

Nickel

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Nickel market conditions improved as 1994 progressed and prices responded accordingly. The London Metal Exchange (LME) monthly average settlement price for nickel increased from US\$2.53/lb in January to US\$3.88/lb in December. The result was a 1994 average settlement price of US\$2.88/lb, up from US\$2.40/lb in 1993. Western World consumption increased for the second year in a row to an estimated 748 600 t, compared to 675 000 t in 1993, and is expected to increase again in 1995 to 790 000 t. In response to growing consumption and rising prices, Western World refined nickel production increased to 592 000 t in 1994, 5% higher than 1993's level of 566 000 t. Western World production should increase to 660 000 t in 1995. "Official" Russian exports were thought to be down in 1994 to 100 000 t from the 1993 official figure of 117 000 t reported at the International Nickel Study Group meetings held in April 1994. On the bearish side, LME stocks finished the year at 148 400 t, up 24 000 t from year-end 1993. Despite large stocks, 1995 is forecast to be another good year for the nickel industry. The 1995 average settlement price of nickel is forecast to be in the range of US\$3.40-\$3.60/lb.

CANADIAN OVERVIEW

Canada's mine production of nickel decreased in 1994 to 152 100 t, compared to 184 400 t in 1993. Production cuts by Inco in the first quarter and the closure of the Namew Lake mine late in 1993 were the main factors responsible for the decrease. Canada's mine production of nickel is expected to rebound to 190 000 t in 1995 as a result of Inco increasing its overall production by 25%.

Inco

Inco decreased production during the first quarter of 1994 through an eight-week shut-down at its Ontario

Division and a five-week shut-down at its Manitoba Division. The Manitoba Division was originally scheduled to be shut down for eight weeks as well, but plans were modified in late February due to stronger-than-anticipated consumer demand. Inco's total nickel production, which includes nickel in matte from P.T. Inco, was 157 000 t compared to 167 000 t in 1993.

Both Divisions closed in July for their annual four-week summer shut-downs. An incident at the Manitoba Division's T-1 mine shaft, however, resulted in the shaft being out of commission until mid-September. This caused a production loss of 3600 t of nickel. There were no injuries associated with the incident in which one of two new 20-t capacity skips was accidentally dropped.

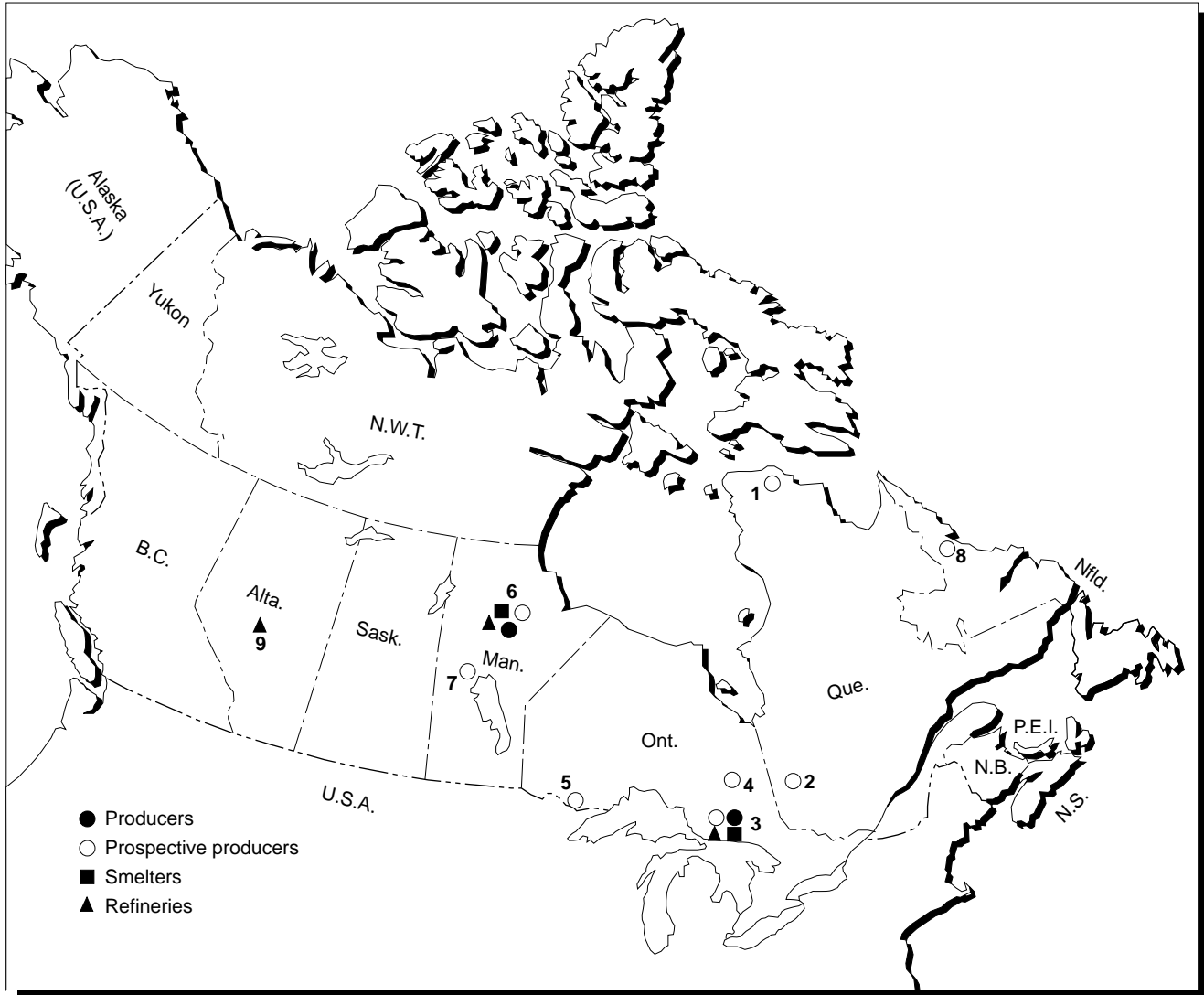
In May, a new three-year labour contract was signed between Inco and its Ontario Division's two United Steelworkers of America locals. The new contract increased basic pensions. The nickel bonus was maintained and an option was added that allows employees to switch to a profit-sharing plan on June 1, 1995.

Inco reduced its Canadian workforce by 800 through a retirement package offered at the beginning of the year. The workforce adjustment helped Inco lower its break-even price for nickel to around US\$2.70/lb in 1994. The break-even price should decrease in 1995 to below US\$2.50/lb as Inco focuses on increasing production and the level of productivity.

The reduction in costs together with an increase in Inco's realized nickel price from US\$2.72/lb in 1993 to US\$3.00/lb in 1994 were the major factors in the company's US\$22 million profit. Inco made US\$28 million in 1993, primarily due to the sale of its equity interest in TVX Gold. A total of US\$319 million was raised by Inco in 1994 on the Canadian and U.S. investment markets. The proceeds went towards repaying Inco's debt and to financing capital projects. Capital expenditures will double in 1995 to US\$315 million to accelerate development programs in Sudbury, Ontario and Thompson, Manitoba.

In 1994, the Ontario government gave environmental approvals for an advanced development program on the Victor deposit located in the Sudbury region.

Figure 1
Nickel in Canada, 1994



Numbers refer to locations on map above.

PRODUCERS

- 3. Falconbridge Limited (Craig, Fraser, Lindsley, Onaping, Strathcona)
Inco Limited (Coleman, Copper Cliff North, Copper Cliff South, Crean Hill,
Creighton, Froid, Little Stobie, McCreedy West, Garson, Stobie)
- 6. Inco Limited (Thompson, Birchtree)

SMELTERS

- 3. Falconbridge Limited (Falconbridge)
Inco Limited (Copper Cliff, Sudbury)
- 6. Inco Limited (Thompson)

REFINERIES

- 3. Inco Limited (Sudbury)
- 6. Inco Limited (Thompson)
- 9. Sherritt Gordon Limited (Fort Saskatchewan)

PROSPECTIVE PRODUCERS

- 1. Falconbridge Limited (New Quebec Raglan)
- 2. Timmins Nickel Inc. (Dumont)
- 3. Inco Limited (Levack, Murray, Totten, McCreedy East,
Victor)
Falconbridge Limited (Lockerby)
- 4. Teck Corporation (Moncalm Township)
Timmins Nickel Inc. (Langmuir)
Black Hawk Mining Inc. (Redstone)
- 5. Inco Limited (Shebandowan)
- 6. Inco Limited (Soab North, Soab South, Pipe No. 1, Pipe No. 2)
- 7. Black Hawk Mining Inc. (Minago)
- 8. Diamond Field Resources Inc. (Voisey Bay)

Development work will include the sinking of a shaft to 1770 m (5800 ft), development of 1675 m (5500 ft) of exploration drifts from the shaft, and development of 38 100 m (125 000 ft) of underground diamond drilling to the 2745-m (9000 ft) horizon. The C\$72 million program will be completed by 1998. Exploration to date has outlined two separate mineral zones. One zone is located 1525 m (5000 ft) below the surface with over 5.4 Mt grading 0.54% copper and 2.26% nickel. The other is located more than 2130 m (7000 ft) below the surface with over 6.4 Mt grading 5.1% copper, 1.9% nickel and 0.24 oz/t of precious metals.

