

Nickel

Bill McCutcheon

International and Domestic Market Policy Division

Telephone: (613) 992-5480

E-mail: bmccutch@nrcan.gc.ca

(Abbreviations used in this article include: ^e Estimated; ^f Forecast; ^P Preliminary; Ni = nickel; NiO = nickel oxide sinter; Cu = copper; Co = cobalt; pgm = platinum group metals; Pt = platinum; Pd = palladium; FeNi = ferronickel; LME = London Metal Exchange.)

2000 nickel: \$1.8 billion^P
 World rank: Second
 2000 exports: \$1.7 billion

Canada	2000	2001 ^e	2002 ^f
	(000 tonnes)		
Mine production	190	187	190
Refined production	134	141	143
Usage	15	14	15

^e Estimated; ^f Forecast.

Notes: Mine production refers to metal content in concentrates produced. "Refined" production refers to "primary" nickel production, which includes refined nickel, nickel in nickel oxide sinter, and nickel in nickel chemicals.

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

1997	1998	1999	2000	2001 ^e
(US\$/lb)				
3.14	2.09	2.73	3.92	2.65

^e Estimated.

CANADIAN OVERVIEW

- Inco:** A feasibility study of the Totten discovery (10 Mt grading 1.5% Ni, 1.97% Cu and 4.8 g/t Pd and Pt) continued. Exploration continued at the Copper Cliff North and McCreedy East mines for pgm-rich areas. Negotiations between Inco and the Government of Newfoundland and Labrador about the Voisey's Bay project resumed in June with a target for completion of year-end 2001; provincial processing requirements remain the major issue. Inco ceased exploration activities at Voisey's Bay in the third quarter of the year; Inco raised US\$230 million selling Lyon notes. Inco produced 149 000 t of Ni worldwide in nine months, compared to 148 000 t in the same period in the previous year.
- Falconbridge:** After a seven-month strike, workers at Falconbridge's Sudbury operations agreed to a new labour contract in February lasting until February 28, 2004. Falconbridge's operations returned to full production by June. Falconbridge bought the Montcalm property from Outokumpu in May; Montcalm has a potential to produce 8000 t/y of Ni in concentrate. Falconbridge's nine-month mine production was 35 000 t, compared to 38 000 t in the same period in the previous year.
- The Ontario government issued Notices of Intent to Inco and Falconbridge that the hourly ground-level concentration of SO₂ will be reduced to 0.32 ppm from 0.50 ppm by April 2002 and that allowable yearly SO₂ emission will be reduced by 34% by 2006. Public consultations are the next step.

- **Sherritt International** owns 50% of **Metals Enterprise (ME)**; ME's nine-month production at its Fort Saskatchewan refinery was 21 000 t of Ni and 2100 t of Co, up 16% and 11% respectively compared to the same period in the previous year. ME is expected to establish a new record at Moa Bay, Cuba, mining higher grade ore.
- **North American Palladium's** new 15 000-t/d mill is producing; the \$207 million mine/mill expansion will increase by-product Ni production to about 900 t/y when ramped up. The concentrate is sent to Inco and Falconbridge for processing.
- With financing of \$6.7 million secured, **Canmine** will start the final phase of expansion of its hydrometallurgical plant in December 2001; initial production will be 300 t/y of Co in chemicals, and a subsequent expansions will see Ni production from the refinery.
- **The Royal Canadian Mint** completed its program to substitute solid alloy coins with new plated coins using a proprietary Ni-Cu and Ni-Cu-Ni plating process. The Mint will save \$10 million per year and reduce Ni usage in coins; the former coins will be available for recycling.

