

Mineral Industry Surveys

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NICKEL IN JUNE 2003

In June, reported domestic nickel consumption on a daily average basis was 10% less than that of May, according to the U.S. Geological Survey. Average daily nickel consumption of cathode, pellets, briquets, and ferronickel for stainless steel was 48.2 metric tons per day (t/d)—16% less than the 57.4 t/d for May and 42% less than the 83.7 t/d for June 2002.

Consumption of elemental nickel to make superalloys and corrosion-resistant nickel alloys decreased by 7% and 25%, respectively, from the corresponding May levels. Sales to plating companies averaged 34.5 t/d, about 15% greater than the May sales figure of 30.1 t/d.

On June 30, U.S. consumer stocks of cathode, pellets, briquets, and powder totaled 1,650 metric tons (t)—8% more than the 1,520 t (revised) on May 31 and 5% more than the 1,570 t reported for yearend 2002. Stocks in London Metal Exchange (LME) warehouses worldwide totaled 24,468 t—8% less than the 26,538 t on May 31. Preliminary data collected by the International Nickel Study Group indicated that, at the end of May, world nickel producers (excluding those in Austria, China, the former Yugoslavia, and the Ural area of Russia) had approximately 93,500 t of nickel in primary products in stock, of which 65,500 t or 70% was Class I materials. Class I materials are refined products with a nickel (Ni) content of 99% or greater (electrolytic cathode, pellets, briquets, rondelles, powder, etc.). Class II materials include ferronickel, oxide sinter, and East Asian utility nickel—products with a Ni content of less than 99%.

Percentages reported in the above paragraphs may not be verifiable owing to concealment of individual company proprietary data and late reporting of data.

The United States imported 56,600 t of primary nickel in the first 5 months of 2003, 23% more than the 45,900 t for the corresponding period of 2002. Class I materials accounted for 87% of total primary imports received during the first 5 months of 2003. Trade data for June 2003 will appear in a subsequent report.

Nickel-based batteries, China, and the U.S. automotive market

Inco and Liaoning Wanzhong form joint venture to produce nickel foam in China.—On August 14, 2003, Inco Ltd. announced that it had formed a joint venture with a Chinese

developer to produce large volumes of high-quality nickel foam for the world market. The partners in the Chinese foam venture are: Inco Asia Holdings (a subsidiary of Inco Ltd.), Liaoning Wanzhong Real Property Development (a developer based in Dalian, China), and Korea Nickel Corp. (a South Korean producer of utility nickel in which Inco Ltd. has a 25% equity interest). The new company has been named Inco Wanzhong Advanced Technology Materials (Dalian) Ltd. (Inco Ltd., 2003).

Most nickel foam is used to fabricate positive electrode substrate for nickel rechargeable batteries. Some foam, however, is used as a catalyst or as a high-temperature, corrosion-resistant filter. Foam also is finding applications in emerging fuel cell technologies. Commercial foam is >99.8% pure nickel metal (by weight) and is available in a wide range of different thicknesses and pore sizes. The density of 1.7 to 2.3-millimeter-thick foam strip typically runs between 400 and 800 grams per square meter.

The joint venture will construct a state-of-the-art nickel foam production plant in Dalian, a port at the southern tip of China's Liaotung Peninsula. The Liaotung Peninsula extends into the Yellow Sea and is situated midway between Tianjin (Tientsin), China, and P'yongyang, North Korea. The foam plant is expected to be fully operational by March 2004 and is being designed to produce 2 million square meters of nickel foam annually. Limited production at a pilot facility is scheduled to begin in late 2003. Inco has agreed to invest \$10 million in the startup phase of the project (Inco Ltd., 2003).

The nickel foam will be produced using electroplating technology licensed from the Harbin Institute of Technology in Heilongjiang Province. The bulk of the foam would be sold to manufacturers of rechargeable batteries. Most of the batteries, in turn, would be used to meet growing demand from consumers in China, Japan, Korea, and Taiwan. Nickel-based batteries are commonly used to power cordless telephones, electric bicycles and scooters, handheld tools, and digital cameras. Demand for much larger batteries for advanced hybrid vehicles—already a major end use for foam—is growing at an even faster rate than the overall battery market.

The Dalian plant will complement Inco's existing foam production facilities at Clydach, Wales, in the United Kingdom.