Exploration in the Thompson, Manitoba, area located a new high-grade nickel deposit known as Pipe Deep. The deposit is 32 km south of Inco's processing facilities and 1.5 km from the Pipe 2 mine production shaft (closed since 1978). Drilling has outlined 3.6 Mt grading 2.32% nickel between 855 m (2800 ft) and 1585 m (5200 ft) below the surface. In 1995, an engineering feasibility study will be conducted, along with continued exploration.

Development work continued at the Manitoba Division's 1-D project. The 5.5-m (18-ft) diameter ventilation shaft was completed and equipped with a 7.25-t (8-ton) skip. In June, the 3600 automated tramming level, which will transport ore from the 1-D orebody to the T-1 production shaft, was finished. Full production of 16 800 t/y of nickel is scheduled for 1998.

In Sudbury, development work re-started on the McCreedy East mine. The remaining capital costs total C\$194 million. Development work was suspended on the deposit in 1991 in order to incorporate a high-grade copper-precious metals orebody located in the footwall. Production is now expected to begin in late 1996 and to reach 10 000 t/y of nickel by 1999.

Also in the Sudbury region, C\$18.3 million will be spent on a new ore-handling system at the Creighton mine. The system will access 2.4 Mt of ore grading 2.9% nickel and 2.45% copper, located between the 2195-m (7200 ft) and 2255-m (7400 ft) levels. As well, the ore-handling system will be used in the subsequent deepening of the mine.

Inco will begin producing a new valued-added product, nickel foam, at its Copper Cliff refinery in Sudbury. Nickel foam is a high-porosity product desirable in the manufacturing of rechargeable nickel-cadmium batteries and nickel-metal hydride batteries, giving the batteries increased energy storage density.

Inco stated its commitment to maintaining a 25% share of the world nickel market while continuing to reduce costs. Total nickel production will increase in 1995 to 195 000 t from 157 000 t in 1994. A large portion of this increase will come from Inco's Canadian operations through a decrease in scheduled

shut-downs. Sudbury will shut down for two one-week periods in 1995, while Thompson will shut down for three weeks. Inco has also indicated that it intends to increase its production to at least 215 000 t/y by the end of the century.

Falconbridge Limited

Falconbridge Limited's Canadian production was down slightly in 1994 to 36 800 t of nickel in matte, from the 38 300 t produced in 1993. The company's Canadian operations were shut down for one week in January and two weeks in July, compared to a total of six weeks in 1993. Total finished nickel production, which comprises refined nickel from Nikkelverk and nickel in ferronickel from Falconbridge Dominicana, increased by 22% to 98 800 t in 1994 from 80 700 t in 1993.

The increase in total production, together with an increase in metal prices, was reflected in Falconbridge's earnings of C\$131 million for 1994. Falconbridge incurred a loss of C\$44 million in 1993, primarily due to a realized nickel price of US\$2.48/lb. In contrast, 1994's realized nickel price was US\$2.91/lb. Continuing success in increasing productivity and in decreasing operating costs also contributed to improved profits.

Falconbridge went public in June, selling 77 million shares for C\$1.4 billion. Falconbridge shares were held 46.4% by Noranda and 28.3% by Trelleborg AB at the end of 1994, with the remaining 25.3% being widely distributed. Proceeds from the sale were partially used to pay down Falconbridge's debt, with the remainder being used to expand its existing production facilities and to continue exploration work on its New Quebec Raglan nickel property in northern Quebec and at its Collahuasi copper property in northern Chile.

A new collective agreement was reached in September between Falconbridge and the Canadian Auto Workers Union, which represents some 1400 mine, mill and smelter workers in Sudbury. The new three-year contract includes retention of cost-of-living allowances, improvements to pensions, a shift premium for work on Saturdays, and the recall of 37 laid-off miners. There were no wage increases agreed to in the contract which runs until August 1, 1997.

The Lockerby mine was placed on care and maintenance effective June 1. It was one of the company's highest grade mines at Sudbury, but also one of the most expensive to operate. The company is, however, considering a shaft-deepening project to access high-grade reserves indicated at depth. Lockerby produced 3400 t in 1993, or 9% of Falconbridge's Sudbury nickel production.

Falconbridge successfully switched its Sudbury smelter from a two-furnace line to one "super" furnace line in 1994. The project began during the

company's two-week summer shut-down in July and was completed by the end of the summer. Full capacity of the new furnace line is expected to be reached early in 1995. The smelter will continue to operate under a two-furnace, two-roaster operation until the #2 furnace is running smoothly. At that time, the old #1 furnace will be taken off line. The single furnace operation will reduce sulphur dioxide emissions and lower maintenance and operating costs. Work was also completed on upgrading the Strathcona mill, which is now producing a higher-grade concentrate.

Exploration work continued on the New Quebec Raglan property in northern Quebec. Since 1989 Falconbridge has spent over C\$54 million on the property, which included a feasibility study completed in 1993. The capital costs of the project were estimated at C\$450 million with a cash operating cost of less than US\$2.00/lb. Reserves to date are 18.1 Mt grading 3.13% nickel and 0.88% copper. An annual concentrate production of 20 800 t of nickel, 5200 t of copper and 330 t of cobalt was forecast.

In the Sudbury area, Falconbridge spent C\$8.3 million on exploration work in 1994 and plans to spend C\$10.5 million in 1995. Results to date at the Nickel Rim property (which surrounds Inco's Victor deposit) have outlined 520 000 t grading 4.13% nickel, 25.53% copper, 9.8 g/t platinum and 8.5 g/t palladium. Encouraging drill results were also encountered at the Craig mine southeast of Sudbury, indicating the potential for a significant new ore-bearing structure. One intersection averaged 1.23% nickel, 0.47% copper and 0.05% cobalt over 99.7 m at a depth of 2041 m.

Sherritt

Sherritt Inc.'s finished nickel production increased to 20 300 t in 1994 from 18 300 t in 1993 as a result of the recent expansion of its cobalt refining facility. The increased production, lower unit operating costs and higher metal prices resulted in operating earnings of C\$44.5 million in 1994 for Sherritt's Metals business and record net earnings of C\$80 million for Sherritt Inc. This is a significant improvement over 1993's loss of C\$19.6 million for Sherritt's Metals and a loss of C\$41.5 million for Sherritt Inc. Sherritt's realized nickel price increased in 1994 to US\$3.84/lb from US\$3.06/lb in 1993.

A joint venture was established in December between Sherritt and Cuba's state-owned General Nickel Co. S.A. to mine, refine and market both nickel and cobalt. The joint venture includes three corporations, each owned 50-50 by General Nickel Co. S.A. and Sherritt. The three corporations are Moa Nickel S.A., which includes the mining operations and associated processing facilities at Moa Bay; The Cobalt Refinery Company Inc., which comprises the metals refining facilities at Fort Saskatchewan, Alberta; and International Cobalt Company Inc. (ICCI), which will be responsible for the commercial activities of the enterprise, including marketing and sales.

The Cuban government will grant the enterprise mining concessions sufficient to supply the Moa Bay plant for 25 years, with further reserves likely available for an additional 25 years. An estimated C\$150 million will be invested in the operation over the next few years to upgrade and expand the Moa facilities.

Black Hawk Mining

Black Hawk Mining successfully issued one million shares valued at C\$600 000 to help finance a drill program at the Redstone nickel mine, south of Timmins, Ontario. The drill program was designed to test the down-dip extension of the known ore zone below the 215-m (700 ft) level, the mine's lowest working zone, to the 335-m (1100 ft) level. In December, the company announced a weighted average of 6.67% nickel over an average intersection of 2.4 m (7.8 ft) for the first four drill holes. If the continuity of the ore zone is established between the 215-m and 335-m levels, the mine could be in operation at a rate of 300 t/d of nickel ore within six months. The Redstone mine began production in 1989 but closed in 1992 due to poor market conditions. Reserves at the time of closure were 36 000 t averaging 2.6% nickel.

Black Hawk Mining also owns the Minago deposit 219 km south of Inco's Thompson operation. Ore reserves at Minago are estimated at 10.5 Mt grading 1.19% nickel. The company is seeking a joint-venture partner to develop the deposit.

