CADMIUM

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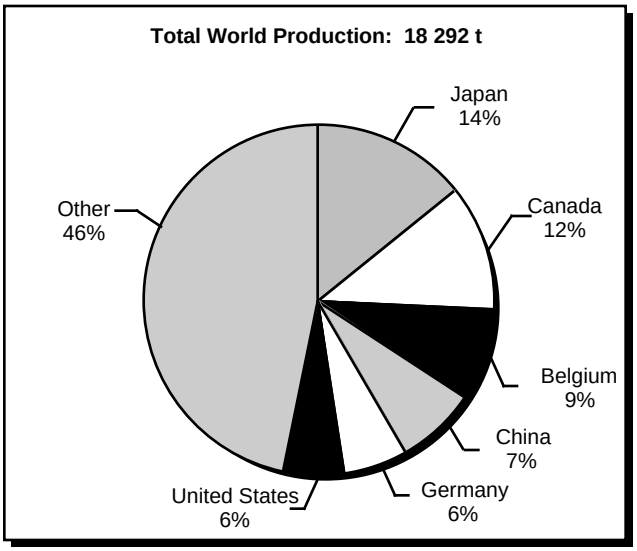
Canadian Developments

Canadian mine production of cadmium in concentrates (recoverable content) had declined to a 10-year low of 1161 t in 1993 before increasing to 1550 t in 1995. During 1995, production from new mines, such as the Louvicourt deposit in Quebec, more than offset lost capacity due to ore reserve depletion or closure at existing facilities (e.g., the Geco mine in Ontario). Canadian metal production of cadmium also grew, in part reflecting an increase in imports of zinc concentrates containing cadmium from Cominco's Red Dog mine in Alaska. Preliminary estimates indicate that metal production increased to a record high of 2360 t, a 9% rise over 1994.

World Developments

Cadmium is mainly produced as a by-product of zinc mining and refining. Therefore, the supply of cadmium is more dependent on zinc production than on cadmium demand. However, cadmium is also produced from recycled materials such as nickel-cadmium (Ni-Cd) batteries, and some residues or intermediate products. Approximately 10-15% of total Western World production is from recycled materials. In December 1995, INMETCO commissioned a cadmium recovery plant at its nickel recycling facility in Elwood City, Pennsylvania. This wholly owned subsidiary of Inco can process 3000 t/y of Ni-Cd batteries and is the only Ni-Cd battery recycling facility in North America.

Figure 1
World Production of Cadmium, 1994



Source: Natural Resources Canada.

Based on data from the World Bureau of Metal Statistics, it is expected that cadmium metal production in the Western World increased in 1995 after a three-year decline to 14 680 t in 1994. At the end of the third quarter, production was 5% greater, year on year, than the 10 554 t produced in 1994.

It is anticipated that Western World demand for cadmium also increased in 1995 as consumption at the end of the third quarter was 17% greater than the 1994 level of 11 776 t. The supply deficit that occurred during this period appears to have been offset by unreported refined recycled material, sales from the U.S. Defense Stockpile, and imports from current and former socialist countries. As a result, producer and consumer inventories grew during 1995 and totalled 3013 t by the end of October, a 44% increase from a year earlier.

With regard to health, safety and the environment, in February 1996, OECD countries endorsed the findings and outcome of a workshop on sources of cadmium in the environment, which was co-hosted by Sweden and the Netherlands in Stockholm during October 1995. Workshop sessions recognized that concerns about cadmium were largely national or regional in nature and that there was little need for concerted OECD action. The collection and recycling of Ni-Cd batteries was considered as an area for future cooperation between industry and governments. With regard to cadmium entering the waste stream, it was recognized that cadmium releases from incinerators and landfills can be mitigated to insignificant levels with the use of current technologies and management practices.

Consumption and Uses

Cadmium's unique chemical and physical properties permit it to be used in a wide variety of applications such as rechargeable Ni-Cd batteries, coatings for corrosion protection on ships or in aerospace applications, and in pigments for plastics or stabilizers in polyvinyl chloride to protect from chemical attack, sunlight, or heat degradation.

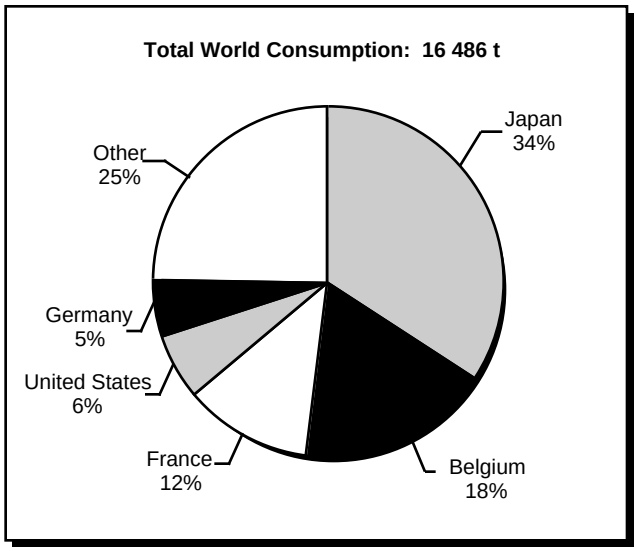
Prices

The weekly average *Metal Bulletin* price for cadmium (99.99% purity) was US$1.74/lb at the beginning of 1995. The price subsequently declined to a low of $1.28/lb in June, in part because of some 300 t of lesser-quality (99.95% purity) C.I.S. cadmium that

