NICKEL

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

Domestic Production and Use: In 2017, the underground Eagle Mine in Michigan produced approximately 23,000 tons of nickel in concentrate. The concentrates were exported to smelters in Canada and overseas for processing. Nickel in crystalline sulfate was produced as a byproduct of smelting and refining platinum-group-metal ores mined in Montana. The principal nickel-consuming States were Pennsylvania and Kentucky. Approximately 48% of the primary nickel consumed went into stainless and alloy steel products, 40% into nonferrous alloys and superalloys, 8% into electroplating, and 4% into other uses.

Salient Statistics—United States:	2013	2014	2015	2016	2017[e]
Production:					
Mine	—	4,300	27,200	24,100	23,000
Refinery, byproduct	W	W	W	W	W
Shipments of purchased scrap[1]	124,000	109,000	116,000	121,000	120,000
Imports:					
Ores and concentrates	3	92	24	([2])	—
Primary	126,000	156,000	130,000	111,000	150,000
Secondary	26,300	39,000	27,100	32,300	37,000
Exports:					
Ores and concentrates	1,010	3,320	25,400	22,400	23,800
Primary	10,600	10,400	9,600	10,300	11,000
Secondary	61,100	56,300	51,900	63,700	48,000
Consumption:					
Reported, primary metal	107,000	113,000	106,000	99,000	110,000
Reported, secondary	89,100	91,500	90,600	89,900	90,000
Apparent, primary metal[3]	114,000	149,000	121,000	105,000	140,000
Apparent, total[4]	203,000	240,000	211,000	195,000	230,000
Price, average annual, London Metal Exchange (LME):					
Cash, dollars per metric ton	15,018	16,865	11,831	9,594	10,144
Cash, dollars per pound	6.812	7.650	5.367	4.352	4.601
Stocks:					
Consumer, yearend	18,400	23,300	19,200	15,300	15,000
LME U.S. warehouses	3,948	1,560	4,212	5,232	4,200
Net import reliance[5] as a percentage of total apparent consumption	47	58	52	45	59

Recycling: In 2017, approximately 90,000 tons of nickel was recovered from purchased scrap. This represented about 39% of consumption for the year.

Import Sources (2013–16): Canada, 42%; Norway, 10%; Australia, 7%; Russia, 7%; and other, 34%.

Tariff: Item	Number	Normal Trade Relations 12–31–17
Nickel ores and concentrates	2604.00.0040	Free.
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).

Prepared by **Michele E. McRae [(703) 648–7743, mmcrae@usgs.gov]**

NICKEL

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 were expected to generate an additional 20,000 tons of nickel in scrap.

Events, Trends, and Issues: The U.S. steel industry produced approximately 2.0 million tons of austenitic (nickel-bearing) stainless steel in 2017. 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.

World production was essentially unchanged in 2017. Production decreased in several leading producing countries including Australia, Brazil, Canada, and the Philippines. The largest decrease in production took place in the Philippines, owing to the continued suspension of as many as one-half of the country's mining operations for failing to meet environmental standards. These decreases were offset primarily by increased production in Indonesia, which in January eased an export ban on direct-shipping ore for companies that intend to construct nickel-processing facilities.

World Mine Production and Reserves: Reserves for Brazil, Canada, China, New Caledonia, and the United States were revised based on new information from company or Government reports.

	Mine production		Reserves[6]
	2016	2017[e]	
United States	24,100	23,000	130,000
Australia	204,000	190,000	[7]19,000,000
Brazil	160,000	140,000	12,000,000
Canada	236,000	210,000	2,700,000
China	98,000	98,000	2,900,000
Colombia	41,600	49,000	1,100,000
Cuba	51,600	51,000	5,500,000
Guatemala	54,000	68,000	1,800,000
Indonesia	199,000	400,000	4,500,000
Madagascar	49,000	45,000	1,600,000
New Caledonia[8]	207,000	210,000	—
Philippines	347,000	230,000	4,800,000
Russia	222,000	180,000	7,600,000
South Africa	49,000	49,000	3,700,000
Other countries	150,000	150,000	6,500,000
World total (rounded)	2,090,000	2,100,000	74,000,000

World Resources: Identified land-based resources averaging 1% nickel or greater contain at least 130 million tons of nickel, with about 60% in laterites and 40% in sulfide deposits. Extensive nickel resources also are found in manganese crusts and nodules on the ocean floor. The decline in discovery of new sulfide deposits in traditional mining districts has led to exploration in more challenging locations such as east-central Africa and the subarctic.

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-base alloys in corrosive chemical environments. Lithium-ion batteries may be used instead of nickel metal hydride batteries in certain applications.

[e]Estimated. W Withheld to avoid disclosing company proprietary data. — Zero.

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

[2]Less than ½ unit

[3]Defined as imports – exports + adjustments for industry stock changes.

[4]Apparent primary consumption + reported secondary consumption

[5]Defined as imports – exports + adjustments for consumer stock changes.

[6]See Appendix C for resource and reserve definitions and information concerning data sources.

[7]For Australia, Joint Ore Reserves Committee-compliant reserves were about 6.0 million tons.

[8]Overseas territory of France. Although nickel-cobalt mining and processing continued, the leading producer reported zero reserves owing to recent nickel prices.