

Nickel

Nickel - 2011 Annual Review and Outlook

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Nickel - 2011 Annual Review and Outlook

HIGHLIGHTS

- World nickel mine production was estimated at 1.83 million tonnes (Mt) in 2011, while production of primary nickel in refined and other forms of finished nickel was estimated by the International Nickel Study Group (INSG) at 1.6 Mt while primary nickel usage was estimated at 1.57 Mt.
- Canada is an important producer and exporter of nickel and nickel products. In 2011, Canada produced 144.4 Mt of primary nickel representing 9.08% of the world's total supply of refined nickel. Canada's refined nickel products are produced at three refineries: Vale Inc.'s Sudbury, Ontario, and Thompson, Manitoba, refineries; and Sherritt International Corporation's Fort Saskatchewan, Alberta, refinery.
- The 2012 price of nickel is expected to fluctuate within a lower and narrower price range than in 2011. This would be consistent with the anticipated nickel oversupply caused by new production capacity and a ramp-up of recently commissioned projects. There is broad agreement that nickel prices will remain depressed through the 2012/13 timeframe as several of the major laterite deposits are scheduled to begin production during that period.

CANADIAN PRODUCTION

In 2011, Canadian mine production of nickel totaled 158 400 tonnes (t). Shipments of recoverable nickel in concentrates were 212 056 t and the production of primary refined nickel (Class I and Class II) was 144 400 t. Canada's use of primary nickel was estimated at 5000 t. Canadian nickel exports in 2011 were valued at \$7.0 billion, up from \$5.3 billion in 2010, while imports were valued at \$9.25 million, up from \$8.80 million.

Ontario was the largest provincial producer of mined nickel in 2011, accounting for 42.5% of Canadian output of nickel in concentrates shipped. The vast majority of Ontario's production was from the Sudbury Basin. Manitoba, Newfoundland and Labrador, and Quebec produced 11.8%, 33.3%, and 12.5%, respectively, of Canada's production. Nickel was refined at Vale's Sudbury and Thompson refineries, and at Sherritt International Corporation's Cobalt Refining Company Inc. in Fort Saskatchewan, Alberta, where the main feed source for nickel was in the form of an intermediate nickel residue (a nickel and cobalt sulphide produced in Cuba, at Moa Bay, by leaching nickel laterite ore with sulphuric acid). The Xstrata Nickel smelter in Sudbury processed nickel concentrates and nickel-cobalt recyclables, and sent the matte to the Xstrata refinery in Norway for refining into nickel, copper, cobalt, and precious metals. Canada exported nickel and nickel products to more than 70 countries throughout the world. Its exports and imports of nickel in various products are shown in Table 2.

The following is a summary of Canadian nickel mines and metal production facilities in operation during 2011.

Newfoundland and Labrador

Companhia Vale do Rio Doce (Vale) is a Brazilian multinational, diversified metals and mining corporation that, as the second largest mining company in the world, produces iron ore, manganese, ferroalloys, nickel, copper, bauxite, potash, kaolin, alumina, and aluminum. Vale's global headquarters for nickel production are in Toronto, Canada, from which it manages mining and metallurgical nickel operations in Indonesia, Asia, New Caledonia, the United Kingdom, and Brazil. Within Canada, Vale has operations in Newfoundland and Labrador; Thompson, Manitoba; Sudbury, Ontario; and Port Colborne, Ontario. In Newfoundland and Labrador, Vale manages the Voisey's Bay operation comprising the Ovoid open-pit mine and an associated concentrator mill. The mine produces a sulphide ore containing nickel, copper, and cobalt. Cobalt containing nickel concentrate is shipped to both the Sudbury and Thompson operations for further smelting and refining. A copper concentrate is sold in the international marketplace. A \$2.8 billion processing plant is under construction in Long Harbour, Newfoundland and Labrador; it is scheduled to commence operations in the first quarter of 2013. The plant will process the nickel concentrate currently being sent to Ontario and Manitoba, using hydrometallurgy technology and, once in operation, will be the first nickel processing plant in the world to process concentrate from nickel sulphide ore directly into finished product. Hydromet technology has the benefit of eliminating airborne emissions of sulphur dioxide and improving overall metal recoveries. Once operational, the plant will have a permanent work force of 475. The company reported mining 2 366 000 t of ore from the Ovoid mine in 2011, which yielded 68 900 t of nickel-bearing metal concentrate.

Quebec

Xstrata Nickel's wholly owned Raglan mine operated at full capacity throughout 2011, mining 1 206 360 t of ore. The mill treated 1 299 821 t of ore resulting in the production of 27 274 t of contained nickel concentrate. Xstrata reports that the 2011 concentrate yield was reduced because of a planned period of lower nickel head grade. The company expects the head grade to decline further in 2012 in accordance with the mine plan. The head grade should improve beyond 2013 when the approved US\$530 million Raglan expansion project starts delivering higher-grade ore from the Qakimajurq and Mine 2 Lower Zone deposits. The Qakimajurq deposit, which contains 2.6 Mt of probable reserves grading 4.40% nickel and 0.85% copper, will start production in 2014. The Mine 2 Lower Zone deposit contains 1.0 Mt of probable reserves grading 3.90% nickel and 1.28% copper. This deposit is also expected to start production in 2014. The expansion projects at Raglan include upgrades to the associated infrastructure that should increase concentrate production from 26 000 tonnes per year (t/y) to 32 000 t/y by 2014. Raglan's concentrator will be upgraded to reach a concentrate capacity of 40 000 t/y by 2016.

Ontario

North American Palladium Ltd. is the owner of the Lac Des Iles palladium mine located 85 kilometres (km) northwest of Thunder Bay, Ontario; it consists of an underground mine and mill. The deposits are the Roby Zone and the Offset Zone, which are mined principally for palladium and by-product platinum, gold, nickel, and copper. The majority of the concentrate is treated under an offtake agreement with Xstrata at Xstrata's smelter in Ontario. Mine production for 2011 included the blending of higher-grade underground ore with lower-grade surface sources. In 2011, 1 830 234 t of ore were extracted of which 988 502 t came from underground sources and 841 732 t came from surface sources. The mill processed 1 689 781 t of ore and produced 370.1 t of nickel, 146 624 ounces (oz) of palladium, 7267 oz of gold, 9143 oz of platinum, and 724 t of copper. North American Palladium is expanding the mine to transition

from mining via ramp access to mining via shaft while utilizing a high-volume bulk mining method. The objective is to increase production at a lower cash cost per ounce. The mine expansion, including commissioning of the shaft, is scheduled to be completed by the end of 2012. This work will allow an increase in the underground mining rate to 3500 tonnes per day (t/d) with a gradual increase by 2014 to 5500 t/d.