became available. As demand continued to rise and the supply of 99.99% purity cadmium tightened, the price climbed to $2.35/lb in July. During the latter half of the year, consumer and producer stocks increased and the price slowly fell to $2.07/lb at year-end.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 70. (2) Information in this review was current as of February 29, 1996.

Figure 2
World Consumption of Cadmium, 1994



Source: Natural Resources Canada.

TARIFFS

Item No.	Description	Canada			United States	EU	Japan[1]
		MFN	GPT	USA	Canada	MFN	MFN
2617.90.00.10	Cadmium ores and concentrates	Free	Free	Free	Free	Free	Free
2825.90.90.10	Cadmium oxide	Free	Free	Free	Free	9.9%	3.7%
2830.30	Cadmium sulphide	Free	Free	Free	Free	6.6%	Free
8107.10.10	Unwrought cadmium, not alloyed; powders, not alloyed	Free	Free	Free	Free	3.5%	4.7%
8107.10.20	Unwrought cadmium, alloyed; waste and scrap; powders, alloyed	Free	Free	Free	Free	3.2%	4.7%
8107.90	Cadmium and articles thereof, n.e.s.	4.5%	3%	Free	Free	5.6%	5.8%

Sources: Customs Tariff, effective January 1996, Revenue Canada; Harmonized Tariff Schedule of the United States, 1996; The "Bulletin International des Douanes," Journal Number 14 (17th Edition), European Union, 1994-1995, "Conventional" column; Custom Tariff Schedules of Japan, 1995.
n.e.s. Not elsewhere specified.
[1] GATT rate is shown; lower tariff rates may apply circumstantially.

TABLE 1. CANADA, CADMIUM PRODUCTION AND TRADE, 1993-95, AND CONSUMPTION, 1992-94

Item No.		1993		1994		1995p	
		(kilograms)	($000)	(kilograms)	($000)	(kilograms)	($000)
PRODUCTION (all forms)[1]							
	Ontario	592 629	760	816 571	2 812	770 752	4 316
	British Columbia	262 363	337	284 343	979	317 991	1 781
	Quebec	101 725	131	126 290	435	194 325	1 088
	Manitoba	78 323	100	113 777	392	148 747	833
	New Brunswick	126 133	162	159 015	548	117 328	657
	Total	1 161 173	1 490	1 499 996	5 166	1 549 143	8 675
	Refined[2]	1 888 255	..	2 173 018	..	2 359 827	..
IMPORTS							
2617.90.00.10	Cadmium ores and concentrates						
	United States	3 180	31	12	...	–	–
	Total	3 180	31	12	...	–	–
2825.90.90.10	Cadmium oxide						
	United States	3 821	78	2 246	47	1 321	27
	Belgium	2 288	45	1 197	23	871	17
	United Kingdom	418	8	563	11	261	5
	Total	6 527	132	4 006	82	2 453	50
2830.30	Cadmium sulphide						
	United States	25 659	17	109 601	75	298 825	206
	Total	25 659	17	109 601	75	298 825	206
8107.10.10	Unwrought cadmium, not alloyed; powders, not alloyed						
	Russia	–	–	–	–	106	4
	United States	1 007	10	4 692	46	13	...
	Bulgaria	–	–	9 053	66	–	–
	Belgium	–	–	2 722	21	–	–
	Other countries	752	7	100	3	18	...
	Total	1 759	18	16 567	139	137	6
8107.10.20.10	Unwrought cadmium, alloyed; powders, alloyed						
	United States	34	1	–	–	20	...
	Mexico	–	–	18 000	109	–	–
	Total	34	1	18 000	109	20	...
8107.10.20.20	Cadmium waste and scrap						
	United States	12	...	109	1	–	–
	Total	12	...	109	1	–	–
8107.90	Cadmium and articles thereof, n.e.s.						
	United States	13 953	157	18 874	234	10 933	143
	France	–	–	531	20	560	24
	Other countries	–	–	349	6	328	5
	Total	13 953	157	19 754	261	11 821	174
EXPORTS							
2830.30	Cadmium sulphide						
	United States	–	–	2	7	–	–
	Total	–	–	2	7	–	–
8107.10	Unwrought cadmium; waste and scrap; powders						
	Japan	550 171	632	528 593	1 667	723 717	3 071
	United States	612 718	858	586 785	1 552	459 866	2 282
	United Kingdom	229 906	262	190 617	256	487 866	1 563
	Belgium	21 206	22	62 120	55	186 493	770
	France	138 544	201	120 825	289	127 121	655
	Other countries	303 391	346	409 893	929	472 234	1 302
	Total	1 855 936	2 327	1 898 833	4 753	2 457 297	9 649
8107.90	Cadmium and articles thereof, n.e.s.						
	United States	1 004	7	4 536	36	5 501	24
	Total	1 004	7	4 536	36	5 501	24

