

Nickel

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Nineteen ninety-five was a strong year for nickel. World nickel consumption increased for the second year in a row to an estimated 967 000 t in 1995 from 868 000 t in 1994. London Metal Exchange (LME) stocks, which hit a record high of 150 700 t in 1994, decreased to 44 892 t at year-end, while producer stocks increased by 13 000 t to 93 000 t. World primary nickel production increased by 11% to 911 000 t in response to the growing demand for nickel, but it was still less than overall demand. With consumption up, stocks down, and production less than demand, the average LME settlement price for nickel increased to US\$3.74/lb, up from US\$2.88/lb in 1994. Nineteen ninety-six is forecast to be another good year for nickel. Consumption is forecast to increase again, but at a much lower rate of 3% to 996 000 t. Primary nickel production is forecast to increase by nearly 6% to 961 000 t, with LME stocks continuing to decrease. The average LME nickel price in 1996 is forecast to be in the US\$4.00-\$4.25/lb range.

CANADIAN OVERVIEW

Canadian mine production of nickel increased by 22% in 1995 to 176 600 t compared to 149 900 t in 1994. Canadian refined production of nickel increased to 119 600 t in 1995 from 105 100 t in 1994. These increases were primarily due to Inco resuming its "normal" production levels.

Canadian nickel production will continue to increase over the next few years as Falconbridge's Raglan operation comes on stream in late 1997, along with Inco's McCreedy East, 1-D and Birchtree projects, which are all scheduled for completion and full production by 1999. Although a portion of this new production will be used to replace depleting orebodies, Canada's mine production of nickel is expected to increase steadily. Canadian nickel production will then increase substantially with the development of the Voisey's Bay property and possibly Inco's Victor

and Pipe Deep deposits. Canadian nickel production could reach 340 000 t/y by the year 2005.

Diamond Fields Resources Inc.

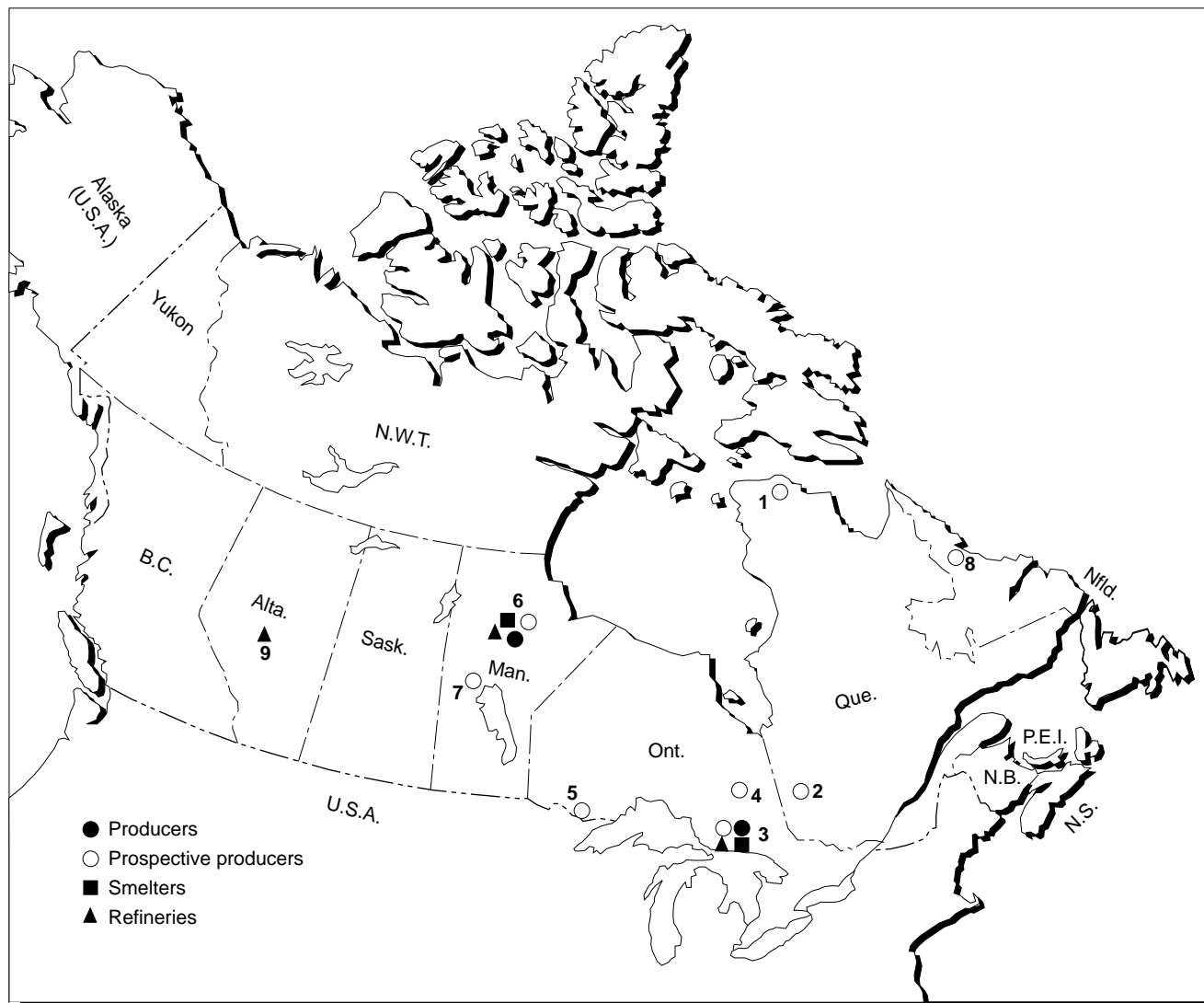
Exploration work continued throughout 1995 on Diamond Fields Resources Inc.'s Voisey's Bay property. At year-end, 210 exploration holes had been drilled in several target areas: the Main Ovoid Zone, the Voisey's Bay West Discovery and Anomaly, Eastern Deeps, and the Sara prospect. Preliminary reserves, calculated in June, which include only the Main Ovoid Zone of the property, are estimated to be 31.7 Mt grading 2.83% nickel, 1.68% copper and 0.12% cobalt at a total stripping ratio of 0.36:1. Drill results from the other areas have been very promising, particularly from the Eastern Deeps target zone where assays of 40 m grading 3.36% nickel, 1.41% copper and 0.17% cobalt have been obtained. Mineral resources for the Voisey's Bay deposits are now considered to be in the 100-Mt range.

In May, Teck Corporation purchased 10.1% of Diamond Fields for C\$108 million (\$84 million in cash and one million Class B common shares of Teck Corporation). In June, Inco purchased a 25% stake in the Voisey's Bay property for C\$525 million and provided a further C\$25 million for the feasibility study and related expenses. Inco also purchased 7% of Diamond Fields and has agreed to market all of the Voisey's Bay nickel and cobalt produced in the first five years plus a minimum of 60 000 t/y of nickel for 15 years.

In August, Teck began working, in consultation with Inco, on a mine/mill feasibility study that is expected to be completed by June 1996. Diamond Fields continued examining downstream processing options for the concentrate, including both pyrometallurgical and hydrometallurgical technologies. Diamond Fields also started to collect and compile baseline environmental data on the Voisey's Bay area in preparation for environmental permitting of the property. Discussions continued with Aboriginal groups concerning the project.

Several mining analysts have suggested that the Voisey's Bay property will have the lowest production costs of any nickel mine in the world. Annual nickel production from the property is currently expected to reach 120 000 t.

Figure 1
Nickel in Canada, 1995



Numbers refer to locations on map above.

PRODUCERS

3. Falconbridge Limited (Craig, Fraser, Lindsley, Onaping, Lockerby, Strathcona)
Inco Limited (Coleman, Copper Cliff North, Copper Cliff South, Crean Hill, Creighton, Froid, Little Stobie, McCreedy West, Garson, Stobie)
5. Inco Limited (Shebandowan)
North American Palladium Ltd. (Lac-des-Îles)
6. Inco Limited (Thompson, Birchtree)

SMELTERS

3. Falconbridge Limited (Falconbridge)
Inco Limited (Copper Cliff)
6. Inco Limited (Thompson)

REFINERIES

3. Inco Limited (Sudbury)
6. Inco Limited (Thompson)
9. Sherritt International Corporation (Fort Saskatchewan)

PROSPECTIVE PRODUCERS

1. Falconbridge Limited (New Quebec Raglan)
2. Timmins Nickel Inc. (Dumont)
3. Inco Limited (Levack, Murray, Totten, McCreedy East, Victor)
4. Outokumpu Mines Ltd. (Moncalm Township)
Timmins Nickel Inc. (Langmuir)
Black Hawk Mining Inc. (Redstone)
6. Inco Limited (Soab North, Soab South, Pipe No. 1, Pipe No. 2)
7. Black Hawk Mining Inc. (Minago)
8. Diamond Fields Resources Inc. (Voisey's Bay)

In February 1996, Diamond Fields accepted a merger proposal from Falconbridge Limited that would give Falconbridge control of the Voisey's Bay property.

