

NICKEL

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

Domestic Production and Use: The United States did not have any active nickel mines in 2003. Limited amounts of byproduct nickel, though, were recovered from copper and palladium-platinum ores mined in the Western United States. On a monthly or annual basis, 143 facilities reported nickel consumption. The principal consuming State was Pennsylvania, followed by West Virginia, Kentucky, and Indiana. Approximately 41% of the primary nickel consumed went into nonferrous alloy and superalloy production, 39% into stainless and alloy steels, 18% into electroplating, and 2% into other uses. Ultimate end uses were as follows: transportation, 32%; chemical industry, 14%; electrical equipment, 11%; construction, 9%; fabricated metal products, 8%; machinery, 7%; household appliances, 6%; petroleum industry, 6%; and other, 7%. Estimated value of apparent primary consumption was \$1.19 billion.

Salient Statistics—United States:	1999	2000	2001	2002	2003^e
Production, mine	—	—	—	—	—
Shipments of purchased scrap ¹	93,000	123,000	141,000	130,000	131,000
Imports: Primary	139,000	156,000	136,000	121,000	133,000
Secondary	9,480	10,700	8,760	9,110	10,500
Exports: Primary	7,440	8,150	8,450	6,520	5,930
Secondary	31,400	49,900	48,600	39,400	48,800
Consumption: Reported, primary	116,000	115,000	98,800	87,300	71,200
Reported, secondary	71,000	84,000	101,000	99,800	92,900
Apparent, primary	140,000	147,000	129,000	121,000	126,000
Total ²	211,000	231,000	230,000	221,000	218,000
Price, average annual, London Metal Exchange:					
Cash, dollars per metric ton	6,011	8,638	5,945	6,772	9,446
Cash, dollars per pound	2.727	3.918	2.696	3.072	4.285
Stocks: Government, yearend	—	—	—	—	—
Consumer, yearend	10,000	14,300	13,900	12,700	13,200
Producer, yearend ³	12,700	12,300	12,600	6,150	7,140
Employment, yearend, number: Mine	1	1	—	—	—
Smelter and port	1	—	—	—	—
Net import reliance ⁴ as a percentage of apparent consumption	63	56	46	48	48

Recycling: About 92,900 tons of nickel was recovered from purchased scrap in 2003. This represented about 57% of total reported consumption for the year.

Import Sources (1999-2002): Canada, 42%; Norway, 12%; Russia, 12%; Australia, 10%; and other, 24%.

Tariff: Item	Number	Normal Trade Relations 12/31/03
Nickel oxide, chemical grade	2825.40.0000	Free.
Ferronickel	7202.60.0000	Free.
Nickel oxide, metallurgical grade	7501.20.0000	Free.
Unwrought nickel, not alloyed	7502.10.0000	Free.

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

Government Stockpile: The U.S. Government sold the last of the nickel in the National Defense Stockpile in 1999. The U.S. Department of Energy is holding 9,700 tons of nickel ingot contaminated by low-level radioactivity plus 3,600 tons of contaminated shredded nickel scrap. Planned decommissioning activities at former nuclear defense sites are expected to generate an additional 23,000 tons of shredded scrap.

Events, Trends, and Issues: Stainless steel accounts for two-thirds of the primary nickel used in the world. U.S. production of austenitic (nickel-bearing) stainless steel reached an all-time high of 1.49 million tons in 2003—6% more than the previous record of 1.41 million tons set in 2002. U.S. stainless producers continued to struggle against significant import penetration and were hurt by lackluster demand and a flat economy in the first half of 2003. Imported steels accounted for 25% of the 1.96 million tons of total stainless steel used in the United States in 2002.

