconbridge began a bankable feasibility study on the **SMSP-Falconbridge Koniambo** FeNi project; a decision on the US$1.5 billion project to produce 60 000 t of Ni in FeNi is expected in early 2004. If Koniambo proceeds, it will receive tax concessions simlar to Goro; possible start-up would be in 2007. **Norilsk** bought into the Nakety project of **Argosy Minerals** but declined to proceed after studying the matter further. **Coral Bay Nickel** in the **Philippines** will start up in mid-2004; an acid pressure leach plant will produce 10 000 t/y of Ni and 800 t/y of Co in intermediates using stockpiled low-grade ore. Sumitomo is expanding its refinery in Japan to handle the additional output.

NINE-MONTH NICKEL PRODUCTION[1]

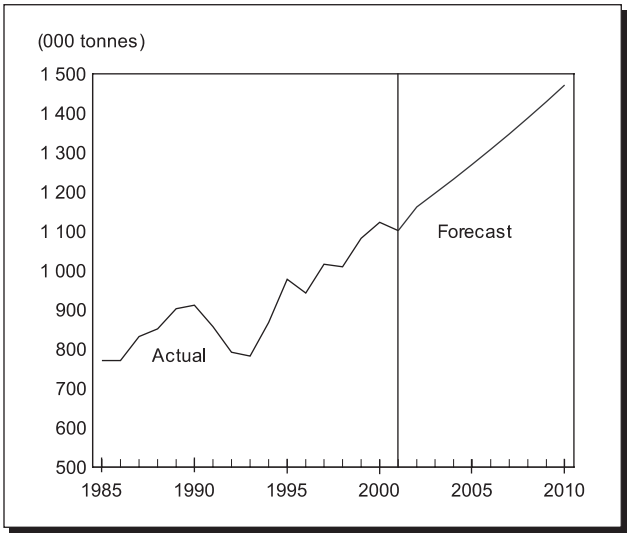
Operation	Jan.-Sept. 2002	Jan.-Sept. 2001	Comments
	(000 t)		
LATERITE ACID PRESSURE LEACH PRODUCTION			
Anaconda Nickel	23.2	19.3	Restructuring and recapitalizing; production < 70% capacity.
Metals Enterprise	23.4	21.1	JV of Sherritt International and Cubaniquel.
OMG (Cawse)	?	?	Refinery closed after OMG purchased it; 2002 data not released.
Preston (Bulong) (6 months)	3.3	3.4	Creditors own 95% of Bulong after August 29.
AMMONIA PRESSURE LEACH PRODUCTION			
Yabulu refinery	22.5	21.4	Expansion to 70 000 t/y for Ravensthorpe output under study.
Cubaniquel (6 months)	20.6	20.2	Two operations producing Ni oxide sinter.
Tocantins (6 months)	10.0	9.5	Expansion under way to 18 000 t/y by 2003; increase to 21 000 t/y by 2004 may be delayed by power costs.
OTHER PRODUCTION OF FINISHED NICKEL			
MMC Norilsk Nickel	?	?	Forecast 217 000 t of production in Jan-Dec. 2002 due to furnace modernization at Nadezhda smelter; production was 223 000 t in Jan.-Dec. 2001.
Inco Sudbury	77.1	67.1	Includes U.K. output (U.K. averaged 2800 t/month in Jan.-Dec. 2002).
Inco UK (6 months)			Production for Jan.-June 2002 was 18 600 t (17 700 t).
Inco TNC	49.4	45.4	Finished Ni output from Inco's share of PT Inco; some reprocessed at
	*	*	Taiwan Nickel and Korea Nickel.
Inco Thompson	32.7	36.3	Includes imported concentrates from Australia.
WMC	47.8	44.3	Fire at smelter reduced feed to refinery.
Nikkelverk (Falco)	47.2	48.3	Feed limited by problems at BCL and by Sudbury mine output.
Sumitomo	24.5	?	Expansion for Coral Bay feed (10 000 t/y) in mid-2004.
Empress	4.9	5.0	Feed shortage due to problems at BCL.
OMG (6 months)	27.0	27.0	Matte from Outokumpu and Fortaleza; intermediates from Cawse.
Sandouville (6 months)	7.1	7.6	Processes matte from New Caledonia to metal and chemicals.
Anglo Platinum (6 months)	9.4	9.2	PGM expansion under way that will also raise by-product Ni output.
Lonmin	?	?	About 1600 t/y as Ni sulphate sent to Anglo Platinum.
Impala	?	?	Produces about 7000 t/y from own mines plus 7000 t/y tolled.
Bindura	?	?	Major furnace rebuild needed by late 2002; capacity 15 000 t/y.
Jinchuan	?	?	Jan.-Dec. 2001 production about 50 000 t; new feed sources sought.
Chengdu	?	?	Refines matte produced at Jilin Nickel; capacity about 5000 t/y.
Ni IN FeNi PRODUCTION			
Japan	55.5	??	Production of Huyuga, Pacific Metals and Nippon Yakin.
Cerro Matoso	33.1	28.1	Ramp-up completed; planned capacity 55 000 t/y.
Falcondo	17.2	19.2	Cutbacks; labour contract up Nov. 30.
Larco	14.3	13.6	Imported some ore from Albania and Turkey in 2001.
PT Antam	6.0	6.9	Financing for expansion to 25 000 t expected in 2003.
Loma de Níquel	7.5	3.6	Ramp-up to be completed by year-end; planned capacity 17 000 t/y.
Eramet (6 months)	24.2	23.2	US$65 million expansion to 75 000 t/y by 2005 approved.
Codemin (6 months)	2.9	3.1	Power rationing instituted in 2001.
Feni-Mak (6 months)	2.5	0.4	Target production of 6000 t for 2002.
Ferronikel Kosovo	??	??	Believed to be inoperative.
Pobuzhsky	??	??	Imported 500 000 t laterite ore (about 8000 t Ni) from SMSP.
Russian FeNi	??	??	Rezh, Yuzhuralnikel, Ufaleynickel also produce some Ni metal; combined production estimated at 25 000 t/y.

(1) January-September of year unless noted otherwise.
* Included in other data.

DEMAND OUTLOOK

The world nickel market forecast by the International Nickel Study Group (INSG) in October showed a surplus of 33 000 t for 2002 and a balanced market in 2003. The continued building of stainless capacity worldwide promises to result in increased demand, but the continued uncertainty about economic growth prospects in 2003 overshadow the promise. Medium-term world use is expected to trend at about 3%/y, but will be controlled by economic growth rates. Lower prices in the latter half of the decade are expected to increase demand as technology makes Ni production cheaper.