The foam produced at Dalian, however, will have some different characteristics than the foam currently produced at Clydach. The nickel metal feed at Clydach is produced onsite by the carbonyl process—a gaseous vaporization purification process. The two types of foams will supplement specialty nickel metal powders already being sold by Inco to battery manufacturers. In 1998, Inco spent \$14 million expanding the foam production line at Clydach.

Inco already has experience operating in China and has been producing nickel salts at Kunshan City in Jiangsu Province since 1997. The Kunshan facility near Shanghai—Jinco Nonferrous Metals Co., Ltd.—is a joint venture with the Jinchuan Non-Ferrous Metals Corp. of Jinchang, Gansu Province. Inco has a 65% interest in the Kunshan operation; Jinchuan, 35%. The Jinchuan mine and refining complex has an annual production capacity of 60,000 t of refined nickel and accounted for about 88% of China's total nickel production in 2002.

Growing hybrid electric vehicles sales increase demand for nickel foam and specialty nickel metal powders.—In 2002, automobile manufacturers sold about 38,000 hybrid electric vehicles to U.S. customers. In 2003, sales of new hybrid vehicles in the United States are expected to reach 54,000 units (Hybrid & Electric Vehicle Progress, 2003b). Many of the vehicles are equipped with nickel-based rechargeable storage batteries.

The Honda Insight, introduced in 1999, was the first hybrid electric vehicle to be readily available in U.S. showrooms. The Insight was followed a year later by the Toyota Prius. In 2002, Honda Motor Corp. began selling its Civic Hybrid into the U.S. market. To date, the hybrid option has been

commercially available only for compact automobiles. However, later this year, Ford Motor Co. and General Motors Corp. will begin offering hybrid equivalents of some sports utility vehicle (SUV) models and full-size pickup trucks to commercial fleets. These larger vehicles could be in car dealerships as early as 2004. Some market analysts believe that trucks could account for more than a third of hybrid sales by 2005. FedEx Express, a division of FedEx Corp., is considering purchasing 30,000 hybrid electric delivery vehicles for its courier fleet (Hybrid & Electric Vehicle Progress, 2003a). ISE Research-ThunderVolt, Inc. is using ZEBRA storage batteries (a sodium metal-nickel chemistry) in its new hybrid transit buses. The buses have a diesel-electric hybrid propulsion system. ISE—a privately held company based in San Diego, CA—expects to produce about 100 of the hybrid buses in 2003 (Hybrid & Electric Vehicle Progress, 2003c).

References Cited

- Hybrid & Electric Vehicle Progress, 2003a, 30,000 HEVs—'This is not a demonstration': Hybrid & Electric Vehicle Progress [Alexander Communications Group, Inc., New York, NY], v. 25, no. 12, June 15, p. 1, 3.
- Hybrid & Electric Vehicle Progress, 2003b, Trucks to make up one third of HEV market by 2005: Hybrid & Electric Vehicle Progress [Alexander Communications Group, Inc., New York, NY], v. 25, no. 12, June 15, p. 1, 4.
- Hybrid & Electric Vehicle Progress, 2003c, Working to fit hybrid technology to transit demands: Hybrid & Electric Vehicle Progress [Alexander Communications Group, Inc., New York, NY], v. 25, no. 15, August 1, p. 5.
- Inco Ltd., 2003, Inco announces formation of joint venture in China for nickel foam production: Toronto, Ontario, Canada, Inco Ltd. press release, August 14, 3 p.

TABLE 1
CONSUMPTION OF NICKEL (EXCLUSIVE OF SCRAP), BY FORM AND USE¹

(Metric tons, nickel content)

