

# SUPPLIES, MINING & EXPLORATION

- Global supplies of platinum fell by 20,000 oz to 5.92 million oz in 2009. Supplies of palladium dropped by 210,000 oz to 7.10 million oz. Rhodium supplies climbed by 75,000 oz to 770,000 oz.
- South African supplies of platinum rose by 0.3% to 4.53 million oz last year. Palladium supplies from South Africa decreased by 2.5% to 2.37 million oz but supplies of rhodium increased to 663,000 oz.
- Supplies of palladium from current Russian mining in 2009 decreased by 0.9% to 2.68 million oz. Sales of palladium from state stocks were flat at 960,000 oz. Platinum supplies fell by 2.5% to 785,000 oz.
- North American palladium supplies fell by 17.0% to 755,000 oz. Platinum supplies fell by 20.0% to 260,000 oz.
- Zimbabwean supplies climbed by a quarter to 230,000 oz of platinum and 180,000 oz of palladium last year.

## SOUTH AFRICA

Supplies of platinum from South Africa rose marginally to 4.53 million ounces in 2009, despite a 3 per cent decline in refined production levels. Shipments by Anglo Platinum were supplemented by the sale early in the year of some metal produced in late 2008. This helped to offset lower supplies from Impala and Lonmin. The operational climate remained extremely difficult, with the industry hit by safety stoppages, strike action, smelter outages and geological issues, while production was also affected by the closure of a number of uneconomic shafts and pits. Palladium supplies decreased to 2.37 million ounces while supplies of rhodium climbed to 663,000 oz.

## Anglo Platinum

Anglo Platinum sold 2.58 million ounces of refined platinum in 2009, an increase of 16 per cent, or over 350,000 oz. Underlying mine production was almost unchanged, but refinery performance improved, while supplies were augmented by the shipment in early 2009 of some 164,000 oz of platinum which had been produced (but not sold) at the tail end of 2008.

Refined production of palladium rose by 3 per cent to 1.36 million ounces, boosted by expansion at the palladium-rich Mogalakwena mine, while rhodium output (which had been depressed by an increase in unrefined pipeline stocks

the previous year) climbed by 17 per cent to 350,000 oz.

Overall “equivalent refined” production of platinum (an indication of production obtained by multiplying the weight of metal recovered from each mine in ore form by standard Anglo Platinum smelting and refining recoveries) was stable at 2.46 million ounces. Shaft closures resulted in a fall in output at the Khuseleka and Siphumelele mines (formerly part of Rustenburg section), but this was offset by higher production from Mogalakwena – where platinum output rose by 26 per cent to 237,000 oz – following the commissioning of the Mogalakwena North expansion project during 2008.

The amount of platinum processed on behalf of joint venture and pool-and-share operations also grew. Output from the Mototolo mine – a 50:50 joint venture between Anglo Platinum and Xstrata – climbed by 25 per cent to 109,000 oz of equivalent refined platinum production as the operation reached its rated capacity of 200,000 tonnes per month of ore milled. Production also increased at Kroondal and Marikana.

At the BRPM joint venture operation, a rise in headgrade and improved recoveries in metal processing were offset by poor ground conditions and equivalent refined production fell by 1 per cent to 173,000 oz. At Modikwa – a joint venture with African Rainbow Minerals – platinum output also fell marginally, to 134,000 oz of equivalent refined production, due to power supply problems and shortages of skilled labour.

There was a decline in purchases of platinum from third parties, due to lower output at Xstrata’s Eland Platinum mine (platinum group metals from this operation are refined by Anglo under a concentrate offtake agreement).

During 2009, Anglo Platinum responded to depressed metal prices by restructuring its large Rustenburg and Amandelbult mines into seven separate units, closing three Rustenburg shafts, and delaying expenditure on a number of capital projects. These include the Amandelbult No 4 shaft (where development will restart in 2012, with first production

PGM Supplies: South Africa  
'000 oz

Supply	2007	2008	2009
Platinum	5,070	4,515	4,530
Palladium	2,765	2,430	2,370
Rhodium	696	574	663

*Production of pgm  
in concentrate at  
Northam's Zondereinde  
mine was stable  
at 310,000 oz  
during 2009.*



scheduled for 2016), the Stydrift Merensky project (due to come onstream in 2017), and the Twickenham Platinum Mine (due in 2018).