Inco Limited

Inco produced a total of 183 000 t of finished nickel in 1995, including 45 000 t of nickel in matte from P.T. International Nickel Indonesia (P.T. Inco). This was a 17% increase over 1994's production, but 13 000 t below its scheduled 1995 production. Production was lower than planned in 1995 due to start-up problems following the annual summer shut-down at its Sudbury operation as well as adverse ground conditions in some of the older and deeper mines in Sudbury. Workforce adjustments following last year's down-sizing and some unanticipated equipment failures in Indonesia also lowered 1995 production. Inco's production is expected to be 195 000 t in 1996, of which 150 000 t will come from its Canadian operations and 45 000 t will come from Indonesia.

Inco's US\$72 million Victor advanced exploration project near Sudbury is on budget and ahead of schedule. The project will further delineate the deposit that to date stands at 5.4 Mt grading 2.26% nickel and 0.54% copper in the upper zone, which is 5000 ft below surface, and 6.4 Mt grading 1.9% nickel and 5.1% copper in the lower zone, which is more than 7000 ft below surface. Included in the project is the sinking of a 24-ft-wide, 5800-ft-deep shaft, development of 5500 ft of exploration drifts, and development of 125 000 ft of underground diamond drilling to the 9000-ft horizon. The project is scheduled to be completed in 1998 with a feasibility study on the Victor property to be completed in 1999. If found to be favourable, Victor could produce 17 000 t/y of contained nickel by 2001.

In 1995, Inco re-opened its Shebandowan nickel mine near Thunder Bay, Ontario. The mine, which had been on standby since the spring of 1992, is being operated by Dynatech Mining Ltd. The mill began operating in October at a rate of 1500 t/d of nickel ore with full production of 1900 t/d of ore, or 8000 t/y of recoverable nickel, expected in 1996. The mine, over its three-year life, will provide Inco with more flexibility in its operations.

Development work continued on Phase I of the McCreedy East mine. Production is scheduled to begin in 1996 at a rate of 3500 t/y of nickel with full production of 11 000 t/y by 1999. Phase I contains an estimated 15 Mt of ore grading 4.32% copper and 1.44% nickel and has an expected mine life of 17 years. Engineering work is also being done on Phase II of the mine, which has an average combined nickel and copper grade of 2.79% and could produce an additional 11 000 t/y for 18 years.

In addition, engineering work is being conducted on Phase II of the Garson mine. The average combined nickel and copper grade of Phase II is 2.67% and pro-

duction could be 10 000 t/y over a mine life of 16 years. The Garson mine re-opened in 1994 and Phase I is producing at a rate of 7000 t/y of contained nickel for an estimated 14 years.

At Inco's Manitoba Division, Phase I of the Thompson mine's 1-D orebody came on stream in 1995 producing 2000 t of contained nickel. Production will increase to 9000 t/y of contained nickel in 1996 and to 17 000 t/y by 1998. Phase I has an average grade of 2.51% nickel and an estimated mine life of 14 years. Engineering work is being done on Phase II of the 1-D orebody.

Inco began deepening its Birchtree mine in Thompson, Manitoba, at a cost of US\$30 million. The deepening will access 9-11 Mt of ore with an average combined nickel and copper grade of 2.02%. Production will start in late 1998 at a rate of 12 000 t/y of nickel for an estimated 23 years.

The mines at Inco's Manitoba Division will be working on a 12-month basis in 1996, resulting in increased production and the addition of 100 new workers to its current staff of 1700. The collective bargaining agreement expires at the Manitoba Division in September 1996.

Inco remains focused on lowering costs and increasing productivity. The company has successfully reduced its global break-even price for nickel over the past few years from US\$3.36/lb in 1991 to US\$2.60/lb for the first nine months of 1995. Inco successfully increased its global productivity from 256 copper-nickel lb/man-shift in 1994 to an estimated 280 in 1995, and is forecast to reach 300 lb/man-shift for 1996.

Inco reported earnings of US\$227 million for 1995 compared to US\$7 million in 1994. The increase was the result of increased deliveries, price and productivity. Inco's 1995 average realized nickel price was US\$3.86/lb, up from US\$3.00/lb in 1994.

Falconbridge Limited

Falconbridge Limited's Canadian mine production of nickel was 34 000 t in 1995, down from 36 800 t in 1994. Production was lower than planned due to disruptions related to the revision of work schedules, delays associated with the final commissioning of the Craig mine, and problems with the matte tap holes on the electric furnace. The decrease in Canadian production, together with a decrease in matte received from Russia and Botswana, resulted in lower production at Falconbridge's refinery in Norway of 53 200 t compared to 68 000 t in 1994. Production from Falconbridge's Dominican Republic operation was relatively unchanged over 1994 at 30 900 t of nickel in ferronickel, bringing Falconbridge's total nickel production to 84 100 t in 1995 compared to 98 800 t in 1994. Production is expected to be at least 93 000 t of nickel in 1996 comprising 62 000 t from

Norway, of which 45 000 t will be derived from matte produced in Canada and 31 000 t from the Dominican Republic.

Despite the decrease in production in 1995, Falconbridge reported earnings of C\$333 million compared to C\$131 million in 1994. The increase was largely the result of an increase in the company's average realized nickel price to US\$3.87/lb from US\$2.91/lb in 1994.

The development of Falconbridge's C\$486 million Raglan nickel property in northern Quebec is proceeding ahead of schedule and on budget, with production of 20 000 t/y of nickel in concentrate expected to start in late 1997. Reserves to date stand at 18.1 Mt grading 3.13% nickel and 0.88% copper. A new zone has been discovered on the property and reserves are expected to increase as a result. Ore grades from the new zone range from 5.02% nickel and 2.17% copper over 16.6 m to 2.05% nickel and 0.42% copper over 34.6 m. Concentrate from the Raglan operation will be shipped to Québec City and railed to Falconbridge's Sudbury smelter which is being expanded, at a cost of C\$37 million, to handle the additional material.

In September, Falconbridge re-opened its Lockerby mine that had closed in 1994. A total of C\$47 million will be spent to bring the mine back into full production of 8000 t/y of nickel and 3500 t/y of copper by 1998. Initial production of 3000 t of nickel and 2000 t of copper is expected in 1996. Mineable reserves at the Lockerby mine are estimated at 2.3 Mt, equal to a mine life of 10 years.

Falconbridge's Craig mine officially opened in September following the installation of the skip and hoist. Some delays were experienced with the final commissioning, but full production of 1.2 Mt/y of nickel-copper ore began in August. Nearly C\$300 million has been spent on developing the Craig mine since 1985. Mineable reserves at the Craig mine are estimated at 12 Mt.

Work continued in 1995 on the upgrading and modernization of Falconbridge's Strathcona mill resulting in improved recoveries. Regular maintenance, along with some additional work in preparation for the Raglan concentrate, was also completed on the Sudbury Division's smelter over the summer months.

Approval was received in 1995 to proceed with a \$28.5 million underground exploration program in the Sudbury Onaping-Craig area. The program will follow up on encouraging surface drill results.

In July, Trelleborg AB and Trelleborg International BV sold their 28.3% interest in Falconbridge to a group of Canadian underwriters for \$1.5 billion, or \$28.75 per share.

Sherritt International Corporation

Sherritt International is 50% owner of a vertically integrated commodity cobalt and nickel business that mines and does preliminary processing at Moa Bay, Cuba; refines at Fort Saskatchewan, Alberta; and markets its products worldwide. The 50% ownership was transferred from Sherritt Inc. to Sherritt International on November 23, 1995.

Output at Moa Bay rose from 12 500 t in 1994 to 20 700 t in 1995, the first full year of the Sherritt-General Nickel Company S.A. joint venture. Total production at the Fort Saskatchewan refinery was 23 300 t compared to 20 300 t in 1994. The refinery's production increase reflects improvements stemming from a US\$12 million capital project to de-bottleneck the refining facilities during 1995 and 1996, resulting in a total production capacity of 27 000 t/y of nickel and 2500 t/y of cobalt.

Black Hawk Mining Inc.

Black Hawk Mining's Redstone nickel mine near Timmins, Ontario, was brought back into production in October 1995 at a capital cost of \$1 million. By the end of January 1996, however, production had been suspended due to lower-than-anticipated nickel prices. The mine is in a state of abeyance, ready for immediate start-up when prices reach a suitable level, probably over US\$4.00/lb. The mine is expected to produce 2300 t/y of nickel. A custom milling and smelting contract was signed in July between Black Hawk Mining and Falconbridge that calls for Black Hawk Mining to provide 300 t/d of nickel ore to Falconbridge's processing facilities near Sudbury for at least two years. The Redstone deposit has proven and probable reserves of 170 000 t averaging 3.28% nickel and 0.038% cobalt. The Redstone nickel mine had started to produce in 1989, but then closed in 1992 due to weak market conditions.

Other Developments

Cameco Corporation is currently building a pilot plant to evaluate the feasibility of recovering nickel and cobalt from uranium tailings at its Key Lake facility located in northern Saskatchewan. If results are positive, a commercial plant could be built, at a cost of C\$45 million, with a capacity to produce 3200 t/y of nickel and 260 t/y of cobalt. Production by 1998 is possible.