Liberty Mines Inc. is a producer of nickel together with lesser amounts of copper, cobalt, and platinum group metals from its properties located in the Nickel Belt region of Timmins, Ontario. Liberty also owns and operates the Redstone concentrator. The McWatters mine processed 209 388 t of ore in January and February and hauled to the surface 38 660 t grading 0.45% nickel. The Redstone concentrator milled 17 488 t of ore prior to Liberty announcing in February the temporary suspension of milling operations to address maintenance requirements. Payable metal production during 2011 was 125 t of nickel, 6.28 t of copper, and 2.1 t of cobalt. Exploration work continues on the Hart East, Groves, and Croxall projects. Liberty indicated that the Hart property and the lower Redstone mine still show significant potential for expansion and will be investigated in 2012.

Quadra FNX Mining Ltd. (purchased by KGHM Polska S.A. in February 2012) is a mid-tier copper mining company that produces copper, nickel, and precious metals from its operating mines: Robinson in Nevada, Carlota in Arizona, Franke in northern Chile, and Levack (which includes the Morrison, Podolsky, and McCreedy West deposits) in Sudbury, Ontario. Under contractual terms, nickel-bearing ore is delivered to the Vale Sudbury operations for processing. During the fourth quarter of 2011, Quadra FNX and Xstrata Nickel signed the Craig Mine Lease Agreement, allowing Quadra FNX to utilize the underground infrastructure of the Craig mine to further develop and mine the Morrison deposit. The transition to the Craig mine is expected to be completed by the second quarter of 2012. Quadra FNX's payable metal production from Canadian mine operations for 2011 totaled 4536 t of nickel.

First Nickel is a Canadian mining and exploration company that operates the nickel-copper Lockerby mine located in the Sudbury Basin in northern Ontario. First Nickel maintains an offtake agreement with Xstrata Nickel whereby ore produced from the Lockerby mine is shipped and processed at Xstrata's Sudbury operations. Production restarted at the Lockerby mine with first ore being shipped to Xstrata in September. Lockerby produced 23 924 t of ore during 2011 with an average nickel grade of 1.71% and an average copper grade of 1.02%. Payable nickel from the Lockerby mine in 2011 was 409 t.

URSA Major Minerals Incorporated's open-pit Shakespeare mine, located 70 km west of Sudbury, produces nickel, copper, cobalt, platinum, palladium, gold, and silver. Under a pre-existing agreement with Xstrata Nickel, crushed ore from the Shakespeare mine is processed at the Strathcona mill in Sudbury. Production during the 2011 period resulted in the delivery of 151 910 t of ore to the Strathcona mill containing the following recovered metals: 477 t of nickel, 560 t of copper, 29 t of cobalt, 1650 oz of platinum, 1840 oz of palladium, 960 oz of gold, and 10 260 oz of silver. In December, the company announced that operations at the Shakespeare mine were being limited to the crushing of existing broken ore. In January 2012, URSA Major announced a temporary suspension of all operations at the Shakespeare mine. Its processing agreement with Xstrata Nickel expired in December 2011 and the company was unable to conclude a new processing agreement for the Shakespeare ore.

Xstrata Nickel's Sudbury operations consist of the Nickel Rim South mine, the Fraser mine, the Strathcona mill, and a metallurgical smelter. The Nickel Rim South mine was commissioned in

April 2010 and reached its operating capacity in the second half of the year. Together with ore from the Fraser mine and from third parties, production from the Strathcona mill reached 1 883 997 t, resulting in the production of 22 716 t of nickel-containing metal concentrate. Of the total 22 716 t of nickel concentrate, 19 795 t were sourced from Xstrata-owned mines while 2921 t were from third-party sources. Xstrata also announced a US\$119 million development plan for the Fraser Morgan project in Sudbury. This investment will develop two zones at the existing Fraser mine while extending the life of the Fraser complex by five years to 2025. The development of Fraser Morgan is expected to start in early 2012 with production starting in 2013.

The Xstrata Sudbury smelter receives concentrates from the Sudbury mines, the Quebec-based Raglan mine, Xstrata's Australasia mines, and third-party sources. The Sudbury smelter produced 69 459 t of nickel in matte in 2011 that were shipped to Nikkelverk, Norway, for refining. Of the total 69 459 t of nickel matte, 57 066 t were sourced from Xstrata-owned mine operations while 12 393 t were sourced from third parties.

In 2011, Vale's Sudbury operations consisted of seven operating mines (Copper Cliff North, Creighton, Stobie, Garson, Coleman, Ellen, and Totten), a mill (Clarabelle), and smelting and refining facilities. Vale announced a multi-year \$3.4 billion investment to make the Ontario facilities more efficient and to significantly reduce atmospheric emissions by 2015. This investment includes a \$200 million upgrade of the Clarabelle mill with new technology designed to improve recoveries, a \$360 million investment to build the Totten mine, \$50 million to fund exploration and mining studies for the Sudbury Basin, and \$2 billion invested in an Atmospheric Emissions Reduction program designed to reduce sulphur dioxide emissions by 70%. For 2011, Vale reported that its Sudbury mine production reached 5 612 000 t of ore at a weighted average nickel grade of 1.45%, yielding 59 700 t of primary nickel production.

Manitoba

Vale's Thompson operations consist of two operating mines (Birchtree and Thompson), a smelter, and a refinery. The company reported 2011 mine production of 1 903 000 t of ore with a weighted average nickel grade of 1.61%, yielding primary nickel production of 25 000 t. Although Vale announced in 2010 the closure of its Thompson smelter and refinery by 2015, mining is expected to remain a strong contributor to Vale's mining and milling operations in Canada. Vale is pursuing an aggressive exploration program in the Thompson Nickel Belt with more than \$25 million in expenditures aimed at identifying and developing new ore sources.