Period	Cathodes, pellets, briquets, and powder	Ferronickel	Oxide-sinter, salts, and other forms	Total	Total year to date
2002:					
June	5,150	873	254	6,280	35,600
July	5,210	730	266	6,200	41,800
August	5,230	843	230	6,310	48,100
September	5,130	754	59	5,950	54,000
October	5,330	750	62	6,140	60,200
November	4,830	632	58	5,520	65,700
December	4,750	505	53	5,310	71,000
January-December	59,600	9,080	2,270	71,000	XX
2003:					
January	5,180	529	75	5,780	5,780
February	4,820	390	23	5,230	11,000
March	4,720	653	42	5,410	16,400
April	5,180	400	46	5,620	22,100
May	4,760 ^r	524	351 ^r	5,640 ^r	27,700
June:					
Steel:					
Stainless and heat resisting	1,170	271	W	1,440	11,000
Alloy (excludes stainless)	97	--	--	97	1,310
Superalloys	873	--	W	873	5,870
Copper-nickel alloys	W	--	--	W	W
Electric, magnetic, and expansion alloys	13	--	--	13	93
Other nickel & nickel alloys	W	--	W	W	W
Cast iron	W	--	--	W	W
Electroplating (sales to platers)	1,030	--	--	1,030	5,640
Chemical and chemical uses	W	--	--	W	W
Other uses	1,370	--	43	1,420	8,650
Total reported	4,550 ²	271	43	4,870	32,600
Total all companies (calc) ³	XX	XX	XX	7,490	50,100
2003: January-June	29,200	2,770	580	32,600	XX
2002: January-June	29,200	4,860	1,550	35,600	XX

^rRevised. W Withheld to avoid disclosing company proprietary data; included in "Other uses" category. XX Not applicable. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Of consumption, 3,654 metric tons was consumed as cathodes and pellets, the remainder as briquets and powder.

³Figures represent calculated apparent consumption; based on the revised proportion of reported primary consumption (65.01%) to apparent primary consumption for 2001.

TABLE 2
ENDING STOCKS OF NICKEL (EXCLUSIVE OF SCRAP) HELD BY CONSUMERS, BY FORM AND USE ^{1,2}

(Metric tons, nickel content)

Period	Cathodes, pellets, briquets, and powder		Ferronickel	Oxide-sinter, salts, and other forms	Total
2002:					
June	1,770		63	138	1,970
July	1,500		98	97	1,700
August	1,820		112	83	2,020
September	2,270		89	78	2,440
October	1,890		140	76	2,100
November	1,700		93	84	1,880
December	1,570		60	81	1,710
2003:					
January	1,450		100	44	1,590
February	1,520		54	34	1,610
March	1,320		148	43	1,510
April	1,520		49	47	1,620
May	1,520 ^r		58	41	1,620 ^r
June:					
Steel (stainless, heat resisting and alloy)	299		(3)	(3)	299
Nonferrous alloys ⁴	1,330		(3)	(3)	1,330
Foundry (cast irons)	(3)		--	--	(3)
Chemical (catalysts, ceramics, plating salt, etc.) and unspecified uses	20		101	71	192
Total	1,650		101	71	1,820

^rRevised. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Stocks held by companies that consume nickel in more than one end-use category are credited to the major category. Stocks are subject to revisions owing to inventory adjustments.

³Included in the "Chemical and unspecified uses" category.

⁴Includes superalloys, nickel-copper and copper-nickel alloys, permanent magnet alloys, and other nickel alloys.

TABLE 3
CONSUMPTION AND ENDING STOCKS OF PURCHASED SECONDARY NICKEL, BY USE¹

(Metric tons, nickel content)

Period	Consumption			Stocks		
	Ferrous scrap ²	Nonferrous scrap ³	Total scrap	Ferrous scrap ²	Nonferrous scrap ³	Total scrap
2002:						
June	6,330	547	6,880	3,300	107	3,410
July	5,900	713	6,610	3,280	90	3,370
August	6,060	662	6,720	3,110	113	3,220
September	4,770	606	5,370	3,400	120	3,520
October	5,170	660	5,830	3,540	104	3,640
November	4,590	506	5,100	3,240	104	3,350
December	3,870	641	4,510	3,210	101	3,310
January-December	61,600	8,070	69,700	XX	XX	XX
2003:						
January	4,710 ^r	646 ^r	5,350 ^r	3,420	107	3,530
February	4,030 ^r	759 ^r	4,790 ^r	3,080	96	3,180
March	6,430 ^r	650 ^r	7,080 ^r	2,930	105 ^r	3,040
April	5,310	675 ^r	5,990 ^r	3,210	93	3,310
May	4,920	775 ^r	5,700 ^r	3,150	102	3,250
June	4,040	647	4,690	3,090	109	3,200
2003: January-June	29,400	4,150	33,600	XX	XX	XX
2002: January-June	31,300	4,280	35,600	XX	XX	XX

^rRevised. XX Not applicable.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Nickel content is calculated from an average nickel content and the reported gross weight of scrap.