The Lac-des-Îles platinum group metals mine located near Thunder Bay operated for its second year in 1995 and produced 600 t of nickel in concentrates, all of which were processed at Falconbridge's Sudbury facilities. The mine is owned by North American Palladium Ltd.

Ego Resources Ltd. started its operations in Cobalt, Ontario, to produce, at full capacity, 270 t/y of cobalt and 91 t/y of nickel contained in value-added compounds, such as carbonates, sulphates and hydroxides. Plans to increase capacity to 455 t/y of cobalt and 155 t/y of nickel are being considered.

Outokumpu Mines Ltd. began development of an exploration ramp at the Montcalm property located west of Timmins, Ontario. The ramp, which will be driven to the 300-m level, is expected to be finished by mid-1997. The property contains drill-indicated reserves of 7.1 Mt grading 1.54% nickel and 0.72% copper.

WORLD OVERVIEW

Australia

As part of the A\$1.3 billion expansion and upgrading project that began in 1991, Western Mining Corporation Holdings Limited (WMC) is constructing an A\$145 million sulphuric acid plant at its Kalgoorlie nickel smelter. The acid plant, scheduled for completion in the second half of 1996, will reduce sulphur dioxide emissions by 90%. WMC is also involved in the construction of the Goldfields gas transmission pipeline from the northwest coast of Australia to the Eastern Goldfields to be completed in the second half of 1996. By converting their power generation to natural gas, both production costs and carbon dioxide emissions will decrease. Production increased 43% in 1994/95 to 83 500 t of nickel in concentrate from 58 450 t in 1993/94 following the commissioning of the Mt. Keith mine. Its capacity now stands at 93 000 t/y of nickel contained in concentrate, although this may be increased through the expansion of Mt. Keith. Production from the Kalgoorlie smelter was 72 700 t, which included 552 t of toll material, or 49% higher than in 1993/94. Production from the Kwinana refinery was up 36% to 42 345 t, including 454 t of toll material.

Work began in 1995 on Queensland Nickel Pty Ltd.'s Yabulu nickel refinery expansion. Included in the expansion are two additional roasters and an electrostatic precipitator at a cost of A\$35 million. Its capacity is expected to increase by 20%: 10-15% as a result of the expansion work and 5% due to improved recovery rates. Queensland Nickel is also in the process of building an A\$47 million dedicated port facility in Townsville; its completion is scheduled for late 1996. Earlier this year, Queensland Nickel purchased the remaining 20% of the Queensland Nickel Joint Venture project from the Queensland state government for A\$140 million.

In November, Mining Project Investors announced the discovery of the Silver Swan deposit in Western Australia. The indicated mineral resource of the deposit is estimated at 440 000 t grading an exceptional 14% nickel. Production of 10 000 t/y of nickel

contained in concentrate is expected to begin as early as mid-1997. Outokumpu, which holds approximately 30% of Mining Project Investors, will market the concentrate. The capital costs of the project are estimated at between A\$45 million and \$50 million. A feasibility study is expected to be completed in the first half of 1996.

In December, North Ltd. decided to lapse its option to acquire a 50-80% interest in the Yakabindie nickel project from Dominion Mining Ltd. Indicated and inferred reserves are estimated at 269 Mt of sulphide ore grading 0.53% nickel.

Exploration continued in 1995 on the Maggie Hays deposit in the Lake Johnston area of Australia. The property is owned by Forrestania Gold NL and Gencor Ltd. Reserves are 10 Mt grading 1.42% nickel. The sulphide deposit could be developed using underground methods. An estimated 11 300 t/y of nickel contained in concentrate could be processed into ferronickel using Gencor's BioNIC extraction process, which uses bacterial oxidation technology. Production could possibly begin by 1998 at a capital cost of A\$150 million.

Anaconda Nickel continued its feasibility study of the Murrin Murrin property in Western Australia. The study is scheduled to be completed by April 1996. Lateritic reserves are estimated at 118 Mt grading 1.14% nickel and 0.07% cobalt. Sherritt Inc.'s pressure acid leach technology would be used to process the ore. The feasibility study is based on production of 45 000 t/y of nickel and 3000 t/y of cobalt, of which 30% will be in the form of a mixed cobalt sulphide.

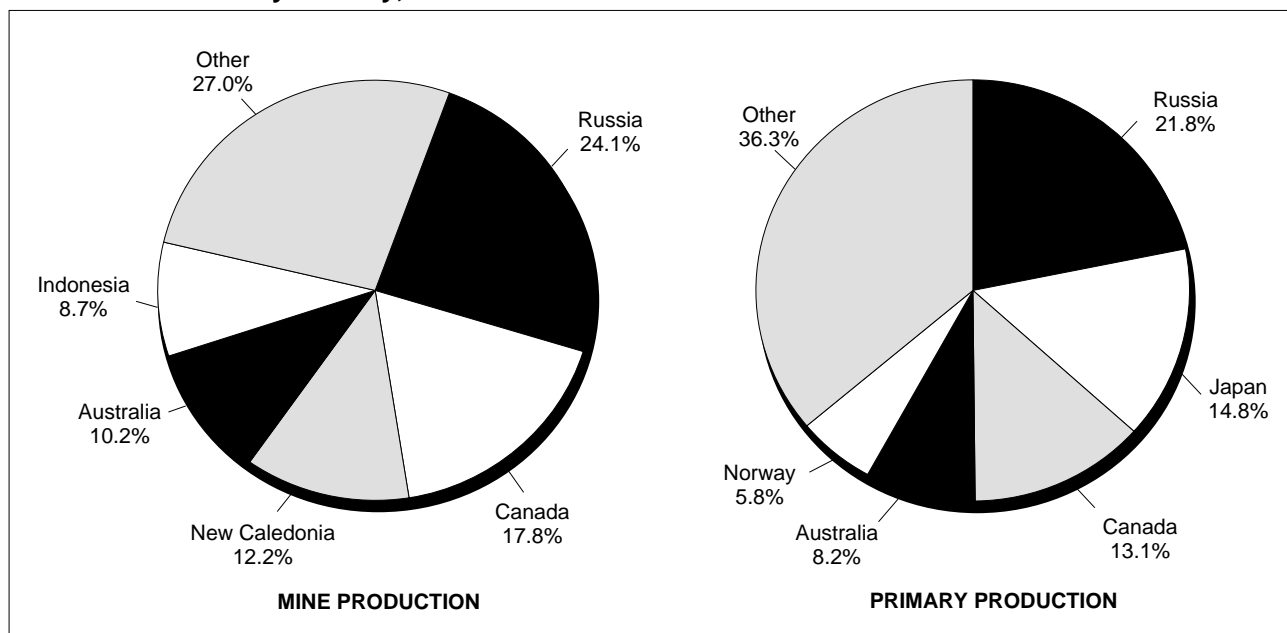
The completion of a feasibility study by Resolute Samantha Ltd. on its Bulong Nickel property is expected in 1996. Its capital costs would be around A\$175 million. The property is estimated to contain 100 Mt of laterite ore grading 1.06% nickel. Production of 6600 t/y of nickel and 550 t/y of cobalt could potentially occur as early as 1998.

Botswana

The Tati Nickel Mining Company, controlled by Anglo American Corp. and managed by BCL, officially opened its Phoenix nickel mine in October. Production from the open-pit sulphide mine is expected to be 3600 t/y of contained nickel, which will increase Tati's production to around 4600 t/y. Reserves at the Phoenix mine stand at 43 Mt containing 0.37% nickel and 0.21% copper. All of Tati's nickel concentrate is smelted by BCL at its Selebi Phikwe smelter in Botswana and refined by the Empress Nickel Mining Company in Zimbabwe.

As a result of the Phoenix mine opening, BCL's production will increase in 1996 to 26 000 t of nickel contained in matte. Production is expected to be sustained at this level until the year 2000, at which time depletion of existing ore reserves will occur after

Figure 2
Nickel Production by Country, 1995



Sources: Natural Resources Canada; International Nickel Study Group.

which production is expected to decrease to 20 000 t/y of nickel contained in matte by the year 2005.

Brazil

RTZ Mineração Ltda is developing its Fortaleza nickel sulphide deposit at a cost of US\$233 million. The property will produce 10 000-12 000 t/y of electrolytic nickel over a mine life of 20 years. Reserves of the property stand at 10.3 Mt grading 1.89% nickel, 0.36% copper and 0.20% cobalt, and production is expected to begin in 1998.

Inco and Korea Zinc Co. Ltd. are in the process of conducting a US\$6 million engineering study to develop the Barro Alto laterite deposit located northwest of Brasilia. The plant would produce 18 000 t/y of nickel in matte over a mine life of 30 years. The deposit contains an estimated 36 Mt of proven and probable ore grading 1.94% nickel.

China

The Jinchuan Nonferrous Metals Corporation continues to work on Phase II of its expansion project that is expected to increase production to 40 000 t/y of nickel, 20 000 t/y of copper and 600 t/y of cobalt. The expansion, which began in 1988 and is expected to be completed by 1996, includes a new flash furnace and a new sulphuric acid plant. The technology for the flash furnace was supplied by Outokumpu and WMC.

Jilin Nickel, China's second largest producer, is reportedly planning to increase capacity in 1996 by

10% to 8800 t/y of nickel contained in matte. Production in 1995 was 4500 t, which was below its target of 8000 t due in part to flooding that occurred in August.