WORLD OVERVIEW

- **Norilsk Nickel** completed its share swap; now **Norilsk Nickel MMC** owns **RAO Norilsk Nickel**, instead of the reverse. The major shareholder of Norilsk Nickel MMC is Interros; foreign interests own 17.5%. Norilsk said it would only export 155 000 t of Ni in 2001; lower domestic demand implies that Norilsk is building a Ni stockpile, estimated to reach about 50 000 t by year-end. To compensate for falling ore grades, Norilsk will pay Outokumpu US\$250 million to build a modern 10-Mt/y mill, replacing an older one, and to expand another mill by 7 Mt/y; Norilsk increased mine operations to seven days/week as of October 1, mining more ore because of lower ore grades.
- **WMC** sold some smaller mines in Australia: The **Miitel Joint Venture** bought the Miitel mine in May and the Wannaway mine in the third quarter while the Otter John and Coronet mines were sold to **GBF Pty Ltd.** These companies will sell the ore to WMC for processing. WMC bought the Yakabindie deposit from **Rio Tinto** in the first quarter.
- Pressure acid leach plants: **Anaconda's** Murrin Murrin plant produced 19 300 t in nine months, up 220%, or 10 600 t compared to the same period in the previous year; operation at the nameplate capacity of 60 000 t/y by mid-2002 was promised. **Preston Resources' Bulong** plant produced 4200 t in eight months, up 150%, or 1500 t, compared to the same period in the previous year. **Centaur's** Cawse operation went into receiver-ship; no production details were released in 2001. The Cawse plant is for sale and Inco and WMC were among those expressing interest. A lack of both financial or technical success at the above Australian pressure acid leach plants inhibits most proposed similar pressure acid leach developments worldwide except for Inco's Goro project. This project, which secured a tax holiday in New Caledonia, is targeted to start up in late 2004 producing 54 000 t/y of Ni in NiO by 2006. Norilsk will fund a bankable feasibility study and progressively pay **Argosy Minerals** for increased ownership in the Nakety project in New Caledonia.
- **BHP** and **Billiton** merged in June to form **BHP Billiton** with Ni interests in **QNI** and **Cerro Matoso**, as well as in the Ravensthorpe and Gag Island projects. The feasibility study of the 35 000-t/y Ni, 2000-t/y Co Ravensthorpe project was extended to the fourth quarter of 2002. Forestry concerns at Gag Island in Indonesia inhibited Falconbridge from completing its purchase of a 37.5% share in the BHP Billiton-PT Aneka Tambang laterite project.
- Production cuts in 2001 included: **Ufaleynikel** in Russia, 3000 t; **Falcondo** in Dominican Republic, 5300 t; **Korea Nickel**, 3000 t; **Sumitomo** in Japan, 4000 t by the end of the first quarter of 2002; WMC in Australia will cut output of Ni in matte by 3000 t in 2001 and by a further 3000 t in 2002.
- Project delays have included: Ravensthorpe (noted above); the 40 000-t/y Nonoc project in the Philippines (**Jinchuan** will not participate and **Pacific Energy** wrote off its 37.5% share of the project); the 40 000-t/y Mindoro project (Philippine authorities canceled **Crew Development's** contract of work); and **Weda Bay** suspended work in Indonesia as **OMG** reduced funding due to business uncertainties.
- Expansions: **Eramet** will expand at **SLN** (from 60 000 t in 2001) to 75 000 t by 2006; **Sumitomo** and **Rio Tuba** will build a 10 000-t/y leach plant in the Philippines to produce Ni-Co intermediates for Sumitomo's refinery in Japan; **Feni-Mak** in the Former Yugoslavian Republic of Macedonia restarted its 8000-t/y plant in April; the **Pobuzhsky Ferronickel Works** in the Ukraine restarted in April and will produce 6000-t/y of Ni in FeNi; **Tectonic Resources's** RAV8 started up in April and will send 9000 t of Ni in concentrate to WMC over two years; **Loma de Niquel's** 19 000-t/y mine smelter started up in Venezuela

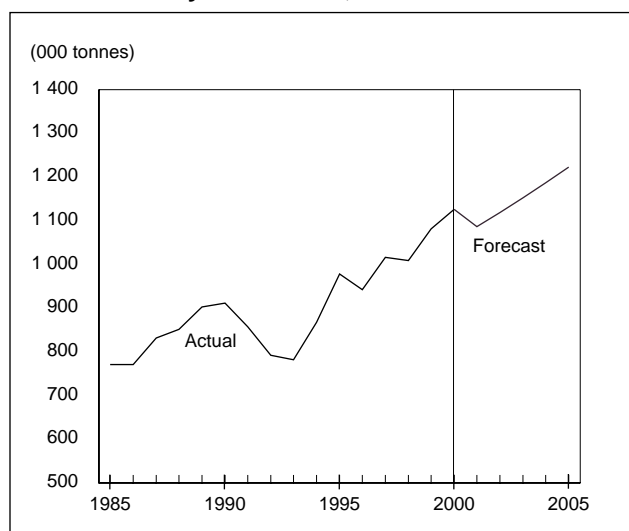
and is scheduled to produce 11 000 t of Ni in FeNi during ramp-up in 2001; and **Cerro Matoso's** 26 000-t/y expansion in Colombia produced its first FeNi on January 1 and expects ramp-up to be completed by mid-2002.