In January 2010, Anglo Platinum's BRPM joint venture with Royal Bafokeng Resources (RBR) was restructured to give majority ownership and operational control to RBR. Majority ownership of Bokoni (previously known as Lebowa) will also move from Anglo Platinum to a Historically Disadvantaged South African managed and controlled producer which will be 51 per cent owned by Anooraq Resources.

Anglo Platinum's stated production target for 2010 is 2.5 million ounces of platinum. However, the company has since revealed that production could rise by up to 200,000 oz above this level if the market demands it.

### Impala Platinum

Output at Impala weakened during 2009, with operations at the Rustenburg lease area disrupted by a two-week strike and a major fall of ground in a mechanised section at 14 shaft. The company estimates that industrial action cost it some 50,000 oz of platinum production, while safety stoppages at 14 shaft and elsewhere resulted in the loss of a further 25,000 oz. Output was also affected by Impala's decision to alter the mining layout at its mechanised sections, cutting bord widths (the distance between pillars) in order to reduce the risk of further falls of ground.

As a result, platinum production from the Impala lease area fell by 12 per cent to 867,000 oz in 2009, the lowest level for a number of years, while sales were down by 18 per cent at 816,000 oz. Impala intends to grow platinum output from the lease area to 1 million ounces annually within 5 years, but the outlook for the immediate future is flat, with the company forecasting production of around 860,000 oz in the financial year to June 2010. However, with refined platinum stocks starting the year above normal levels, there may be some flexibility to increase sales modestly in 2010.

Impala Refining Services (IRS) refines platinum group metals (pgm) on behalf of other mines, including the Zimplats and Mimosa operations in Zimbabwe (of which Impala holds 87 per cent and 50 per cent respectively), the Marula mine on the Eastern Bushveld (of which Impala owns 73 per cent), and the Two Rivers joint venture with African Rainbow Minerals (of which Impala owns 45 per cent).

Additionally, IRS purchases and refines pgm-bearing concentrate from a number of third party operations, as well as processing autocatalyst scrap. Excluding secondary scrap

materials (which we do not include in our primary supplies numbers), refined platinum output from IRS rose by 8 per cent to 627,000 oz in 2009. It should be noted that much of this increase relates to expansion in Zimbabwe: although this metal is refined in South Africa, it is reported as Zimbabwean supply (see pages 21 and 22).

Output at Marula continued to ramp up gradually, reaching 76,000 oz of platinum in concentrate in 2009. The mine is undertaking a switch from mechanised to conventional mining methods, but progress has been slower than previously anticipated and platinum output has grown slowly.

At Two Rivers, the ramp-up to full production is now almost complete. Following optimisation of the concentrator plant, mill throughput rose by 7 per cent to 2.8 million tonnes in 2009, while recoveries also improved; output climbed by more than a quarter, to 132,000 oz of platinum in concentrate. Once at steady state, production should climb to a rated annual capacity of 150,000 oz of platinum in concentrate.

### Lonmin

Production of platinum in concentrate from Lonmin's operations fell by 9 per cent to 652,000 oz in 2009, reflecting the decision to place the Limpopo mine on care and maintenance, the closure of one uneconomic mine shaft and several half-levels at Marikana, and the cessation of open pit operations across the company's Western Bushveld operations. Supplies of platinum from Lonmin were down by 6 per cent at 666,000 oz, as the company sold small amounts from its stocks of refined metal.

After consistently declining since 2005, underlying performance at the company's main Marikana operation showed signs of stabilising, with production from the new vertical shafts, Hossy and Saffy, beginning to ramp up, offsetting the effects of safety stoppages at the two largest shafts, K3 and Rowland. Recoveries also improved as a result of a better ore mix and a completed concentrator optimisation programme. A third new vertical shaft, K4, is under development and will begin to contribute to refined output in 2011.

At the Pandora joint venture, plant throughput dropped by 26 per cent to 650,000 tonnes last year, following the decision to terminate open pit mining. However, ore continues to be extracted from underground via shaft infrastructure located on the adjacent Marikana mine: output of platinum totalled 40,000 oz in 2009.