China produced 38 100 t of primary nickel in 1995 compared to 31 500 t in 1994. China's consumption of nickel in 1995 was 45 000 t.

Colombia

Cerro Matoso S.A., owned by Billiton International Ltd. (52.3%) and the Institute for Industrial Development (47.7%), produced a record 24 600 t of nickel in ferronickel in 1995 compared to 20 800 t in 1994. Cerro Matoso achieved this level through process improvements at its existing operation. Other process improvements scheduled for 1996 include a new transformer which, along with minor modifications, will result in a capacity expansion to 32 000 t/y of ferronickel by 1999.

Cuba

Cuba produced 44 000 t of nickel in 1995 compared to 26 400 t in 1994. Production increases occurred at all three operations, Moa Bay, Punta Gorda and Nicaro, due to process improvements made to the facilities. Production is expected to increase again in 1996 to 46 000 t of contained nickel.

Sherritt International is 50% owner of a vertically integrated commodity cobalt and nickel business that mines and does preliminary processing at Moa Bay,

Cuba; refines at Fort Saskatchewan, Alberta; and markets its products worldwide. The other 50% is owned by the General Nickel Company S.A., a Cuban state company. An estimated US\$165 million is being spent between 1995 and 1999 on rehabilitating and sustaining the Moa Bay facilities. Expenditures in 1995 included the upgrading of one of the steam boilers and new sulphuric acid handling facilities following the closure of one of the existing acid plants. Work will begin in 1996 on a new acid plant and related facilities that could be commissioned by late 1997.

A total of 20 651 t of contained nickel and cobalt was produced at the Moa Bay mining and processing operation in 1995 with a record production of 2200 t of contained nickel and cobalt recorded for the month of May.

Engineering work on increasing its capacity from 24 000 t/y to 28 500 t/y of contained nickel and cobalt is under way with costs estimated at US\$12 million. A further expansion of the Moa Nickel facilities to 46 000 t/y of contained nickel and cobalt has been estimated to cost US\$173 million and is currently being evaluated.

WMC's wholly owned subsidiary, Westminer Holdings, signed an agreement with Cuba's state-owned Commercial Caribbean Nickel SA (CCA) to begin evaluation of the Pinares de Mayari West nickel deposit in the Holguin Province of Cuba. The deposit contains over 200 Mt of reserves grading more than 1% nickel and 0.1% cobalt. If a production decision is taken on the property, Westminer would hold 65% of the joint venture, with CCA holding the remaining 35%.

Gencor acquired 75% of the state-owned San Felipe nickel deposit. Exploration and assessment of the deposit is expected to be completed by the year 2000.

Dominican Republic

Production from Falconbridge Dominicana C por A was relatively unchanged at 30 900 t of nickel in ferronickel in 1995 and is expected to remain at the same level in 1996. Pilot plant testing of a new laterite upgrading technique is under way which, if results are favourable, could lead to a capacity expansion to 40 000 t/y. Falconbridge's average ferronickel price was US\$3.75/lb in 1995 compared to US\$2.87/lb in 1994.

Finland

Outokumpu Oy completed the expansion and modernization of its Harjavalta nickel smelter in June. Its capacity has been increased from 18 000 t/y to 32 000 t/y of contained nickel. Additional nickel feed for the expansion will come from Outokumpu's Forrestania nickel mine in Western Australia and WMC's Mt. Keith mine.

The Finnish government has proposed that Outokumpu be given licences to explore the Kevitsa copper-nickel deposit in northern Finland. The exploration program is expected to last three years with a feasibility study to be completed, if warranted, by the end of 2001 and mining to start by the end of 2004.

Greece

General Mining and Metallurgical Co. S.A. LARCO produced 17 000 t of nickel in ferronickel in 1995, compared to 16 200 t in 1994. Work continued on trying to improve the company's financial situation.

Indonesia

Inco Limited will spend US\$580 million to expand P.T. International Nickel Indonesia's (P.T. Inco) capacity by 50% to 68 000 t/y of contained nickel in matte by late 1998. 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 the signing of an agreement with the Indonesian government to extend P.T. Inco's contract of work. Production in both 1994 and 1995 was around 45 000 t.

P.T. Aneka Tambang plans to double its capacity to 22 000 t/y of nickel in ferronickel through the construction of a US\$200 million hydro-electric plant, which is expected to be on stream by 1998. A smelter expansion was completed in 1995 that increased capacity from 5500 t/y to 11 000 t/y of nickel in ferronickel.

Four new prospects are being studied in the eastern island province of Maluku and in Irian Jaya. These ventures are being studied as either joint ventures with P.T. Aneka or with domestic private companies.

Ivory Coast

Exploration work continued in 1995 on the Touba-Biankouma laterite property. Preliminary mineable resources at the Fougouesso and Moyango deposits are now estimated at 39.5 Mt grading 2% nickel and 0.07% cobalt. Further drilling is planned for 1996. The project is a joint venture between Falconbridge, the Société d'État 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

Japan's nickel production increased to 135 400 t in 1995 compared to 112 600 t in 1994. All three ferronickel producers, Sumitomo Metal Mining, Pacific Metals, and Nippon Yakin Kogyo, increased their production in response to strong demand from the stainless steel sector. Production is expected to increase marginally in 1996.

New Caledonia

Production from the Société Métallurgique Le Nickel's (SLN) operations was relatively unchanged at 50 000 t of nickel contained in ferronickel and nickel matte. An expansion project is planned in order to increase production to 60 000 t/y by the year 2000.

Inco continued to conduct a feasibility study of its Goro nickel project. Completion is expected for 1996. The deposit, which contains reserves of 165 Mt grading 1.6% nickel and 0.16% cobalt, would be processed using pressure acid leach technology.

Norway

Output from Falconbridge Limited's Nikkelverk refinery decreased to 53 200 t in 1995 from 68 000 t in 1994, primarily due to a decrease in custom feed materials. Its refining capacity will be increased from 69 000 t/y to 80 000 t/y to accommodate production from the Raglan operation located in northern Quebec.

Outokumpu Metals and Resources purchased 70% of Nikkel og Olivin, which owns a nickel mine and concentrator in northern Norway. The operation produces around 2600 t/y of nickel in concentrate that Outokumpu processes at its Harjavalta nickel smelter in Finland.

The Philippines

A Memorandum of Understanding has been signed by Stellar Gold Corp. and BHP Minerals Ltd. whereby BHP can earn up to a 70% working interest in the Palawan and Surigao properties in a number of stages. Reserves for the two laterite properties are estimated at 197 Mt and 90 Mt, respectively, at a grade of 1.4% nickel and 0.1% cobalt. The properties also contain 776 000 t of saprolite located close to the surface grading 2.29% nickel. Stellar plans to mine and ship the saprolite to a smelter beginning in 1996. Pre-feasibility exploration work will be conducted on the properties in 1996.

A consortium called Pacific Metals Co. Ltd. has been negotiating with the Philippines government over the purchase of the Nonoc nickel refinery. The cost required to bring the plant back into production has been estimated at over US\$500 million, which includes US\$333 million for the purchase of the plant, US\$68 million for rehabilitation work and US\$120 million in working capital. The plant, which remains idle, has a capacity of 30 000 t/y of nickel and 1500 t/y of cobalt in a mixed sulphate concentrate. Nonoc was closed in 1986.

Russia

Russian production of nickel increased to 199 000 t in 1995 from 180 400 t in 1994. The Russian Share-

holding Company Norilsk Nickel (RAO Norilsk Nickel) produced 178 000 t of nickel, including nickel matte and ferronickel, and the Limited Partnership Tyazhtsvetmet (TOO Tyazhtsvetmet), which is located in the Urals, produced 21 000 t of nickel. The increase was partially due to the increased price of metals. Consumption, which has been decreasing since the break-up of the former Soviet Union in 1990, increased to an estimated 44 000 t in 1995 from 37 500 t in 1994.

The renovation of the Pechenganikel smelter on the Kola Peninsula will apparently be funded by Russian revenues from nickel exports and by financial assistance from Norway, Sweden and Finland. The tender for the US\$250 million project had been awarded to a consortium of Elkem Technology, Kvarner Engineering, and Boliden Contech in 1993.

Uneximbank obtained the right to manage the Russian government's 38% controlling interest in RAO Norilsk Nickel in exchange for a US\$170 million loan to the Russian government. It is still not known whether Uneximbank plans to make any changes to the existing structure of the metals combine that could involve changes to the board, charter and business strategy. The shares-for-loans deal is the second part of the Russian government's privatization program that began in 1994. Phase I saw the Russian government retaining a 38% controlling interest in Norilsk, with 50% of Norilsk being sold or given to employees and management and the remaining 12% being auctioned under the Russian privatization coupon system.

South Africa

South Africa produced an estimated 29 800 t of nickel in 1995 as a co-product of platinum production, compared to 30 100 t in 1994.

