

# SUPPLIES, MINING & EXPLORATION

## SOUTH AFRICA

**Supplies of platinum from South Africa are forecast to rise by 6 per cent to 5.43 million ounces in 2006. Much of this increase will come from higher production at Anglo Platinum, as it benefits from improved performance by established mines, expansion of the Kroondal operation, and the release of pgm from the processing pipeline. New mines on the Eastern Bushveld, Aquarius's Everest South and ARM and Impala's Two Rivers, will also add significantly to supplies this year.**

## Anglo Platinum

Refined platinum production at Anglo Platinum rose by 6 per cent to 1.34 million ounces in the first six months of 2006. Production of palladium rose more modestly, up 1 per cent to 731,000 oz. Improved results from several of the group's mines were supplemented by the release of a backlog of platinum, which had built-up in the processing pipeline following the closure of the Polokwane smelter in late 2005. Refined platinum output for the year is expected to exceed 2.7 million ounces, increasing to 2.8 - 2.9 million ounces in 2007.

Production increased at the wholly-owned Rustenburg and Amandelbult operations. Growth was particularly strong at Amandelbult, where mill throughput rose by 19 per cent from January to June, although this was partly offset by lower grades due to fluctuating reef widths.

Higher production was also achieved by the Bafokeng Rasimone Platinum Mine (BRPM), a joint venture with the Royal Bafokeng Nation, and by the Kroondal mine, part of a Pool & Share Agreement with Aquarius Platinum. At BRPM, mill throughput rose by 12 per cent, mainly due to processing of a surface stockpile of ore, while an expansion at Kroondal resulted in more metal being available for refining by Anglo Platinum.

(Processing of pgm from this operation is currently split with Impala Refining Services).

These gains more than offset lower output at Union Section, where the need for additional ground support limited access to the UG2 declines, and at PPRust

and the Western Limb Tailings Retreatment plant, both of which were affected by heavy rains in early 2006.

Previously-announced projects will continue to add to production this year and next, with expansion at the Marikana mine, under a Pool and Share Agreement with Aquarius Platinum, and the Mototolo joint venture with Xstrata, where commissioning of the concentrator is planned for late 2006. One further expansion project - PPRust North - was approved in the first half of 2006.

## Impala Platinum

Production of refined platinum from the Impala Platinum lease area declined by 6 per cent to 534,000 oz in the first half of 2006. Although the quantity of ore processed through the plant was little changed, the headgrade declined, reflecting increased reliance on mechanised mining and a rise in the proportion of UG2 ore (typically lower in grade than Merensky Reef). Output of palladium fell by 21 per cent to 219,000 oz, due to fluctuations in the processing pipeline.

At the Marula Platinum operation on the Eastern Bushveld, the build-up to full production continues. In the January to July period, mill throughput rose by 64 per cent to 508,000 tonnes of UG2, yielding 21,000 oz of platinum in concentrate.

Although annual production from the Impala lease area is not expected to expand beyond 1.1 to 1.2 million ounces of platinum, the capacity of Impala Refining Services' processing facilities will grow to exceed 2.3 million ounces, from just under 2 million ounces currently. This is in line with the planned expansion of the company's Zimbabwe operations and growing concentrate shipments from Eastern limb projects.

## Lonmin Platinum

During the first half of 2006, refined platinum production from Lonmin's operations fell by 15 per cent to 389,000 oz. This reflected a build-up of pgm in the processing pipeline following the rebuild of a furnace in February and a shutdown of the smelter in April. Much of the backlog will be treated in 2006, and we expect platinum sales this year to total approximately 950,000 oz.

The expansion of the Marikana operations continued, with first half mill throughput up 5 per cent to 6.8 million tonnes. At the Limpopo mine (formerly Messina),

PGM Supplies: South Africa  
'000 oz

	2005	2006
Platinum	5,115	5,430
Palladium	2,605	2,855
Rhodium	628	702





*Aquarius Platinum signed a Pool and Share Agreement covering its Marikana operation with Anglo Platinum during 2005. The plant is currently being expanded.*

acquired in June 2005, a total of 452,000 tonnes of ore were processed, similar to the previous six months. The project remains on schedule to produce 75,000 oz of platinum annually from 2007.

Lonmin's longer term intention is to expand output at Marikana and continue development at Limpopo. It is also reevaluating the Pandora project, a joint venture with Anglo Platinum and Northam, which could produce around 200,000 oz of platinum per annum.

### Other Producers

Northam's production has been affected by difficult ground conditions during 2006. Severe potholing led to an 11 per cent drop in the amount of Merensky ore mined; however, this was partly offset by increased production from the more consistent UG2. First half mill throughput declined by 4 per cent to 1.11 million tonnes in 2006, yielding 104,000 oz of platinum in concentrate. Geological issues will continue to affect production in the second half, and platinum output in concentrate is set to fall below last year's figure of 225,000 oz.

In addition to its Kroondal and Marikana operations, both the subject of Pool and Share Agreements with Anglo Platinum, Aquarius Platinum now has a third mine at Everest South on the Eastern Bushveld which is in its first full year of operation. Between January and June, the mine yielded 52,000 oz of platinum in concentrate. Much of the ore treated has come from opencast operations, but underground mining will ramp up to full production in the period to March 2007.

ARM Platinum has stakes in three pgm-producing

joint ventures: Modikwa, the Nkomati nickel mine and Two Rivers. At Modikwa, refined pgm production was steady at 70,000 oz in the first half of 2006. In the same period, Nkomati saw an 18 per cent increase in mill throughput, boosting nickel output and nearly doubling by-product pgm production to 33,000 oz.