³Combined consumption and stocks of aluminum-base, copper-base, and nickel-base scrap.

TABLE 4
U.S. IMPORTS FOR CONSUMPTION OF NICKEL, BY COUNTRY¹

(Metric tons, nickel content)²

Period and country of origin	Cathodes pellets, and briquets	Powder and flakes	Ferro-nickel	Metal-lurgical-grade oxide	Waste and scrap	Stainless steel scrap	Chemicals	Total ³	Total year to date ⁴	Wrought nickel
2002:										
May	6,600	590	1,240	14	221	477	298	9,450	49,100	53
June	8,950	391	1,160	238	174	460	228	11,600	60,700	43
July	11,800	627	1,080	214	367	874	225	15,200	75,900	69
August	7,750	603	1,790	127	152	762	171	11,400	87,200	72
September	13,000	566	1,570	2	160	641	194	16,200	103,000	85
October	5,140	609	1,010	11	230	564	183	7,740	111,000	106
November	6,560	684	991	27	181	627	222	9,300	120,000	51
December	6,970	512	750	16	225	530	312	9,310	130,000	70
January-December	97,200	6,970	12,300	1,230	3,030	6,080	2,860	130,000	XX	878
2003:										
January	5,950	928	605	10	341	322	223	8,380	8,380	55
February	7,060	954	916	8	323	424	269	9,960	18,300	115
March	17,400	1,130	1,310	34	420	476	309	21,100	39,400	93
April	7,770	678	1,700	--	496	533	321	11,500	50,900	64
May:										
Australia	636	22	--	7	--	--	--	665	5,230	--
Brazil	40	--	--	--	4	--	--	44	585	--
Canada	4,280	381	--	--	101	315	--	5,070	23,600	1
Colombia	--	--	325	--	--	--	--	325	1,210	--
Dominican Republic	--	--	1,100	--	--	--	--	1,100	3,510	--
Finland	340	97	--	--	--	--	107	544	2,580	--
France	131	--	--	--	22	2	53	208	1,330	--
Germany	18	2	--	--	42	--	40	102	458	17
Japan	--	3	--	--	--	--	101	104	370	6
Mexico	--	--	--	--	4	135	--	139	814	--
New Caledonia	--	--	106	--	--	--	--	106	1,160	--
Norway	250	--	--	--	--	--	--	250	4,980	--
Russia	405	380	--	--	--	--	--	785	11,500	--
South Africa	--	20	--	--	--	--	--	20	58	--
Sweden	--	4	--	--	--	--	--	4	31	--
United Kingdom	38	14	--	--	208	--	16	276	1,040	2
Venezuela	--	--	--	--	--	3	--	3	11	--
Zimbabwe	20	--	--	--	--	--	--	20	196	--
Other	--	10	--	--	31	6	61	108	2,100	11
Total	6,160	933	1,530	7	412	461	378	9,880	60,800	37
2003: January-May	44,300	4,630	6,060	59	1,990	2,220	1,500	60,800	XX	362
2002: January-May	37,100	2,980	3,970	596	1,540	1,620	1,330	49,100	XX	383

XX Not applicable. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²The nickel contents are assumed to be as follows: metallurgical-grade oxide (77%), waste and scrap (50%), and stainless steel scrap (7.5%). The chemicals category includes chlorides (25%); sulfates (22%); other salts (22%); supported catalysts (22%); and oxide, sesquioxide, and hydroxide (65%).

³Excludes wrought nickel.

⁴May include revisions for prior months.

Source: U.S. Census Bureau.