CONSUMPTION	**1992**	**1993a**	**1994p,a**
		(kilograms)	
Cadmium metal[3]			
Plating	17 371	17 933	3 557
Solders, other alloys and other uses[4]	68 737	71 317	79 644
Total	86 108	89 250	83 201

Sources: Natural Resources Canada; Statistics Canada.
– Nil; .. Not available; ... Amount too small to be expressed; n.e.s. Not elsewhere specified; p Preliminary.
a Increase in number of companies being surveyed.
1 Production includes recoverable content of cadmium in the zinc-lead concentrates shipped. 2 Refined metal produced from domestic and foreign ores and secondary materials. 3 Available data as reported by consumers. 4 Chemicals and pigments.
Note: Numbers may not add to totals due to rounding.

TABLE 2. CANADA, CADMIUM PRODUCTION AND EXPORTS, 1975 AND 1980-95

	Production		Exports
	All Forms[1]	Refined[2]	Cadmium Metal
	(kilograms)		
1975	1 191 674	1 142 508	637 797
1980	1 033 000	1 302 955	1 095 825
1981	833 788	1 293 265	1 452 904
1982	886 055	1 162 390	769 505
1983	1 107 000	1 296 000	1 365 111
1984	1 605 286	1 756 707	1 369 422
1985	1 716 731	1 696 192	1 477 415
1986	1 483 907	1 551 732	1 382 807
1987	1 481 496	1 571 444	1 156 555
1988	1 663 978	1 693 708	1 142 716 r
1989	1 710 527	1 619 798	1 433 144
1990	1 333 664	1 470 229	1 282 603
1991	1 549 087	1 829 059	1 452 481
1992	1 393 099	1 962 813	1 579 823
1993	1 161 173	1 888 255	1 856 940
1994	1 499 996	2 173 018	1 903 369
1995 p	1 549 143	2 359 827	2 462 798

Sources: Natural Resources Canada; Statistics Canada.
p Preliminary; r Revised.
1 Production includes recoverable content of cadmium in the zinc-lead concentrates shipped.
2 Refined metal produced from domestic and foreign ores and secondary materials.

TABLE 3. WORLD PRODUCTION OF CADMIUM, 1990-94

Country	1990	1991	1992	1993	1994[p]
			(tonnes)		
EUROPE					
Austria	44	20	–	–	–
Belgium-Luxembourg	1 958	1 810	1 550	1 563	1 557
Finland	570	592	590	785	548
France	187	271	252	137	5
Germany	573	1 048	941	1 056	1 145
Italy	691	658	742	517	475
Netherlands	590	549	612	526	307
Norway	286	237	249	213	288
Spain	355	344	361	365	387
United Kingdom	438	449	383	458	470
Ex-Yugoslavia	362	286[r]	236[r]	257[r]	77
of which Macedonia	..	286	230	249	74
of which Serbia	..	–	6	8	3
Total	6 054	6 264[r]	5 916[r]	5 877[r]	5 259
AFRICA					
Algeria	65	78	56	65	59
Namibia	69	67	86	18[r]	42
South Africa	55	–	–	–	–
Zaire	127	123	84	12[r]	–
Total	316	268	226	95[r]	101
ASIA					
India	277	270	311	270	230
Japan	2 451	2 889	2 986	2 832	2 614
South Korea	568	395	789	719	909
Thailand	..	..	..	449	400[e]
Turkey	46	22	23	31	36
Other Asia	..	373	635	–	–
Total	3 342	3 949	4 744	4 301	4 189
AMERICAS					
Argentina	55	49	37	49	27
Brazil	135	140[e]	135	135	162
Canada	1 470	1 829	1 963	1 888[r]	2 129
Mexico	882	688	616[r]	797[r]	646
Peru	385	524	410[r]	471[r]	510
United States	1 678	1 676	1 620	965	1 011
Total	4 605	4 906	4 781[r]	4 305[r]	4 485
OCEANIA					
Australia	648	1 076	1 001	729	910
EASTERN COUNTRIES[e]					
Bulgaria	309	232	194	266	186
China, People's Republic of	1 000	1 125	1 200	1 270	1 300[e]
Germany	17	–	–	–	–
North Korea	340	380	200	200	200[e]
Poland	373	364	132	149	155[e]
Romania	–	–	–	–	–
Ex-U.S.S.R.	1 970	1 500	1 509[r]	1 601[r]	1 407
of which Russia	..	..	649	741	546
of which Kazakstan	..	..	600	600	601
of which Uzbekistan	..	..	200	200	200
of which Ukraine	..	..	60	60	60
Total	4 009	3 601	3 235[r]	3 486[r]	3 348
Total world	18 974	20 064	19 903[r]	18 793[r]	18 292

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metal Statistics.
– Nil; .. Not available; [e] Estimated; [p] Preliminary; [r] Revised.