Columbus Steel began importing nickel in 1995 following the completion of its first expansion from 140 000 t/y to 220 000 t/y of stainless steel. A further expansion to 600 000 t/y of stainless steel is expected by the end of 1997 at which time the operation will require 45 000 t/y of nickel. Iscor Ltd. is scheduled to begin production of stainless steel in 1996 at a targeted rate of 480 000 t/y that will require an estimated 36 000 t/y of nickel. As a result, South Africa's total nickel consumption could exceed 80 000 t/y, making it the fourth largest nickel consumer in the world after Japan, the United States and Germany.

Anglovaal continued work on the Slaaihoek - Uitkomst/Nkomati joint-venture project in the Eastern Transvaal Province in which Anglovaal holds a 75% interest and Anglo American Corporation holds the remaining 25%. A feasibility study is scheduled to be completed in 1996. The small high-grade property is expected to produce less than 5000 t/y of nickel in concentrate.

Tanzania

BHP has relinquished its interest in the Kabanga nickel deposit. Sutton Resources Ltd. is now the sole owner of the property, but is reportedly looking for a new partner. Reserves are estimated at 31 Mt grading 1.5% nickel, 0.23% copper and 0.13% cobalt. A US\$321 million mine, mill and flash smelter complex is reported to be under consideration for the deposit that would produce 27 000 t/y of nickel in matte and 1800 t/y of cobalt.

United Kingdom

Production from Inco's nickel refinery in Clydach, Wales, increased to 35 000 t in 1995 from 28 200 t in 1994. Production is expected to increase again in 1996 to 38 000 t as part of Inco's worldwide increase in nickel production.

United States

Cominco Resources International Limited re-opened the Glenbrook Nickel Co. in Riddle, Oregon, during the second quarter of 1995 producing 8300 t of nickel in ferronickel. Production of 15 400 t is expected for 1996. Glenbrook had been closed since July 1993 due to low nickel prices.

The U.S. Defense Logistics Agency sold 9560 t of nickel in 1995 compared to 5500 t in 1994. The allocation for sale in fiscal year 1996 (October 1995 to September 1996) is 9072 t. As of December 31, 1995, a total of 17 010 t of uncommitted nickel remained in the stockpile.

A decision to close the U.S. Bureau of Mines was taken in 1995 due to budgetary constraints and restructuring of the federal government. Some work from the Bureau, such as the collection and dissemination of minerals information, will be shifted to the U.S. Geological Survey along with a budget of US\$16 million, down from the US\$27.3 million received for fiscal year 1995. Nickel commodity work is now being conducted by the U.S. Geological Survey.

Venezuela

A production decision could be taken in 1996 on the Loma de Niquel ferronickel deposit (formerly Loma de Hierro) where reserves are estimated at 40 Mt grading 1.48% nickel. Capital costs are estimated at between US\$350 million and \$400 million with operating costs estimated at US\$1.60/lb. Annual production of 16 000-18 000 t of nickel contained in ferronickel could start in mid-1999. The property is owned by Minorco SA (85%) and Corporacion Federal de Minas CA (COFEMINAS) (15%).

Zimbabwe

Refined nickel production in Zimbabwe was down to 14 000 t in 1995 from 18 700 t in 1994. The decrease

was partly the result of a decrease in matte shipments from Botswana to the Empress nickel refinery. Empress, owned by a subsidiary of RTZ Corporation PLC, has expanded its capacity from just under 6000 t/y of nickel to around 9000 t/y to accommodate new mine production in Botswana.

Nickel production was also lower in 1995 at Anglo American's Bindura nickel operation due to commissioning problems at the new matte pressure leach plant. Its overall nickel recovery increased by 2% as a result of the new plant. Bindura is aiming to raise its refinery output to 20 000 t of nickel, of which 11 000 t of nickel in matte would come from Bindura itself, with the remaining coming from BCL in Botswana and as by-product nickel carbonate from Western Platinum Limited in South Africa.

Delta Gold and The Broken Hill Proprietary Co. are going ahead with the development of the Hartley platinum project. An estimated 3000 t/y of nickel will be produced as a by-product of platinum production. The project should reach full capacity by 1997.

THE INTERNATIONAL NICKEL STUDY GROUP

The International Nickel Study Group (INSG) is an autonomous intergovernmental organization based in The Hague, Netherlands. It was formed in 1991 to improve market information and to provide regular inter-governmental consultations on the nickel markets and a forum for discussion of issues of concern to the industry. Membership is comprised of nickel-producing, consuming and trading countries, and Canada is an active member. At present there are 15 member countries representing close to 80% of world nickel mine production, 65% of world nickel trade and 60% of world nickel consumption. A world nickel statistics bulletin that contains information on world nickel production, consumption and trade is published monthly.

The 10th Session of the INSG was held in The Hague, Netherlands, in April 1995. The meetings were well attended by member countries including observers from the United States, China, South Africa and Ukraine. The session examined the monthly statistical bulletin, a nickel consumption analysis prepared by the secretariat, and current new mine and smelter projects. The group also formally approved the Industry Advisory Panel that will provide guidance to the INSG Secretariat on its workplan and discussed other issues, such as the environment, the current health and environmental issues affecting nickel, and the nickel regulatory developments in the European Union.

CHARACTERISTICS AND USES

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

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 that account for approximately 70% of the primary nickel consumed. 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, as well as in building facings and trim.

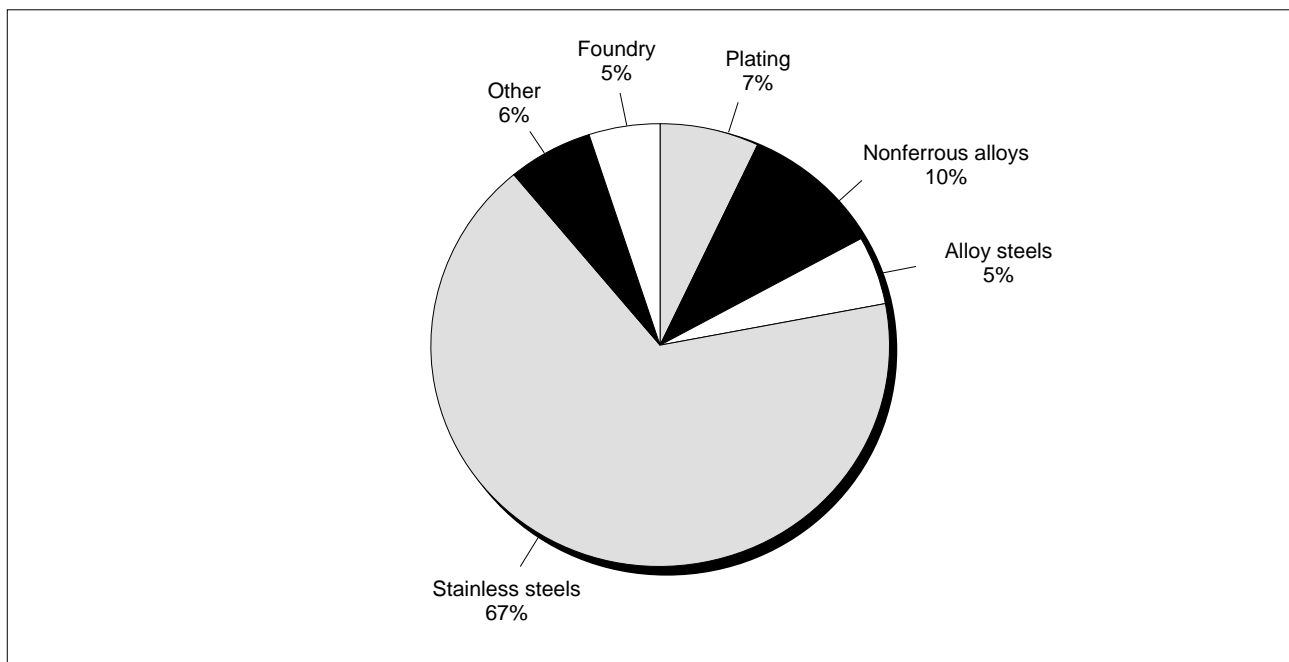
Stainless steels can contain varying quantities of nickel, but must have at least 10% chromium. The addition of large quantities of nickel, usually between 7 and 12%, changes the crystal structure of the steel to austenitic, making the steel non-magnetic. This type of stainless steel is thus called austenitic 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 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. Although nickel has been used in coinage, its use is slowly decreasing as countries are replacing nickel coins with coins made of other metals or metal alloys.

Figure 3
Nickel, World Consumption by First Use



Source: Inco Limited.

At present, Japan, the United States and Germany account for nearly 50% of all nickel consumed in the world. However, countries such as China, Taiwan and Korea have experienced tremendous growth in nickel consumption over the past few years, increasing Asia's consumption of nickel from 27% of world consumption in 1991 to 38% in 1995. It is expected that Asia will continue to be a growth market for nickel over the next few years with stainless steel accounting for the increase. Batteries are also seen as a growth area for nickel as the world's use of portable electronic articles increases.

HEALTH AND THE ENVIRONMENT

Nickel is a naturally occurring element that exists in all soils and is believed to make up a large percentage of the earth's core. Nickel is also considered to be an essential element for plants and most animals. In fact, nickel has been proven to be an absolute growth requirement for certain types of bacteria and algae, and nickel deficiencies in animals have been linked to growth retardation. Besides being an essential element for plants and many animals, it is the view of many experts that nickel is likely an essential element for humans as well.