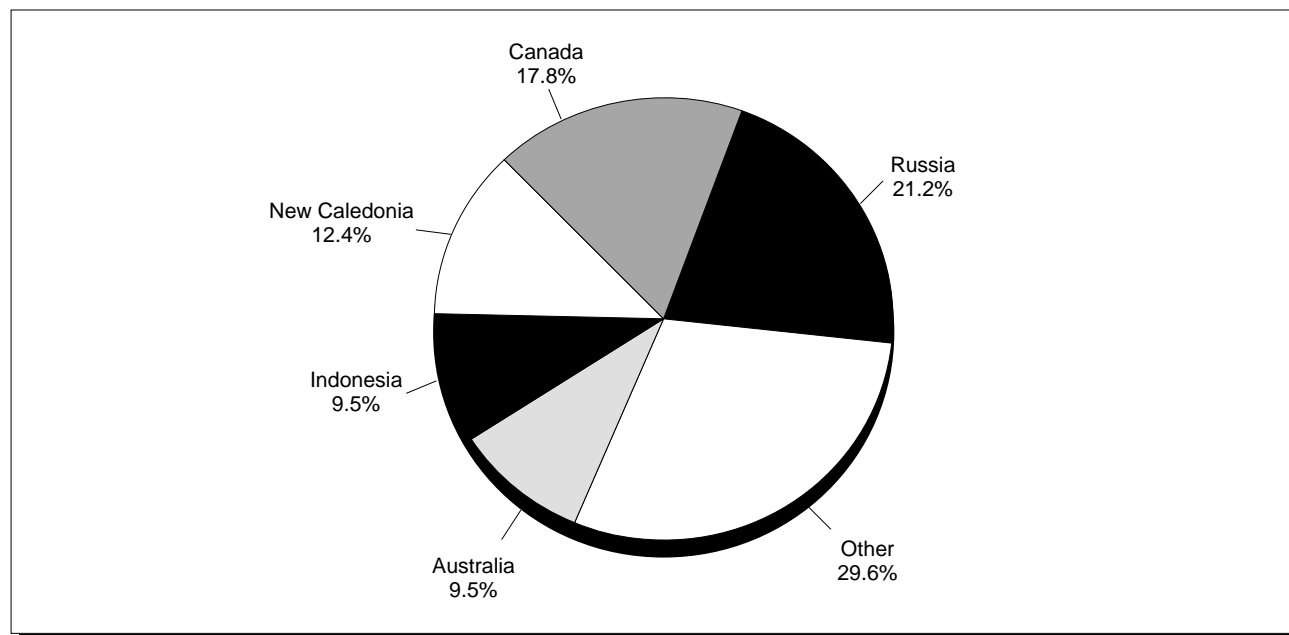
Diamond Field Resources Inc.

In November, Vancouver-based Diamond Field Resources Inc. reported assay results of five drill holes that confirmed a significant nickel, copper and cobalt discovery at its Voisey Bay Labrador Project, 35 km southwest of Nain. Drill hole #2 intersected a 71-m base-metal mineralization assaying 2.23% nickel, 1.47% copper and 0.123% cobalt. Preliminary metallurgical results indicated good recoveries of both copper and nickel by standard flotation methods. A Toronto-based company has been hired to complete a pre-feasibility study of the Voisey Bay discovery.

WORLD DEVELOPMENTS

The year 1994 saw a flurry of activity in the nickel industry, including a number of production increases, the opening of Western Mining Corporation's (WMC) Mount Keith project, and the announced re-opening of Cominco's Glenbrook facility and Defiance Mining's Carr Boyd mine. Exploration and feasibility projects were carried out on many deposits including RTZ's Fortaleza property in Brazil and Anglo American's Loma de Heirro property in Venezuela. Russia continued to face shortages and production

Figure 2
Nickel, Production by Country, 1994



Sources: Natural Resources Canada; International Nickel Study Group.

stoppages, which resulted in decreased production. Inco and Falconbridge's Canadian facilities, along with Queensland Nickel Pty Ltd., also had lower production in 1994.

Australia

WMC nearly completed the A\$800 million expansion of its nickel operations in Australia. The Mount Keith operation was commissioned in November with full capacity of 28 000 t/y of nickel in concentrate expected in 1995. Half of the Mount Keith output will be shipped to Outokumpu; the other half will bring WMC's production up to 93 000 t of nickel in concentrate in 1995. At the Leinster operation, development work continued on the Perseverance mine, scheduled for re-opening in 1995. Work continued on upgrading the Kwinana Nickel Refinery. When completed, also in 1995, its products will meet the LME specifications for sale. WMC produced 66 000 t of contained nickel in 1994, up from 55 000 t in 1993.

Production at WMC's Kalgoorlie nickel smelter was down slightly at the beginning of the year due to shut-downs associated with new emission regulations. As of January 1, 1994, changes to the Goldfields Environmental Protection Policy came into effect that reduced the allowable ground level concentrations of sulphur dioxide. WMC has a two-year exemption to meet the new policy in order to evaluate the technological options that could ensure the smelter's compliance.

Queensland Nickel Pty Ltd. (QNI) will spend A\$50 million to expand capacity at its Yabulu Refinery by 20% from 27 000 t/y to 32 000 t/y. QNI will also spend A\$47 million to build a dedicated port facility in Townsville, Australia, to handle increased ore shipments. Construction was scheduled to begin in December 1994 with completion expected in late 1996. QNI produced 29 000 t of nickel in 1994, up from just over 27 000 t in 1993.

Defiance Mining will re-open the Carr Boyd nickel mine, which was closed and subsequently sold by WMC in 1975. The mine's closure was primarily due to low prices. Defiance will start production in mid-1995 of a mixed concentrate containing 2000 t/y of nickel. Carr Boyd has a proven, probable and indicated resource of 1 Mt grading 1.54% nickel and 0.52% copper.

The 1993 drill program at the Honeymoon Well deposit increased the identified mineral resources to 96 Mt at an average grade of 0.9% nickel. The project, located 40 km south of Wiluna, is a joint venture between CRA Limited of Australia (65%) and Outokumpu Exploration Australia.

Gencor Ltd. joined Forrestania Gold in the development of the Maggie Hays nickel deposit in the Lake Johnston area of Australia. Gencor will earn an equity interest of up to 50% over the next two years by spending A\$5 million on exploration. It will also provide its BioNictm extraction process. This bacterial oxidation process for concentrates bypasses both

smelting and refining. Two notable intersections between the 400-m and 470-m depths include 40 m at 1.65% nickel and 0.05% cobalt, and 28 m at 0.84% nickel and 0.03% cobalt. Development could take two to three years at a capital cost of A\$125 million.

In May, Australia's Resolute Resources Group (RRG) entered into agreements with Agip Australia (Pty) Ltd. RRG acquired the Radio Hill complex for A\$8 million. It includes a fully developed mine with proven and probable ore reserves of 1.032 Mt grading 2.48% nickel and 1.83% copper, a concentrator, and a smelter with a capacity of 10 000-12 000 t/y of nickel-copper matte. The operation has been idle since 1992, but a feasibility study is planned.

WMC withdrew its participation in the Bulong nickel project after completing a feasibility project with RRG who now owns 100% of the project. The Bulong deposit contains an estimated 40 Mt grading 1.3% nickel and 0.1% cobalt. Capital costs of a 12 000-t/y refined nickel complex are estimated at A\$120 million-\$150 million.

North Broken Hill Peko Ltd. intends to acquire 80% of the Yakabindie nickel deposit from Dominion Mining Ltd., pending the outcome of a feasibility study. The deposit, located in central Western Australia, contains an estimated 181 Mt grading 0.59% nickel. Total development costs of the project, which would produce 22 000 t/y of nickel in concentrates, are estimated at A\$420 million.

Brazil

Details of the Fortaleza de Minal nickel deposit feasibility study were released in early January 1995. RTZ Mineracao, RTZ's Brazilian subsidiary, will make a decision in 1995 whether to go ahead with the US\$200 million project located in Minas Gerais State. The project will be an integrated operation with both underground and open-pit mines, a smelter and a refinery with an operating life of 20 years. Mine throughput is estimated at 550 000 t/y at a grade of 1.8% nickel to produce 10 000 t/y of refined nickel.

China

China's refined nickel production in 1994 was estimated at 33 000 t, of which the Jinchuan Nonferrous Metals Corporation produced over 80%. Work continued on the expansion of the Jinchuan facilities. Its new flash smelter was successfully commissioned in 1993 but there was no indication that work began on the refinery expansion. The expansion will increase Jinchuan's capacity to 40 000 t/y by 1995, but the mine may not be able to supply the additional feed required.

Inco entered into a US\$10 million joint venture with the Jinchuan Nonferrous Metals Corporation. The joint venture, in which Inco will hold 65%, will con-

struct and operate a plant near Shanghai to produce nickel salts for the Asian market.

Colombia

In July, Gencor of South Africa acquired a 52% interest in the Cerro Matoso ferronickel operation. Cerro Matoso was part of the US\$1.2 billion sale of Billiton Assets by Royal Dutch/Shell to Gencor. The new company, called Billiton International Ltd., is owned 100% by Gencor.

Cuba

Cuba received a US\$20 million credit from the Netherlands Caribbean Bank to modernize the Punta Gorda plant. The plant has a capacity of 30 000 t/y of nickel and cobalt in nickel oxide sinter, but actual production is much lower. The note will be repaid by revenue from increased nickel production.

A US\$15 million credit was also obtained from the Italian Ansaldo Corp. to repair and upgrade the René Ramos Latour smelter in the Holguin province. This smelter has a capacity of 22 000 t/y of nickel and cobalt in nickel oxide sinter, but actual production is also much lower.