CaNickel Mining Limited, formerly Crowflight Minerals Inc., operates the Bucko Lake nickel mine located near Wabowden, Manitoba, in the Thompson Nickel Belt. The Bucko Lake mine maintains an operating agreement with Xstrata Nickel, who has agreed to purchase 100% of Bucko Lake's nickel concentrates over its mine life. The mine produced 107 451 t of ore in 2011 that yielded 740 t of payable nickel. In December, CaNickel Mining announced that, due to the unfavourable nickel price, operations at the Bucko Lake mine would be scaled down to reduce operating costs and to preserve capital to complete the paste backfill plant construction and tailings facility expansion. As a result, ore production would be reduced from 600-700 t/d to 400-500 t/d.

Alberta

Sherritt International Corporation is a world leader in the mining and refining of nickel with operations in Canada, Cuba, Indonesia, and Madagascar. Sherritt has a 50% partnership with the General Nickel Company S.A. of Cuba called the Moa Joint Venture, which has mining and

processing operations in Moa, Cuba, and refining facilities in Fort Saskatchewan, Alberta. Processing nickel- and cobalt-bearing material from Moa, the Fort Saskatchewan refinery produced 34 572 t of refined nickel and 3854 t of refined cobalt.

WORLD PRODUCTION

World primary nickel production of refined and other forms of finished nickel in 2011 was estimated by the INSG at 1.59 Mt, compared to 1.45 Mt in 2010. Primary nickel usage was 1.57 Mt, up from 1.46 Mt in 2010. World nickel mine production for 2011 was 1.90 Mt, up from 1.58 Mt in 2010. Canada was the fourth largest refined nickel producer in the world behind China (411.2 Mt), Russia (266.8), and Japan (157.9) with 9.09 % of global refined nickel production. Canada was also the fourth largest mine producer of nickel in the world behind Indonesia (2.94 Mt), Russia (2.70 Mt), and the Philippines (2.45 Mt) having accounted for 11.73 % of global nickel-containing ore. The world's five largest refined nickel producers were Norilsk (Russia, Finland) with production of 2.86 Mt; Vale (Canada, Great Britain, Japan) with 2.06 Mt; Jinchuan (China) with 1.27 Mt; Xstrata (Canada, Dominican Republic) with 1.06 Mt; and BHP Billiton (Australia, Colombia) with 0.83 Mt.

MARKETS AND PRICES

Despite early market strength in January and February, the overriding influence throughout 2011 was the global uncertainty caused by the economic crisis in Europe and the United States. Nickel prices started the year at US\$25 175/t (US\$11.42 per pound [lb]), building upon strong demand for stainless steel products. Stainless steel production climbed to 32.1 Mt from 31 Mt in 2010. and nickel prices peaked in February at US\$29 030/t (US\$13.17/lb). The London Metal Exchange (LME) 2011 cash settlement nickel price averaged US\$22 830/t (US\$10.36/lb), slightly higher than the average of US\$21 818/t (US\$9.90/lb) in 2010. Following the February highs, nickel prices steadily declined throughout the rest of 2011 with some brief rallies in October. The lowest realized nickel price in 2011 was in November at US\$16 935/t (US\$7.68/lb). Nickel prices began the year at US\$25 175/t (US\$11.42/lb) and ended it at US\$18 280/t (US\$8.29/lb) (Figure 1). LME nickel inventories opened the year at 134 400 t and had decreased to 91 100 t by year-end (Figure 2).

TRADE

Total nickel exports from Canada were valued at \$7.0 billion in 2011, compared to \$5.3 billion in 2010. Norway was Canada's largest export trade partner, receiving 73 723 t of nickel matte valued at \$2.0 billion from the Xstrata smelter in Ontario destined for Xstrata's Nikkelverk refinery. The United States was Canada's second largest export trade partner, purchasing 49 479 t of unwrought nickel valued at \$1.312 billion. Canada's total nickel imports were valued at \$925 million, compared to \$880 million in 2010. Australia was Canada's largest import trade partner. Xstrata's Australasia mine shipped 16 000 t of nickel concentrate valued at \$375 million for processing in Sudbury, Ontario. Canada's second largest import trade partner was the United States from which 16 850 t of recyclable nickel were imported valued at \$69.9 million. Overall, Canada conducted trade in nickel products with more than 100 countries.

OUTLOOK

Despite drawdowns in nickel stocks throughout 2011, demand for nickel closely tracked the economic downturn experienced in most developed countries. The International Nickel Study Group forecasts that 2012 primary nickel production will approach 1.69 Mt, up from 1.60 Mt in

2011, while world primary nickel usage will increase to 1.64 Mt in 2012 from 1.60 Mt in 2011. The INSG recognizes, however, that these forecasts are premised upon new capacity coming into production and a ramp-up of recently commissioned projects. The current INSG view for 2012 is for a stock build-up, which could grow if projects ramp up faster than anticipated in the forecast.

As nickel supply is forecast to exceed demand throughout 2012, there appears to be limited scope for price appreciation beyond the \$18 000/t level. This oversupply originating from new projects will continue to place downward pressure on prices through 2012 and beyond. Demand for nickel will also depend on the strength of the economic recovery in both Europe and North America. Lower price levels could put pressure on marginally profitable producers, prompting the closure of less profitable mines and manufacturing operations. While this would appear to be positive from a supply perspective, the potential overhang from major new projects scheduled to come into production will more than offset any gains in higher-cost producing operations.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to the document entitled “Definitions and Valuation: Mineral Production, Shipments, and Trade.” (2) Information in this review was current as of February 2012. (3) This and other reviews, including previous editions, are available on the Internet at www.nrcan.gc.ca/minerals-metals/business-market/canadian-minerals-yearbook/4070.