Figure 1
World Primary Nickel Use, 1985-2010



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

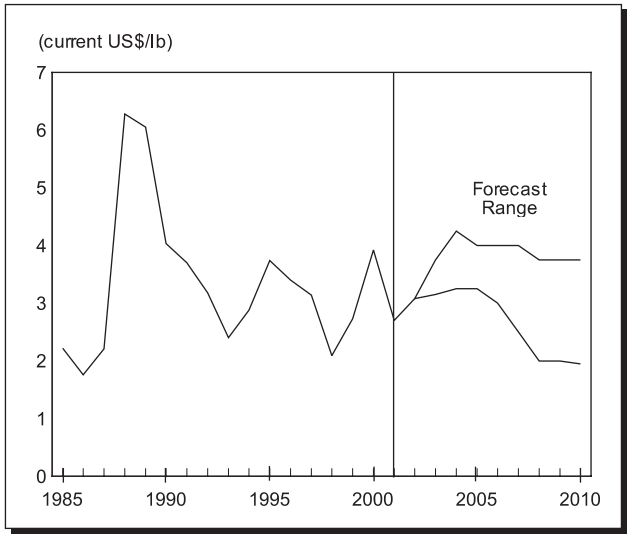
PRODUCTION OUTLOOK

Canadian production of Ni in conc. in 2002 is forecast at 182 000 t and is expected to rise back to the 2000 level of 190 000 t in 2003. Finished nickel production in Canada is forecast at 145 000 t in 2002, rising to 147 000 t in 2003. Both forecasts assume no strikes or unforeseen production interruptions. The Voisey's Bay mine is scheduled to start production in 2006 and the concentrates will be smelted at Inco's existing facilities. Consequently, some development in Sudbury and Thompson will be deferred. By 2007, Inco has forecasted production at Voisey's Bay of 50 000 t, in Ontario at 88 000 t, and in Manitoba at 34 000 t; production in 2001 was 95 000 t and 50 000 t, respectively, for the latter two. Falconbridge's forecast for its Canadian production in 2005 was 57 000 t, compared to 49 800 t in 2001.

OUTLOOK FOR PRICE (LME SETTLEMENT)

Nickel cash settlement prices peaked in 2002 on July 15 at US$7725/t or US$3.50/lb, up US$2100/t from the low on January 3. On November 29, prices were US$7390/t. The LME Ni inventory was 19 600 t at the start of the year; it increased to 29 000 t in early June and then declined to 20 000 t at the end of November. The average price for 2002 is projected at US$6795/t (US$3.08/lb). Prospects for higher prices for the 2003-07 period appear to be good due to large increases in stainless steel plant capacity and a protracted lack of similar capacity-building of primary nickel facilities, albeit with Norilsk's 60 000-t stockpile ready to cap prices whenever Norilsk chooses. Large laterite projects such as Ravensthorpe, Weda Bay, Gag Island, Ramu and Nakety are presently stalled or worse. Uncertain world economic growth prospects appear to be tempered by a record of increasing Chinese demand for stainless steel. Assuming reasonably robust world economic growth, the average price for nickel in 2003 is forecast as US$7600/t (US$3.45/lb). In the long term, the price band between US$2 and $4/lb is expected to trend downwards by about late 2006 as new technology reduces production costs. In the medium term, however, if one accepts that Norilsk's collateral will stay off the market until 2005, then the period of high prices may be restricted to a period of late 2003 to 2005 because of the 60 000 t of Norilsk stock and new output from Doniambo in 2004 and from PT Antam Tbk and Goro in 2005, likely followed by Koniambo in 2007. All prices are in current dollars or dollars of the day.

Figure 2
Nickel Prices, 1985-2010
Annual LME Cash Settlement



Source: Natural Resources Canada.

Note: Information in this article was current as of November 30, 2002.

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Zinc

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2001 mine production:	$1.42 billion
World rank:	Second (metal production)
2001 exports:	$1.38 billion

Canada	2001	2002 (e)	2003 (f)
		(000 t)	
Mine production	1 052	900	770
Metal production	658	765	800
Use	181	190	200

(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

1998	1999	2000	2001	2002 (e)
		(US$/t)		
1 023.3	1 077.3	1 128.1	886.3	780.0

(e) Estimated.

CANADIAN OVERVIEW

- The Myra Falls mine in British Columbia resumed production following a three-month shut-down. Boliden AB suspended operations at the mine in December 2001 to evaluate its future. A new operating plan was put in place to improve the mine's operating efficiency.

- Teck Cominco Limited temporarily closed its Trail, British Columbia, smelter in August to cut zinc production by about 25 000 t in response to weak market conditions.

- Hudson Bay Mining and Smelting closed the Ruttan mine in northern Manitoba at the end of June after 29 years of operation. Record low zinc and copper prices, along with depressed mineral markets, were cited as the reasons for the closure.

- Noranda temporarily shut production during the month of July at its Bell Allard mine near the town of Matagami in northern Quebec in response to poor market conditions

- Teck Cominco Limited's Polaris mine on Little Cornwallis Island, Nunavut, closed on September 3 after 21 years of operation due to ore reserve depletion. Work has started on mine decommissioning and rehabilitation, which is expected to be completed by October 2004.

- The Nanisivik mine on northwestern Baffin Island, Nunavut, closed at the end of September after 26 years of operation. The mine, owned and operated by CanZinco Ltd., a wholly owned subsidiary of Breakwater Resources, was closed due to a combination of ore reserve depletion and weak zinc prices.

WORLD OVERVIEW

- Outokumpu resumed production at its Tara zinc mine in Ireland in mid-September after ceasing operations in November 2001. The company expects to produce some 800 000 t of ore by the end of 2002. For 2003, the mine expects to produce 2.6 Mt of ore.

- Brazil's Paranapanema nonferrous group sold its zinc smelting subsidiary, Companhia Paraibuna de Metais, to the Votorantim Grupo.

- BHP Billiton will close its Pering lead and zinc mine in South Africa at the end of 2002. The announcement reflects weak market conditions for zinc.

- Metaleurop announced its decision to switch its Noyelles-Godault plant in France from primary to recycled zinc production sometime in 2003. Zinc production will fall by 20 000-30 000 t to around 70 000 t/y.

- Big River Zinc Corp. restarted its refining operations in the state of Illinois in November following a three-month maintenance shut-down.