WMC agreed in principle to a joint venture with Cuba's state-owned Commercial Caribbean Nickel SA (CCA). The joint venture will assess and potentially develop the Pinares de Mayari West nickel deposit in the Holguin Province of Cuba. The deposit contains over 200 Mt of reserves grading over 1% nickel and 0.1% cobalt. WMC will hold 65% of the joint venture, with CCA holding the remaining 35%. WMC will earn its interest in the project by funding a drill program, metallurgical test work and a feasibility study over the next three years.

Dominican Republic

Falconbridge's Dominicana C por A produced 30 800 t of nickel in ferronickel in 1994, compared to 23 900 t in 1993. Production had been reduced in 1993 by a three-month shut-down for market and maintenance reasons. A taxation agreement was finalized for the Dominicana operation. This reinstates an effective tax rate of about 50% by changing the base on which tax is calculated.

Finland

Outokumpu increased production to 16 000 t in 1994 from 14 800 t in 1993. Production is expected to increase in 1995 with the completion of the nickel portion of its Harjavalta refinery expansion. This expansion will increase production from 18 000 t/y of nickel to 32 000 t/y. The entire project should cost US\$327 million and should be completed by 1996. Additional nickel feed for the expansion will come from Outokumpu's Forresteria nickel mine in Western Australia and WMC's Mount Keith mine.

Outokumpu Finnmines Oy closed its Enonkoski nickel mine in Finland. The mine, which produced 3300 t of nickel in concentrate in 1993, was closed due to ore depletion. The Vammala mine is also scheduled to be closed sometime in 1995.

In December, the Finnish government invited bids for the development of the Kevitsa copper-nickel deposit. The successful bidder will carry out supplementary investigations and studies by December 12, 1997, to determine the viability of the deposit.

Greece

General Mining and Metallurgical Co. S.A. LARCO produced 15 000 t of nickel in ferronickel in 1994 compared to 10 900 t in 1993. Plans for privatization were deferred, but new management was appointed to try to improve the company's financial situation.

Indonesia

P.T. Aneka Tambang completed its smelter expansion from 5500 t/y to 11 000 t/y of nickel in ferronickel. The additional ferronickel will be sold to Japan.

Inco Ltd. will spend US\$500 million to expand P.T. International Nickel Indonesia's (P.T. Inco) capacity by 50% to 68 000 t/y of nickel in ferronickel by the year 2000. The expansion will include the construction of a fourth smelting line at Soroako and additional hydro-electric generating capacity on the Larona River. The announcement followed an agreement in principle between Inco and the Indonesian government to extend P.T. Inco's work contract. Production in 1994 was 45 000 t, which was 100% of rated capacity, compared to 34 000 t produced in 1993. The higher production rate was the result of a five-year expansion program that was completed in 1993.

Ivory Coast

In June, a US\$1.1 million work program was completed at the Biankouma-Sipilou nickel concession in western Ivory Coast. Results indicated an in-situ resource of 54 Mt grading 2.02% nickel and 0.07% cobalt in three laterite deposits, at a cut-off grade of 1.4% nickel. Phase two of the work program will examine, in detail, these deposits and examine other potential laterite deposits. This phase, which will cost an estimated US\$3.2 million, will be completed by September 1995. The project is a joint venture between Falconbridge, the Société d'Etat pour le Développement Minier de la Côte d'Ivoire (SODEMI), and Trillion Resources of Canada. Falconbridge can earn a 60% interest in the project by funding and completing a feasibility study.

Japan

Japanese nickel production increased slightly in 1994 to 109 000 t, compared to 105 300 t in 1993. The production of nickel oxide sinter increased due to increased matte shipments from both P.T. Inco and WMC. Production of ferronickel decreased, however, due to cutbacks by producers at the beginning of the year. Ferronickel production increased in the second half of 1994 as market conditions improved, and it is expected to increase again in 1995 in response to continued strong demand from the stainless steel sector.

Tokyo Nickel Company Ltd. increased its value-added "molded" type nickel oxide capacity from 1200 t/y to 4000 t/y at its 36 000-t/y Matsuzaka plant. Production capacity for nickel granules will drop by an equivalent amount.

New Caledonia

Société Métallurgique Le Nickel (SLN) produced 50 000 t of nickel contained in ferronickel and nickel matte in 1994, up from 47 700 t in 1993. It announced plans to upgrade and expand its capacity to produce 51 000 t in 1995 and 60 000 t/y by the year 2000. As part of the expansion, the company inaugurated its Neopoui mine in May. The mine will supply 17 000 t/y of contained nickel for 15 years.

Eramet, the parent company of SLN, acquired Cofremmi, a 100% subsidiary of Bureau de Recherches Géologiques et Minières (BRGM), for a 2.4% stake in Eramet. This gives Eramet ownership of Cofremmi's nickel deposits in New Caledonia, which have estimated reserves of 800 000 t of nickel. This new reserve base will allow Eramet-SLN to increase its nickel production to 60 000 t/y by the year 2000.

Norway

Output from Falconbridge Limited's Nikkelverk refinery increased to 68 000 t in 1994 from 56 800 t in 1993 due to a reduction of matte inventories and increased processing of custom feed materials. Falconbridge spent C\$6 million to increase capacity at its Nikkelverk refinery by 7000 t to 67 000 t/y of nickel cathode.

Papua New Guinea

An A\$5 million feasibility work project has been started on the Ramu nickel-cobalt-chromite project by Highland Gold. Additional drilling, metallurgical testing and engineering studies will be carried out. The expenditure will increase Highland's ownership of the project to 60%. Nord Pacific Limited, a subsidiary of Nord Resources Corp. of the United States, owns the rest of the project.

The Philippines

Rehabilitation work remained suspended at the Nonoc plant. Nonoc is owned by the Philippines government, but ownership will be transferred to Philnico after a seven-year payment period beginning one year after start-up. In May, a Canadian consortium made a bid of US\$150 million-\$250 million to rehabilitate the idled refinery in conjunction with Philnico. The plant had a capacity of 30 000 t/y of nickel and 1500 t/y of cobalt in a mixed sulphate concentrate when it closed in 1986.

Russia

Russian government officials provided the International Nickel Study Group with official production, consumption and export statistics for the first time in April 1994. In October, Russia forecast its 1994 nickel production at 179 000 t, down from 186 000 t produced in 1993, 244 000 t in 1992, and 321 000 t in 1991. Exports, not including non-official nickel exports, were reported at 67 800 t for the first nine months of 1994. Exports of ferronickel and nickel-bearing scrap were estimated at 20 000 t in 1994. Exports of intermediate products were given as 8000 t of matte. Consumption was reported at 62 000 t in 1993.

Norilsk Nikel was reported to have encountered difficulties in obtaining both consumer and industrial supplies due to a lack of financial resources in 1994. It was also hampered by a series of problems caused by a lack of maintenance and the age of the equipment, which resulted in shut-downs at various parts of the Norilsk Nikel operation. Subsequently, Russia announced that it was 4000 t short of its contract obligations in the first half of the year. Production was rumoured not to have been affected in the second half of 1994, but was rumoured to have increased slightly over 1993.

The Russian government adopted a number of measures to control exports in 1994, but there still appears to be the incentive for "synthetic" ferronickel to be produced. Synthetic ferronickel, a mix of nickel cathodes and iron scrap, is being made at the Severonickel Refinery and is being sold directly to the steel mills at a discount to the LME. Russian nickel exports in 1994 are estimated at between 90 000 and 100 000 t, with "back-door" exports being as much as an additional 40 000 t.

The project to renovate the Pechenganikel smelter on the Kola Peninsula is still awaiting financing. The Norwegian government has allocated a number of grants for the project, but neither the Russian government nor Norilsk have made any commitments. One possibility is part payment, on the Russian side, in product rather than cash. The tender was awarded to a consortium of Elkem Technology, Kvarner Engineering, and Boliden Contech in 1993.

The privatization of Norilsk was completed in 1994. The Russian government continues to hold a 38% controlling interest with another 50% having been sold or given to employees and management. The remaining 12% was to be auctioned under the Russian privatization coupon system in June/July. The nominal issue price for the auctioned shares totalled the equivalent of US\$2 million. Norilsk sold an additional 70 352 shares with a nominal value of 250 roubles each by auction on November 19. Norilsk nickel coupons were US\$12-\$13 each on the off-bourse securities market.

South Africa

South Africa produced 32 000 t of nickel in 1994 compared to 29 900 t in 1993. The nickel is a by-product of platinum production. Rustenburg Platinum increased production in 1994 despite problems with a recently upgraded smelter.

Nickel consumption will increase in South Africa over the next few years as Columbus Steel and Iscor Ltd. bring on additional or new stainless steel capacity. Columbus continued expansion of its current operation, which will make it the world's largest single-site producer of stainless steel. The first expansion will be completed by the middle of 1995, increasing production of stainless steel from 140 000 t to 177 000 t in 1995. A further expansion to 600 000 t/y of stainless steel is expected by the year 2000. At a production rate of 600 000 t/y, the operation would need 40 000 t/y of nickel. Iscor Ltd. will begin production of stainless steel in 1996 and will require 36 000 t/y of nickel to produce its targeted 480 000 t/y of stainless steel.