Nickel - Other Information

NICKEL USES

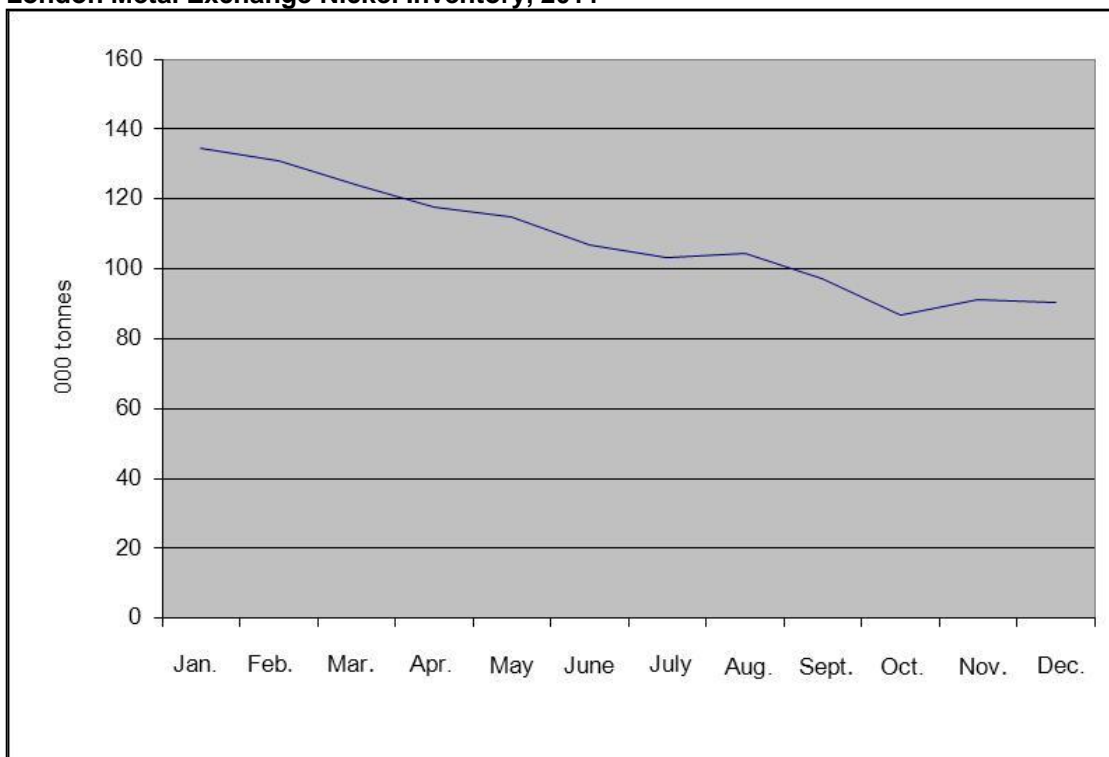
Nickel’s resistance to corrosion, high strength over a wide temperature range, pleasing appearance, and suitability as an alloying agent make it useful in a wide variety of applications. Stainless steel accounts for the predominant use of nickel (Figure 3). Stainless steel is the material of choice when designing containers and products that require consumer safety and hygiene. As such, stainless-made containers and equipment include household equipment, domestic appliances, equipment for the food industry, pharmaceutical production tools, and surgical equipment. Stainless steel is also extensively used in building and construction, transportation, and heavy industries such as chemicals and petrochemicals. In 2010, the principal uses for primary nickel were stainless steel (65%), nickel-based alloys (12%), electroplating (10%), casting and alloy steels (8%), rechargeable batteries (3%), coins (1%), and other nickel uses (1%). Nickel is also intensively recycled; between 45% and 48% of the nickel used to make stainless steel is in the form of stainless steel scrap.

Figure 1
London Metal Exchange Nickel Prices, 2011



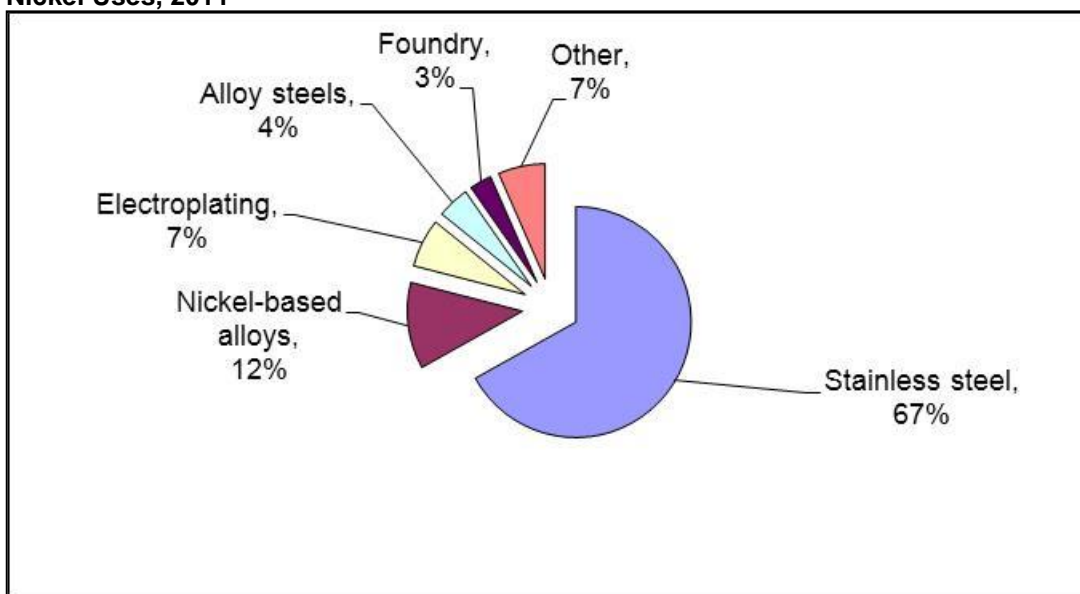
Source: London Metal Exchange.

Figure 2
London Metal Exchange Nickel Inventory, 2011



Source: London Metal Exchange.

Figure 3
Nickel Uses, 2011



Source: Brook Hunt.