LEADING WORLD ZINC PRODUCERS

Producers Zinc in Concentrate	2002 (e)	Producers Zinc in Metal	2002 (e)
	(000 t)		(000 t)
China	1 500	China	2 000
Australia	1 450	Canada	770
Peru	1 250	Japan	640
Canada	900	South Korea	610
United States	740	Australia	570

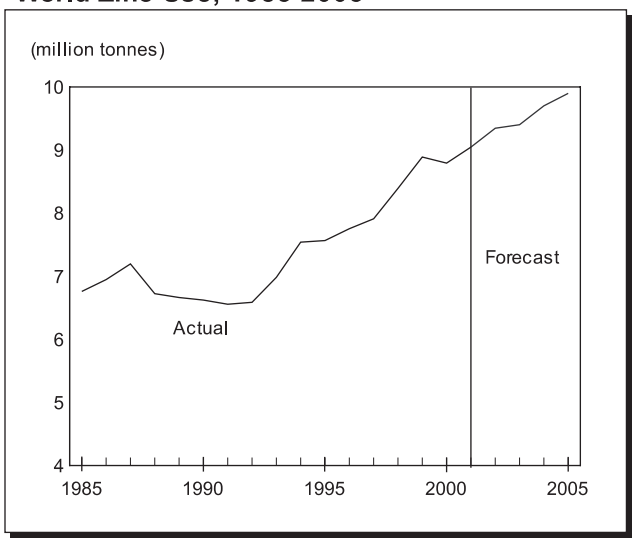
Source: International Lead and Zinc Study Group.
(e) Estimated.

DEMAND OUTLOOK

According to the International Lead and Zinc Study Group (ILZSG), world demand for refined zinc metal is forecast to rise by 3.4% in 2002 and by a further 3.3% in 2003. Strong growth in China will benefit demand in Asia, which is forecast to rise by 4% in both 2002 and 2003. Demand growth in the United States is expected to rise 6.6% in 2002 and 4.5% in 2003. Growth in Europe is forecast to be more modest at 1.6% in 2002 and 1.4% in 2003.

Galvanizing will remain the dominant end use of zinc and exhibit the largest increase in demand during the forecast period, followed by brass and die-cast alloys.

Figure 1
World Zinc Use, 1985-2005



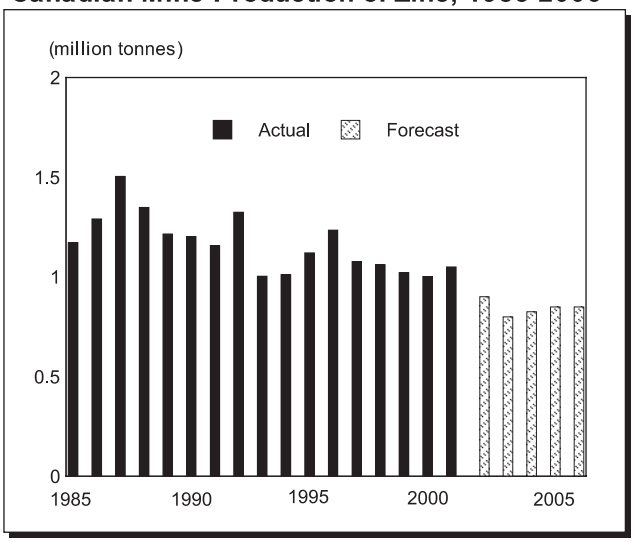
Source: Natural Resources Canada.

CANADIAN PRODUCTION OUTLOOK

Zinc mine production is expected to be about 2.5% lower in 2002 compared to 2001. The closure of the Sullivan mine at the end of 2001, together with closures at the Ruttan mine, Polaris and Nanisivik mines, contributed to the lower levels for 2002. Mine production is forecast to fall another 14% in 2003 as a result of the mine closures in 2002.

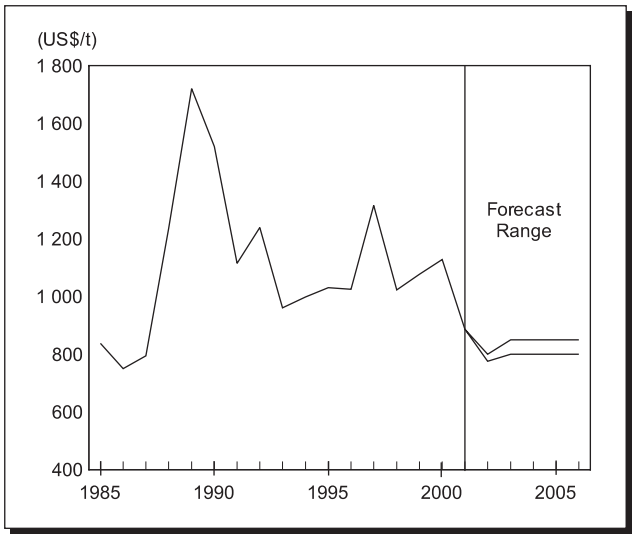
Zinc metal production in Canada is expected to increase by about 16% over 2001, again as a result of a return to more normal levels of production at the Trail smelter and the expansion at Flin Flon. Zinc metal production is expected to increase again by 4.5% in 2003 as the full effects of the expansion at Flin Flon come on stream.

Figure 2
Canadian Mine Production of Zinc, 1985-2006



Source: Natural Resources Canada.

Figure 3
Zinc Prices, 1985-2006
Annual LME Settlement



Source: Natural Resources Canada.

PRICE OUTLOOK

Cash settlement prices struggled throughout the first three quarters of the year to remain above US$800/t on the London Metal Exchange (LME). Overall zinc prices followed a downward trend, reaching record lows of $725.50/t by mid-August. The continued low zinc prices did not, however, lead to any significant production cuts and prices remained in the US$740-$780/t price range for most of the third quarter.

While consumer stocks fell by about 105 000 t during the year, stocks on the LME continued their upward climb from 434 000 t to over close to 650 000 t by the end of October. Overall, the Study Group forecast anticipates that the Western World market for refined zinc metal will again remain in substantial surplus in both 2002 and 2003. Prices are expected to continue to reflect the oversupply in the market and are forecast to average about US$775/t in 2002 and to rise to average $825/t in 2003.

Beyond 2003, continued growth in galvanizing markets, combined with good growth overall for principal zinc markets, is expected in the remainder of the forecast period with zinc prices ranging from US$800-$850/t through to 2005.

Note: Information in this article was current as of November 15, 2002.

NOTE TO READERS

The Canadian and World Economic Situation and Outlook

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The Canadian economy has performed well so far in 2002 and is expected to lead all G7 countries in growth in both 2002 and 2003. After registering a real growth rate of only 1.5% in 2001, the economy, as measured by the annualized rate of change of real Gross Domestic Product (GDP), forged ahead by 6.2% in the first quarter and 4.3% in the second quarter of 2002. Economic growth is likely to slow somewhat during the second half of the year to about 2.5%, resulting in a growth rate of about 3.5% for 2002 as a whole. For 2003, a respectable growth rate of 3-4% may be expected. These figures contrast with those of the United States. Excess capacity and reduced consumer spending in the United States resulted in a weak growth rate of 1.3% in the second quarter (following a 5.0% growth rate in the first quarter). Aggressive interest rate reductions by the Federal Reserve Board in 2002 should, however, lay the groundwork for a recovery in the U.S. economy through 2003.

