

Table 3.3

Estimates of Russia's historical production of the PGM, 1950-1992 (kg)

Period	Individual annual data for the five-year period						Annual growth/decline, %
	1	2	3	4	5	Mean	
1950-54	3 254	3 995	4 773	5 551	6 535	4 822	+18,81
1955-59	7 778	8 164	8 553	8 942	9 335	8 554	+ 4,67
1960-64	10 264	15 552	24 883	32 658	46 655	26 002	+45,79
1965-69	52 876	55 986	59 097	62 206	65 317	50 096	+ 5,42
1970-74	68 428	71 538	73 870	76 736	77 526	73 620	+ 3,25
1974-79	81 674	86 341	89 193	92 190	92 579	88 395	+ 3,31
1980-84							
Pt	23 084	24 886	26 015	26 752	27 286	25 605	+ 4,15
Pd	66 307	71 428	74 729	76 843	77 383	73 738	+ 4,43
Ru	1 805	1 932	1 977	2 065	2 078	1 971	+ 2,66
Rh	2 807	3 003	3 124	3 249	3 251	3 087	+ 3,79
Ir	1 803	1 956	1 985	2 024	2 047	1 961	+ 2,92
Os	962	1 011	1 032	1 039	1 037	1 014	+ 1,79
PGM	96 768	104 196	108 862	111 972	115 082	107 376	+ 4,28
1985-89							
Pt	29 383	28 285	29 050	29 654	29 872	29 249	+ 0,81
Pd	77 374	84 949	87 149	89 434	89 152	85 612	+ 3,41
Ru	2 070	1 984	1 988	2 011	2 004	2 013	- 0,57
Rh	3 164	3 034	3 051	3 096	3 107	3 090	- 0,16
Ir	2 057	2 049	2 145	2 261	2 300	2 160	+ 3,27
Os	1 029	999	1 017	1 043	1 052	1 028	+ 0,88
PGM	115 083	121 300	124 400	127 499	127 487	123 566	+ 2,58
1990-92							
Pt	30 886	30 118	29 586	-	-	30 376	- 2,13
Pd	83 492	82 066	85 328	-	-	83 629	+ 1,09
Ru	2 472	2 173	1 539	-	-	2 061	-21,10
Rh	3 844	3 374	2 401	-	-	3 206	-20,97
Ir	2 895	2 593	1 869	-	-	2 452	-19,65
Os	1 309	1 162	831	-	-	1 101	-20,32
PGM	124 898	121 486	121 554	-	-	122 646	- 1,35
Sales to Western countries							
1985-89							
Pt	7 154	9 020	12 441	13 686	17 107	11 852	+24,12
Pd	44 789	49 766	55 675	55 053	51 321	51 321	+ 3,80
Rh	1 400	2 644	3 110	3 110	4 043	2 861	+25,65
1990-92							
Pt	22 395	34 214	23 328	-	-	26 646	+ 2,06
Pd	58 164	66 872	62 207	-	-	62 414	+ 3,42
Rh	4 821	3 421	2 488	-	-	3 577	-28,16

ports. After separation and electrolytic refining of the base metals at the mines, the PGM-rich sludges are sent to the refinery at Krasnoyarsk, the point closest to Noril'sk on the Trans-Siberian railway. The other smelter is situated about 3000 km to the west, at Pechanga in the Kola peninsula, but recent reports have suggested that the plant was being refurbished by the Finnish State company, Outokumpu Oy.

In the past, there were always domestic and foreign outlets for Russia's PGM production, but the latest intelligence also postulates the hoarding of inventories. Short-term domestic PGM sales are falling, due to the general disruption within the CIS, the lack of capital for ongoing projects, and the reduction of offtake by

the military owing to budgetary cuts. If Russia converts to a market economy (which is at present in doubt), the local consumption of the PGM is bound to escalate in the longer term. Russian sales of platinum to the West have shown some stability in the past with minor ups and downs. According to Johnson Matthey, the average annual sales from 1983 to 1985 were 7983 kg/y, declining 10,94 per cent per year during that period. Between 1986 to 1988, sales grew by 23,99 per cent to 11 716 kg/y, and from 1989 to 1991 by 41,42 per cent per year to 24 572 kg/y. In 1991, sales reached an unprecedented 34 214 kg or 1 100 000 oz, an increase of 53 per cent over the previous year. Exports of palladium and ruthenium showed similar increases. It is clear that

these sales were not possible from production alone, and that they would have had to be augmented by a draw-down of stocks that were unknown before that time. This action probably left the secret Kremlin vaults depleted of their entire PGM inventory. If this type of Russian sale is repeated in future, it will have to be at the expense of supplies to domestic consumers.