The average human body contains an estimated 7-10 mg of nickel, with nickel also being present in human fetal tissue. Food is the major route of nickel intake in humans. Another route of intake, primarily in individuals who are occupationally exposed, is inhalation, but nickel is also inhaled through tobacco smoke.

As well, jewellery, particularly lower-quality nickel-plated earrings, may cause a condition referred to as nickel dermatitis. Nickel dermatitis is caused through direct or indirect contact of the skin with certain nickel-containing items that can dissolve in sweat and penetrate the skin. However, many nickel alloys, including stainless steels, do not react with sweat and therefore do not cause a nickel allergy. It is estimated that 10-20% of women and 1-2% of men are "sensitive" to nickel, with nickel dermatitis being one of the principal adverse health effects associated with nickel.

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 into contact with the skin. The Commission of the European Communities wants this amending directive to be implemented by the end of 1997 in member states.

In Canada, the substances "nickel and its compounds" and "metallic nickel" are not considered to be "toxic" under the *Canadian Environmental Protection Act* (CEPA). However, each of the groups, "oxidic," "sulphidic," and "soluble" inorganic nickel com-

pounds are as a whole considered to constitute a danger to human life or health and are considered, therefore, to be "toxic" as defined under CEPA. A substance is deemed "CEPA toxic" based on its effect on the environment and/or its danger to human life or health.

PRICES AND STOCKS

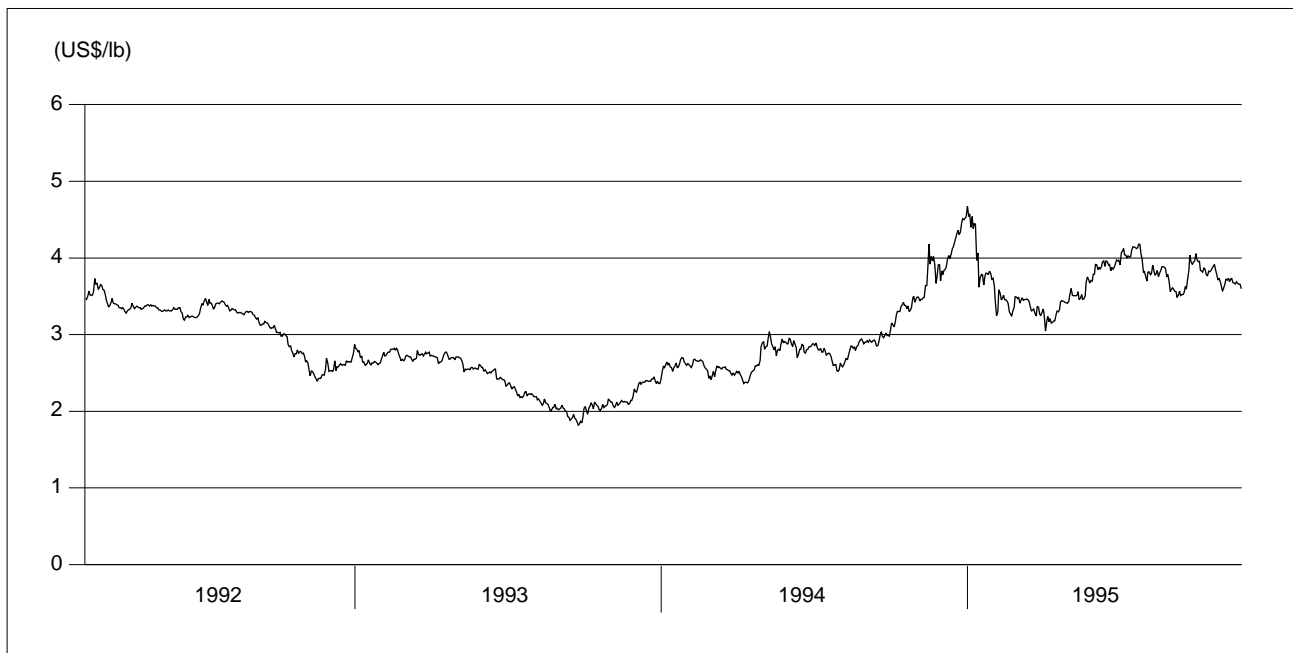
The LME inventory of nickel stocks, which hit a record high of 150 700 t in 1994, decreased to 44 892 t at the end of 1995. The decrease was the result of the demand for nickel being larger than production. Producer stocks remained relatively flat at around 80 000 t in the first half of 1995 and gradually increased to just over 90 000 t at year-end. The small build-up was due to a general slowdown in demand for stainless steel in the second half of 1995 following spectacular growth in the first half. The slowdown also resulted in a build-up of stainless steel stocks.

Improved market fundamentals were reflected in the LME average settlement price of nickel which increased to US\$3.74/lb, 30% higher than the 1994 price of US\$2.88/lb. Investment funds continued to play a very active role in the commodity markets in 1995, causing prices to move due to technical reasons such as fund short-covering and speculative buying. Soaring prices at the end of 1994 and in early 1995 were adjusted rather quickly in February and continued to decrease through to May as nickel appeared to be following the downward price movements of aluminum and copper. This decrease was despite an apparent tightness of both nickel metal and scrap, along with increased demand. Prices began to increase in May as market tightness continued and LME stocks steadily declined. In August, however, prices again began to decrease as nickel broke the US\$4.00/lb mark, sparking funds to sell out. The slowdown in the stainless steel industry in the last half of 1995 encouraged the decrease in prices to US\$3.50/lb.

CONSUMPTION AND PRODUCTION

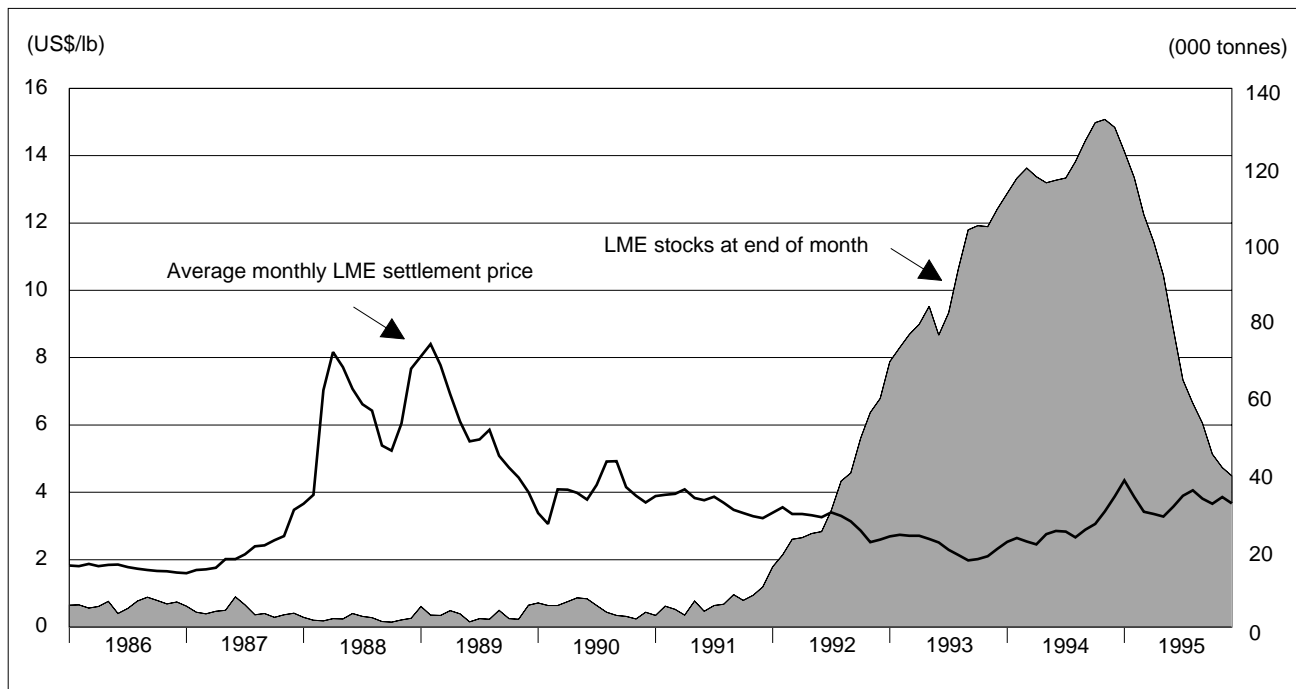
In 1995, world nickel consumption hit double-digit growth for the second continuous year to an estimated 973 000 t, compared to 863 600 t in 1994 and 780 900 in 1993. The strong demand for nickel has been sparked by the strong demand for stainless steel, which accounts for nearly 70% of all nickel consumed. A large portion of this growth occurred in China, Taiwan and Korea, which combined now make up an estimated 13% of world consumption, compared to only 7% in 1989. Also contributing to the increase in nickel consumption over 1995 was the continued shortage of stainless steel scrap in the first half of the year that forced stainless steel producers in Europe and Asia to use more primary nickel.

Figure 4
London Metal Exchange Nickel Settlement Prices, 1992-95



Source: Natural Resources Canada.