TARIFFS

Item No.	Description	Canada			United States	European Union	Japan
		MFN	GPT	USA	Canada	Conventional Rate (1)	WTO (2)
2604.00	Nickel ores and concentrates	Free	Free	Free	Free	Free	Free
2620.99	Slag, ash and residues (other than from the manufacture of iron or steel) containing metals, arsenic or their compounds: other: other	Free	Free	Free	Free	Free	Free
2825.40	Hydrazine and hydroxylamine and their inorganic salts; other inorganic bases; other metal oxides, hydroxides and peroxides: nickel oxides and hydroxides	Free	Free	Free	Free	Free	4.8%
2827.35	Chlorides, chloride oxides and chloride hydroxides; bromides and bromide oxides; iodides and iodide oxides: other chlorides: of nickel	Free	Free	Free	Free	5.5%	3.3%
2833.24	Sulphates; alums; peroxosulphates (persulphates): other sulphates: of nickel	Free	Free	Free	Free	5%	3.9%
3815.11	Reaction initiators, reaction accelerators and catalytic preparations, not elsewhere specified or included: supported catalysts: with nickel or nickel compounds as the active substance	Free	Free	Free	Free	6.5%	2.2%
7202.60	Ferro-alloys: ferro-nickel	Free	Free	Free	Free	Free	3.3%
7204.21	Ferrous waste and scrap; remelting scrap ingots of iron or steel: waste and scrap of alloy steel: of stainless steel	Free	Free	Free	Free	Free	Free

75.01	Nickel mattes, nickel oxide sinters and other intermediate products of nickel metallurgy	Free	Free	Free	Free	Free	Free-3%
7502.10	Unwrought nickel: nickel, not alloyed	Free	Free	Free	Free	Free	44 yen/kg
7502.20	Unwrought nickel: nickel alloys	Free	Free	Free	Free	Free	Free-3%
75.03	Nickel waste and scrap	Free	Free	Free	Free	Free	Free
75.04	Nickel powders and flakes	Free	Free	Free	Free	Free	Free-3%
7505.11	Nickel bars, rods, profiles and wire: bars, rods and profiles: of nickel, not alloyed	Free	Free	Free	Free	Free	3%
7505.12	Nickel bars, rods, profiles and wire: bars, rods and profiles: of nickel alloys	Free	Free	Free	Free	2.9%	3%
7505.21	Nickel bars, rods, profiles and wire: wire: of nickel, not alloyed	Free	Free	Free	Free	Free	3%
7505.22	Nickel bars, rods, profiles and wire: wire: of nickel alloys	Free	Free	Free	Free	2.9%	3%
75.06	Nickel plates, sheets, strip and foil	Free	Free	Free	Free	Free-3.3%	Free-3%
75.07	Nickel tubes, pipes, and tube or pipe fittings (e.g., for couplings, elbows, sleeves)	Free	Free	Free	Free	Free-2.5%	Free-3%
75.08	Other articles of nickel	Free-3%	Free	Free	Free	Free	3%

Sources: Canadian *Customs Tariff*, effective January 2011, Canada Border Services Agency; *Harmonized Tariff Schedule of the United States*, 2011; *Official Journal of the European Union* (Tariff Information), October 29, 2010 edition; *Customs Tariff Schedules of Japan*, 2011.

GPT General Preferential Tariff; MFN Most Favoured Nation; WTO World Trade Organization.

(1) The customs duties applicable to imported goods originating in countries that are Contracting Parties to the General Agreement on Tariffs and Trade or with which the European Community has concluded agreements containing the most-favoured nation tariff clause shall be the conventional duties shown in column 3 of the Schedule of Duties. (2) WTO rate is shown; lower tariff rates may apply circumstantially.

TABLE 1. CANADA, NICKEL PRODUCTION BY PROVINCE, 2009-11

	2009		2010		2011 (p)	
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
MINE OUTPUT						
Nickel content of concentrates produced	135 037	..	160 063	..	219 263	..
SHIPMENTS						
Recoverable content of nickel in concentrates shipped from Canadian mines						
Newfoundland and Labrador	28 235	471 812	44 313	995 272	69 448	1 666 120
Quebec	30 276	505 919	29 791	669 098	26 791	642 733
Ontario	42 125	703 905	52 708	1 183 811	90 552	2 172 443
Manitoba	31 835	531 960	30 359	681 866	25 265	606 142
Total	132 471	2 213 597	157 170	3 530 047	212 056	5 087 439
Finished nickel output = refined nickel in various shapes in Class I, plus Class II nickel (as defined by the international Nickel Study Group), which includes nickel oxide sinter	116 909	..	105 413	..	141 727	..

Sources: Natural Resources Canada; Statistics Canada.

.. Not available; (p) Preliminary.

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

TABLE 2. CANADA, NICKEL TRADE, 2009-11

		2009		2010		2011	
		(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS							
2604.00.40	Nickel ores and concentrates, (nickel content)						
	Finland	–	–	–	–	7 670	165 231
	China	3	48	32	289	31	374
	Australia	–	–	–	–	1	7
	Other countries	–	–	–	–	...	6
	Total	3	48	32	289	7 702	165 618
2825.40	Nickel oxides and hydroxides (weight of material, not nickel content)						
	United States	141	1 463	96	852	118	973
	South Africa	3	34	11	118	14	148
	Brazil	7	72	13	139	9	101
	China	7	80	–	–	6	70
	Other countries	–	–	105	1 363	–	–
	Total	158	1 649	225	2 472	147	1 292
2827.35	Nickel chlorides (weight of material, not nickel content)						
	Mexico	–	–	–	–	...	...
	United States	4	8	–	–	–	–
	Total	4	8	–	–	...	...
2833.24	Nickel sulphates (weight of material, not nickel content)						
	Hong Kong	–	–	...	1	4	28
	Brazil	182	2 226	90	626	–	–
	United States	12	66	2	16	–	–
	Total	194	2 292	92	643	4	28
3815.11	Catalysts and other reaction initiators, reaction accelerators and catalytic preparations with nickel or nickel compounds as the substance (weight of material, not nickel content)						
	Germany	–	–	–	–	5	52
	United States	111	51	148	79	64	36
	Other countries	362	4 869	–	–	...	...
	Total	473	4 920	148	79	69	88
7202.60	Ferronickel (weight of material, not nickel content)						
	United States	182	916	39	464	597	4 968
7204.21	Stainless Steel Waste and Scrap (weight of material, not nickel content)						
	United States	91 180	103 446	113 461	211 164	93 630	200 098
	Netherlands	8 823	15 121	17 594	43 021	25 619	65 087
	Taiwan	552	1 220	1 625	4 177	2 535	6 733
	China	14 714	25 261	3 813	5 899	2 655	6 729
	Italy	844	1 365	2 589	5 528	22 070	4 900
	South Korea	804	1 453	1 580	3 859	1 232	3 147
	India	3 750	4 999	421	1 128	888	2 195
	Thailand	53	93	7	26	604	2 160
	Other countries	3 558	3 405	1 365	3 590	992	2 710
	Total	124 278	156 363	142 455	278 392	150 225	293 759
7501.10	Nickel mattes (nickel content)						
	Norway	68 972	1 217 068	70 127	1 831 888	73 724	1 990 028
7501.20	Nickel oxide sinters and other intermediate products of nickel metallurgy (weight of material, not nickel content)						
	United Kingdom	11 869	151 470	36 248	828 649	42 874	973 553
	South Korea	3 236	47 555	2 728	57 439	3 859	83 860
	China	5 546	71 292	6 060	68 920	3 500	82 340
	Taiwan	1 236	17 946	216	5 070	2 456	53 412
	Japan	–	–	–	–	302	7 042
	Other countries	126	106	37	820	147	1 131
	Total	22 013	288 369	45 289	960 898	53 138	1 201 338
7502.10	Nickel unwrought, not alloyed (nickel content)						
	United States	35 488	533 897	17 287	389 621	48 881	1 129 328