Anglovaal continued work on its Slaaihoek joint-venture property in the Eastern Transvaal province. Work progressed on sinking an exploration shaft. The complex mineralized orebody located in the Eastern Transvaal contains nickel, cobalt, copper and platinum group metals. A feasibility study is scheduled to be completed by 1997.

Spain

In November, PRESUR, a subsidiary of the Spanish state-owned Instituto Nacional de Industria (INI), and Rio Tinto Minera (RTM) announced the discovery of a nickel-copper deposit, called Agua Blanca, in southwest Spain. RTM will spend 300 million-400 million pesetas on a feasibility study over the next few months on the 20-Mt low-grade deposit.

Tanzania

Sutton Resources Ltd. (42%) and its partner, BHP Minerals (58%), continued exploration work on the Kabanga deposit. Drill results intersected a section over an estimated 25-m (82 ft) true width of 2.52% nickel, 0.35% copper and 0.19% cobalt. To date,

reserves are estimated at 24.9 Mt grading 1.2% nickel, 0.2% copper and 0.1% cobalt. A US\$210 million 24 000-t/y smelter is being considered for the deposit.

United States

On February 8, 1994, the government lifted a ban (in place since 1980) on imports of unfabricated and nickel-bearing materials from the former Soviet Union. The ban was designed to prevent Russian nickel and nickel-bearing material made from Cuban feed from entering the United States. Also, other Russian material that was allowed into the country, but only under certification of origin, may enter the country freely. This was in response to Russia's lessening dependency on Cuban nickel.

Cominco Resources will re-open its Glenbrook Nickel Corporation in Riddle, Oregon, during the second quarter of 1995. It closed on July 31, 1993, due to low nickel prices. Glenbrook produced 9000 t of nickel in ferronickel in 1992 and 5000 t in 1993.

Black Hawk Mining plans to develop its Knox nickel-copper-cobalt deposit in Maine when market conditions improve. Black Hawk Mining estimates the US\$35 million project will have cash costs of between US\$1.70 and \$1.80/lb.

The U.S. Defense Logistics Agency sold 5700 t of nickel in fiscal year 1994 (October 1, 1993 to September 31, 1994) compared to 1300 t sold in 1993. The allocation for sale in fiscal year 1995 is 9072 t. The United States has indicated that it plans to sell all of its inventory from the strategic stockpile over the next few years. The inventory was 32 120 t in October 1993.

Venezuela

Anglo American Corp. completed the technical portion of a feasibility study on the Loma de Heirro ferronickel deposit in December 1994. The geological in-situ reserves of the deposit have been calculated at 36 Mt grading 1.6% nickel. A financial analysis of the project is planned for the first quarter of 1995, following completion of the feasibility study. Anglo American Corporation acquired the right in 1993 to buy 70% of Jordex Resource's 50% stake in the Venezuelan company Cofeminas, which owns the Loma de Heirro nickel deposit. Preliminary capital costs are estimated at between US\$300 million and \$350 million for a mine and smelter which would produce 16 000-20 000 t/y of ferronickel over a 20-year period.

CHARACTERISTICS AND USES

Nickel is a hard, tough, greyish-white metallic element that ranks 24th in the abundance of metals

found in the earth's crust. Its many desirable properties, particularly its resistance to corrosion in both acidic and basic environments, its high strength over a wide temperature range and its pleasing appearance, have resulted in its wide application in both the alloyed and unalloyed state.

Along with chromium, nickel is alloyed with iron to produce stainless steels which account for over 60% of primary nickel consumed by the Western World. As well, considerable quantities of secondary material are used directly in the production of stainless steels. These steels are used in a wide variety of applications, primarily for their resistance to corrosion, strength, and ease of cleaning. They are used in chemical and food processing equipment, petroleum refining equipment, tanks for road, rail and sea transportation of various liquids, household goods, and surgical equipment, along with building facings and trim, to name a few.

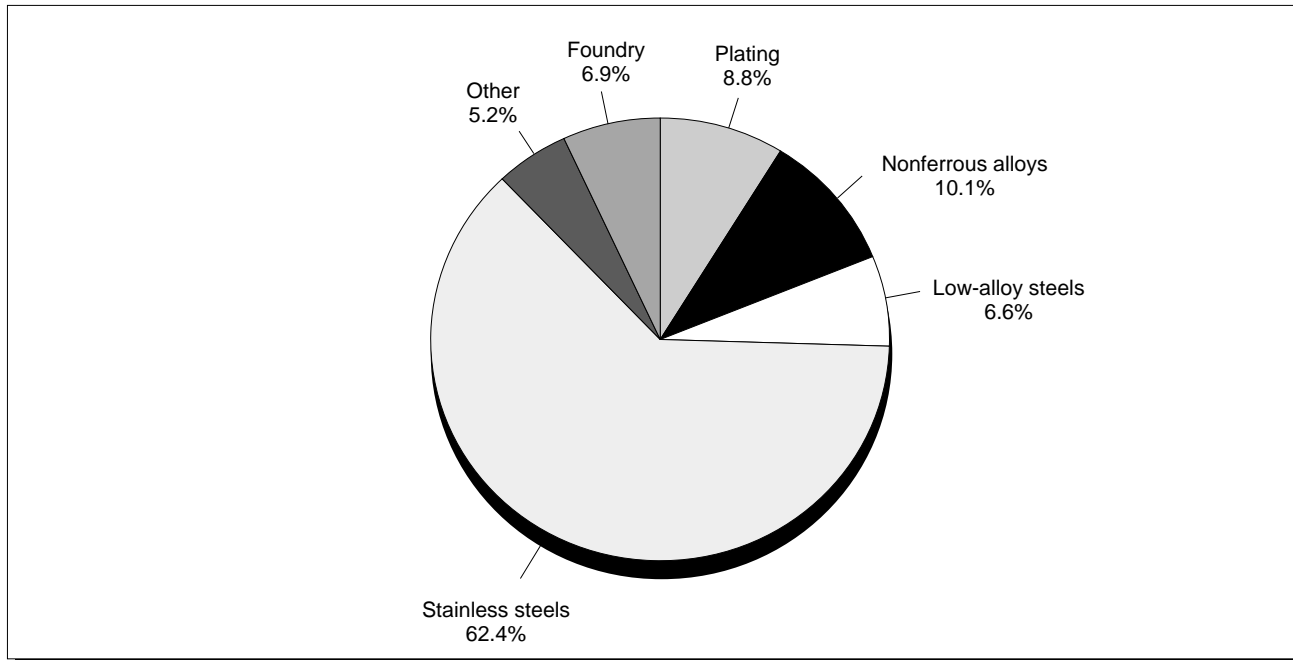
Stainless steels can contain varying quantities of nickel, but must have at least 10% chromium. The addition of large quantities of nickel, usually between 7% and 12%, changes the crystal structure of the steel to austenitic, making the steel non-magnetic. This type of stainless steel is thus called austenitic stainless steel and is widely referred to as 18/8, due to the most common content of chromium (18%) and nickel (8%). Austenitic stainless steel is readily fabricated and welded, and accounts for three quarters of all stainless steel produced.

Nickel is used as an alloying agent and is a component in some 3000 different alloys that are used in more than 250 000 end-use applications. When nickel is alloyed with other metals such as chromium, its high-temperature performance makes it indispensable to the aerospace industry, specifically in the design of gas turbine aircraft engines. When alloyed with metals such as molybdenum or copper, its resistance to corrosion makes it essential in aggressive chemical processes, the petroleum industry, and nuclear power plants. These highly corrosion-resistant nickel alloys have been the overwhelming choice in environmental equipment such as flue-gas desulphurization scrubbers.

In an unalloyed state, nickel is used for the plating of automotive products and household appliances. The use of zinc-nickel coatings can provide five to six times more resistance to road salt corrosion than ordinary galvanized steel.

The chemical properties of nickel enable it, and some of its salts, to be used as catalysts in the chemical industry. It is also used in the production of batteries and fuel cells, in carbide and hard-facing materials, and in ceramics to form a bond between the enamel and metal, as well as in the manufacturing of colours and pigments.

Figure 3
Nickel, Western World First-Use Consumption, 1993



Source: CRU International Ltd.

Note: Does not include the C.I.S., China, and former Comecon countries.

At present, Japan, the United States and Western Europe account for close to 85% of the demand for nickel in the Western World. But the newly industrialized countries, particularly in the Pacific Rim, are gradually increasing their share of the market and are expected to continue this trend in the future. China, which currently consumes an estimated 45 000 t/y of primary nickel, is anticipated to be one of the largest growth areas for nickel and, according to some analysts, could consume 90 000 t/y by the year 2000.

Nickel stainless steels and new high-performance alloys will be the major growth areas for nickel.

ENVIRONMENT AND HEALTH

Nickel is a naturally occurring element that exists in all soils and is thought to make up a large percentage of the earth's core. Besides being an essential element for plants and many animals, it is the view of many experts that nickel is probably an essential element for humans as well.