Lonmin expects to see an improvement of around 5 per cent in underlying production of pgm in concentrate in 2010, in line

with improved productivity and the ramp-up in production from the next generation Marikana shafts. However, the outlook for refined production and sales is less certain, following another leak at the company's No 1 furnace at the end of March 2010. The plant was scheduled to be closed for repairs for at least one month. Despite the availability of some back-up smelting capacity, using three old Pyromet furnaces, there will be a temporary build-up in stocks of unrefined concentrate. This may affect the amount of pgm available for sale this year.

### Northam

At Northam's Zondereinde mine, the quantity of newly-mined ore processed through the mills declined by 7 per cent in 2009, to 2.02 million tonnes. However, production of pgm in concentrate was stable at 310,000 oz, with lower ore production rates offset by improved grades, and the processing of other pgm-bearing materials (such as smelter reverts) which added some 15,000 oz to pgm output during the second half.

For the first time, concentrate purchase contracts made a significant contribution to Northam's business. The company has an offtake agreement with Platmin's Pilanesberg mine, which came onstream in early 2009, and also processes small quantities of concentrate from other sources. In total, Northam purchased just under 50,000 oz of pgm in concentrate last year, and this augmented the company's pgm sales: platinum shipments rose by 35 per cent to 235,000 oz.

In February 2010, Northam confirmed that development of its Booyensdal project on the Eastern limb of the Bushveld complex will proceed this year. The board has approved initial capital expenditure of R340 million, which will be used to build basic infrastructure such as roads and pipelines, in advance of the start of mine construction in mid-2010. The project is to be developed in a modular fashion, with the first phase costing some R3 billion and due to come onstream in mid-2013. It is planned to extract 150,000 tonnes of ore per month, yielding 130,000 oz of pgm annually including around 75,000 oz of platinum, with further expansion in later phases.

### Aquarius Platinum

Aquarius Platinum operates four mines and two tailings retreatment operations in South Africa. At the Kroondal mine, production of platinum in concentrate rose marginally to 241,000 oz in 2009, while the Marikana mine saw a 7 per cent increase in output, to 89,000 oz. These gains were made in spite of an unofficial strike in August which resulted in the dismissal

*Platinum supplies from Crocodile River climbed in 2009 due to the processing of a greater tonnage of ore and improvements in recoveries and headgrades.*



of the contractor workforce and the loss of around 15,000-20,000 oz of pgm production. Both these mines are operated under pool-and-share agreements with Anglo Platinum, which purchases all concentrate from Kroondal; output from Marikana is refined by both Anglo and IRS. The mine life of both operations was extended by the acquisition of First Platinum and Salene Mining in early 2010; these companies own mineral rights in the vicinity of the Kroondal and Marikana mines.

Aquarius Platinum's Everest Mine was closed in December 2008, due to subsidence in mined-out levels of the mine around the decline shaft following a period of exceptionally heavy rainfall. A decision to redevelop the mine was taken in mid-2009, involving the construction of two new decline shafts to access the mining areas (which were unaffected by the subsidence). This will cost some R259 million, and will put the company in a position to resume milling ore in late 2010. However, pgm production from Everest this year – if any – will be relatively small.

In July 2009, Aquarius acquired the UK company Ridge Mining, owner of a 50 per cent stake in the Blue Ridge mine, and a 39 per cent stake in a large pgm/nickel project, Sheba's Ridge, which is undergoing feasibility studies. Blue Ridge came onstream during the first half of 2009, and between July and December it produced just under 20,000 oz of platinum. The mine is ramping up towards full production, and platinum output should exceed 50,000 oz this year. Metal from both Blue Ridge and Everest is refined and marketed by IRS.

Aquarius also has 50 per cent stakes in the Mimosa mine in Zimbabwe (see page 21), and in two tailings retreatment operations in South Africa: the Chromite Tailings Retreatment Plant (CTRP), based at the Kroondal mine, and Platinum Mile,

An expansion programme is currently underway at ARM and Norilsk Nickel's Nkomati mine to lift annual pgm output to 100,000 oz.



located on Anglo Platinum's Rustenburg lease area. These process tailings from adjacent chrome and platinum mining operations. Together, the two operations produced just under 17,000 oz of platinum in 2009.