	China	34 901	599 413	29 482	655 788	26 256	616 403
	Netherlands	10 336	165 112	14 281	318 374	16 670	379 316
	Taiwan	2 943	47 919	4 487	101 671	8 787	197 821
	Hong Kong	10 138	165 026	7 301	157 668	6 137	149 549
	Japan	1 450	23 751	2 577	59 096	4 009	90 290
	United Kingdom	—	—	882	20 986	2 452	59 355
	Italy	769	11 269	1 731	38 105	2 221	52 477
	Belgium	505	7 717	838	19 910	2 232	50 173
	South Korea	2 081	32 639	1 821	42 542	1 707	41 925
	Turkey	924	17 844	960	22 304	1 403	34 125
	India	2 087	31 273	1 640	39 633	1 320	33 216
	Spain	669	11 630	551	12 580	1 402	32 852
	Singapore	510	7 388	1 698	38 089	1 074	25 846
	Australia	799	11 395	252	5 558	1 024	24 574
	Thailand	273	4 642	243	5 700	987	24 128
	Indonesia	203	3 570	221	5 375	243	6 244
	Pakistan	310	4 857	214	4 636	250	5 896
	United Arab Emirates	118	1 757	36	930	195	4 793
	France	51	921	124	2 795	177	4 465
	Brazil	68	941	76	1 841	175	3 971
	Vietnam	81	1 734	90	1 965	136	3 399
	Russia	—	—	—	—	85	1 935
	Egypt	31	593	18	474	42	1 074
	Other countries	646	10 127	64	1 393	20	588
	Total	105 381	1 695 415	86 874	1 947 034	127 885	2 973 743
7502.20	Nickel unwrought, alloyed (weight of material, not nickel content)						
	United States	...	36	59	209	599	2 278
	Poland	1	21	...	16	1	23
	Other countries	1	34	...	6	..	...
	Total	2	91	59	231	600	2 301
7503.00	Nickel waste and scrap (weight of material, not nickel content)						
	United States	3 952	37 947	3 831	38 498	2 635	25 798
	Japan	81	1 184	—	—	194	4 832
	Netherlands	296	853	15	148	1 577	3 750
	Taiwan	—	—	—	—	63	1 442
	Norway	162	1 371	139	2 459	60	1 087
	Belgium	—	—	—	—	109	280
	Other countries	105	366	120	776	2	61
	Total	4 596	41 721	4 105	41 881	4 640	37 250
7504.00	Nickel powders and flakes, alloyed and unalloyed (weight of material, not nickel content)						
	United States	2 275	50 543	1 675	54 680	2 727	80 967
	Japan	1 685	31 500	2 581	72 329	2 700	79 257
	China	1 510	26 793	201	6 281	1 249	38 337
	Taiwan	280	4 881	630	15 942	1 432	37 895
	Belgium	769	12 752	883	19 316	916	21 246
	South Korea	610	11 336	524	13 306	659	16 931
	Brazil	105	2 312	64	1 753	662	15 464
	Malaysia	2	49	2	51	57	4 255
	Germany	419	4 707	86	4 168	70	3 748
	Philippines	...	7	...	9	79	2 178
	Thailand	32	648	30	855	74	2 090
	Sweden	11	567	21	1 034	28	1 326
	Other countries	166	3 313	177	6 019	82	2 399
	Total	7 864	149 408	6 874	195 743	10 735	306 093
7505.11	Bars, rods and profiles of nickel, not alloyed (nickel content)						
	Mongolia	—	—	—	—	...	8
	China	...	...	—	—	...	1
	Madagascar	—	—	—	—	...	1

	United Arab Emirates	...	3	—	—	—	—
	Total	...	3	—	—	...	10
7505.12	Bars, rods and profiles of nickel alloy (weight of material, not nickel content)						
	United States	20	174	103	815	24	1 329
	China	—	—	—	—	1	51
	Cuba	—	—	...	16	...	25
	Poland	...	22	1	32	...	19
	Brazil	—	—	—	—	...	8
	Iran	—	—	—	—	...	2
	Other countries	...	4	...	2	—	—
	Total	20	200	104	865	25	1 434
7505.21	Nickel wire, not alloyed (weight of nickel wire plus coating if any, not nickel content)						
	Japan	—	—	—	—	...	...
	Chile	...	6	—	—	—	—
	Spain	—	—	...	34	—	—
	Total	...	6	...	34	...	...
7505.22	Wire, nickel alloy (weight of alloy plus coating, if any; not nickel content)						
	United States	9	471	28	750	10	364
	United Kingdom	...	4	...	1	1	38
	Other countries	1	91	6	192	...	29
	Total	10	566	34	943	11	431
7506.00	Nickel plates, sheets, strip and foil						
	Philippines	1	11	1	24	1	24
	Cuba	—	—	1	23	...	23
	Other countries	34	424	32	271	1	18
	Total	35	435	34	318	2	65
		(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)
7507.11 to 7507.20	Tubes, pipes and tube or pipe fittings alloyed and unalloyed (weight of material, not nickel content)						
	United States	..	10 748	..	11 637	..	13 855
	Netherlands	..	104	..	120	..	992
	China	..	156	..	20	..	517
	United Arab Emirates	..	304	..	513	..	393
	Singapore	..	563	..	66	..	350
	South Korea	..	114	..	95	..	346
	United Kingdom	..	256	..	181	..	314
	Sweden	—	—	..	83	..	193
	Australia	—	—	..	67	..	187
	India	..	5	..	115	..	148
	Other countries	..	1 026	..	901	..	581
	Total	..	13 276	..	13 798	..	17 876
7508.00	Other articles of nickel (weight of material, not nickel content)						
	United States	..	16 403	..	21 241	..	20 281
	China	..	16	..	144	..	3 173
	France	..	3 594	..	2 126	..	3 123
	Japan	..	5	..	2 002	..	1 788
	Poland	..	600	..	981	..	662
	United Kingdom	..	668	..	528	..	458
	Germany	..	436	..	347	..	409
	Hong Kong	—	—	—	—	..	302
	Sweden	..	160	..	112	..	276
	Brazil	..	343	..	237	..	162
	Dominican Republic	—	—	..	628	..	126
	Italy	..	53	..	103	..	110
	Other countries	..	365	..	1 016	..	534
	Total	..	22 643	..	29 465	..	31 404
Total exports		..	3 595 397	..	5 305 437	..	7 027 726