The most striking feature of Canada's economic performance in 2002 was job creation. While the number of people entering the labour force kept the unemployment rate averaging 7.7% through October, the Canadian economy created a very impressive 459 000 full- and part-time jobs through the January-October period of 2002, compared to only 13 000 created during the whole of 2001. This fact, coupled with a real increase of over 3% in personal disposable income through the first half of 2002, provides support for consumer spending and a strong base for continued growth in the domestic side of the Canadian economy.

Another highlight of Canada's economic performance is the recovery of the business sector. Pre-tax corporate profits have risen by an annualized rate of about 50% for each of the first two quarters of 2002. This has contributed to a sharp increase in investment in machinery and equipment – an annualized rate of almost 21% in the second quarter. With capacity utilization rates rising, business investment is set to expand over the next few quarters.

In an attempt to head off a downturn in the economy in 2001, the Bank of Canada instituted a series of 10 interest rate reductions, lowering the Bank's trend-setting overnight target rate from 5.75% in January of 2001 to just 2.00% at the end of the year. As economic prospects improved, and in an attempt to contain any inflationary pressures that might arise, the Bank began raising rates in January 2002 to the present level of 2.75%. The rate has held steady at this level since July.

Inflation rates have increased somewhat through the third quarter and into the fourth. The year-over-year All Items Consumer Price Index (CPI) ranged from a low of 1% in May to 1.8% in March before breaching the 2% mark in July. Indications are that the rate will continue to increase over the next few months and will likely average somewhat more than 2% for the year. The increases are, however, largely the result of a series of one-off price movements that do not reflect underlying price pressures. When the price of a good spikes in one month, the inflation rate will increase that month and will continue to show up in the year-over-year CPI rate in subsequent months – it reflects a one-time jump and not a general increase in the rate at which prices are rising (the same applies when the price of a good declines).

The CPI rose 3.2% in October 2002 compared to the October 2001 level (0.3% compared to September 2002). Increases in the price of cigarettes (due to higher federal and provincial taxes), auto insurance premiums and energy prices accounted for almost all of the year-over-year rise. This spike in the October rate, compared to the 2.3% registered in September, is not as drastic as it appears. It is largely due to what Statistics Canada refers to as the "base effect."[1] The "base effect" in this case skews the year-over-year comparison upward. This effect will also skew the November rate upward.

The Bank of Canada is more concerned with the core inflation rate, which excludes eight volatile items as defined by the Bank. This rate is currently running at about 2.5% – in the upper half of the Bank's target range

[1] For an explanation of the Base effect, see the November 21, 2002, issue of Statistics Canada's *The Daily*, available on the Internet at www.statcan.ca.

of 1-3%. The rate is expected to increase further in the months ahead and may approach the upper limit of the target range. Two factors contributed significantly to the increased core rate, both of them the one-off variety. First, energy prices in Ontario increased sharply as a result of deregulation of the electricity market. Second, auto and home insurance premiums increased sharply in several provinces during the year. While the Bank stated that it is monitoring the inflation front carefully, it is aware that the increases are not yet due to underlying price pressures. This factor, plus the guarded outlook for the economies in the United States, Europe and Japan, as well as the aggressive interest rate cuts in the States, indicate the Bank will be reluctant to raise interest rates in the near term. However, as the Canadian economy begins to perform above potential and as the global outlook improves, interest rate increases may be expected near the middle of 2003.

(Note: On November 11, 2002, the Ontario government announced that it was freezing electricity rates at 4.3 cents per kilowatt-hour, the rate that prevailed prior to deregulation. This will reduce the rate of increase in inflation starting with the December figure).

Perhaps the brightest light in a generally bright economic picture is the Canadian housing market. The industry is benefiting from the strong job and income growth mentioned above, combined with low mortgage rates. In October 2002, housing starts reached 220 400 units, compared to just under 200 000 in September. The October level was the highest since March 1990. The October increase was broad-based across the country and suggests that the housing and related industries will remain positive factors for the Canadian economy through at least the fourth quarter of 2002.

Since the beginning of 2000, the Canadian dollar has depreciated against its U.S. counterpart. From about US69¢ in January 2000, the value of the Canadian dollar *vis-a-vis* the U.S. dollar has declined to about US63¢-64¢ in late 2002. For the year, the dollar should average about US63.5¢. Because Canada is a major exporter, the value of our dollar is strongly influenced by world commodity prices and by the economic performance of our major trading partners. Commodity prices (petroleum products excepted) have been low and the economies of the United States, and particularly Japan and the European Union, have lagged behind Canada's. The Canadian dollar is expected to strengthen through 2003 as the Canadian economy maintains its robust growth and as the U.S. recovery picks up steam. Given this scenario, by the end of 2003, the dollar could be trading near the US70¢ level. A downside risk to this forecast is the current uncertain global situation related to Iraq and periodic warnings of possible terrorist activities.

Exports are a significant part of Canada's economy. In 2001, exports contributed more than 40% to Canada's GDP. The export sector may, in the short term, be the one vulnerable spot in the Canadian economy, although the upward trend in exports since the beginning of 2002 is still intact. In September, exports rose by 0.8% (compared to August) to $35.1 billion due to increases in trade with the United States and the European Union. So far, Canada's exports have not been significantly affected by the U.S. economic situation, although the impact may be felt over the short term. For the first nine months of 2002, exports were down by 3.6% (to $306.6 billion) compared to the same period in 2001, with exports to the United States, Japan and the European Union all lower than the previous year's levels. With the anticipated strengthening of the U.S. economy (and a firming of commodity prices), the Canadian export sector should be able to weather any temporary slowdown that may occur. In addition, the relatively lower value of the Canadian dollar has given a significant lift to Canada's trade-oriented industries, especially the manufacturing sector. For these reasons, the value of merchandise exports is expected to strengthen further in 2003.

Merchandise imports declined in September to $30.3 billion, down 1.3% compared to August. Machinery and equipment, industrial goods and materials, and energy products were responsible for most of the decline. Imports of machinery and equipment, Canada's largest import sector, decreased 1.4% in September to $8.9 billion. For the first nine months of 2002, imports were down by 0.6% (to $265.2 billion), with declines from the United States more than offsetting increases from other countries.

Growth in the U.S. economy in 2002 should reach about 2.5% – not spectacular, but much improved over the tiny 0.3% rate realized in 2001. The economy grew at an annualized rate of 3.5% in the first half of 2002 and at a revised rate of 4.0% in the third quarter. Third-quarter growth was lead by personal consumption expenditures, government spending, equipment and software, private inventory investment and exports. Fourth-quarter growth is expected to slow. In response to this uneven recovery in the U.S. economy, the Federal Reserve Board in early November lowered its trend-setting Federal Funds rate by 50 basis points to 1.25%, the lowest level since 1961. Declining household spending over the course of the year, geopolitical uncertainty (particularly with respect to Iraq), concerns over corporate accounting scandals, and stalled business spending have combined to create the spotty recovery in evidence to date. The aggressive interest rate cut is expected to counteract these negative forces and lay the groundwork for a more robust recovery in 2003, when growth for the year should approach 2.7-3%, which is still relatively low for a post-downturn recovery.