### ARM Platinum

African Rainbow Minerals (ARM) is involved in three pgm-producing mining ventures in South Africa. It has a 55 per cent stake in the Two Rivers mine (with the remaining 45 per cent held by Impala), which started up in late 2006. This mine has enjoyed a relatively rapid ramp-up to full production, with platinum output of over 130,000 oz achieved in 2009.

ARM also participates in a 50:50 joint venture with Anglo Platinum, the Modikwa Platinum Mine: this operation has now reached steady state production and recorded stable output of 134,000 oz of platinum last year. Further capital investment is expected to maintain output at this level.

Finally, ARM and its joint venture partner Norilsk Nickel produced just under 30,000 oz of pgm as a by-product of nickel mining at the Nkomati Nickel mine; an expansion programme is currently being undertaken at this operation which will lift platinum group metal output to close to 100,000 oz annually.

### Eastern Platinum

At Eastern Platinum's Crocodile River mine, the tonnage of freshly-mined ore processed through the concentrator rose by 4 per cent, while recoveries and grades also improved. Platinum group metal output climbed from 118,000 oz in 2008 to 130,000 oz in 2009, with sales of platinum in concentrate also

rising by over ten per cent to 65,000 oz.

In January 2010, the company announced the reactivation of development work at Crocette, a small section adjacent to the existing Crocodile River operations which had been on care and maintenance since November 2008. At full production, Crocette will contribute some 50,000 oz of pgm annually. The company has yet to confirm its plans for the Spitzkop project on the Eastern Bushveld, the development of which was also put on hold in late 2008 due to low pgm prices.

### Other

Platinum Australia's Smokey Hills mine joined the ranks of pgm producers in early 2009. In its first year of operation, the plant milled 487,000 tonnes of ore, shipping around 27,000 oz of pgm in concentrate to IRS.

Much of the ore processed at Smokey Hills last year came from an open pit, the life of which was extended from September to December 2009 due to the slower than expected ramp-up of underground production. Geological issues which hampered underground mining last year will continue to affect production in early 2010, but should be offset by higher plant recoveries. The Smokey Hills concentrator is designed to treat 720,000 tonnes of UG2 ore annually, which at full production should yield some 95,000 oz of pgm annually over a mine life of seven years.

Another first-time contributor to pgm production was Platmin's Pilanesberg open pit operation. Mining began in December 2008, and concentrator commissioning commenced three months later, with the first delivery of pgm concentrate to Northam taking place in April 2009. However, the mine's ramp-up was delayed by industrial action, while production was also affected by difficulties in processing weathered, oxidised ore from shallower sections of the pit. For the year as a whole, the company shipped some 28,000 oz of pgm in concentrate; it expects output to rise to 160,000 oz in 2010, with full production (250,000 oz of pgm annually) being achieved during the following year.

Sylvania Resources is developing a series of chrome tailings retreatment plants, known collectively as the Sylvania Dump Operations (SDO). Two further plants were commissioned during 2009, bringing the total to four, with a fifth due to be brought onstream in May 2010. Last year, SDO processed some 690,000 tonnes of tailings, yielding 21,000 oz of pgm.

The Blue Ridge mine also started production during 2009 but was purchased by Aquarius Platinum and is therefore reported under Aquarius above.

## RUSSIA

Supplies of palladium from current Russian mining operations fell by 25,000 oz to 2.68 million ounces in 2009, a higher total than previously forecast. We estimate that sales of metal from Russian state stocks contributed another 960,000 oz of palladium to supplies. Sales of platinum – all from current production – fell by 20,000 oz to 785,000 oz. Supplies of rhodium decreased from 85,000 oz in 2008 to a more sustainable level of 70,000 oz in 2009.