TABLE 4. WORLD CONSUMPTION OF CADMIUM, 1990-94

Country	1990	1991	1992	1993	1994[p]
			(tonnes)		
EUROPE					
Austria	1.0	0.1	–	–	–
Belgium-Luxembourg	2 411.0	2 638.0	2 291.0	4 168.0[r]	2 944.0[r]
Denmark	–	–	2.0	–	–
France	1 754.0	1 651.0	1 333.0	1 703.0[r]	1 969.0
Germany	734.0	652.0	820.0	673.0	850.0[e]
Greece	–	1.0	–	0.2	–
Italy	379.0	280.0	200.0	200.0	140.0
Netherlands	25.0	20.0	5.0	5.0[e]	5.0[e]
Norway	10.0[e]	8.0	10.0[e]	10.0[e]	10.0[e]
Spain	45.0	39.0	20.0	20.0[e]	20.0[e]
Sweden	187.0	181.0	239.0	216.0	293.0
Switzerland	30.0	25.0	30.0	26.0	4.0
United Kingdom	934.0[e]	826.0	715.0	622.0	664.0
Ex-Yugoslavia	160.0	140.0[e]	60.0[e]	40.0[e]	30.0[e]
Other Europe	2.0[e]	1.0[e]	–	–	–
Total	6 672.0	6 462.1	5 725.0	7 683.2[r]	6 929.0
AFRICA					
South Africa	20.0[e]	30.0[e]	25.0	20.0[e]	20.0[e]
ASIA					
India	282.0	436.0	500.0	649.0	412.0
Israel	40.0[e]	40.0[e]	–	1.0	15.0
Japan	5 505.0	5 800.0[e]	5 200.0[e]	5 400.0	5 615.0
South Korea	380.0	400.0	380.0[e]	300.0[e]	300.0[e]
Taiwan	20.0	15.0	–	25.0	30.0[e]
Thailand	2.2	2.1	2.0	20.0	50.0[e]
Turkey	8.0	9.0	11.0	13.0	15.0
Other Asia	1.0	90.0	11.0	5.0[e]	5.0
Total	6 238.2	6 792.1	6 104.0	6 413.0	6 442.0
AMERICAS					
Argentina	35.0	34.0	28.0	60.0	–
Brazil	100.0	80.0	90.0[r]	90.0	100.0
Canada (apparent)	142.0	173.0	66.0	114.0	59.0
Mexico	178.0	155.0	125.0	130.0	140.0[e]
Peru	21.0	21.0[r]	22.0[r]	21.0[r]	26.0
United States	2 801.0[r]	3 079.0[r]	3 332.0[r]	2 943.0[r]	1 024.0
Other America	20.0	20.0	5.0	22.0	20.0[e]
Total	3 297.0[r]	3 562.0[r]	3 668.0[r]	3 380.0[r]	1 369.0
OCEANIA					
Australia	50.0	25.0[e]	24.0	25.0	25.0
EASTERN COUNTRIES[e]					
Bulgaria	209.0	182.0	184.0	177.0	230.0
China, People's Republic of	440.0[e]	500.0[e]	500.0[e]	500.0[e]	500.0[e]
Czechoslovakia	110.0	60.0	40.0	..	..
Czech Republic	..	..	..	56.0	50.0[e]
Germany	161.0	–	..	–	–
Hungary	40.0	20.0	1.0	1.0	1.0[e]
Poland	233.0	135.0	163.0	36.0	40.0[e]
Romania (apparent)	175.0[r]	20.0[r]	23.0	124.0	50.0[e]
Ex-U.S.S.R.	2 180.0	1 400.0	1 250.0	1 000.0[e]	700.0[e]
Other countries	20.0	30.0	30.0	30.0[e]	30.0[e]
Total	3 569.0	2 347.0[r]	2 191.0	1 974.0	1 701.0
Total world	19 846.2[r]	19 218.2[r]	17 737.0[r]	19 495.2[r]	16 486.0

Sources: Natural Resources Canada; International Consultative Group on Nonferrous Metal Statistics.
– Nil; .. Not available; [e] Estimated; [p] Preliminary; [r] Revised.