TABLE 5
U.S. EXPORTS OF NICKEL, BY COUNTRY¹

(Metric tons, nickel content)²

Period and country of destination	Cathodes pellets, and briquets	Powder and flakes	Ferro-nickel	Metal-lurgical-grade oxide	Waste and scrap	Stainless steel scrap	Chemicals	Total ³	Total year to date	Wrought nickel
2002:										
May	65	119	10	111	1,360	1,900	213	3,780	22,100	271
June	105	134	(4)	19	1,550	2,500	155	4,470	26,500	283
July	131	139	1	9	1,560	2,040	204	4,080	30,600	200
August	76	222	1	42	826	1,510	168	2,840	33,500 ^r	230
September	164	122	2	55	718	1,660	153	2,880	36,300	249
October	113	99	8	34	1,010	1,840	167	3,280	39,600	221
November	64	95	8	6	830	1,470	184	2,650	42,300	181
December	75	65	7	3	983	2,080	423	3,630	45,900	175
January-December	1,740	1,480	46	685	13,700	25,700	2,570 ^r	45,900	XX	2,570
2003:										
January	92	58	10	11	853	3,060	267	4,350	4,350	586
February	24	84	13	7	948	5,050	261	6,380	10,700	462
March	46	113	5	13	770	5,150	243	6,340	17,100	629
April	78	86	8	19	894	2,880	466	4,430	21,500	149
May:										
Australia	--	--	--	--	10	--	1	11	31	(4)
Belgium	--	1	--	--	--	8	4	13	170	--
Canada	--	15	--	8	606	303	172	1,100	5,380	9
China	--	(4)	11	--	--	378	10	399	2,480	1
Germany	--	11	--	--	16	3	1	31	181	5
India	--	1	--	--	29	110	--	140	401	2
Italy	--	(4)	--	--	--	(4)	--	(4)	492	46
Japan	2	3	--	(4)	45	96	18	164	744	3
Korea, Republic of	--	(4)	--	--	--	551	50	601	2,020	--
Mexico	7	4	--	--	--	1	4	16	289	26
Netherlands	--	3	(4)	--	19	22	3	47	644	(4)
South Africa	--	(4)	--	--	--	--	1	1	54	--
Spain	--	--	--	--	--	--	--	--	1,980	(4)
Sweden	--	(4)	--	--	63	3	--	66	201	--
Taiwan	1	--	--	--	--	444	4	449	6,060	17
United Kingdom	--	1	--	1	41	32	9	84	653	2
Other	20	20	--	2	7	433	102	584	3,430	36
Total	30	51	11	11	836	2,380	379	3,700	25,200	147
2003: January-May	270	399	48	61	4,300	18,500	1,620	25,200	XX	1,973
2002: January-May	1,010	599	20	516	6,210	12,600	1,120	22,100	XX	1,032

¹Revised. XX Not applicable. -- Zero.

²Data are rounded to no more than three significant digits; may not add to totals shown.

³The nickel contents are assumed to be as follows: metallurgical-grade oxide (77%), waste and scrap (50%), and stainless steel scrap (7.5%). The chemicals category includes chlorides (25%); sulfates (22%); other salts (22%); supported catalysts (22%); and oxide, sesquioxide, and hydroxide (65%).

⁴Excludes wrought nickel.

⁵Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF NICKEL ALLOYS, BY COUNTRY¹

(Metric tons, gross weight)

Period and country of origin	Unwrought alloyed ingot	Bars, rods and profiles	Wire	Plates and sheets	Foil	Tubes and pipes	Other alloyed articles	Total	Total year to date
2002:									
May	179	248	456	289	1	337	162	1,670	8,170
June	232	293	401	286	15	511	122	1,860	10,000
July	133	259	624	361	31	124	196	1,730	11,800
August	170	217	360	356	34	180	161	1,480	13,200
September	64	153	412	207	35	243	131	1,250	14,500
October	180	150	400	212	28	106	117	1,190	15,700
November	231	279	324	348	28	194	149	1,550	17,200
December	170	192	510	353	21	147	153	1,550	18,800
January-December	2,540	2,640	5,230	3,520	194	2,850	1,810	18,800	XX
2003:									
January	54	252	427	332	(2)	133	91	1,290	1,290
February	167	158	356	264	11	93	140	1,190	2,480
March	129	209	600	308	(2)	148	163	1,560	4,040
April	184	245	697	316	6 ^r	204	266	1,920	5,950
May:									
Australia	68	--	--	--	--	--	--	68	276
Belgium	20	--	(2)	--	--	--	(2)	20	112
Canada	--	1	9	--	--	23	5	38	86
China	--	(2)	1	1	--	--	20	22	144
France	--	(2)	82	3	--	10	19	114	682
Germany	4	77	161	184	7	131	(2)	564	2,550
Italy	--	86	1	--	--	--	2	89	490
Japan	--	--	10	1	--	(2)	10	21	172
Mexico	--	--	--	--	--	--	91	91	425
Netherlands	--	--	--	--	--	--	27	27	81
South Africa	39	--	(2)	--	--	--	--	39	137
Sweden	--	--	193	5	--	13	--	211	1,040
United Kingdom	50	35	18	132	--	28	8	271	1,140
Other	--	5	29	2	(2)	1	13	50	244
Total	181	204	504	328	7	206	195	1,630	7,580
2003: January-May	715	1,070	2,590	1,550	25	784	855	7,580	XX
2002: January-May	1,360	1,090	2,200	1,390	3	1,350	780	8,170	XX