In fact, nickel deficiencies in animals can cause growth retardation. Nickel has also been proven to be an absolute growth requirement for certain types of bacteria and algae. The amount of nickel present in the average human body is estimated at between 7 and 10 mg, and nickel has also been confirmed in human fetal tissue.

In humans, food is the major route for nickel intake. Inhalation is another route of intake, primarily in individuals who are occupationally exposed. Humans are also exposed to nickel through contact with nickel-containing articles such as jewellery and through tobacco smoke.

Nickel dermatitis is one of the principal adverse health effects associated with nickel. It is a condition caused through direct and prolonged contact with nickel-containing solutions or items that can dissolve in sweat and penetrate the skin. Many nickel alloys, including stainless steels, do not react with sweat and therefore do not cause nickel allergy. It is estimated that 10-20% of women and 1-2% of men are sensitive to nickel. The primary exposure is through lower-quality nickel-plated earrings and other jewellery.

The European Union adopted an amending directive that limits the use of nickel in certain objects, such as earrings, wrist watch cases and straps, that come in contact with the skin. The European Economic Commission wants this amending directive implemented by the end of 1997 in Member States.

In Canada, nickel and its compounds were assessed by Environment Canada and Health Canada under the *Canadian Environmental Protection Act* (CEPA) as one of 44 substances on the Priority Substance List. A substance is deemed "CEPA toxic" based on

its effect on the environment and/or its danger to human life or health. The assessment concluded that dissolved and soluble forms of inorganic nickel are having, or may have, a harmful effect on the environment, and are therefore considered to be "toxic" as defined under CEPA. The substance "nickel and its compounds" does not constitute a danger to the environment upon which human life depends, and is therefore not considered to be "toxic" as defined under CEPA. Metallic nickel does not constitute a danger to human life or health, and therefore is not considered to be "toxic" as defined under CEPA. However, each of the groups "oxidic," "sulphidic" and "soluble" nickel compounds as a whole constitutes a danger to human life or health and is considered, therefore, to be "toxic" as defined under CEPA. Like many other substances assessed under CEPA, these will be subjected to the Strategic Options Process to determine whether additional controls are required for the production and use of nickel.

PRICES AND STOCKS

Strong demand, an increase in investment fund activity, and continued speculation about Russian exports were the main factors behind the nickel price increase in 1994. The expectation of continuing strong demand over the next few years also added to the bullish outlook for nickel, having a positive effect on price. The LME average settlement price increased from US\$2.53/lb in January to US\$3.88/lb in December. The result was a 1994 average settlement price of US\$2.88/lb, up 20% from the US\$2.40/lb attained in 1993.

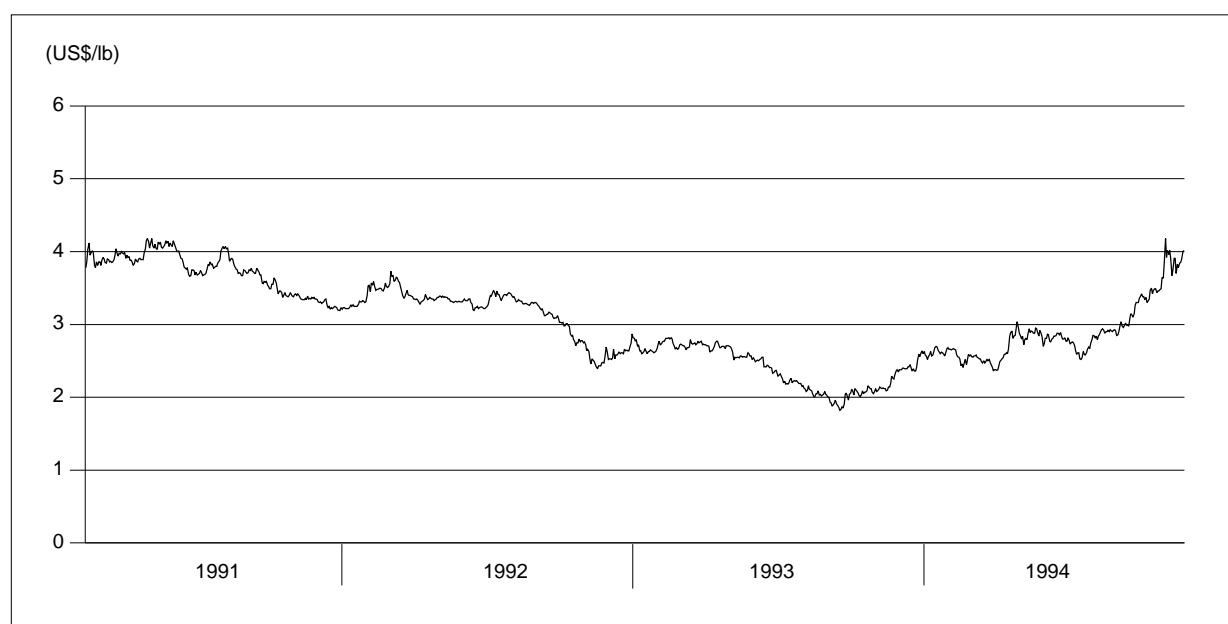
In contrast to basic principles, LME nickel stocks increased by the same percentage as the 1994 average settlement price. LME stocks reached 148 400 t on December 29, 1994, compared to 124 100 t in 1993. Although the overall quantity of LME stocks increased, there was a draw-down of 8400 t in the quantity of briquettes, along with a 78-t decrease in pellets. The only increase was in the quantity of nickel cathodes, which rose by 32 800 t.

OUTLOOK

Western World primary nickel consumption is expected to again increase in 1995 to 790 000 t/y, a 6% increase over 1994's level of 748 600 t. The increase in nickel consumption over the past two years is due to the strong demand for stainless steel, which accounts for over 60% of primary nickel consumption. A continued shortage of stainless steel scrap is also adding to the increase in primary nickel consumption as stainless producers are having to use a higher ratio of primary nickel to scrap feed. Both increased stainless steel production and the shortage of stainless steel scrap are expected to continue, at least through 1995, resulting in continued increases in primary nickel consumption. Primary nickel consumption is expected to reach 830 000 t/y in 1996, with long-term consumption increasing at an overall rate of 2% to 990 000 t/y by the year 2005.

Western World production is forecast to increase in 1995 to 660 000 t in response to the increase in demand. A large portion of the increased refinery production will come from Inco, Outokumpu and

Figure 4
London Metal Exchange Nickel Settlement Prices, 1991-94



Source: Natural Resources Canada.

producers in Japan. The re-opening of Cominco's Glenbrook operation should also increase Western World production by an estimated 8200 t.

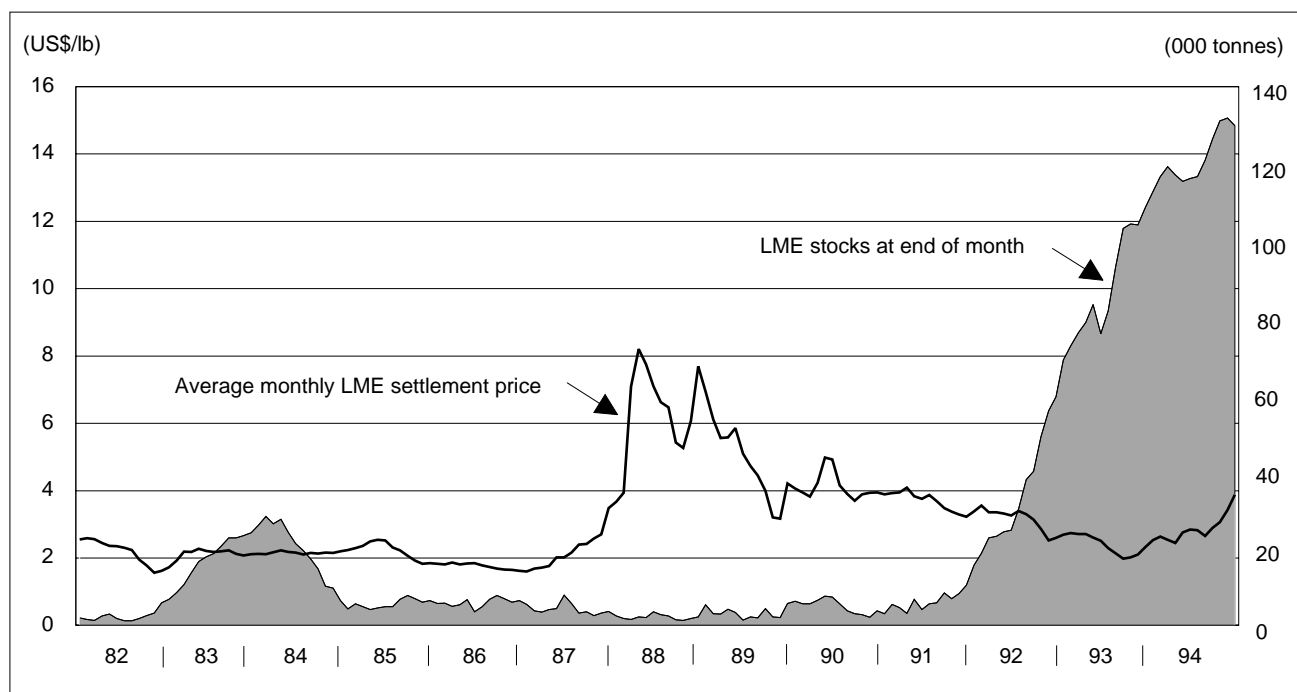
The 1995 LME average settlement price for nickel is forecast to be in the range of US\$3.40-\$3.60/lb. The price increased steadily from August 1994 when it was US\$2.66/lb to US\$4.54/lb at the end of January 1995. LME stocks are expected to decrease during the first half of 1995 partially due to re-stocking by consumers. In the long term, it is expected that the nickel price will be in the US\$3.25-\$3.75/lb range, in real terms.