- Australian nickel producer **Titan Resources** continued trials to commercialize its BioHeap™ bacterial leach for sulphide ores; the Research and Productivity Council in Canada is testing 65 t of Inco's ore from Canada for use in cold climates. Titan is commissioning a plant in Australia to recover metals and mixed sulphides from the bioleaching.

DEMAND OUTLOOK

The world nickel market forecast by the International Nickel Study Group (INSG) in April was a surplus of 35 000 t for 2001. The updated INSG forecast will be completed in November (after the due date for this article). The October INSG Bulletin showed increased finished production of 18 000 t and decreased demand of 46 000 t to August 2001 compared to August 2000. Nickel demand was adversely affected by destocking in the stainless steel industry as demand fell with economic activity. 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, 1985-2005



Source: Natural Resources Canada.

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

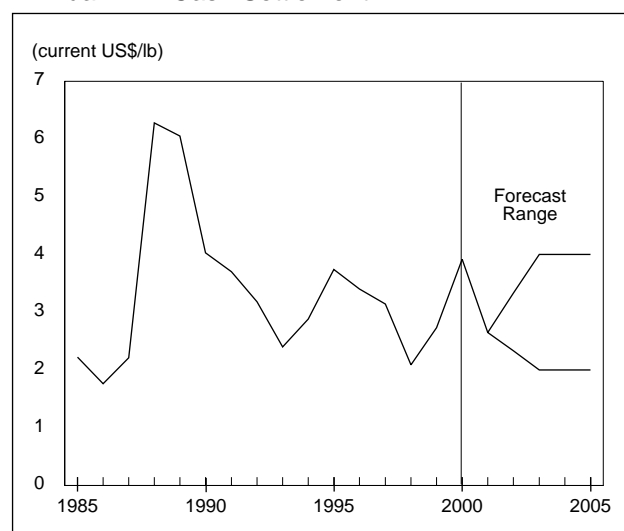
PRODUCTION OUTLOOK

Canadian production of nickel in concentrate in 2001 is forecast at 187 000 t and is expected to rise back to the 2000 level of 190 000 t in 2002. Finished nickel production in Canada is forecast at 141 000 t in 2001, rising to 143 000 t in 2002. Both forecasts assume no strikes or unforeseen production interruptions. Depending upon prices, permitting and financing, possible new production in the medium term includes: **Canmine's** Maskwa deposit, **Falconbridge's** Montcalm deposit, and **Inco's** Totten and Voisey's Bay projects. **Nuinsco** in Manitoba and **Ft. Knox-Dynatec** in Ontario have the potential to produce from former Inco properties and mines. Because of the relative size of Voisey's Bay and the associated uncertainty, a yearly forecast of Canada's nickel production is not presented.

PRICE OUTLOOK

Nickel cash settlement prices on the LME peaked in May at US\$7535/t (\$3.42/lb); despite a small rebound in August, prices continued downward to, at the time of writing (October 31), US\$4420/t (or \$2.00/lb). The average price for the year to October 31 is US\$6085/t (\$2.76/lb). If the price were to average US\$4500/t during the last two months of 2001, then the year's average would be US\$5832/t, or \$2.64/lb. LME stocks rose from 9624 t in January to 17 844 t on October 31, peaking at 18 180 t on October 24.

Figure 2
Nickel Prices, 1985-2005
Annual LME Cash Settlement



Source: Natural Resources Canada.

Prices in 2002 will depend upon the recovery of the world economy. The outlook seems gloomy as of October, although de-stocking of nickel inventories has taken place. The build-up of Norilsk's stockpile overhangs prospects for price growth in 2002. In the medium to long term, prices are expected to average between US\$2 and \$4/lb; if pressure acid leach operations show good production records and low costs by the period 2005-07, prices are then expected to trend downward as lower-cost production starts up. The downward price trend will assist nickel demand growth. The prices below are shown in current dollars or dollars of the day.

Note: Information in this review was current as of October 31, 2001.

NOTE TO READERS

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