^rRevised. XX Not applicable. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. EXPORTS OF NICKEL ALLOYS, BY COUNTRY¹

(Metric tons, gross weight)

Period and country of destination	Unwrought alloyed ingot	Bars, rods and profiles	Wire	Plates and sheets	Foil	Tubes and pipes	Other alloyed articles	Total	Total year to date
2002:									
May	862	495	99	638	32	136	297	2,560	12,900
June	1,070	393	142	567	8	127	363	2,670	15,500
July	437	518	94	392	8	144	307	1,900	17,400
August	951	527	142	545	15	128	426	2,730	20,200
September	788	568	174	733	4	133	333	2,730	22,900
October	290	507	146	717	3	187	320	2,170	25,100
November	739	418	174	546	10	147	295	2,330	27,400
December	415	316	78	302	14	115	426	1,660	29,100
January-December	8,720	6,020	1,520	6,590	169	1,770	4,290	29,100	XX
2003:									
January	729	375	138	236	12	231	192	1,910	1,910
February	1,160	419	93	215	38	168	374	2,460	4,380
March	226	615	113	399	214	150	307	2,020	6,400
April	600	743	158	315	14	182	292	2,300	8,700
May:									
Australia	--	--	(2)	(2)	--	--	(2)	1	19
Belgium	39	102	2	25	1	--	3	172	460
Canada	2	38	25	21	2	50	34	172	1,220
France	107	57	22	26	(2)	(2)	3	215	1,140
Germany	616	76	4	14	(2)	1	5	716	2,720
India	--	6	--	-2	--	(2)	--	6	62
Ireland	(2)	--	(2)	2	--	--	--	3	9
Italy	(2)	34	(2)	10	--	(2)	4	48	192
Japan	19	60	4	3	2	1	3	92	613
Korea, Republic of	1	9	1	7	(2)	2	(2)	20	181
Mexico	22	186	5	33	--	76	95	417	1,320
Netherlands	--	2	(2)	2	--	(2)	(2)	4	62
Singapore	--	4	1	2	--	4	1	12	48
Spain	2	11	--	--	--	(2)	1	14	74
Sweden	--	1	(2)	1	--	(2)	(2)	2	39
Switzerland	--	1	3	17	--	12	1	34	237
Taiwan	6	8	--	18	--	1	7	40	155
United Kingdom	36	293	2	84	(2)	6	1	422	1,620
Other	7	62	13	30	39	31	98	279	1,200
Total	857	950	82	295	44	184	256	2,670	11,400
2003: January-May	3,570	3,100	583	1,460	323	915	1,420	11,400	XX
2002: January-May	4,030	2,770	572	2,790	107	786	1,820	12,900	XX

XX Not applicable. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 8
NICKEL CONSUMPTION IN CAST AND WROUGHT PRODUCTS

	Percent	
	Wrought	Cast
June 2003:		
Stainless and heat resisting steels	70	30
Alloy steels	95	5
Superalloys	99	1
Copper-nickel alloys	71	29
Other nickel-base alloys	100	(1)

