

## NICKEL

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

**Domestic Production and Use:** The only nickel smelter in the United States—a ferronickel operation near Riddle, OR—closed in April 1998 because of low nickel prices. The adjoining mine on Nickel Mountain has been idle since 1996. Limited amounts of byproduct nickel are recovered from copper and palladium-platinum ores mined in the western United States. On a monthly or annual basis, 174 facilities reported nickel consumption. The principal consuming State was Pennsylvania, followed by West Virginia and Ohio. Approximately 47% of the primary nickel consumed went into stainless and alloy steel production, 34% into nonferrous alloys and superalloys, 13% into electroplating, and 6% into other uses. Ultimate end uses were as follows: transportation, 29%; chemical industry, 14%; electrical equipment, 10%; construction, 8%; fabricated metal products, 8%; petroleum, 7%; household appliances, 7%; machinery, 6%; and other, 11%. Estimated value of apparent primary consumption was \$830 million.

<b>Salient Statistics—United States:</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999<sup>o</sup></b>
Production: Mine	1,560	1,330	—	—	—
Plant	8,290	15,100	16,000	4,290	—
Shipments of purchased scrap: <sup>1</sup>	98,400	84,900	97,600	89,900	90,100
Imports: Ore	8,200	15,000	17,600	1,420	—
Primary	149,000	142,000	147,000	148,000	138,000
Secondary	7,930	8,060	11,000	8,500	6,960
Exports: Primary	9,750	13,100	16,400	8,440	7,410
Secondary	41,800	33,600	40,200	35,100	28,200
Consumption: Reported, primary	125,000	119,000	121,000	116,000	122,000
Reported, secondary	64,500	59,300	68,400	63,300	68,800
Apparent, primary	151,000	147,000	154,000	149,000	137,000
Total <sup>2</sup>	216,000	206,000	222,000	213,000	206,000
Price, average annual, London Metal Exchange:					
Cash, dollars per metric ton	8,228	7,501	6,927	4,630	6,024
Cash, dollars per pound	3.732	3.402	3.142	2.100	2.732
Stocks: Government, yearend	19,800	15,900	8,530	2,600	—
Consumer, yearend	12,400	13,100	16,100	15,800	12,700
Producer, yearend <sup>3</sup>	12,700	13,300	12,600	13,100	10,200
Employment, yearend, number: Mine	17	8	7	7	7
Smelter	253	253	264	6	6
Port facility	25	23	22	1	1
Net import reliance <sup>4</sup> as a percent of apparent consumption	60	59	56	64	63

**Recycling:** About 69,000 tons of nickel was recovered from purchased scrap in 1999. This represented about 38% of reported consumption for the year.

**Import Sources (1995-98):** Canada, 38%; Russia, 16%; Norway, 14%; Australia, 9%; and other, 23%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Canada and Mexico 12/31/99</b>	<b>Normal Trade Relations 12/31/99</b>
Nickel oxide, chemical grade	2825.40.0000	Free	Free.
Ferronickel	7202.60.0000	Free	Free.
Nickel oxide, metallurgical grade	7501.20.0000	Free	Free.
Unwrought nickel, not alloyed	7502.10.0000	Free	Free.

**Depletion Allowance:** 23% (Domestic), 15% (Foreign).

<b>Government Stockpile:</b>	<b>Stockpile Status—9-30-99<sup>5</sup></b>			<b>Disposal plan FY 1999</b>	<b>Disposals FY 1999</b>
<b>Material</b>	<b>Uncommitted inventory</b>	<b>Committed inventory</b>	<b>Authorized for disposal</b>		
Nickel	—	—	—	3,810	1,990

**Events, Trends, and Issues:** Stainless steel accounts for two-thirds of the primary nickel consumed in the world. U.S. production of austenitic (i.e., nickel bearing) stainless steel was slightly greater than that of 1998, but still short of the near-record high of 1.36 million tons reached in 1997. The U.S. International Trade Commission issued several countervailing duty and antidumping rulings in 1998-99 that slowed a surge in stainless steel imports. Imported steels accounted for 37% of total U.S. stainless steel consumption in 1998, up from 33% in 1997.