Employment growth has not recovered from the 2001 downturn. The number of persons employed in the United States actually declined in each of the first two quarters of 2002 before becoming positive in the third quarter. For

the year employment is expected to decline relative to 2001, but as the economy improves through 2003, employment may increase by about 1% for the year. The unemployment rate will likely remain just under 6% through 2003 as both employment numbers and the overall labour force should rise moderately. Excess capacity, low profit margins and uncertain capital markets have restrained business investment and have made business reluctant to hire new staff.

Housing construction in the United States fell sharply in October, down 11.4% from the 16-year high recorded in September. The decline indicates that while the housing market may have plateaued, interest rates at 40-year lows should continue to support the industry.

Price competition to maintain market share from both domestic and foreign firms has kept price increases subdued, with the CPI expected to average about 1.5% in 2002. Price pressures are likely to increase moderately in 2003, with the CPI rising by about 2-2.5% compared to 2002. These modest inflation figures should allow the Federal Reserve Board to maintain the current low interest rates into the middle of 2003. A modest series of rate increases through the second half of 2003 should bring the Fed Funds rate up to about 3% by year-end.

A major uncertainty over the next year or so will be the situation regarding Iraq and a possible conflict between Iraq and the United States or a United Nations-sanctioned force. In mid-November, the Iraqi government agreed to allow UN weapons inspectors into their country to search for "weapons of mass destruction" or to verify that no such weapons exist. This concession by the Iraqi government appears to have calmed the situation for the present, but the longer-term outlook remains volatile and the ultimate resolution is very much in doubt.

Citing the effect of a weak U.S. economy on Japan's exports and industrial production, the Bank of Japan issued a gloomy assessment of the Japanese economy. The Japanese economy has stabilized, but hopes for a recovery are uncertain. Exports from Japan grew strongly in the first and second quarters of 2002, but have since weakened in line with lacklustre global demand. Domestically, the story is even more discouraging. Retail sales, including department store sales and new car sales, are declining and housing starts are at their lowest levels for many years. The consumer sector is suffering from high unemployment, very weak income and wage growth, and declining asset prices.

Japan's gross domestic product rose 0.7% in the third quarter compared to the previous quarter after rising 1.0% in the April-June quarter. However, the Organization for Economic Co-operation and Development (OECD) reported that the Japanese economy, the world's second largest, would probably shrink or show no growth for 2002 and that growth would remain stunted for the next couple of years.

In emerging markets in Asia,[2] activity has picked up markedly since the beginning of 2002, with industrial production and exports rebounding in response to the global upturn. The International Monetary Fund has projected growth for this area to be about 6% both in 2002 and 2003. However, the outlook remains dependent on external developments.

China will likely be the fastest growing economy in the region with growth topping 7% in both 2002 and 2003 and with a strong export sector boosting industrial production.

Aided by strong external demand and strong domestic demand in Russia and the Ukraine, growth in the Commonwealth of Independent States (C.I.S.) is expected to be a respectable 4.6% in 2002 and nearly 5% in 2003. These rates have moderated from 2001, however, due primarily to lower oil revenues and a return to more normal levels of agricultural growth, which was very high owing to the recovery from drought, and structural reforms to the Ukraine agriculture sector in 2000.

The European Union (EU) economy, apparently on the road to recovery earlier in 2002, seems to have faltered and is likely to lag the overall global recovery. Both business investment and consumer spending have weakened in the face of the pessimistic outlook. An interest rate cut may have provided some impetus to renewed growth, but the European Central Bank (ECB) in a meeting in early November 2002 elected to leave rates unchanged. Inflation is a concern in the Union where several countries are experiencing rapidly rising prices. Inflation has breached the 2% ceiling set by the ECB and money supply growth is above the ECB's 4.5% upper limit. Consequently, the OECD has forecast growth to reach only 0.7% in 2002 and to rise to only about 2% in 2003.

Germany, the largest economy in the EU, has exhibited the slowest growth in the EU as its large export sector suffered as a result of weak global demand. Unemployment has also risen, prompting a cutback in consumer spending. Also, volatile foreign demand, weak equity markets and the uncertain geopolitical situation have caused the business sector to lose some confidence in the future. German growth is forecast to be a tiny 0.2% in 2002 and only 0.3% in 2003.

Economic and financial conditions in Latin America deteriorated in the first half of 2002 and remain fragile. Output contracted by 2.5% in the first quarter of 2002 (compared to the last quarter of 2001) and is expected to fall in 2002

[2] Includes developing Asia, newly industrialized Asian economies, and Mongolia.

as a whole. Financial indicators have come under particular pressure, reflecting both the broad-based sell-off in world equity markets and perceptions of increased political risk. Two countries in the region are faring better, however, and have largely resisted the region's difficulties – Chile, because of relatively low public debt, and Mexico, because of its close ties with the United States.

The financial crisis in Argentina (defaulting on its debt and devaluation of its currency) and its spillover effect on some other South American countries accounted for a significant portion of the output decline in 2002. Political uncertainties, high debt levels, large external financing requirements, and fragile banking systems in many of these regional economies are continuing to weigh on economic progress in the area. In order to reduce economic vulnerabilities, firm monetary policies, and structural reforms such as addressing banking sector weaknesses and liberalizing external trade policies, are required.

Improvements in global growth are expected to provide some support for the region next year, but downside risks related to the difficulties mentioned above still remain. Overall, the IMF expects the South American economy to grow by about 2.4% in 2003. Growth in the Mexican economy may reach 4%, although that rate could depend on the strength of the U.S. recovery.

The IMF has projected global growth to reach 2.8% in 2002 and to rise to 3.7% in 2003, underpinned by the turn in the inventory cycle and accommodative policies, with interest rate increases in the United States and the European Union likely deferred until well into 2003. Risks to the forecast are primarily to the downside. The global recovery depends heavily on the outlook for the United States, oil prices may spike if the unrest and uncertainty in the Middle East continues, equity markets remain very volatile, and risks in emerging markets in South America and Turkey have increased.

Note: Information in this article was current as of November 26, 2002.