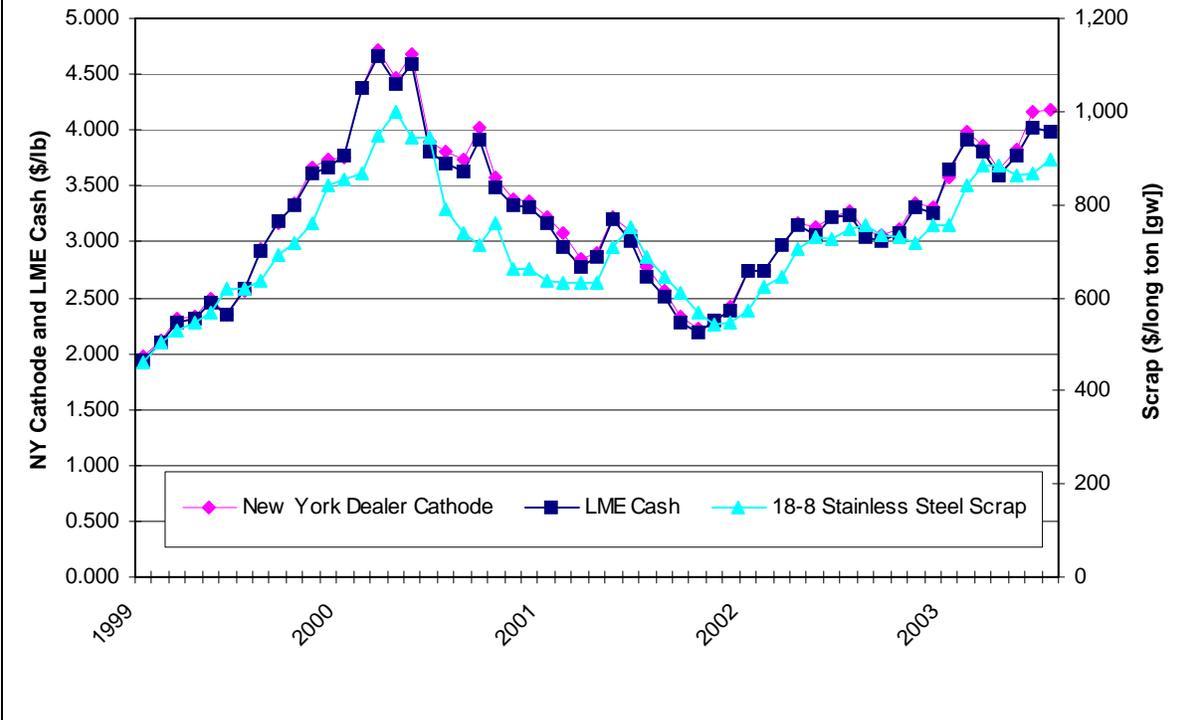
¹Less than 1/2 unit.

TABLE 9
NICKEL PRICES

Date	Platts Metals Week			18/8 Stainless	American
	Cathode NY Dealer \$/lb.	LME Cash \$/t	LME Cash \$/lb.	steel scrap Free market \$/long ton (gw)	18/8 Stainless steel scrap Pittsburgh \$/long ton (gw)
2002:					
Average for month of:					
July	3.268	7,142.717	3.240	XX	748
August	3.094	6,717.143	3.047	XX	755
September	3.053	6,640.238	3.012	XX	733
October	3.118	6,804.457	3.086	XX	729
November	3.349	7,313.929	3.318	XX	716
December	3.308	7,193.158	3.263	XX	755
Yearly average	3.095	6,771.751	3.072	XX	703
2003:					
Average for week ending:					
June 6	4.25-4.47	9,358.500	4.245	870-890	860-875
June 13	4.27-4.55	9,141.000	4.146	865-880	860-875
June 20	4.10-4.24	8,657.500	3.927	865-880	860-875
June 27	4.00-4.15	8,438.500	3.828	865-880	860-875
July 4	4.00-4.07	8,387.000	3.804	865-880	860-875
July 11	4.06-4.23	8,675.500	3.935	880-910	900-910
July 18	4.22-4.31	8,817.000	3.999	880-910	900-910
July 25	4.19-4.26	8,856.000	4.017	880-910	900-910
Average for month of:					
January	3.580	8,026.020	3.641	XX	757
February	3.978	8,623.000	3.911	840	840
March	3.865	8,378.810	3.801	886	885
April	3.655	7,910.125	3.588	885	885
May	3.826	8,330.625	3.779	839	861
June	4.155	8,874.762	4.026	874	867
July	4.178	8,797.391	3.990	889	896

XX Not applicable.

1999-2003 AVERAGE MONTHLY PRICES
 (Derived from Metals Week and American Metal Market quotations)



1999-2003 STOCKS