Canadian mine production of nickel is expected to rebound in 1995 to 190 000 t compared to 150 000 t

in 1994. Production cuts by Inco in the first quarter and an accident in the main shaft at Inco's Thompson operations, as well as the closure of the Namew Lake mine late in 1993, were mainly responsible for the decrease in production in 1994. Inco will increase its Canadian production in 1995 by decreasing its scheduled shut-downs. Canada's nickel production is forecast to be 200 000 t/y by the year 2005, and should Falconbridge's New Quebec Raglan property be brought into production, Canada's mine production would increase by an additional 20 000 t/y.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 60. (2) Information in this review was current as of February 1, 1995.

Figure 5
Nickel, LME Monthly Settlement Price and LME Stocks, 1982-94



Source: Natural Resources Canada.

TARIFFS

Item No.	Description	Canada			United States	E.U.	Japan ¹
		MFN	GPT	USA	Canada	MFN	MFN
2604.00	Nickel ores and concentrates	Free	Free	Free	Free	Free	Free
7501.10	Nickel mattes	Free	Free	Free	Free	Free	Free
7501.20	Nickel oxide sinters and other intermediate products of nickel metallurgy	Free	Free	Free	Free	Free	Free-81 yen/kg ²
7502.10	Unwrought nickel, not alloyed	Free	Free	Free	Free	Free	81 yen/kg
7502.20	Unwrought nickel alloys	Free	Free	Free	Free	Free	Free-9% ³
7503.00	Nickel waste and scrap	Free	Free	Free	Free	Free	Free
7504.00.10	Nickel powders containing by weight 60% or more nickel	Free	Free	Free	Free	0.5%	Free
7504.00.20	Nickel powders containing by weight less than 60% of nickel; flakes	8.8%	6.5%	Free	Free	0.5%	65 yen/kg-6%
7505.11	Bars, rods and profiles of nickel, not alloyed	Free-8.8%	Free-6.5%	Free	Free	4.4%	7.2%
7505.12	Bars, rods and profiles of nickel alloy	Free-8.8%	Free-6.5%	Free	Free	4.4%	5.8%
7505.21	Nickel wire, not alloyed	Free-8.8%	Free-6.5%	Free	Free	4.4%	7.2%
7505.22	Wire, nickel alloy	Free-8.8%	Free-6.5%	Free	Free	4.4%	5.8%
7506.00	Nickel plates, sheets, strip and foil	Free-8.8%	Free-6.5%	Free	Free	4.9%	Free-7.2%
7507.00	Nickel tubes, pipes and tube or pipe fittings	Free-8.8%	Free-6.5%	Free	Free	5.3%	6.5-7.2%
7508.00	Other articles of nickel	Free-9.4%	Free-7%	Free-3.3%	1.4-1.6% ^a	4.6%	5.8%

Sources: Customs Tariff, effective January 1995, Revenue Canada; Harmonized Tariff Schedule of the United States, 1995; The "Bulletin International des Douanes," Journal Number 14 (16th Edition), European Economic Community, 1992-1993, "Conventional" column; 1st Supplement to Journal No. 14 (16th Edition), European Economic Community, 1993-1994, "Conventional" column; Customs Tariff Schedules of Japan, 1994.

^a Lower tariff rates may apply circumstantially.

¹ GATT rate is shown; lower tariff rates may apply circumstantially. ² Free except for nickel oxide sinters containing by weight not less than 88% nickel which is 81 yen/kg, and nickel oxide containing by weight not more than 1.5% copper which is 7.2%. ³ Tariff rate of 9% applies to nickel alloys other than those containing by weight less than 50% of nickel and not less than 10% of cobalt.

TABLE 1. CANADA, NICKEL PRODUCTION AND TRADE, 1993 AND 1994

Item No.	1993		1994p		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
PRODUCTION¹					
	All forms				
	Ontario	125 833	859 313	113 648	947 140
	Manitoba	52 696	359 859	30 675	255 648
	Total	178 529	1 219 172	144 323	1 202 788
	Refined	123 139	..	106 568	..
EXPORTS					
2604.00	Nickel ores and concentrates, nickel content				
	Total	-	-	-	-
7501.10	Nickel mattes				
	Norway	41 865	322 609	42 598	324 162
	United Kingdom	32 039	213 720	25 105	201 088
	United States	-	-	8	52
	Total	73 903	536 329	67 710	525 302
7501.20	Nickel oxide sinters and other intermediate products of nickel metallurgy				
	South Korea	2 947	17 779	1 820	11 678
	Taiwan	1 264	7 576	746	6 132
	Singapore	752	4 895	590	5 789
	United States	462	2 841	436	3 435
	Belgium	1 987	18 101	243	2 721
	Other countries	115	1 498	233	2 759
	Total	7 526	52 690	4 068	32 514
7502.10	Nickel unwrought, not alloyed				
	United States	51 889	373 083	38 541	309 049
	Belgium	18 156	132 248	15 865	125 490
	Taiwan	6 248	44 185	6 823	56 529
	Japan	3 749	26 448	3 856	32 666
	Netherlands	6 175	42 681	2 736	22 346
	South Korea	1 437	10 200	1 691	14 025
	United Kingdom	2 471	18 600	1 639	13 499
	Hong Kong	1 809	12 770	1 669	13 152
	Germany	210	1 218	1 449	12 631
	Other countries	4 823	34 671	6 144	50 963
	Total	96 968	696 105	80 413	650 352
7502.20	Nickel unwrought, alloyed				
	United States	1 282	10 016	985	9 439
	Belgium	981	7 298	541	6 164
	South Korea	85	787	102	1 061
	Taiwan	-	-	73	625
	Sweden	29	263	58	582
	Other countries	411	3 114	148	1 425
	Total	2 788	21 483	1 907	19 302
7503.00	Nickel waste and scrap				
	United States	1 606	6 866	1 991	9 875
	Japan	60	461	89	251
	Netherlands	554	1 958	36	245
	United Kingdom	77	184	97	152
	People's Republic of China	-	-	9	37
	Hong Kong	2	13	-	-
	Total	2 299	9 483	2 221	10 561
7504.00	Nickel powders and flakes				
	United States	6 239	77 242	6 705	88 006
	Japan	2 529	19 991	2 257	24 490
	People's Republic of China	385	4 389	707	10 134
	Belgium	57	637	554	6 485
	Netherlands	511	3 419	346	4 211
	Other countries	732	8 366	1 053	11 945
	Total	10 452	114 046	11 622	145 273
7505.11	Bars, rods and profiles of nickel, not alloyed				
	United States	..	2	-	-
	Philippines	8	44	-	-
	Total	8	47	-	-
7505.12	Bars, rods and profiles of nickel alloy				
	Poland	..	1	-	-
	United States	1	36	-	-
	Total	1	37	-	-

TABLE 1 (cont'd)