Sources: Bank of Canada, *Monetary Policy Report, October 2002 Summary*; Canada Mortgage and Housing Corporation, Press Releases, October 8 and November 8, 2002; International Monetary Fund, *World Economic Outlook*, September 2002; RBC Financial Group, *Economic and Financial Market Outlook*, Autumn 2002; Scotiabank Group, *Global Outlook,* September 2002, and *Market Trends*, November 1, 2002; Statistics Canada, *Canadian Economic Observer*, October 2002; *The Daily*, October 18, 2002, November 8, 2002, November 19, 2002, November 21, 2002; TD Economics, *Global Economic Outlook*, July 21, 2002, *Quarterly Economic Forecast*, September 16, 2002; TD Economics Commentary, October 16, October 18, October 23, October 31, November 6, November 19 (2) and November 21, 2002; TD Economics, *The Bottom Line*, November 8, 2002; TD Economics Topic Paper, November 7, 2002; 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 TO READERS

Non-Ferrous Metals Consultative Forum On Sustainable Development

The Hague, Netherlands
November 25-26, 2002

CHAIRMEN'S SUMMARY

The three international non-ferrous metals study groups – the International Copper Study Group, the International Lead and Zinc Study Group and the International Nickel Study Group – and their member countries convened the third Non-Ferrous Metals Consultative Forum on Sustainable Development in The Hague, Netherlands, on November 25 and 26, 2002. The Forum was co-chaired by Sauli Rouhinen, Ministry of the Environment, Finland, and Léon Doyen, Ministry of Foreign Affairs, Belgium. Some 60 delegates from 18 countries attended, including government officials and representatives from environment, social and other non-governmental organisations. There was a strong Forum attendance from industry, industry associations and governmental organisations such as UNCTAD, the United Nations Commission on Sustainable Development (UNCSD), and the United Nations Environment Programme (UNEP). A list of Forum delegates is attached.

The Forum was convened to review the results of the three Working Groups and consider a path forward. The Production Working Group, the Product Stewardship Working Group and the Science, Research and Development Working Group were established with a mandate to bring together existing work, share information, identify gaps, and rapidly initiate activities identified by the Forum for future action. Over 100 participants from governments, industry, industry associations, non-governmental organizations, academia and intergovernmental organisations have been collaborating in the work of the three groups over the past two years.

The co-chairs from each of the three Working Groups presented their achievements and recommendations to move the work forward.

PRODUCTION WORKING GROUP

The Working Group reported on its evaluation of the effectiveness of drivers for Sustainable Development (SD) and Community Engagement (CE) approaches in non-ferrous metals production. The financial community was included in its review, as this sector is considered to be a potential driver for sustainable development in the mining and minerals sector. To analyse the SD and CE initiatives, the Working Group compiled inventories on SD practices and CE approaches. Although the inventories are not comprehensive, they still provide a representative overview of existing initiatives. Most of the SD initiatives appeared to be government led and mainly environment oriented. Only a few drivers included a "triple bottom line" approach, addressing simultaneously issues related to the economic, social and environmental pillars of the SD concept. Most of the CE initiatives included in the inventory were initiated by industry, mainly directed towards capacity building tools for solving local problems. About 30% of the reported SD drivers and half of the CE initiatives were reported as being successful. However, respondents did not provide information on the indicators and criteria used to evaluate the initiatives. The Working Group therefore recommended selecting criteria and indicators for assessing specific initiatives. The Working Group concluded that although the financial sector is a potentially important driver for SD in the mining and minerals industry, there is currently no evidence that companies with good SD practices get preferential treatment from banks and other institutions. To evaluate the potential impact of the financial sector, the Working Group recommended assessing the possible role of this sector more thoroughly. Further work would also be needed to appraise more clearly the role of governments in assisting SD policies related to the mining and minerals industry.

SCIENCE, RESEARCH AND DEVELOPMENT WORKING GROUP

The Working Group reported that the Science Research Network was now functioning on the Forum's web site at www.nfmsd.org. The Forum recognised that the Network was an important output of the Forum and that it represented a useful tool in understanding the link between science and the sustainable development of non-ferrous metals. It endorsed the work done and recommended that further work be done to analyse key users of the Network to guide future work on science issues. It was also recommended that steps be taken to establish formal links with the web sites of the non-ferrous metals industry associations, with government members' research sites, and with the web sites of research institutes that appear on the Network to help the Network's visibility to improve further. The Working Group's report on scientific and policy issues relating to risk assessment of non-ferrous metals was approved and the Forum recommended that future work undertaken on risk assessment should be widened to include elements of risk management – following a broader approach that could be termed risk analysis. It proposed that work should be done to show how risk analysis as a tool could contribute to product stewardship; that linkages between the tools used in risk analysis and approaches to life-cycle management should be explored; that workshops or working groups on specific issues such as the current state of knowledge in the science of bioavailability of metals or risk assessment methodologies should be convened; and that future presentation of work on risk analysis should be targeted carefully at audiences to ensure that recommendations are taken up. The Forum endorsed the valuable work undertaken to date that had contributed to improving understanding of both the use of life-cycle analysis (LCA) as a tool and its potential limitations, and agreed that a broader "life-cycle thinking" that included elements of materials choice and the efficient use of resources should be analysed. The Forum recommended that detailed consideration be given to how the LCA work undertaken could be used as a tool within a product stewardship scheme and risk analysis; that consideration should be given to fostering understanding of a life-cycle management approach to non-ferrous metals; that an approach to LCA that recognised the different priorities of the developed and developing worlds should be elaborated on; and that the shortcomings regarding LCA that had been identified should be communicated to regulatory agencies.

PRODUCT STEWARDSHIP WORKING GROUP

The Working Group reported back to the Forum on its efforts to develop tools and guidelines for a product stewardship scheme for non-ferrous metals. Among the achievements to date, the Working Group developed a template of product stewardship principles, criteria and indicators and tabled the results of a preliminary questionnaire on product stewardship performance within selected companies in the non-ferrous metals industry. The Forum recommended continuing to develop a product stewardship framework in close collaboration with industry and other key stakeholders. Recognising that responsible product management should be an integral part of good business practice, the Forum identified the need to demonstrate more clearly the benefits of adhering to a product stewardship scheme. Aiming at developing the "business case for product stewardship," the communication of benefits should be directed to both industry and other supportive key stakeholders such as consumers, governments and NGOs. The Forum recommended that future work should continue to take stock of existing experiences within the non-ferrous metals industry. The preliminary questionnaire was regarded to be a useful tool for assessing the current product stewardship performance of industry. Building on the outcomes of the results of the questionnaire, the Forum recommended that future work should expand the exercise to reach wider global coverage and to arrive at a representative crosscut of the industry. Furthermore, the questionnaire should aim at identifying the benefits and difficulties related to the product stewardship concept from the industry's perspective. While broadening the questionnaire exercise to include companies without prior knowledge of product stewardship, the questionnaire should be refined, aiming at clarifying definitions and avoiding extensive use of technical jargon. While referring to the Forum's original "Vision statement," it was highlighted that any framework to be developed should be compatible and consistent with management tools and schemes addressing other aspects of sustainable development. The Forum recognized the need to address a common set of principles and criteria that allows for flexibility of implementation depending on regional conditions and commodity variability.

