



U.S. Department of the Interior • Bureau of Mines

MINERAL INDUSTRY SURVEYS

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Platinum, Quarterly

PLATINUM-GROUP METALS IN THE THIRD QUARTER 1993

Toyota announced that it had developed an all-palladium catalyst for cleaning motor vehicle exhaust emissions. The new catalyst is expected to be used on some compact models beginning in January. A similar announcement was made by Allied Signal earlier this year (see First Quarter 1993 report). While there is a trend towards using more palladium-only autocatalysts, the vast majority of autocatalysts still contain platinum, palladium, and rhodium or a combination of platinum and rhodium. Palladium-only catalysts reportedly have limited usage on smaller vehicles.

In September, the International Precious Metals Institute sponsored a meeting on platinum-group metals in New York, NY. One of the papers presented was "Recycling of Spent Catalysts at Nippon PGM." Nippon PGM is owned by Dowa Mining, Tanaka Kikinzoku Kogyo, and Kosaka Smelting and Refining, a subsidiary of Dowa.

Nippon PGM, Kosaka, Japan, started up a new plant in April 1992, designed to process 400 metric tons per month of spent catalyst. The pyrometallurgical procedure, called the Rose Process, consists of two steps: melting spent catalysts with flux and copper to absorb PGM and then concentrating PGM in copper. The original concentration of PGM in catalysts is 0.15%, while the end product is a copper alloy ingot containing 65% to 75% PGM. The PGM and copper can then be refined by conventional methods.

Another paper, presented by International Catalyst Technology (ICT) talked about the emission control for diesel engines. Medium duty trucks and passenger cars make up 61% of the world diesel engine market. Diesel engines emit 30 times as much particulate matter as gasoline engines. Therefore, diesel engines must have a differently designed catalyst than a gasoline engine, in order to prevent the catalyst from plugging. The diesel oxidation catalyst was designed for this purpose. Beginning in 1994, these catalysts will consume 2 to 2.6 metric tons per year of PGM worldwide. Diesel oxidation catalysts contain a ratio of 70 parts platinum to 30 parts palladium, and no rhodium.

In the Republic of South Africa, Rustenburg Platinum Mines Ltd. opened the open-pit Potgietersrust platinum mine. The mine is reportedly one of the lowest cost producers in the industry. Initial annual production is projected to be 5,300 kilograms of platinum, 5,100 kilograms of palladium, and 400 kilograms of rhodium. Other metals that will be produced are gold, nickel, and copper.

The entire October 1993 issue of American Jewelry Manufacturer (AJM) was devoted to platinum. A sampling of the articles covered platinum jewelry designs, working platinum alloys, platinum castings, and platinum polishing.

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TABLE 1
PLATINUM-GROUP METALS^{1/} REFINED IN THE UNITED STATES

(Kilograms)

Period	Platinum	Palladium	Iridium	Osmium	Rhodium	Ruthenium	Total
1992: 2/							
Nontoll-refined:							
Year -----	2,134	3,001	W	--	W	W	5,424
Toll-refined:							
Year -----	25,050	27,066	W	W	W	1,194	56,190
1993:							
Nontoll-refined:							
First quarter r/--	554	552	W	--	W	W	1,137
Second quarter r/-	630	586	W	--	W	--	1,251
Third quarter ----	629	545	W	--	W	W	1,208
Toll-refined:							
First quarter r/--	6,046	6,866	W	W	W	170	13,875
Second quarter r/-	7,448	6,287	W	W	W	209	14,755
Third quarter ----	7,448	6,283	W	W	W	208	14,750

r/Revised. W Withheld to avoid disclosing company proprietary data; included in "Total."

1/Typically, nearly all of the platinum and palladium are secondary metal; the other metals are entirely secondary.

2/Includes data for companies reporting annually.