		(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
IMPORTS							
2604.00.00.20	Nickel ores and concentrates (nickel content)						
	Australia (1)	12 456	201 771	17 215	360 461	15 998	374 982
	Spain	–	–	1 979	45 438	749	17 202
	Other countries	495	5 749	1	20	4	85
	Total	12 951	207 520	19 195	405 919	16 751	392 269
2620.99.00.90	Ash and residues: other (containing mainly nickel)						
	South Africa	17 794	8 173	15 326	6 605	45 627	19 760
	United States	204 705	11 535	130 648	8 466	115 553	16 106
	Suriname	3 152	861	18 955	1 792	296	11 273
	Qatar	1 282	6 368	1 048	10 655	672	6 303
	Japan	21 847	2 240	220	1 246	312	1 704
	Other countries	34 420	8 307	45 882	6 367	408	789
	Total	283 200	37 484	212 079	35 131	162 868	55 935
2825.40	Nickel oxides and hydroxides (weight of material, not nickel content)						
	United States	976	4 498	1 357	4 118	759	2 145
	Japan	–	–	..	...	13	150
	Other countries	17	204	43	516	...	...
	Total	993	4 702	1 400	4 634	772	2 295
2827.35	Nickel chlorides (weight of material, not nickel content)						
	France	40	218	80	574	72	510
	Germany	23	159	22	153	30	162
	Finland	–	–	–	–	16	112
	United States	8	52	4	31	16	108
	Other countries	11	78	...	1	1	8
	Total	82	507	106	759	135	900
2833.24	Nickel sulphates (weight of material, not nickel content)						
	United States	1 771	4 575	2 238	6 935	5 666	16 153
	Finland	159	747	2 614	14 467	2 999	12 981
	China	143	803	346	2 337	131	878
	Belgium	19	96	153	993	121	821
	Other countries	182	1 131	262	1 542	14	98
	Total	2 274	7 352	5 613	26 274	8 931	30 931
3815.11	Catalysts and other reaction initiators, reaction accelerators and catalytic preparations with nickel or nickel compounds as the substance (weight of material, not nickel content)						
	United States	609	14 612	293	6 034	217	4 972
	United Kingdom	–	–	84	1 445	224	3 661
	India	39	577	74	1 032	229	3 548
	Denmark	386	7 696	183	3 661	127	2 666
	Germany	35	511	219	5 294	105	2 562
	Netherlands	4	63	–	–	33	1 146
	Other countries	110	1 884	202	3 724	49	725
	Total	1 183	25 343	1 055	21 190	984	19 280
7202.60	Ferronickel (weight of material, not nickel content)						
	United States	...	3	–	–	79	271
	Brazil	–	–	–	–	...	...
	Total	...	3	–	–	79	271
7204.21	Stainless Steel Waste and Scrap (weight of material, not nickel content)						
	United States	223 146	25 934	136 172	40 071	315 521	39 768
	Other countries	569	675	233	510	336	130
	Total	223 715	26 609	136 405	40 581	315 857	39 898
7501.10	Nickel mattes (nickel content)						
	Germany	–	–	...	...	653	3 216
	Indonesia	318	3 619	2 524	38 471	–	–
	Other countries	3	152	13	372	–	–
	Total	321	3 771	2 537	38 843	653	3 216

