

NICKEL

(Data in metric tons of nickel content, unless otherwise noted)

Domestic Production and Use: The United States has only one nickel smelter. This smelter, near Riddle, OR, operated at full capacity in 1996, producing ferronickel from imported ores. The adjoining mine was idle all year. On a monthly or annual basis, 164 facilities reported nickel consumption. The principal consuming State was Pennsylvania, followed by West Virginia and New Jersey. Approximately 46% of the primary nickel consumed went into stainless and alloy steel production, 33% into nonferrous alloys and superalloys, 14% into electroplating, and 7% into other uses. Ultimate end uses were as follows: transportation, 29%; chemical industry, 14%; electrical equipment, 10%; construction, 9%; fabricated metal products, 8%; petroleum, 8%; machinery, 7%; household appliances, 6%; and other, 9%. Total estimated value of apparent primary consumption was \$1.2 billion.

Salient Statistics—United States:	1992	1993	1994	1995	1996^e
Production: Mine	6,670	2,460	—	1,560	—
Plant	8,960	4,880	—	8,290	14,600
Imports: Ore	3,580	2,970	—	8,200	16,800
Primary ¹	119,000	126,000	127,000	149,000	146,000
Secondary ¹	9,510	6,710	6,060	7,900	7,660
Exports: Primary	8,560	7,180	7,420	9,750	12,800
Secondary	25,300	26,000	34,500	41,800	32,000
Consumption: Reported, primary	101,000	105,000	107,000	124,000	117,000
Reported, secondary	55,900	54,000	58,600	64,400	55,000
Apparent, primary	119,000	122,000	133,000	150,000	158,000
Price, average annual, London Metal Exchange					
Cash, dollars per metric ton	7,001	5,293	6,340	8,228	7,515
Cash, dollars per pound	3.176	2.401	2.876	3.732	3.409
Stocks: Government, yearend	33,800	31,600	26,800	19,800	13,600
Consumer, yearend	17,500	14,400	11,000	12,300	10,600
Producer, yearend ²	10,100	15,700	10,200	14,100	12,200
Employment, yearend, number: Mine	10	2	1	15	1
Smelter	250	33	22	250	250
Port facility ³	23	5	3	25	25
Net import reliance ⁴ as a percent of apparent consumption	59	63	64	59	63

Recycling: About 55,000 tons of nickel was recovered from purchased scrap in 1996. This represented about 32% of reported consumption for the year.

Import Sources (1992-95): Canada, 42%; Norway, 14%; Australia, 11%; Russia, 9%; and other, 24%.

Tariff: Item	Number	Canada, Mexico, and most favored nation (MFN) 12/31/96	Non-MFN⁵ 12/31/96
Nickel oxide, chemical grade	2825.40.0000	Free	Free.
Ferronickel	7202.60.0000	Free	6.6¢/kg.
Nickel oxide, metallurgical grade	7501.20.0000	Free	Free.
Unwrought nickel, not alloyed	7502.10.0000	Free	6.6¢/kg.
Waste and scrap	7503.00.0000	Free	6.6¢/kg.

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile:

Material	Stockpile Status—9-30-96			
	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposals Jan.-Sept. 96
Nickel	10,300	5,690	9,490	6,090

Events, Trends, and Issues: Demand for nickel-bearing stainless steel has improved substantially in the United States since 1992. However, a large part of the increase was being met by imported stainless from, in decreasing order, the European Union, Japan, and Canada. U.S. production of stainless steel increased 12% between 1994-95, with nickel-bearing grades accounting for 65% of the 2.06 million tons made in 1995. In 1996, domestic shipments of stainless sheet and strip were down about 4% from the all-time high of 1995.