Key findings and outputs from each of the three Working Groups and background papers presented at the Forum meeting are available on the Forum's web site at www.nfmsd.org.

THE WAY FORWARD

Forum participants restated their commitment to the Forum process and support for the work accomplished to date by the three Working Groups. It was recognised that the outcomes of this work were already having an influence on discussions in other forums with an interest in mining, minerals and metals. The Forum recognised that as a multi-stakeholder group, the Consultative Forum was unique in its ability to look at issues related to the mining, minerals and metals sector from a non-ferrous metals perspective.

Recognising the need to take actions forward in an integrated and targeted approach, the Forum agreed to refocus its future work plan and build on the outcomes from the work of the three Working Groups in a co-ordinated manner under the unified theme of stewardship. To take its work forward, the Forum approved the establishment of an "Implementation Task Force" to comprise co-chairs of the three former Working Groups, Working Group Champions, the Study Group Secretariats and other interested parties. The Task Force will consider the Working Groups' results, use of analytical tools, and communication issues, and look at further development of the Forum's product stewardship framework and draw up a work plan for consideration by Forum participants. As a first priority, the Task Force will focus its efforts on:

- Further developing a product stewardship framework for the non-ferrous industry;
- Issues related to life-cycle management and risk analysis;
- Building the business case for sustainable development;
- Indicators for community engagement;
- Enhancing the Science Research Network;
- The development of a communications strategy for improving the Forum's visibility and ability to interact with other forums; and
- Analysing the role of the financial sector as it impacts on the non-ferrous metals industry.

The Implementation Task Force will draw up a draft work plan early in January 2003 that will then be submitted to the participants in the Forum in The Hague and the Study Groups. A revised work plan will then be developed by the Implementation Task Force at the end of January.

At its last meeting in Porto, the Consultative Forum recommended that a workshop be organized to address issues regarding recycling technology transfer and sound policy development on metals recycling with special focus on developing countries and countries with economies in transition. Recognizing this, the International Copper Study Group, the International Lead and Zinc Study Group, and the International Nickel Study Group will jointly organize an international workshop on metals recycling in St. Petersburg, Russian Federation, September 10-12, 2003. The theme of the multi-stakeholder workshop will be to look at metals recycling from a developing world and economies in transition perspective. Workshop participants will identify issues and outline possible solutions towards the development of national and international policies or strategies to encourage the sustainable management of recoverable metal-bearing materials and resources.

The co-chairs noted the continued strong commitment of Forum participants to work collectively to achieve tangible results through the Forum process. Considerable progress has been made already through the entirely voluntary efforts of this global group of stakeholders.

Léon Doyen
Ambassador Plenipotentiary
Directorate-General of Economic and Bilateral Relations
Ministry of Foreign Affairs
Belgium

Sauli Rouhinen
Environment Counsellor
Ministry of the Environment and Secretary General of the Finnish National Division Commission on Sustainable Development
Finland

December 2002

Import and Export Tables

TABLE 1. CANADA, VALUE OF MINERALS AND MINERAL PRODUCTS (STAGES I TO IV), IMPORTS BY COMMODITY, 2000-02

	2000	2001	2002 (a)
		($000)	
METALS			
Aluminum	5 009 047	4 841 593	4 243 736
Antimony	8 497	7 198	7 613
Barium	5 259	5 096	3 979
Beryllium	106	513	520
Bismuth	2 640	2 399	1 166
Cadmium	1 217	1 051	1 095
Calcium metal	51 652	41 030	46 819
Chromium	79 201	69 717	55 563
Cobalt	49 331	41 214	22 096
Copper	3 350 352	1 826 433	1 358 293
Gallium	36	20	55
Germanium	3 659	8 004	6 645
Gold	954 657	807 960	848 306
Hafnium	222	2	146
Indium	1 489	1 574	764
Iron and steel	17 131 354	15 051 926	13 741 932
Iron ore	364 182	340 313	318 398
Lead	468 186	382 099	329 761
Lithium	62 467	60 356	47 313
Magnesium and magnesium compounds	151 674	135 212	105 402
Manganese	212 759	179 366	185 289
Mercury	552	1 092	2 680
Mineral pigments	144 488	147 835	150 142
Molybdenum	38 494	33 105	44 656
Nickel	396 371	349 829	337 997
Niobium	24 245	18 435	17 117
Platinum group metals	378 022	415 968	263 276
Rare earth metals	9 922	9 043	10 476
Rhenium	36	204	176
Selenium	624	3 049	654
Silicon	88 120	69 284	56 711
Silver	150 552	153 819	168 092
Strontium	1 904	1 841	1 244
Tantalum	1 924	3 905	757
Tellurium	468	541	340
Thallium	18	20	–
Tin	70 891	55 883	46 525
Titanium metal	151 819	107 678	69 966
Tungsten	10 904	10 454	8 870
Uranium and thorium	252 757	243 142	216 612
Vanadium	15 271	13 403	15 347
Zinc	269 191	198 243	184 003
Zirconium	40 003	42 575	46 257
Other metals	11 728 680	11 372 767	9 787 298
Total metals	41 683 243	37 055 191	32 754 087
NONMETALS			
Abrasives	479 189	416 872	352 963
Arsenic	427	526	413
Asbestos	103 143	94 053	90 320
Baryte and witherite	6 679	9 290	6 382
Boron	35 155	37 442	32 713
Bromine	2 215	2 688	2 281
Calcium (industrial minerals)	5 494	5 031	4 638
Cement	233 623	242 139	202 016

TABLE 1 (cont'd)