Platinum & Palladium Production Toll-Refined Plus Nontoll-Refined

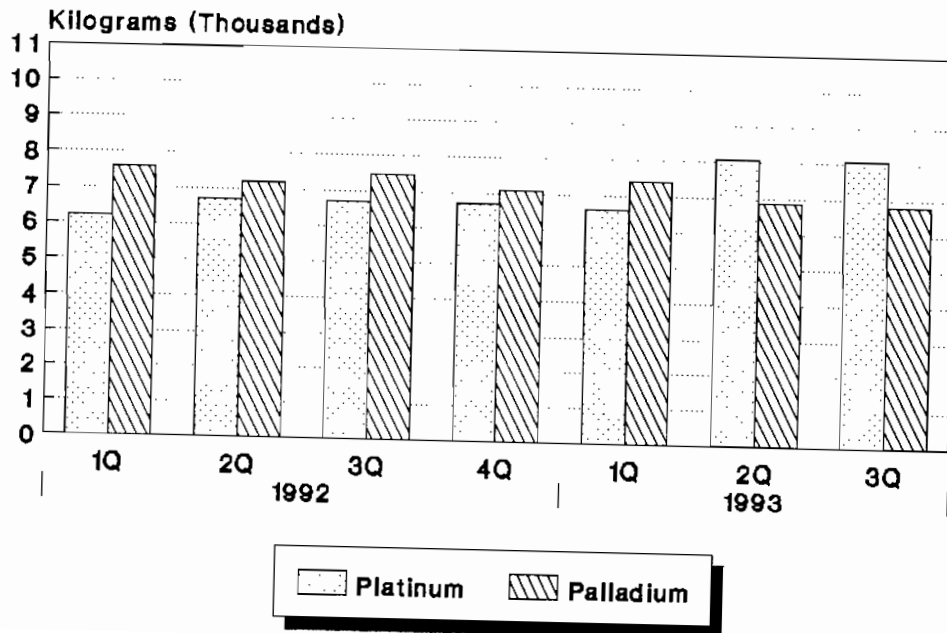


TABLE 2
STOCKS OF PLATINUM-GROUP METALS HELD BY REFINERS, IMPORTERS,
AND DEALERS IN THE UNITED STATES^{1/}

(Kilograms)							
Period	Platinum	Palladium	Iridium	Osmium	Rhodium	Ruthenium	Total
1992:							
Yearend -----	14,187	10,641	W	122	364	W	26,946
1993:							
Mar. 31 r/ -----	9,020	12,085	W	W	W	W	22,816
June 30 r/ -----	8,145	10,735	W	W	W	W	20,445
Sept.30 -----	9,439	10,405	W	W	W	W	21,385

r/Revised. W Withheld to avoid disclosing company proprietary data; included in "Total".

^{1/}Includes metals in depositories of the New York Mercantile Exchange; on September 30, 1993 this comprised 3,625 kilograms of platinum and 1,425 kilograms of palladium.

TABLE 3
PLATINUM-GROUP METALS SOLD TO CONSUMING INDUSTRIES IN THE UNITED STATES

(Kilograms)							
Period and industry	Platinum	Palladium	Iridium	Osmium	Rhodium	Ruthenium	Total ^{1/}
1992:							
Year -----	31,245	28,523	444	41	3,930	2,617	66,801
Apparent consumption ^{2/} -----	45,606	54,485	207	-19	6,873	2,317	109,469
1993:							
First quarter:							
Automotive r/ 3/ -----	5,617	802	--	--	802	--	7,222
Chemical -----	W	W	W	--	W	W	1,495
Dental and							
medical -----	W	1,399	W	W	--	W	1,622
Electrical r/ -----	W	2,611	W	--	W	W	3,471
Glass -----	W	W	--	--	W	W	W
Jewelry and							
decorative r/ -----	W	80	W	--	W	W	557
Petroleum -----	W	W	--	--	--	W	W
Miscellaneous r/ -----	821	182	W	W	W	W	1,146
Total r/ -----	8,000	6,397	W	W	1,207	W	16,137
Apparent consumption ^{2/} -----	14,396	16,661	W	W	1,258	853	33,378
Second quarter:							
Automotive r/ 3/ -----	6,143	880	--	--	880	--	7,903
Chemical -----	W	W	W	--	W	W	1,433
Dental and							
medical r/ -----	237	1,323	W	W	--	W	1,612
Electrical r/ -----	W	2,081	W	--	W	W	3,464
Glass -----	W	W	--	--	W	W	W
Jewelry and							
decorative r/ -----	363	W	W	--	W	W	728
Petroleum -----	W	W	--	--	--	W	W
Miscellaneous r/ -----	656	228	W	--	W	W	1,027
Total r/ -----	9,032	5,542	210	W	1,289	W	16,680
Apparent consumption r/ 2/-	16,980	20,650	302	W	1,585	W	40,486

See footnotes at end of table.

TABLE 3
PLATINUM-GROUP METALS SOLD TO CONSUMING INDUSTRIES IN THE UNITED STATES (continued)

(Kilograms)

Period and industry	Platinum	Palladium	Iridium	Osmium	Rhodium	Ruthenium	Total ^{1/}
Third quarter:							
Automotive ^{3/} -----	4,187	597	--	--	597	--	5,381
Chemical -----	W	W	W	--	W	W	1,433
Dental and medical -----	W	1,301	W	W	--	W	1,563
Electrical -----	W	2,079	W	--	W	W	3,448
Glass -----	W	W	--	--	W	W	W
Jewelry and decorative -----	W	W	W	--	W	W	W
Petroleum -----	W	W	--	--	--	W	W
Miscellaneous -----	654	148	W	--	W	W	946
Total -----	7,025	5,088	210	W	849	W	13,779
Apparent consumption ^{2/} -----	NA	NA	NA	NA	NA	NA	NA

r/Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; included in "Total."