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Nickel supply and demand have been closely balanced since early 1995. Growing demand for austenitic stainless steel in the developing countries and an improving global economy have encouraged nickel producers to open new mines and upgrade older operations despite weak prices for the metal in 1993 and 1994. London Metal Exchange (LME) inventories peaked at 151,000 tons in November 1994 and then fell steadily over the next 20 months, eventually leveling off at 40,000 tons in the fall of 1996. Nickel prices have improved considerably since mid-1994, but continue to be kept in check by large exports of cathode and powder from Russia to the West. For the week ending November 22, 1996, the LME cash price for 99.8%-pure nickel averaged \$6,744 per metric ton (\$3.06 per pound). The new Mount Keith Mine in Western Australia already exceeded its design capacity of 28,000 tons per year of nickel in concentrate and was being upgraded to 37,000 tons per year. Part of the concentrate was being shipped to the recently expanded Harjavalta smelter in Finland. In Cuba, a Canadian company began modernizing and upgrading the 37-year-old mining and beneficiating complex at Moa Bay.

The discovery of a world class nickel-copper-cobalt deposit in 1993 at Voisey's Bay, Labrador, Canada, has drastically altered the long-term nickel supply picture. Mining of the high-grade sulfide deposit is to begin by the year 2000. The concentrate produced at Voisey's Bay will be processed on the island of Newfoundland. A state-of-the art smelting and refining complex is to be built at Argentia, 130 kilometers west of St. John's. The Argentia complex will be the largest nickel smelting and refining facility in the Western World, producing about 122,000 tons of nickel per year.

Programs were underway in the European Union, Japan, and the United States to develop advanced nickel-based batteries for electric vehicles. Beginning in 2003, 10% of all motor vehicles sold within California must have zero tailpipe emissions—a requirement revised in 1996 that only electric vehicles can presently satisfy.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ⁶	Reserve base ⁶
	1995	1996 ^e		
United States	1,560	—	23,000	2,500,000
Australia	101,000	113,000	2,200,000	6,800,000
Botswana	18,700	22,000	480,000	900,000
Brazil	32,700	34,000	670,000	4,300,000
Canada	181,000	189,000	6,200,000	14,000,000
China	37,000	37,000	730,000	900,000
Colombia	24,200	31,000	560,000	740,000
Cuba	42,700	51,000	18,000,000	23,000,000
Dominican Republic	49,000	50,000	450,000	680,000
Finland	4,380	4,100	80,000	100,000
Greece	19,900	21,000	450,000	900,000
Indonesia	88,200	89,000	3,200,000	13,000,000
New Caledonia	121,000	122,000	4,500,000	15,000,000
Philippines	15,100	13,000	410,000	11,000,000
Russia	251,000	250,000	6,600,000	7,300,000
South Africa	29,800	32,000	2,500,000	2,600,000
Zimbabwe	11,700	12,000	77,000	100,000
Other countries	<u>6,510</u>	<u>5,900</u>	<u>250,000</u>	<u>10,000,000</u>
World total (may be rounded)	1,040,000	1,080,000	47,000,000	110,000,000

World Resources: Identified world resources in deposits averaging 1% nickel or greater contain a total of 130 million tons of nickel. About 60% of the nickel is in laterites and 40% is in sulfide deposits. World resources of lower grade nickel deposits are very large. In addition, there are extensive deep-sea resources of nickel in manganese crusts and nodules covering large areas of the ocean floor, particularly in the Pacific Ocean.

Substitutes: With few exceptions, substitutes for nickel would result in increased cost or some tradeoff in the economy or performance of the product. Present and potential nickel substitutes include aluminum, coated steels, and plastics in the construction and transportation industries; nickel-free specialty steels in the power generating, petrochemical, and petroleum industries; and titanium and plastics in severe corrosive applications.

^eEstimated.

¹Imports for consumption as reported by the U.S. Bureau of the Census.

²Stocks of producers, agents, and dealers held only in the United States.

³Employment at port facility in Coos Bay, OR, used exclusively for drying and transshipping imported nickel ore.

⁴Defined as imports - exports + adjustments for Government and industry stock changes.

⁵See Appendix B.

⁶See Appendix C for definitions.