

## NICKEL

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

**Domestic Production and Use:** The United States had only one active nickel mine—the underground Eagle Mine in Michigan. The new chalcopyrite-pentlandite mine was commissioned in April 2014, returning the United States to the family of nickel producing countries after an absence of 18 years. Three mining projects were in varying stages of development in northeastern Minnesota. The principal nickel-consuming State was Pennsylvania, followed by Kentucky, Illinois, New York, and North Carolina. Approximately 45% of the primary nickel consumed went into stainless and alloy steel production, 43% into nonferrous alloys and superalloys, 7% into electroplating, and 5% into other uses. End uses were as follows: transportation and defense, 34%; fabricated metal products, 20%; electrical equipment, 13%; chemical and petroleum industries, 7% each; construction, household appliances, and industrial machinery, 5% each; and other, 4%. The estimated value of apparent primary consumption was \$2.50 billion.

<b>Salient Statistics—United States:</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014<sup>e</sup></b>
<b>Production:</b>					
Mine	—	—	—	—	3,600
Refinery, byproduct	W	W	W	W	W
Shipments of purchased scrap <sup>1</sup>	139,000	132,000	130,000	124,000	119,000
<b>Imports:</b>					
Primary	129,000	138,000	133,000	126,000	158,000
Secondary	23,800	21,300	22,300	26,300	39,500
<b>Exports:</b>					
Primary	12,600	12,400	9,100	10,600	10,300
Secondary	80,300	64,800	59,800	61,200	57,500
<b>Consumption:</b>					
Reported, primary	100,000	110,000	114,000	114,000	148,000
Reported, secondary	81,900	88,800	92,400	88,800	102,000
Apparent, primary	114,000	125,000	125,000	110,000	148,000
Total <sup>2</sup>	196,000	213,000	218,000	199,000	250,000
<b>Price, average annual, London Metal Exchange:</b>					
Cash, dollars per metric ton	21,804	22,890	17,533	15,018	16,863
Cash, dollars per pound	9.890	10.383	7.953	6.812	7.649
<b>Stocks:</b>					
Consumer, yearend	16,800	18,100	16,600	18,500	20,900
Producer, yearend <sup>3</sup>	6,240	6,610	6,380	9,730	7,640
Net import reliance <sup>4</sup> as a percentage of apparent consumption	41	48	49	46	54

**Recycling:** About 102,000 tons of nickel was recovered from purchased scrap in 2014. This represented about 41% of reported secondary plus apparent primary consumption for the year.

**Import Sources (2010–13):** Canada, 36%; Russia, 14%; Australia, 11%; Norway, 10%; and other, 29%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–14</b>
Nickel oxides, chemical grade	2825.40.0000	Free.
Ferronickel	7202.60.0000	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 8,800 tons of nickel ingot contaminated by low-level radioactivity at Paducah, KY, plus 5,080 tons of contaminated shredded nickel scrap at Oak Ridge, TN. Ongoing decommissioning activities at former nuclear defense sites are expected to generate an additional 20,000 tons of nickel in scrap.

**Events, Trends, and Issues:** The U.S. steel industry produced 1.64 million tons of austenitic (nickel-bearing) stainless steel in 2014—up 8% from 2013, and 39% greater than the reduced output of 1.18 million tons in 2009. Stainless steel has traditionally accounted for two-thirds of primary nickel use worldwide, with more than one-half of the steel going into the construction, food processing, and transportation sectors. China, the world's leading steel producer, cast a record-high 16.7 million tons of austenitic stainless steel in 2014.

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Nickel prices increased by 12% in 2014 despite weak economic conditions in some developing countries and parts of the European Union. In May 2014, the London Metal Exchange (LME) cash mean for 99.8%-pure nickel peaked briefly at \$19,434 per metric ton after partially recovering from a downturn in mid-2013. However, the cash price started contracting again in the fourth quarter of 2014 as manufacturing cutbacks in the euro area, related economic problems, and the threat of deflation helped to depress prices. By October, the cash price had fallen to \$15,765 per metric ton and was accompanied by the gradual buildup of stocks in LME warehouses to record high levels. At the end of October, LME warehouses held more than 385,000 tons of nickel metal.

Despite current weak prices and an oversupply of the metal, mining companies continue to bring on new nickel projects in anticipation of a turnaround in the global economy. Global production of austenitic stainless steel continues to increase and was at an all-time high in 2014, with China accounting for more than one-half of the year's output. Demand for nickel-base superalloys is also increasing and has been especially strong in the aerospace and power-generation sectors. In January 2014, the Government of Indonesia banned the export of direct shipping ores of nickel, hoping to encourage the construction of additional ferronickel and nickel pig iron production facilities in the archipelago. In May, the world's leading producer of nickel announced that it would focus on its core operations in Russia and began selling off assets in Australia, Botswana, and South Africa.

**World Mine Production and Reserves:** Reserves data for Australia, Brazil, Canada, the Dominican Republic, Indonesia, the Philippines, and Russia were revised based on new information from company or Government reports.

	Mine production		Reserves <sup>5</sup>
	2013	2014 <sup>e</sup>	
United States	—	3,600	160,000
Australia	234,000	220,000	<sup>6</sup> 19,000,000
Brazil	138,000	126,000	9,100,000
Canada	223,000	233,000	2,900,000
China	95,000	100,000	3,000,000
Colombia	75,000	75,000	1,100,000
Cuba	66,000	66,000	5,500,000
Dominican Republic	15,800	—	930,000
Indonesia	440,000	240,000	4,500,000
Madagascar	29,200	37,800	1,600,000
New Caledonia <sup>7</sup>	164,000	165,000	12,000,000
Philippines	446,000	440,000	3,100,000
Russia	275,000	260,000	7,900,000
South Africa	51,200	54,700	3,700,000
Other countries	<u>377,000</u>	<u>410,000</u>	<u>6,500,000</u>
World total (rounded)	2,630,000	2,400,000	81,000,000

**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% is in sulfide deposits. Extensive resources of nickel are also found in manganese crusts and nodules covering large areas of the ocean floor. The long-term decline in discovery of new sulfide deposits in traditional mining districts has forced exploration teams to shift to more challenging locations like east-central Africa and the Subarctic. Development of awaruite deposits in Canada may help alleviate projected shortages of nickel concentrate. Awaruite, a natural iron-nickel alloy, is easier to concentrate than pentlandite.

**Substitutes:** Low-nickel, duplex, or ultrahigh-chromium stainless steels are being substituted for austenitic grades in construction. Nickel-free specialty steels are sometimes used in place of stainless steel in the power-generating and petrochemical industries. Titanium alloys can substitute for nickel metal or nickel-based alloys in corrosive chemical environments. Lithium-ion batteries instead of nickel-metal hydride may be used in certain applications.

<sup>e</sup>Estimated. W Withheld to avoid disclosing company proprietary data. — Zero.

<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 industry stock changes.

<sup>5</sup>See [Appendix C](#) for resource/reserve definitions and information concerning data sources.

<sup>6</sup>For Australia, Joint Ore Reserves Committee (JORC)-compliant reserves were about 8.3 million tons.

<sup>7</sup>Overseas territory of France.