ARM's newest platinum operation is at Two Rivers, where the concentrator was commissioned ahead of schedule in August 2006. The mine has a 1.1 million tonne surface stockpile of ore, built-up during the construction of the plant, allowing the concentrator to operate at full capacity from the final quarter of 2006. Full underground production is targeted for late 2007.

In May 2006, the Canadian company Eastern Platinum acquired a 65 per cent stake in Barplats, owner of the Crocodile River mine. Production is currently from the Maroelabult and Zandfontein sections, and platinum output is expected to be about 50,000 oz in 2006. Eastplats also has pgm exploration projects at Maresburg and Spitzkop on the Eastern Bushveld.

## RUSSIA

**Russian supplies of palladium are expected to total 4.37 million ounces in 2006, above the level of mine production but around 5 per cent less than the year before. Norilsk Nickel is on course to produce over 3 million ounces of palladium, in line with output in 2005, and very substantial volumes of metal from state stocks appear to have been sold early in the year. Sales of Russian metal by Stillwater Mining, however, will be sharply lower than in 2005 as its inventory was exhausted during the first quarter of the year. Russian shipments of platinum from Norilsk and alluvial mines are forecast to be marginally higher at 895,000 oz.**

Norilsk Nickel expects to produce between 3.15 and 3.19 million ounces of palladium in 2006, a marginal increase from last year. Production of platinum is also forecast to be close to last year's level at 750,000 - 760,000 oz. Output comes primarily from Norilsk's operations on the Taimyr Peninsula in Siberia. As in 2005, mine production (estimated at 3 million ounces palladium, 700,000 oz platinum)

PGM Supplies: Russia '000 oz		
	2005	2006
Platinum	890	895
Palladium	4,620	4,370
Rhodium	90	60

will be augmented by the release of metal from Norilsk's process pipeline and by an improvement in overall pgm recoveries.

In June, Norilsk released a summary of its strategy to 2015. The plan includes significant expansion of ore production from its Taimyr mines and major changes to its flotation and metallurgical plants, which should raise nickel production 7 per cent by 2011. However, pgm production is forecast to remain broadly stable. Of longer term interest, it also concluded separate joint venture exploration and development agreements with Rio Tinto and BHP Billiton in the first half of the year.

Just over 1.45 million ounces of Russian palladium were recorded as entering Switzerland, Hong Kong and the USA during the first quarter of this year. A significant proportion of this is believed to be metal shipped from Russian state stocks by Gokhran (the State Fund for Precious Metals and Precious Stones) under its 2005 export quota, which was only received late last year.

During the first quarter of 2006, Stillwater Mining of the USA sold 63,000 oz of Russian palladium. This completed the company's sale of the metal that it received from Norilsk Nickel in 2003. Stillwater's sales of metal from this source totalled 439,000 oz in 2005.

### NORTH AMERICA

**Supplies of platinum from North America are forecast to be stable at 365,000 oz in 2006, while palladium shipments are expected to rise by 6 per cent to 955,000 oz. Output of by-product pgm from Canadian nickel operations will decline slightly, but production at North American Palladium should recover strongly. Pgm shipments from the Stillwater mine are forecast to be marginally up on 2005.**

In the first half of 2006, increased production from the East Boulder mine lifted Stillwater's mill throughput by 5 per cent to 678,000 tons, yielding 67,000 oz of platinum and 228,000 oz of palladium.

The company is implementing more selective mining methods, with the aim of improving average grades in the future.

After a very difficult 2005, North American Palladium should see a significant increase in pgm output this year.

PGM Supplies: North America '000 oz		
	2005	2006
Platinum	365	365
Palladium	905	955
Rhodium	20	20

Palladium production from January to June totalled 104,000 oz, up 3.5 per cent, with strong gains in the second quarter. The ramp-up of production from a new underground section has rapidly improved the headgrade, which by mid-year had risen above 2.2 grams of palladium per tonne compared with less than 1.5 grams per tonne in the second half of 2005.

Output of by-product pgm from Canada's nickel mines is expected to fall this year. Inco produced 173,000 oz of pgm in the first half of 2006 and expects full year output of 400,000 oz, down 5 per cent on 2005. We also forecast a moderate decline in pgm production at the former Falconbridge operations, which were acquired by Xstrata in August. Nickel and copper output from the company's Sudbury mines fell by 25 per cent and 12 per cent respectively between January and June of 2006, due to a combination of difficult ground conditions and lower grades.

### ZIMBABWE

**Production of platinum in Zimbabwe is forecast to rise by 10 per cent to 170,000 oz in 2006. Most of this gain will be from expansion of the Mimosa mine which came on stream in the second quarter. Increasing underground mining at Ngezi should improve grades and raise pgm output this year.**

At Mimosa, jointly owned by Impala and Aquarius, output of platinum in concentrate was 36,000 oz in the first half of 2006, marginally up on the previous year. The Wedza Phase IV expansion project was commissioned in April, increasing milling capacity to 150,000 tonnes per month, which will yield around 85,000 oz of platinum in concentrate annually.

At the Ngezi mine, owned by Zimplats, mill throughput was unchanged in the first half of 2006. However an improvement in headgrade, due to an increased contribution from underground workings, led to a 5 per cent rise in pgm output to 94,000 oz.

In May, Zimplats reached an agreement with the Zimbabwean government over future development of its properties. Impala and Zimplats have now approved the capital expenditure for the first phase of their long term expansion plan.

PGM Supplies: Zimbabwe and Others '000 oz		
	2005	2006
Platinum	280	310
Palladium	280	300
Rhodium	17	19