Total production of platinum group metals from Norilsk Nickel's Russian operations fell slightly from 2008 levels but outperformed earlier expectations. Palladium output decreased from 2.70 million ounces to 2.68 million ounces. Platinum output rose marginally from 632,000 oz in 2008 to 636,000 oz. Nickel production within Russia remained flat as Norilsk Nickel maintained domestic production but copper output fell, suggesting that the mix of ore being mined and processed at these Siberian operations has changed.

Although there was no repeat of the issues which affected production in the first quarter of 2008, platinum group metal output – and base metal production – declined in the first quarter of 2009. This was partly due to lower-than-expected processing rates of disseminated ore. However, the volumes of metal produced increased throughout the year, as a number of technical changes improved platinum group metal recoveries at the company's smelting and metallurgical facilities.

Nickel production is forecast to rise marginally in 2010 while copper output is expected to fall, suggesting a decrease in the amount of cuprous ore which will be mined. Current plans anticipate a 1 per cent rise in palladium output from Norilsk Nickel's Russian operations to 2.72 million ounces in 2010 and a 3 per cent rise in platinum production to 655,000 oz.

Supplies of platinum from other mining in Russia – mainly from alluvial mining operations in the far East of the country – decreased from 175,000 oz in 2008 to 150,000 oz last year. The largest of these, the Amur mine, on the Kondjor deposit

*Palladium output from Norilsk Nickel's Russian operations fell marginally in 2009 but platinum production rose slightly.*



in the Khabarovsk region, produced marginally less platinum than in the previous year due to poor weather conditions. Platinum sales from the Korjak mine fell to roughly 25,000 oz. No metal was supplied from the Inagli placer deposit which had produced almost 5,000 oz in 2008. Production from the Urals placer deposits fell slightly lower to close to 10,000 oz. Palladium output from these operations remains negligible.

We estimate that 960,000 oz of palladium was sold from Russian state stocks during 2009. This is metal mined at Norilsk in previous decades but never supplied to the market. There were large shipments of palladium from Russia to Switzerland in late 2007 and again in the second half of 2008, amounting to roughly 3 million ounces in total. We believe that around a third of this metal was priced and sold in 2008 and again in 2009 and that the remainder is scheduled for sale in 2010. Additionally, more than ten tonnes of palladium was shipped into Switzerland in early 2010, apparently from Russian state stocks. We do not currently expect this recently-shipped metal to be sold into the market this year.

## NORTH AMERICA

Supplies of palladium from North America declined from 910,000 oz in 2008 to 755,000 oz last year due to the temporary closure of North American Palladium's Lac des Iles mine and prolonged strike action at Vale Inco's Sudbury nickel operations. Supplies from Stillwater Mining's two Montana mines were almost unchanged despite a reduced workforce at the East Boulder property. Platinum supplies dropped from 325,000 oz to 260,000 oz. Rhodium sales decreased from 18,000 oz to 15,000 oz.

**PGM Supplies: Russia**  
'000 oz

Supply	2007	2008	2009
Platinum	915	805	785
Palladium			
Primary Production	3,050	2,700	2,675
State Sales	1,490	960	960
Rhodium	90	85	70

Platinum group metal production at Stillwater Mining increased in 2009 despite a reduction in the workforce at its East Boulder site.



**Canada**

North American Palladium, the only primary producer of platinum group metals in Canada, temporarily closed its Lac des Iles mine in Ontario in late October 2008 in response to low prevailing precious metals prices. Having produced some 212,000 oz of palladium in 2008, no ore was mined or processed during 2009. Our estimates of supplies do however include the sale of a small amount of metal processed in late 2008 but not sold until the first six months of 2009.

In December 2009, North American Palladium responded to the strength of the palladium price by announcing that it would restart part of the Lac des Iles mine in the second quarter of 2010. Mining is planned to take place at the Roby underground section and could produce 140,000 oz of palladium per year over a two-year period. However, full production will not be reached until late 2010 and sales of refined metal are expected to remain at relatively low levels this year.

Vale Inco produced less platinum and palladium from its Canadian nickel operations in 2009 than in the previous year. Platinum output fell from 166,000 oz to 103,000 oz while palladium production dropped from 231,000 oz to 152,000 oz despite increased pgm recoveries.