1/Data may not add to totals shown because of independent rounding.

2/Defined as mine production + non-toll production + refined imports - refined exports + beginning stocks - ending stocks. Export data for iridium, osmium, and ruthenium are not available separately; in this calculation, the collective export figure was assigned to ruthenium.

3/Platinum, palladium, and rhodium sales to the automotive industry are estimated based on the U.S. light truck sales and U.S. automobile production.

Platinum & Palladium Consumption Sales to Industry

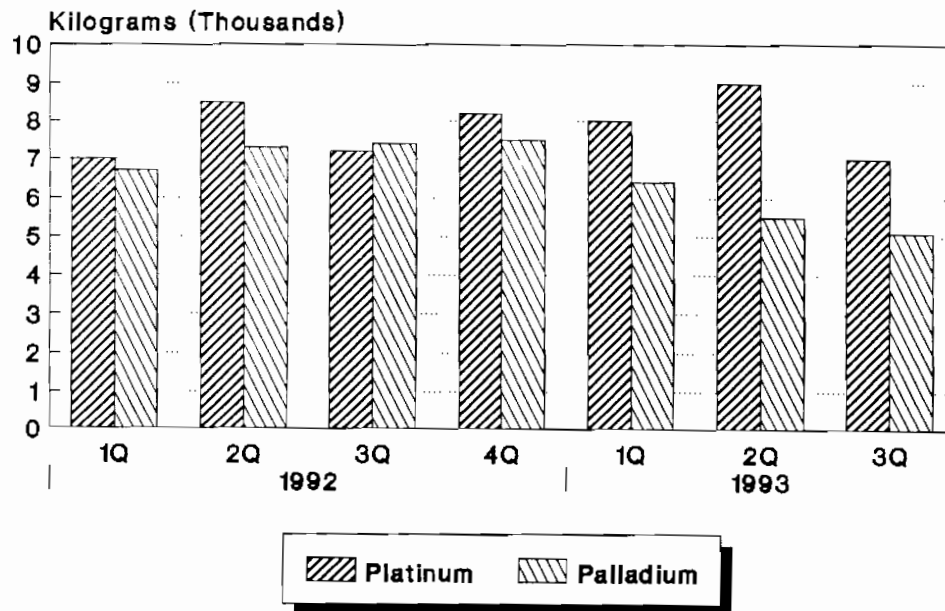


TABLE 4
MONTHLY AVERAGE PRODUCER AND DEALER PRICES OF PLATINUM-GROUP METALS^{1/}

(Dollars per troy ounce)

	Platinum		Palladium		Rhodium		Iridium	Ruthenium	Osmium
	Pro- ducer	Dealer	Pro- ducer	Dealer	Pro- ducer	Dealer	Dealer	Dealer	Dealer
1992:									
January -----	600	337	150	81	1,275	1,823	260	48	400
February -----	600	356	150	85	1,275	2,564	233	51	400
March -----	600	353	150	84	1,275	2,795	230	34	400
April -----	600	346	150	83	1,275	2,870	179	33	400
May -----	600	355	150	82	1,275	2,706	160	31	400
June -----	600	365	150	80	1,275	2,534	148	25	400
July -----	600	377	150	85	1,275	2,612	140	25	400
August -----	600	377	150	85	1,275	2,612	142	25	400
September -----	600	353	150	85	1,275	2,483	133	25	400
October -----	600	361	150	90	1,275	2,361	109	23	400
November -----	600	352	150	94	1,275	1,963	81	15	400
December -----	600	360	150	104	1,275	1,788	80	15	400
Average2/-----	600	356	150	87	1,275	2,365	158	29	400
1993:									
January -----	600	355	150	109	1,275	1,752	70	28	400
February -----	600	354	150	111	1,275	1,589	70	15	400
March -----	600	347	150	105	1,275	1,302	68	15	400
April -----	600	365	150	112	1,275	1,068	60	14	400
May -----	600	382	150	118	1,275	841	40	12	400
June -----	600	379	150	124	1,275	775	40	15	400
July -----	600	400	150	137	1,275	725	40	12	400
August -----	600	386	150	133	1,275	816	40	12	400
September -----	600	358	150	120	1,275	914	40	12	400
Average2/-----	600	370	150	119	1,275	1,087	52	15	400

^{1/}Average prices calculated at the low end of the range and rounded to the nearest dollar.

^{2/}Average yearly prices for platinum, palladium, and rhodium are as published by Metals Week; average yearly prices for iridium, ruthenium, and osmium are calculated by averaging the monthly average prices.

Source: Metals Week.