World mine production was at an all-time high in 2003 despite a 3-month-long strike at a major operation in Canada's Sudbury Basin. Since 1950, stainless steel production in the Western World has been growing at an average rate of

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6.0% per year. Demand for stainless steel in China has been particularly robust since 2000 and is now on par with that of Japan. Prices moved upward for most of the year, reaching levels not seen in the market since 1989. For the week ending November 28, 2003, the London Metal Exchange cash price for 99.8% pure nickel averaged \$12,096 per metric ton (\$5.49 per pound). Twelve months earlier, the cash price was only \$7,390 per ton (\$3.35 per pound). High prices could encourage substitution of duplex or ferritic stainless for applications where austenitic is now used. Some nickel consumers were concerned that global demand for the metal would outstrip supply before several new mining projects could be completed. In mid-2002, a major Canadian-based producer began developing the huge Voisey's Bay sulfide deposit in northeastern Labrador. The same company also was developing the Goro laterite deposit at the southeastern tip of New Caledonia. The New Caledonian nickel was to be recovered onsite using advanced pressure acid leach (PAL) technology. In Australia, three greenfield PAL projects built in 1998-9 continued to ramp up production. A second generation of Australian PAL projects was in varying stages of development. Competitors were considering employing some form of acid leach technology to recover nickel at greenfield sites in Cuba, Indonesia, and the Philippines. Several automobile manufacturers were using nickel-metal hydride (NiMH) batteries to power their gasoline-electric hybrid vehicles for the 2005 and 2006 model years. Demand for gasoline-electric hybrid vehicles has been gradually building up in the United States since their introduction in late 1999. Three commercial models were being offered in North America—all of Japanese design. In mid-2003, about 31,100 hybrid passenger cars were operating on U.S. highways. In November 2003, a leading NiMH battery manufacturer commissioned a major production facility at Springboro, OH, near Dayton. The new plant will enable the manufacturer to produce up to 1.2 million battery modules per year for transportation and stationary applications.

World Mine Production, Reserves, and Reserve Base: Estimates of reserves for Brazil, China, Colombia, and the Dominican Republic were revised based on new information from the mining industry.

	Mine production		Reserves ⁵	Reserve base ⁵
	2002	2003 ^e		
United States	—	—	—	—
Australia	211,000	220,000	22,000,000	27,000,000
Botswana	20,005	18,000	490,000	920,000
Brazil	45,029	46,000	4,500,000	8,300,000
Canada	178,338	180,000	5,200,000	15,000,000
China	54,500	56,000	1,100,000	7,600,000
Colombia	58,196	65,000	830,000	1,000,000
Cuba	73,000	75,000	5,600,000	23,000,000
Dominican Republic	38,859	39,000	740,000	1,000,000
Greece	22,670	23,000	490,000	900,000
Indonesia	122,000	120,000	3,200,000	13,000,000
New Caledonia	99,650	120,000	4,400,000	12,000,000
Philippines	26,532	27,000	940,000	5,200,000
Russia	310,000	330,000	6,600,000	9,200,000
South Africa	38,546	40,000	3,700,000	12,000,000
Venezuela	18,200	21,000	610,000	610,000
Zimbabwe	8,092	8,000	15,000	260,000
Other countries	14,000	12,000	1,300,000	5,100,000
World total (rounded)	1,340,000	1,400,000	62,000,000	140,000,000

World Resources: Identified land-based resources averaging 1% nickel or greater contain at least 130 million tons of nickel. About 60% is in laterites and 40% in sulfide deposits. In addition, extensive deep-sea resources of nickel are 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 tradeoff in the economy or performance of the product. Aluminum, coated steels, and plastics can replace stainless steel to a limited extent in many construction and transportation applications. Nickel-free specialty steels are sometimes used in place of stainless steel within the power generating, petrochemical, and petroleum industries. Titanium alloys or specialty plastics can substitute for nickel metal or nickel-base superalloys in highly corrosive chemical environments.

^eEstimated. — Zero.

¹Scrap receipts – shipments by consumers + exports – imports + adjustments for consumer stock changes.

²Apparent primary consumption + reported secondary consumption.

³Stocks of producers, agents, and dealers held only in the United States.

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

⁵See Appendix C for definitions.