The reasons for this situation are not hard to find. The devastated Russian economy, with its \$65 billion foreign debt, caused Western countries to be wary of extending credit. Russia became desperate for foreign currency in 1991. At that stage, the Russians realized that precious metals were the only bankable commodities capable of conversion to foreign exchange to service their commitments to, and needs from, the West. With their gold probably much depleted, their PGM and particularly their platinum and rhodium, seemed to offer a ready-made solution. Thus in 1991, PGM sales were shared by Almazjuveli-Export (Almaz), the traditional PGM marketing agent, and the Society Bank for Foreign Economic Affairs (Vneshekonombank), the principal government establishment used to service the USSR's foreign debt. Glavalmazoloto is also responsible for running the gold and diamond mines — it retains tight control over all the information regarding PGM production, stocks, etc. and ensures that it is unavailable to anyone outside that organization. Apart from steady aggressive selling to consumers (through the Tokyo Commodity Exchange, TOCOM, and the New York Mercantile Exchange, NYMEX, and also through a joint marketing venture called Salmaz with Salomon Brothers of New York), the bank swapped a substantial amount of its platinum allocation for hard currency loans, then sold metal into the market when the swaps expired towards the end of 1991. There was wide speculation regarding the motivation for getting the platinum out of Russia and lodging it in Swiss banks. This included the safekeeping of the USSR stocks against claims of ownership by groups such as by the conservative elements before the coup attempt, or by the individual independent Soviet republics (the metals had in fact been mined in the Russian Federation), as well as financial swaps in which the metal was sold with a commitment to repurchase with interest at a later date; or its use as collateral against loans from the West or for leasing to Western consumers or fabricators.

This state of affairs was short-lived, however, since with the fragmentation of the USSR into its component republics at the end of 1991, Almaz and Glavalmazoloto were transferred to the Russian Federation and the Bank was sidelined. The credit lines it enjoyed with the Western banks and dealers were then withdrawn, and the swaps were no longer rolled forward on expiry. In November 1991, the Russian government ruled that all precious metals mined on its territory were to be delivered to the State treasury under the control of a Committee for precious metals and gemstones, which reports to the Russian finance ministry. The Committee allocates PGM for sale locally and outside Russia through Almaz, which now has the monopoly on export

sales. This has been welcomed by Western buyers, as Almaz aims to market less aggressively than the bank did in the previous year, and is proving to be more judicious than its Society counterparts in supplying PGE to the West. Although Russia is dependent on the foreign exchange that sales of the PGM can earn, the lower grade of the deeper ores and the political uncertainty in that country must be cause for concern to the West regarding Russia as a reliable PGM supplier, particularly if it reverts to greater conservatism or even old-style communism in the future.

3.3. Canada

From the chance discovery of the Sudbury orebody by railway worker Tom Flanagan in 1883, it took quite a long time for production to commence. Production started in earnest only in 1902, and by 1920 Canada had become the world's leading nickel producer. Increased nickel production by rival companies, especially from laterites, tended to erode Canada's supremacy, and by 1970 its share had been trimmed to 62 per cent of world production. By 1982, Canada produced 36 per cent of the Western world's nickel, and only 22 per cent of global production. From 1934 to 1956, by-product PGM from Sudbury made Canada the world's largest PGM producer, but after that, South Africa and Russia took the lead. In 1981, Canada was still producing 5,4 per cent of the world's PGM, in spite of strikes during the preceding two years.

For a long time, two major companies have dominated PGM production in Canada, namely Inco Ltd (formerly the International Nickel Corporation of Canada) and Falconbridge Nickel Mines Limited. Lesser amounts of PGM are also produced from the Lac des Isles area (see below), and from the Namew Lake deposit by the consortium of Hudson Bay Mining & Smelting and the Finnish company Outokumpu Oy.

3.3.1. Major Producers

Inco Ltd owns and operates the following mines in eastern Ontario: Blezard, Clarabelle, Coleman, Copper Cliff North and South, Crean Hill, Creighton, Evans, Frood-Stobie, Garson, Kirkwood, Levack West, Little Stobie, Lower Coleman, McCreedy East, Murray, Shephard, Totten, Vermillion, Victoria, Whistle, Worthington, and other mines which produce 90 per cent of the PGM in the Sudbury area; and the Shebandowan mine in north-western Ontario; as well as the Birchtree, Pipe, Soab, and Thompson mines in Manitoba. Inco operates seven concentrating plants: Clarabelle (31 750 t/d), Copper Cliff (flotation only), Creighton (9525 t/d), Frood-Stobie (21 772 t/d), Levack (6350 t/d), Shebandowan (2268 t/d), and Thompson (18 844 t/d). The concentrates produced are sent to the smelters at Sudbury in Ontario or Thompson in Manitoba, where the PGM are concentrated in the nickel-copper smelter matte. The PGM are separated from the matte during the electrolytic refining of the base metals. The PGM-bearing sludge is sent to one of Inco's three refineries at Sudbury, Port Colborne in Ontario, or Thompson in Manitoba. There