TABLE 5
U.S. IMPORTS FOR CONSUMPTION OF PLATINUM-GROUP METALS
(Kilograms)

Period and country	Platinum	Palladium	Rhodium	Ruthenium	Iridium	Osmium	Waste and scrap	Ores	Total	
									Quantity1/	Value (thousands)
1992:										
First quarter	2/13,099	11,950	1,560	961	166	--	746	--	28,478	\$300,739
Second quarter	3/18,896	16,455	2,193	960	155	12	864	--	39,535	462,390
Third quarter	4/10,711	16,663	2,060	1,059	76	3	370	--	30,943	358,568
Fourth quarter	5/14,867	16,025	1,943	405	149	42	609	--	34,041	365,912
1993:										
First quarter	6/13,317	17,670	1,420	1,010	185	46	382	--	34,032	298,884
Second quarter	7/14,051	19,598	1,697	874	209	36	896	--	37,362	320,345
July and August:										
Belgium	557	2,472	41	--	--	--	--	--	3,069	19,481
Canada	27	598	--	--	--	--	71	--	697	3,739
France	--	--	3	--	--	--	--	--	3	77
Germany	526	516	18	12	12	--	--	--	1,085	9,674
Hong Kong	--	--	--	--	--	--	63	--	63	551
Japan	126	543	--	--	--	--	--	--	669	3,539
Mexico	11	1	2	--	--	--	1,101	--	1,115	11,982
Netherlands	--	1	31	--	--	--	12	--	44	1,049
Russia	1,006	3,379	167	--	--	--	--	--	4,552	32,028
South Africa, Republic of	5,733	2,757	489	230	46	48	--	--	9,303	97,522
Switzerland	1,294	42	78	--	--	--	--	--	1,414	18,114
Taiwan	--	107	--	--	--	--	36	--	143	1,140
United Kingdom	1,175	1,511	49	78	--	--	15	--	2,828	22,735
Other	467	147	19	--	--	--	6	--	639	2,726
Total1/	8/10,922	12,074	897	321	59	48	1,303	--	8/25,623	224,357

^{1/}Data may not add to totals shown because of independent rounding.

2/Of this amount 703 kilograms was in the form of platinum coins.

3/Of this amount 543 kilograms was in the form of platinum coins.

4/Of this amount 553 kilograms was in the form of platinum coins.

5/Of this amount 745 kilograms was in the form of platinum coins.

6/Of this amount 165 kilograms was in the form of platinum coins.

7/Of this amount 66 kilograms was in the form of platinum coins.

8/Of this amount 381 kilograms was in the form of platinum coins.

Source: Bureau of the Census and U.S. Bureau of Mines.

TABLE 6
U.S. EXPORTS OF PLATINUM-GROUP METALS
(Kilograms)

Period and country	Platinum	Palladium	Rhodium	Iridium, osmium, ruthenium	Ores	Waste and scrap	Total	
							Quantity1/	Value (thousands)
1992:								
First quarter	3,315	3,954	237	37	2	1,698	9,243	\$96,275
Second quarter	1,849	4,732	239	45	8	2,143	9,016	88,913
Third quarter	3,554	4,447	178	308	275	2/17,445	26,207	99,305
Fourth quarter	3,388	4,567	182	30	203	4,992	13,363	97,522
Total1/	12,103	17,701	834	419	489	26,279	57,829	382,016
1993:								
First quarter	3,634	5,974	174	82	53	14,371	24,286	113,989
Second quarter	4,593	7,326	140	298	16	6,130	18,502	118,036
July and August:								
Australia	17	45	--	--	--	1	63	494
Belgium	388	935	--	--	--	244	1,568	10,594
Canada	22	115	1	5	--	129	272	2,323
China	--	--	--	--	--	1	1	6
France	2	8	--	--	--	--	9	50
Germany	37	28	--	7	--	253	326	2,189
Hong Kong	--	--	3	--	--	2	5	184
Italy	--	50	--	--	--	68	117	707
Japan	961	1,199	19	1	--	252	2,433	22,025
Korea, Republic of	104	8	--	--	--	--	112	1,340
Netherlands	11	383	--	--	--	6	399	1,300
Singapore	4	166	--	7	--	--	176	629
Sweden	12	1	--	--	--	46	59	305
Switzerland	1,310	115	--	--	--	--	1,425	17,760
Taiwan	--	191	--	2	--	--	193	552
United Kingdom	51	357	--	13	--	540	962	8,563
Other	42	56	7	--	--	--	105	770
Total1/	2,960	3,657	30	35	--	1,543	8,226	69,790

1/Data may not add to totals shown because of independent rounding.

2/All or part of these data have been referred to the Bureau of the Census for verification.

Source: Bureau of the Census and U.S. Bureau of Mines.

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