Figure 5
Nickel, LME Monthly Settlement Price and LME Stocks, 1986-95



Source: Natural Resources Canada.

World primary nickel production increased by 11% to 911 000 t in 1995 from 823 000 t in 1994. Most of the increase came from increased production at existing operations in response to growing demand.

OUTLOOK

Nickel consumption is forecast to increase again in 1996, but at a much lower rate of 3%, to 996 000 t. The lower rate of consumption is forecast to follow the lower rates of growth expected in the United States, Europe and Japan, and possibly in China, Korea and Taiwan. In the long term, consumption is forecast to increase at closer to its historic rate of 2%/y.

World finished nickel production is expected to increase by nearly 6% in 1996 and by 3% in 1997 to 961 000 t and 986 000 t, respectively. The majority of the increases will come from increased production at existing operations. Most world nickel producers are producing at or close to full capacity, which could lead to shortages in 1998 as consumption continues to increase. However, a number of greenfield nickel projects and capacity expansions at existing operations are being considered to fill the shortages that might occur.

Prices are expect to stay below US\$4.00/lb for the first few months of 1996 as the stainless steel industry de-stocks. The average 1996 nickel price is forecast to be in the range of US\$4.00-\$4.25/lb as consumption increases, albeit at a slower rate than in 1995. A long-term cash price of US\$3.25-\$3.75/lb, in real terms, is forecast for nickel.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 70. (2) Information in this review was current as of February 16, 1996.

TARIFFS

Item No.	Description	Canada			United States	EU	Japan ¹	Brazil	India	Taiwan	Korea
		MFN	GPT	USA	Canada	MFN	GATT	UR	UR	1995	UR
2604.00	Nickel ores and concentrates	Free	Free	Free	Free	Free	Free			2.5%	1%
2825.40.00	Nickel oxides and hydroxides	Free	Free	Free	Free				40%		
7202.60.00	Ferronickel	9.5%	6.7%	Free	Free	Free	5.9%	35%		2.5%	5%
7501.10	Nickel mattes	Free	Free	Free	Free	Free	Free		40%	Free	2%
7501.20	Nickel oxide sinters and other intermediate products of nickel metallurgy	Free	Free	Free	Free	Free	Free-73.6 yen/kg ²			Free	2%
7502.10	Unwrought nickel, not alloyed	Free	Free	Free	Free	Free	73.6 yen/kg	10%	25%	1.25%	
7502.20	Unwrought nickel alloys	Free	Free	Free	Free	Free	Free-7.8% ³		40%	1.25%	
7503.00	Nickel waste and scrap	Free	Free	Free	Free	Free	Free		40%	Free	
7504.00.10	Nickel powders containing by weight 60% or more of nickel	Free	Free	Free	Free	Free	Free	35%	40%	Free	
7504.00.20	Nickel powders containing by weight less than 60% of nickel; flakes	Free	Free	Free	Free	Free	60.2 yen/kg-5.4%				
7505.11	Bars, rods and profiles of nickel, not alloyed	Free	Free	Free	Free	3.5%	6.4%				
7505.12	Bars, rods and profiles of nickel alloys	Free	Free	Free	Free	4.1%	5.2%				
7505.21	Nickel wire, not alloyed	Free	Free	Free	Free	3.5%	6.4%				
7505.22	Wire of nickel alloys	Free-2.4%	Free-1%	Free	Free	4.1%	5.2%				
7506.00	Nickel plates, sheets, strip and foil	Free-3.9%	Free-2%	Free	Free	3.9-4.6%	Free-6.4%				
7507.00	Nickel tubes, pipes, and tube or pipe fittings	Free-7.3%	Free-4%	Free	Free	3.5-4.2%	5.2-6.4%				
7508.00	Other articles of nickel	Free-7.8%	Free-5%	Free-2.2%	0.9-1.1% ^a	3.7%	5.2%				

Sources: Customs Tariff, effective January 1996, Revenue Canada; Harmonized Tariff Schedule of the United States, 1996; The "Bulletin International des Douanes," Journal Number 14 (17th Edition), European Union, 1994-1995, "Conventional" column; Custom Tariff Schedules of Japan, 1995, "WTO" column.

^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 73.6 yen/kg, and nickel oxide containing by weight not more than 1.5% copper which is 6.4%. ³ Tariff rate of 7.8% applies to nickel alloys other than those containing by weight less than 50% of nickel and not less than 10% of cobalt.

Note: UR: Uruguay Round Most Favoured Nation rates; the final rate in place by January 1, 1999.

TABLE 1. CANADA, NICKEL PRODUCTION AND TRADE, 1994 AND 1995P

Item No.	1994		1995P		
	(tonnes)	(\$000)	(tonnes)	(\$000)	
PRODUCTION¹					
	All forms				
	Ontario	106 852	925 234	127 828	1 505 173
	Manitoba	35 122	304 119	39 014	459 388
	Total	141 974	1 229 354	166 842	1 964 562
	Refined	105 144	-	119 600	-
EXPORTS					
2604.00	Nickel ores and concentrates, nickel content				
	Total	-	-	-	-
2825.40	Nickel oxides and hydroxides				
	United States	634	9 136	641	9 389
	Singapore	272	3 170	323	4 367
	Belgium	148	1 703	292	4 130
	Taiwan	284	4 197	261	4 310
	People's Republic of China	.	6	201	3 249
	Other countries	199	2 697	220	3 521
	Total	1 538	20 915	1 938	28 972
7202.60	Ferronickel				
	Taiwan	-	-	65	679
	Total	-	-	65	679
7501.10	Nickel mattes				
	United Kingdom	25 105	201 088	39 799	467 715
	Norway	42 598	324 162	29 705	380 624
	United States	8	52	21	240
	Total	67 710	525 302	69 525	848 580
7501.20	Nickel oxide sinters and other intermediate products of nickel metallurgy				
	South Korea	1 820	11 678	4 289	30 499
	Taiwan	746	6 132	3 175	28 979
	Singapore	590	5 789	672	7 937
	United States	436	3 435	511	5 318
	Belgium	243	2 721	390	4 686
	Other countries	233	2 759	144	1 285
	Total	4 068	32 514	9 181	78 706
7502.10	Nickel unwrought, not alloyed				
	United States	38 541	309 049	42 944	469 225
	Belgium	15 865	125 490	14 412	163 584
	Taiwan	6 823	56 529	5 921	63 780
	Japan	3 856	32 666	4 836	55 458
	Netherlands	2 736	22 346	2 638	30 028
	People's Republic of China	335	3 150	2 033	22 314
	South Korea	1 691	14 025	1 941	20 551
	Germany	1 593	13 823	1 904	39 648
	Singapore	1 046	8 340	1 667	18 805
	Hong Kong	1 669	13 152	1 020	11 049
	United Kingdom	1 639	13 499	657	7 520
	Other countries	4 805	39 906	4 461	51 171
	Total	80 597	651 892	84 434	953 148
7502.20	Nickel unwrought, alloyed				
	United States	985	9 439	1 075	13 186
	Belgium	541	6 164	225	3 246
	South Korea	102	1 061	43	551
	Taiwan	73	625	-	-
	Sweden	58	582	-	-
	Other countries	148	1 425	83	1 021
	Total	1 907	19 302	1 426	18 004
7503.00	Nickel waste and scrap				
	United States	1 991	9 875	2 903	19 474
	United Kingdom	97	152	61	187
	Netherlands	36	245	54	69
	Japan	89	251	43	243
	People's Republic of China	9	37	-	-
	Other countries	-	-	77	249
	Total	2 221	10 561	3 138	20 227
7504.00	Nickel powders and flakes				
	United States	6 705	88 006	6 443	94 534
	Japan	2 274	24 658	3 316	42 901
	People's Republic of China	707	10 134	778	12 400
	Belgium	554	6 485	613	7 592
	Netherlands	346	4 211	405	4 707
	Other countries	1 053	11 935	688	12 151
	Total	11 639	145 441	5 800	174 297

TABLE 1 (cont'd)

Item No.	1994		1995p	
	(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS (cont'd)				
7505.11	Bars, rods and profiles of nickel, not alloyed			
	United States	-	-	-
	Philippines	-	-	-
	Total	-	-	-
7505.12	Bars, rods and profiles of nickel alloy			
	Hong Kong	-	1	9
	United States	-	1	17
	Poland	-	..	2
	Total	-	3	29
7505.21	Nickel wire, not alloyed			
	United States	2	4	37
	Total	2	4	37
7505.22	Wire, nickel alloy			
	United States	46	61	1 051
	Japan	-	12	67
	Other countries	-	1	12
	Total	46	73	1 133
7506.00a	Nickel plates, sheets, strip and foil			
	United States	64	93	1 585
	Poland	3	15	179
	People's Republic of China	1	2	21
	Taiwan	..	-	-
	Other countries	-	1	18
	Total	68	111	1 806
7507.00b	Nickel tubes, pipes, and tube or pipe fittings			
	United States	60	96	4 623
	Italy	-	18	89
	South Korea	-	5	51
	Cuba	-	4	86
	Other countries	53	3	28
	Total	114	126	4 880
7508.00	Other articles of nickel			
	United States	..	..	3 945
	Netherlands	..	..	172
	United Kingdom	..	..	69
	Switzerland	..	..	-
	France	..	..	109
	Other countries	..	..	426
	Total	..	..	4 731
IMPORTS²				
2604.00.00.20	Nickel ores and concentrates, nickel content			
	Australia	-	1 490	11 424
	United States	896	968	5 343
	United Kingdom	-	16	92
	Total	896	2 474	16 860
2825.40	Nickel oxides and hydroxides			
	United States	157	139	1 491
	Finland	14	41	496
	Total	171	180	1 987
7202.60	Ferronickel			
	Russia	-	632	2 616
	Finland	8	-	-
	United States	2	-	-
	Total	10	632	2 616
7501.00c	Nickel mattes, nickel oxide sinters and other intermediate products of nickel metallurgy			
	Cuba	23 931	33 987	237 873
	Australia	2 054	6 630	66 159
	United States	4 276	4 284	8 665
	United Kingdom	1 568	1 130	7 404
	Albania	-	1 010	1 015
	Poland	1 072	787	1 196
	People's Republic of China	-	758	5 236
	Sweden	621	701	1 558
	Chile	180	80	132
	Belgium	457	36	113
	Other countries	-	33	42
	Total	34 160	49 437	329 399