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World nickel demand grew faster than supply in 1999, allowing the London Metal Exchange (LME) cash price to partially recover from its lowest level in more than a decade. For the week ending November 19, 1999, the LME cash price for 99.8%-pure nickel averaged \$7,878 per metric ton (\$3.57 per pound). Twelve months earlier, the cash price was \$4,163 per ton (\$1.89 per pound). Resumption of economic growth in parts of East Asia has encouraged consumption of stainless steel worldwide, strengthening nickel prices. Since 1975, demand for stainless has grown at an average rate of 4.5% per year. This growth rate is projected to continue or accelerate over the next 20 years. Advances in pressure acid leach (PAL) technology have made it possible to develop laterite deposits in Australia. The completion of a natural gas pipeline from the North West Shelf to Kalgoorlie in 1996 spurred development of three laterite deposits in Western Australia. All three of the new PAL operations began producing metal in early 1999, after overcoming startup problems associated with the new technology. In Canada, the Provincial Government of Newfoundland and Labrador was expected to finally approve development of the huge Voisey's Bay nickel-copper sulfide deposit near Nain. The project has undergone extensive environmental and socioeconomic review because of its significant impact on the Province. Drilling crews are exploring several other promising districts in northern Canada—the Lac Rocher region southeast of James Bay, the Ungava Nickel Belt in northern Quebec, South Voisey's Bay, and an area in Manitoba northeast of the Thompson Nickel Belt. New ore bodies also have been found in and around existing mines in the Sudbury district of Ontario. In the United Kingdom, a facility producing nickel foam and fine powders was upgraded and expanded to meet growing demand from manufacturers of nickel-metal hydride and nickel-cadmium batteries. Two Japanese automotive manufacturers are mass producing a hybrid automobile that uses an electric motor to power the vehicle in low-speed, stop-and-go city driving, and switches to an internal combustion engine for higher speeds. A regenerative braking system recovers part of the vehicle's kinetic energy. The kinetic energy is converted to electrical energy and stored in a nickel-based battery for later reuse by the motor.

### **World Mine Production, Reserves, and Reserve Base:**

	Mine production		Reserves <sup>6</sup>	Reserve base <sup>6</sup>
	1998	1999 <sup>e</sup>		
United States	—	—	43,000	2,500,000
Australia	143,513	138,000	9,100,000	11,000,000
Botswana	21,000	23,800	780,000	830,000
Brazil	36,764	45,800	670,000	6,000,000
Canada	208,201	203,000	6,300,000	15,000,000
China	48,700	51,000	3,700,000	7,900,000
Colombia	29,422	34,400	560,000	1,100,000
Cuba	65,300	66,000	5,500,000	23,000,000
Dominican Republic	41,600	43,000	720,000	1,300,000
Greece	16,985	17,100	450,000	900,000
Indonesia	74,063	83,900	3,200,000	13,000,000
New Caledonia	129,200	103,000	4,500,000	15,000,000
Philippines	12,840	14,000	410,000	11,000,000
Russia	250,000	250,000	6,600,000	7,300,000
South Africa	36,411	37,900	2,500,000	12,000,000
Zimbabwe	12,749	12,300	240,000	260,000
Other countries	16,000	15,100	450,000	12,000,000
World total (rounded)	1,140,000	1,140,000	46,000,000	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 some 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-based superalloys in some highly corrosive chemical environments.

<sup>e</sup>Estimated.

<sup>1</sup>Scrap receipts - shipments by consumers + exports - imports + adjustments for consumer stock changes.

<sup>2</sup>Apparent primary consumption + reported secondary consumption.

<sup>3</sup>Stocks of producers, agents, and dealers held only in the United States.

<sup>4</sup>Defined as imports - exports + adjustments for Government and industry stock changes.

<sup>5</sup>See Appendix B for definitions.

<sup>6</sup>See Appendix C for definitions.