	2000	2001	2002 (a)
		($000)	
NONMETALS (cont'd)			
Chlorine and chlorine compounds	87 640	100 807	95 389
Clay and clay products	977 008	998 836	928 425
Diamonds	523 488	498 848	504 867
Dolomite	1 901	3 596	6 460
Feldspar	333	306	283
Fluorspar	49 681	58 954	44 247
Glass and glassware products	2 839 047	2 858 333	2 286 663
Granite	57 614	69 890	65 166
Graphite	472 395	428 344	340 887
Gypsum	48 258	61 582	69 875
Iodine	13 898	12 855	10 448
Lime	8 067	11 801	8 352
Limestone flux and other limestone	21 442	27 014	24 491
Marble, travertine and other calcareous stones	47 276	61 616	55 753
Mica	12 790	13 601	13 013
Nepheline syenite	2	6	16
Nitrogen	207 481	236 594	134 774
Olivine	1 272	943	718
Pearls	24 271	19 950	19 575
Peat	1 219	1 733	2 516
Perlite	14 585	17 569	14 771
Phosphate and phosphate compounds	520 131	427 265	285 417
Potash and potassium compounds	38 753	41 889	31 891
Salt and sodium compounds	348 261	405 568	301 293
Sand and gravel	17 679	15 096	15 603
Sandstone	2 373	3 331	2 721
Silica and silica compounds	217 301	201 995	164 450
Slate	9 985	11 570	10 300
Sulphur and sulphur compounds	24 184	25 566	19 715
Talc, soapstone and pyrophyllite	15 497	17 768	22 679
Titanium oxides	261 903	237 876	219 140
Vermiculite	7 428	10 223	7 572
Other nonmetals	629 922	605 362	500 402
Other structurals	89 397	85 685	78 751
Total nonmetals	8 458 407	8 380 413	6 978 349
FUELS			
Coal and coke	1 171 592	1 263 915	1 090 305
Natural gas	228 763	294 656	438 991
Natural gas by-products	146 207	91 552	60 857
Petroleum	17 306 251	16 610 593	4 136 515
Other fuels	537 542	586 643	472 860
Total fuels	19 390 355	18 847 359	6 199 528
Total mining imports (including fuels)	69 532 005	64 282 963	45 931 964
Total nonfuel mining imports	50 141 650	45 435 604	39 732 436
Total mining imports (including coal)	51 313 242	46 699 519	40 822 741
Total economy imports	356 851 381	342 977 731	291 357 962

Sources: Natural Resources Canada; Statistics Canada.
– Nil.
(a) First 10 months.
Note: Numbers may not add to totals due to rounding.

TABLE 2. CANADA, VALUE OF MINERALS AND MINERAL PRODUCTS (STAGES I TO IV), TOTAL EXPORTS BY COMMODITY, 2000-02

	2000	2001	2002 (a)
		($000)	
METALS			
Aluminum	8 034 452	8 282 343	7 227 364
Antimony	519	621	67 081
Barium	1 131	621	1 134
Beryllium	–	22	4
Bismuth	3 320	1 483	857
Cadmium	4 190	5 052	3 069
Calcium metal	3 229	2 192	2 216
Chromium	35 920	35 336	26 915
Cobalt	241 140	198 639	142 714
Copper	2 646 405	2 560 801	1 917 093
Gallium	–	–	–
Germanium	97	135	428
Gold	2 589 740	2 295 509	2 488 170
Hafnium	–	–	–
Indium	–	–	–
Iron and steel	11 552 805	10 815 102	10 120 458
Iron ore	1 060 337	955 380	903 377
Lead	285 562	243 782	195 988
Lithium	116	368	480
Magnesium and magnesium compounds	223 424	193 033	229 018
Manganese	29 669	15 040	23 194
Mercury	71	55	22
Mineral pigments	98 391	112 203	112 764
Molybdenum	48 912	57 763	80 182
Nickel	2 566 763	2 283 300	1 993 132
Niobium	44 378	52 981	50 488
Platinum group metals	377 830	366 355	190 749
Rare earth metals	10	374	93
Rhenium	–	–	–
Selenium	4 020	5 565	3 695
Silicon	128 440	105 958	82 909
Silver	473 272	452 336	397 876
Strontium	9	28	–
Tantalum	1 227	1 442	59
Tellurium	2 386	2 634	1 731
Thallium	–	–	–
Tin	14 048	10 255	6 999
Titanium metal	21 579	33 218	19 374
Tungsten	852	2 117	17 653
Uranium and thorium	645 966	939 088	789 733
Vanadium	4 738	3 537	93 832
Zinc	1 678 531	1 325 506	1 118 890
Zirconium	11 925	8 196	17 065
Other metals	6 393 408	5 772 865	4 894 664
Total metals	39 228 812	37 141 235	33 221 470
NONMETALS			
Abrasives	260 203	236 960	205 303
Arsenic	–	43	–
Asbestos	262 247	249 390	210 729
Barite and witherite	5 189	7 948	4 727
Boron	1 581	1 144	1 661
Bromine	33	8	144
Calcium (Industrial minerals)	136	138	55
Cement	755 926	813 920	738 525

TABLE 2 (cont'd)

	2000	2001	2002 (a)
		($000)	
NONMETALS (cont'd)			
Chlorine and chlorine compounds	160 812	144 175	134 207
Clay and clay products	81 572	77 836	70 321
Diamonds	713 299	813 419	730 979
Dolomite	42 305	40 265	33 238
Feldspar	66	180	189
Fluorspar	68 699	57 677	54 205
Glass and glassware products	1 219 473	1 393 989	1 044 000
Granite	90 694	94 136	82 144
Graphite	88 002	58 766	62 667
Gypsum	288 676	237 054	172 822
Iodine	6 566	6 250	5 690
Lime	11 439	15 325	19 099
Limestone flux and other limestone	25 205	24 470	21 289
Marble, travertine and other calcareous stones	65 539	25 582	22 226
Mica	15 215	12 555	12 372
Nepheline syenite	52 176	51 378	53 367
Nitrogen	1 025 121	922 253	818 616
Olivine	–	–	–
Pearls	5 148	5 072	2 440
Peat	330 388	318 705	237 828
Perlite	–	–	–
Phosphate and phosphate compounds	35 678	22 687	34 218
Potash and potassium compounds	2 428 760	2 221 674	2 016 502
Salt and sodium compounds	498 536	641 524	473 866
Sand and gravel	29 902	41 465	50 669
Sandstone	106	344	150
Silica and silica compounds	23 954	31 450	33 278
Slate	11 590	7 641	13 757
Sulphur and sulphur compounds	336 077	222 388	185 453
Talc, soapstone and pyrophyllite	22 889	20 088	25 008
Titanium oxides	195 326	181 554	157 820
Vermiculite	–	–	–
Other nonmetals	381 397	438 229	409 293
Other structurals	158 552	180 449	158 265
Total nonmetals	9 698 477	9 618 131	8 297 122
FUELS			
Coal and coke	1 874 784	1 985 592	1 580 206
Natural gas	20 555 588	25 595 364	14 295 232
Natural gas by-products	1 816 085	2 022 019	1 105 956
Petroleum	27 724 121	25 348 929	22 494 906
Other fuels	311 513	317 642	299 271
Total fuels	52 282 091	55 269 546	39 775 571
Total mining exports (including fuels)	101 236 115	102 054 374	81 313 285
Total nonfuel mining exports	48 954 023	46 784 829	41 537 713
Total mining exports (including coal)	50 828 808	48 770 420	43 117 920
Total economy exports	412 900 022	402 500 502	330 633 455

Sources: Natural Resources Canada; Statistics Canada.
– Nil.
(a) First 10 months of 2002.
Note: Numbers may not add to totals due to rounding.