Item No.	1993		1994p		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
EXPORTS (cont'd)					
7505.21	Nickel wire, not alloyed				
	United States	...	6	2	26
	Total	...	6	2	26
7505.22	Wire, nickel alloy				
	United States	35	478	46	744
	South Africa	3	76	-	-
	Singapore	...	3	-	-
	Total	39	558	46	744
7506.00	Nickel plates, sheets, strip and foil				
	United States	116	2 305	64	1 540
	Poland	12	168	3	58
	People's Republic of China	1	17	1	6
	Taiwan	1	86	...	5
	Other countries	11	65	-	-
	Total	142	2 644	68	1 610
7507.00	Nickel tubes, pipes and tube or pipe fittings				
	United States	..	1 268	..	1 809
	Singapore	..	37	..	94
	United Kingdom	-	-	..	89
	North Korea	-	-	..	80
	Other countries	..	166	..	82
	Total	..	1 473	..	2 157
7508.00	Other articles of nickel				
	United States	..	627	..	2 745
	Netherlands	..	1 585	..	557
	United Kingdom	..	317	..	308
	Switzerland	..	54	..	172
	France	..	41	..	137
	Other countries	..	3 021	..	397
	Total	..	5 645	..	4 316
IMPORTS²					
2604.00.00.20	Nickel ores and concentrates, nickel content				
	United States	589	3 314	896	4 957
	Total	589	3 314	896	4 957
7501.00	Nickel mattes, nickel oxide sinters and other intermediate products of nickel metallurgy				
	Cuba	22 366	108 850	23 931	112 325
	Australia	497	2 669	2 370	15 430
	United Kingdom	886	2 438	1 568	8 063
	United States	4 861	6 972	4 276	7 465
	Poland	1 456	1 762	1 072	1 100
	Sweden	515	592	621	947
	Belgium	3 013	3 540	457	631
	Chile	87	98	180	210
	Netherlands	293	274	-	-
	Total	33 974	127 197	34 476	146 174
7502.10	Nickel unwrought, not alloyed				
	United Kingdom	1 858	11 498	3 930	29 091
	Norway	1 670	10 472	3 873	20 563
	Russia	5 635	39 330	2 056	15 489
	People's Republic of China	-	-	454	4 306
	United States	322	2 145	220	1 991
	Other countries	194	1 401	94	731
	Total	9 678	64 850	10 627	72 176
7502.20	Nickel unwrought, alloyed				
	United States	382	1 988	371	2 188
	United Kingdom	525	3 151	31	346
	Russia	162	1 148	19	204
	South Africa	-	-	11	105
	Switzerland	-	-	3	16
	Other countries	31	174	...	6
	Total	1 100	6 463	436	2 869
7503.00	Nickel waste and scrap				
	United States	15 676	21 163	18 714	33 073
	United Kingdom	659	3 145	806	4 476
	Belgium	206	149	421	984
	Germany	461	978	316	765
	Other countries	963	1 828	693	1 586
	Total	17 966	27 265	20 950	40 889

TABLE 1 (cont'd)

Item No.	1993		1994 ^p		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
IMPORTS (cont'd)					
7504.00	Nickel powder and flakes				
	Australia	131	1 063	600	5 125
	United States	125	1 812	525	4 178
	Germany	4	50	10	181
	United Kingdom	67	971	5	67
	Other countries	23	204	3	38
	Total	350	4 104	1 144	9 591
7505.11	Bars, rods and profiles of nickel, not alloyed				
	United States	8	139	16	249
	Germany	1	18	...	8
	France	-	-	1	8
	United Kingdom	-	-	...	...
	Italy	-	-	...	...
	Total	9	157	17	266
7505.12	Bars, rods and profiles of nickel alloy				
	United States	169	3 595	203	4 355
	Germany	12	238	17	230
	United Kingdom	6	157	6	172
	Other countries	20	232	8	88
	Total	207	4 224	235	4 848
7505.21	Nickel wire, not alloyed				
	United States	11	155	7	94
	Germany	...	4	1	19
	Japan	-	-	2	17
	Sweden	1	21	...	...
	Total	12	181	11	132
7505.22	Wire, nickel alloy				
	United States	271	4 954	276	5 279
	Germany	50	647	52	795
	France	5	81	13	234
	Other countries	...	...	5	85
	Total	326	5 683	345	6 396
7506.00	Nickel plates, sheets, strip and foil				
	United States	743	13 823	490	9 601
	Germany	233	3 751	76	1 256
	United Kingdom	1	14	4	75
	Sweden	...	12	1	33
	France	2	26	1	32
	Japan	-	-	1	8
	Other countries	...	6	...	4
	Total	979	17 634	574	11 012
7507.00	Nickel tubes, pipes and tube or pipe fittings				
	Japan	17	308	253	18 918
	United States	502	15 361	515	10 656
	Germany	8	207	48	786
	France	26	1 346	19	441
	United Kingdom	27	822	15	280
	Sweden	12	197	12	152
	Other countries	12	301	4	89
	Total	605	18 546	866	31 325
7508.00	Other articles of nickel				
	United States	..	3 588	..	3 932
	People's Republic of China	..	77	..	627
	United Kingdom	..	171	..	312
	Italy	..	189	..	227
	Germany	..	56	..	132
	Mexico	..	242	..	116
	Taiwan	..	77	..	109
	Other countries	..	270	..	635
	Total	..	4 671	..	6 091

Sources: Natural Resources Canada; Statistics Canada.

- Nil; .. Not available or not applicable; ... Amount too small to be expressed; ^p Preliminary.¹ Refined nickel and nickel in oxides and salts produced, plus recoverable nickel in matte and concentrates exported. ² Imports from "Other countries" may include re-imports from Canada.

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

TABLE 2. CANADA, NICKEL PRODUCTION AND CONSUMPTION, 1970, 1975, 1980 AND 1985-94

	Production ¹ (mine output)	Consumption ²
	(tonnes)	
1970	277 490	10 699
1975	242 180	11 308
1980	184 802	9 676
1985	169 971	7 206
1986	163 640	8 865
1987	193 391	9 732
1988	216 589	9 250
1989	200 899	10 421 ^r
1990	196 225	8 410 ^r
1991	192 259	10 322 ^{r,a}
1992	186 384	12 528 ^r
1993	188 080	13 884 ^a
1994 ^p	152 136	. .

Source: Natural Resources Canada.

. . Not available; ^p Preliminary; ^r Revised.

^a Increase in number of companies being surveyed.

¹ Refined nickel and nickel in oxides and salts produced, plus recoverable nickel in matte and concentrates exported. Data for 1987-94 are nickel contained in concentrates produced.

² Consumption of metallic nickel, all forms (refined metal, and in ferronickel oxides and salts) as reported by consumers on the Natural Resources Canada survey "Consumption of Nickel."

TABLE 3. CANADIAN PROCESSING CAPACITY, 1994

	Inco Limited		Falconbridge Limited	Sherritt Gordon Limited
	Sudbury	Thompson	Sudbury	Fort Saskatchewan
	(t/y of contained nickel)			
Smelter	100 000	63 000	45 000	n.a.
Refinery	59 000	55 000	n.a.	25 000

Source: Natural Resources Canada.

n.a. Not applicable.

TABLE 4. WORLD MINE PRODUCTION OF NICKEL, 1992-94

	1992	1993	1994
	(tonnes)		
Russia	244 000	186 000	179 000
Canada	186 300	188 400	150 100
New Caledonia	100 500	98 100	104 700
Indonesia	78 100	65 800	80 500
Australia	57 700	64 700	80 100
Dominican Republic	27 500	23 900	31 600
People's Republic of China	30 800	29 100	30 700
South Africa	27 600	29 900	30 200
Cuba	32 200	30 200	26 200
Colombia	23 300	22 800	26 100
Brazil	22 000	22 700	26 000
Botswana	20 800	21 500	20 700
Greece	17 000	12 900	18 800
Other	24 400	98 100	39 600
Total	892 200	894 100	844 300

Sources: Natural Resources Canada; International Nickel Study Group.

TABLE 5. WORLD CONSUMPTION OF NICKEL, 1992-94

	1992	1993	1994
	(tonnes)		
Japan	148 200	157 200	177 800
United States	119 100	122 100	134 000
Germany	73 000	75 000	84 800
Russia	123 000	62 000	50 000
People's Republic of China	41 000	45 000	47 000
Italy	29 600	38 500	42 000
France	35 000	36 500	38 500
United Kingdom	28 500	29 800	35 000
Republic of Korea	26 000	33 200	35 000
Belgium/Luxembourg	21 400	22 000	24 000
Other	151 500	166 400	183 300
Total	796 300	787 700	851 400

Sources: Natural Resources Canada; International Nickel Study Group.

TABLE 6. AVERAGE ANNUAL NICKEL PRICES, 1983-94

	London Metal Exchange – Settlement Price	
	(US\$/lb)	
1983	2.12	
1984	2.16	
1985	2.22	
1986	1.76	
1987	2.21	
1988	6.28	
1989	6.05	
1990	4.03	
1991	3.70	
1992	3.18	
1993	2.40	
1994	2.88	

Source: Natural Resources Canada.

TABLE 7. AVERAGE MONTHLY NICKEL PRICES, 1992-94

	London Metal Exchange – Settlement Price		
	1992	1993	1994
	(US\$/lb)		
January	3.41	2.69	2.53
February	3.57	2.74	2.64
March	3.37	2.71	2.54
April	3.37	2.71	2.45
May	3.32	2.62	2.76
June	3.26	2.51	2.85
July	3.40	2.29	2.83
August	3.30	2.14	2.66
September	3.14	1.98	2.89
October	2.86	2.02	3.06
November	2.52	2.10	3.43
December	2.60	2.32	3.88

Source: Natural Resources Canada.

TABLE 8. LME MONTHLY STOCKS, 1992-94

	1992	1993	1994
		(tonnes)	
January	17 916	78 804	128 826
February	21 432	83 028	133 284
March	26 028	86 910	136 284
April	26 478	89 910	133 752
May	27 792	95 280	131 904
June	28 296	86 646	132 684
July	34 560	101 568	133 344
August	43 302	106 260	138 186
September	45 750	117 930	144 474
October	56 040	119 196	149 820
November	63 726	118 944	150 732
December	67 914	124 104	148 392

Source: Natural Resources Canada.