TABLE 1 (cont'd)

Item No.		1994		1995P	
		(tonnes)	(\$000)	(tonnes)	(\$000)
IMPORTS (cont'd)					
7502.10	Nickel unwrought, not alloyed				
	Norway	3 873	20 563	2 276	22 429
	United Kingdom	3 930	29 091	1 622	19 434
	United States	200	1 738	1 041	10 992
	Russia	2 056	15 489	443	5 233
	People's Republic of China	454	4 306	—	—
	Other countries	114	983	551	6 382
	Total	10 627	72 176	5 932	64 477
7502.20	Nickel unwrought, alloyed				
	United States	371	2 188	1 221	4 809
	Russia	19	204	56	775
	United Kingdom	31	346	38	520
	Germany	—	—	36	243
	Netherlands	—	—	19	215
	Other countries	15	127	6	70
	Total	436	2 869	1 376	6 636
7503.00	Nickel waste and scrap				
	United States	18 714	33 073	19 538	38 377
	United Kingdom	806	4 476	757	5 174
	Netherlands	253	278	534	2 362
	Germany	316	765	397	1 528
	Belgium	421	984	13	6
	Other countries	440	1 308	678	4 299
	Total	20 950	40 889	21 919	51 753
7504.00	Nickel powder and flakes				
	Australia	600	5 125	922	10 929
	United States	525	4 178	696	6 943
	United Kingdom	5	67	175	1 881
	Germany	10	181	11	262
	Other countries	3	38	143	1 664
	Total	1 144	9 591	1 947	21 683
7505.11	Bars, rods and profiles of nickel, not alloyed				
	United States	16	249	10	179
	Other countries	1	16	1	4
	Total	17	266	11	184
7505.12	Bars, rods and profiles of nickel alloy				
	United States	203	4 355	276	6 307
	United Kingdom	6	172	13	351
	France	8	82	3	34
	Germany	17	230	2	45
	Other countries	1	6	5	81
	Total	235	4 848	300	6 821
7505.21	Nickel wire, not alloyed				
	Germany	1	19	22	376
	Japan	2	17	12	98
	United States	7	94	9	103
	Other countries	.. .	.. .	1	21
	Total	11	132	44	600
7505.22	Wire, nickel alloy				
	United States	276	5 279	298	6 085
	Germany	52	795	55	872
	France	13	234	5	75
	Other countries	5	85	6	128
	Total	345	6 396	364	7 164
7506.00	Nickel plates, sheets, strip and foil				
	United States	490	9 601	759	16 480
	Germany	76	1 256	208	3 708
	Japan	1	8	33	167
	United Kingdom	4	75	2	44
	Sweden	1	33	2	57
	France	1	32	..	2
	Other countries	1	4	11	391
	Total	574	11 012	1 015	20 853
7507.00	Nickel tubes, pipes, and tube or pipe fittings				
	Japan	253	18 918	751	47 263
	United States	515	10 656	473	10 189
	France	19	441	145	7 452
	Sweden	12	152	34	732
	Germany	48	786	18	492
	United Kingdom	15	280	18	430
	Other countries	4	89	33	431
	Total	866	31 325	1 473	66 994

TABLE 1 (cont'd)

Item No.	1994		1995 ^p	
	(tonnes)	(\$000)	(tonnes)	(\$000)
IMPORTS (cont'd)				
7508.00	Other articles of nickel			
	2	31	927	7 436
	204	3 932	373	7 280
	11	132	198	3 863
	185	523	43	196
	15	312	18	382
	79	627	13	123
	7	109	10	94
	12	227	8	177
	4	116	1	28
	5	71	35	372
Total	523	6 091	1 626	19 841

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.^a Included in the data are HS codes 7506.10 and 7506.20. ^b Included in the data are HS codes 7507.11, 7507.12 and 7507.20.^c Included in the data are HS codes 7501.10 and 7501.20.

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

TABLE 2. CANADA, NICKEL PRODUCTION AND CONSUMPTION, 1970, 1975, 1980 AND 1985-95

	Production ¹	Consumption ²
	(mine output)	
	(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
1990	196 225	8 410
1991	192 259	10 322 ^a
1992	186 384	12 528
1993	188 080	13 884 ^a
1994	149 886	16 877 ^p
1995 ^p	176 605	. .

Source: Natural Resources Canada.

. . Not available; ^p Preliminary.^a Increase in number of companies being surveyed.¹ Refined nickel and nickel in oxides and salts produced, plus recoverable nickel in matte and concentrates exported. Data for 1987-95 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, 1995

	Inco Limited		Falconbridge Limited	Sherritt International Corporation
	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, 1993-95

	1993	1994	1995
	(tonnes)		
Russia	247 500	214 500	240 000
Canada	188 100	149 900	176 600
New Caledonia	97 100	97 300	121 500
Australia	64 700	79 000	101 300
Indonesia	65 800	81 200	86 600
Cuba	30 200	26 900	43 900
People's Republic of China	30 700	36 900	38 100
Dominican Republic	23 900	30 800	30 900
South Africa	29 900	30 100	29 800
Brazil	22 700	20 100	19 000
Other	97 100	104 100	106 700
Total	897 700	870 800	994 400

Sources: Natural Resources Canada; International Nickel Study Group.

TABLE 4a. WORLD PRIMARY PRODUCTION OF NICKEL, 1993-95

	1993	1994	1995
	(tonnes)		
Russia	184 000	180 400	199 000
Japan	105 300	112 600	135 400
Canada	123 100	105 100	119 600
Australia	54 800	66 600	75 000
Norway	56 800	68 000	53 200
New Caledonia	36 900	39 500	42 200
People's Republic of China	30 500	31 300	38 100
United Kingdom	27 000	28 200	35 000
Dominican Republic	23 900	30 800	30 900
South Africa	29 900	30 100	29 800
Other	130 400	130 900	152 500
Total	802 600	823 500	910 700

Sources: Natural Resources Canada; International Nickel Study Group.

TABLE 5. WORLD CONSUMPTION OF NICKEL, 1993-95

	1993	1994	1995
		(tonnes)	
Japan	157 200	181 100	205 400
United States	121 900	133 800	148 000
Germany	73 100	87 800	98 000
Russia	62 000	37 500	48 000
Italy	38 500	44 000	46 500
Republic of Korea	33 200	39 000	46 000
France	36 500	44 100	45 000
People's Republic of China	38 000	40 000	40 200
United Kingdom	29 800	38 000	37 500
Belgium/Luxembourg	22 000	25 000	28 000
Other	168 500	198 100	224 600
Total	780 700	868 400	967 200

Sources: Natural Resources Canada; International Nickel Study Group.

TABLE 6. AVERAGE ANNUAL NICKEL PRICES, 1984-95

	London Metal Exchange Settlement Price
	(US\$/lb)
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
1995	3.74

Source: Natural Resources Canada.

TABLE 7. AVERAGE MONTHLY NICKEL PRICES, 1993-95

	London Metal Exchange Settlement Price		
	1993	1994	1995
	(US\$/lb)		
January	2.69	2.53	4.35
February	2.74	2.64	3.86
March	2.71	2.54	3.42
April	2.71	2.45	3.36
May	2.62	2.76	3.28
June	2.51	2.85	3.57
July	2.29	2.83	3.90
August	2.14	2.66	4.06
September	1.98	2.89	3.81
October	2.02	3.06	3.66
November	2.10	3.43	3.66
December	2.32	3.88	3.87

Source: Natural Resources Canada.

TABLE 8. LME MONTHLY STOCKS, 1993-95

	1993	1994	1995
	(tonnes)		
January	78 804	128 826	141 276
February	83 028	133 284	133 482
March	86 910	136 284	122 436
April	89 910	133 752	114 390
May	95 280	131 904	104 484
June	86 646	132 684	88 464
July	101 568	133 344	73 380
August	106 260	138 186	66 456
September	117 930	144 474	60 546
October	119 196	149 820	51 372
November	118 944	150 732	47 328
December	124 104	148 392	44 892

Source: Natural Resources Canada.