7501.20	Nickel oxide sinters and other intermediate products of nickel metallurgy (weight of material, not nickel content)						
	Germany	8 975	15 188	11 730	26 349	15 256	41 934
	United States	2 349	3 594	8 636	11 796	7 849	14 290
	Taiwan	64	87	1 341	1 811	708	1 203
	Zimbabwe	–	–	–	–	141	1 035
	Other countries	15 949	27 198	3 836	7 614	379	1 604
	Total	27 337	46 067	25 543	47 570	24 333	60 066
7502.10	Nickel unwrought, not alloyed (nickel content)						
	Canada	178	3 078	478	11 089	226	5 835
	Australia	60	1 155	164	3 457	114	2 585
	Russia	26	491	353	8 232	104	2 490
	Finland	18	355	27	477	88	2 224
	Norway	144	2 820	291	8 059	75	1 657
	United States	14	185	23	599	34	919
	United Kingdom	37	558	283	6 281	37	785
	Brazil	63	1 198	39	911	15	309
	France	6	119	21	546	13	289
	China	8	153	44	955	6	168
	Zimbabwe	–	–	85	2 029	5	101
	Other countries	4	92	1	27	4	87
	Total	558	10 204	1 809	42 662	721	17 449
7502.20	Nickel unwrought, alloyed (weight of material, not nickel content)						
	United States	36	726	67	1 472	50	1 144
	United Kingdom	10	250	28	779	34	1 004
	Canada	25	421	15	383	32	695
	Australia	–	–	–	–	12	270
	Belgium	5	108	6	172	6	186
	Norway	–	–	21	529	4	105
	Other countries	46	592	16	334	3	64
	Total	122	2 097	153	3 669	141	3 468
7503.00	Nickel waste and scrap (weight of material, not nickel content)						
	United States	5 389	17 193	11 814	51 193	16 780	69 744
	Norway	505	1 374	901	5 115	1 388	7 778
	Belgium	33	202	26	263	185	1 925
	United Kingdom	99	463	332	2 755	269	1 890
	Japan	–	–	95	431	132	678
	France	–	–	20	245	71	666
	Zimbabwe	214	599	89	604	110	552
	Russia	–	–	2	52	51	472
	Finland	–	–	–	–	6	160
	Canada	31	81	5	49	54	123
	Other countries	71	185	177	1 587	...	1
	Total	6 342	20 097	13 461	62 294	19 046	83 989
7504.00	Nickel powders and flakes, alloyed and unalloyed (weight of material, not nickel content)						
	Australia	722	13 248	1 285	17 939	1 450	16 461
	United States	129	5 338	162	6 845	204	8 470
	Russia	36	2 099	67	3 034	124	3 460
	China	...	...	117	4 659	80	2 404
	United Kingdom	174	3 019	344	8 196	61	1 242
	Belgium	26	943	32	1 203	26	1 075
	Other countries	37	1 051	33	1 018	42	1 750
	Total	1 124	25 698	2 040	42 894	1 987	34 862
7505.11	Bars, rods and profiles of nickel, not alloyed (nickel content)						
	United Kingdom	3	145	2	90	3	186
	United States	23	856	4	133	2	121
	Other countries	...	19	...	29	...	10
	Total	26	1 020	6	252	5	317
7505.12	Bars, rods and profiles of nickel alloy (weight of material, not nickel content)						

	United States	507	22 742	574	21 755	722	28 382
	Germany	33	1 160	40	1 257	53	1 917
	Italy	2	74	27	621	29	968
	Brazil	...	6	...	8	17	549
	United Kingdom	7	299	6	271	13	534
	Austria	7	109	7	162	7	261
	Other countries	5	257	8	376	4	229
	Total	561	24 647	662	24 450	845	32 840
7505.21	Nickel wire, not alloyed (weight of nickel wire plus coating if any, not nickel content)						
	United States	5	266	5	243	4	219
	France	9	264	–	–	7	194
	Germany	11	296	14	403	4	118
	Other countries	5	116	4	113	3	89
	Total	30	942	23	759	18	620
7505.22	Wire, nickel alloy (weight of alloy plus coating, if any; not nickel content)						
	United States	185	7 383	149	4 769	250	8 972
	France	5	153	23	812	73	2 693
	Sweden	53	1 489	66	1 982	62	2 187
	Germany	68	2 196	21	562	14	535
	United Kingdom	4	269	5	472	5	381
	Other countries	10	326	23	690	9	389
	Total	325	11 816	287	9 287	413	15 157
7506.00	Nickel plates, sheets, strip and foil						
	United States	551	19 949	546	18 970	675	29 490
	Germany	449	10 798	242	7 163	429	16 000
	Belgium	–	–	1	89	6	376
	United Kingdom	1	39	1	47	10	195
	China	1	33	2	128	3	161
	Sweden	2	100	2	103	3	112
	Other countries	4	117	8	172	3	188
	Total	1 008	31 036	802	26 672	1 129	46 522
7507.00	Tubes, pipes and tube or pipe fittings alloyed and unalloyed (weight of material, not nickel content)						
	Japan	7	355	10	437	410	33 598
	United States	465	18 818	367	18 774	495	19 828
	United Kingdom	5	369	39	2 749	22	1 417
	Germany	4	230	12	762	34	1 318
	Spain	2	100	1	47	27	956
	Sweden	218	4 358	113	2 207	36	669
	Other countries	29	634	15	728	13	635
	Total	730	24 864	557	25 704	1 037	58 421
7508.00	Other articles of nickel (weight of material, not nickel content)						
	United States	123	14 065	154	15 615	163	20 244
	United Kingdom	15	1 422	5	930	16	1 742
	France	5	1 612	8	1 465	5	1 493
	Poland	...	163	...	221	1	569
	Canada	6	520	5	625	14	479
	China	31	543	32	466	27	433
	Other countries	51	5 520	29	1 336	33	1 190
	Total	231	23 845	233	20 658	259	26 150
Total imports		563 113	535 624	423 966	880 202	556 964	924 856

Sources: Natural Resources Canada; Statistics Canada.

– Nil; . . Not available; . . . Amount too small to be expressed; n.a. Not applicable.

(1) The United States does not produce nickel concentrates, so reported imports may come from other countries or be misclassified.

Notes: Numbers may not add to totals due to rounding. Harmonized system (HS) code descriptions in this table may have been abbreviated. For detailed HS code descriptions related to this commodity, please refer to the corresponding tariffs table. The value of nickel in ash and residue from Cuba is not included in the total value.

TABLE 3. CANADA, HISTORICAL NICKEL PRODUCTION AND USE, 1990-2011

Year	Production (1) (Mine Output)	Use (r, 2)
	(tonnes)	
1990	196 225	8 410
1991	192 259	13 322
1992	186 384	15 528
1993	188 080	17 384
1994	149 886	20 746
1995	181 820	20 973
1996	192 649	24 504
1997	190 529	19 447
1998	208 302	19 787
1999	186 236	22 527
2000	190 793	24 976
2001	194 058	17 735
2002	189 297	18 955
2003	163 244	13 010
2004	186 694	9 491
2005	199 932	9 251
2006	232 948	7 787
2007	254 915	7 196
2008	259 651	..
2009	135 037	..
2010	160 063	..
2011 (p)	219 263	..

Sources: Natural Resources Canada; Statistics Canada.

.. Not available; (p) Preliminary; (r) Revised.

(1) Refined nickel and nickel in oxides and salts produced, plus recoverable nickel in matte and concentrates exported. Data are for nickel contained in concentrates produced. (2) Use of metallic nickel, all forms (refined metal, nickel in ferronickel oxides and salts, and other forms of nickel, including nickel in purchased scrap) as reported by users on the Natural Resources Canada survey "Nickel Use."

Note: The Nickel Use survey is currently suspended.