Most of this metal comes as a by-product from nickel mining at Vale Inco's Sudbury, Ontario mines. Its Copper Cliff South mine was closed in late 2008 in response to low base metal prices. The remaining Sudbury operations were temporarily closed by the company in June. However, in July, much of the workforce decided to strike, preventing these operations from restarting. Nickel output dropped by roughly half and pgm output fell heavily too. At the time of writing (April

2010) industrial action was continuing although smelting had restarted at 50 per cent of maximum throughput. Platinum group metal production from these mines will therefore remain constrained this year.

In contrast, at Xstrata, the second major producer of nickel in Canada, nickel output was much more stable in 2009. Although the company closed two of its mines, it ramped up production from its low cost Nickel Rim South Mine to 500,000 tonnes of ore. According to the company, this mine is on schedule to reach its full capacity of 1.25 million tonnes of ore in 2011. While the weight of ore milled from all of its Sudbury operations fell by 42.6 per cent to 1.1 million tonnes, headgrades improved dramatically, limiting the fall in base metal and pgm production.

Both output and headgrades improved at Xstrata's Raglan nickel operations with, we believe, a positive impact on pgm production there too. Although Xstrata releases little data on its North American pgm production, we estimate that its overall output of both palladium and platinum from its operations in North America increased last year.

**USA**

Stillwater Mining, the only US primary producer of platinum group metals, performed well during 2009, producing a combined 530,000 oz of palladium and platinum compared to 499,000 oz in the previous year. Palladium production rose from 384,000 oz to 407,000 oz while platinum output increased from 115,000 oz to 123,000 oz. Combined sales of both metals to the market – our definition of supplies – from this primary production were 2,000 oz above 2008 levels at 516,000 oz.

In the second half of 2008, Stillwater responded to the low prevailing precious metals prices by refocusing its efforts on activity at its Stillwater property at the expense of the smaller, higher-cost East Boulder operation.

Although the workforce at the East Boulder site was reduced by almost 50 per cent in late 2008, the weight of ore milled dropped by only 3.0 per cent to 359,000 tonnes during 2009 due to an enhanced focus on the most economically-attractive

PGM Supplies: North America			
	'000 oz		
Supply	2007	2008	2009
Platinum	325	325	260
Palladium	990	910	755
Rhodium	20	18	15

sectors of this mine. Annual palladium production at this site fell from 116,000 oz to 105,000 oz while platinum production dropped by a similar 8.8 per cent to 31,000 oz.

At the Stillwater Mine, the relocation of a number of miners from East Boulder boosted the workforce. The weight of ore milled climbed by 5.4 per cent to 727,000 tonnes as a result. The headgrade at the mill rose too and annual palladium output increased by 12.7 per cent to 302,000 oz. Platinum production increased to 92,000 oz during the same period.

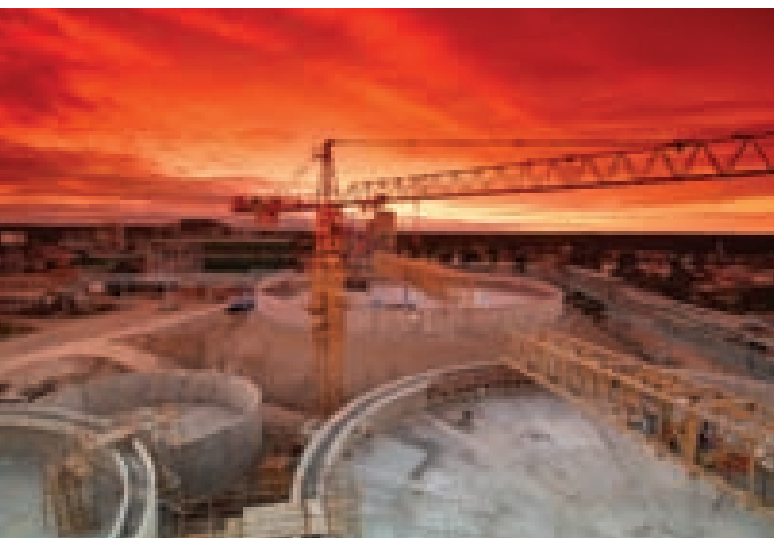
Costs were reduced at both mines and the company intends to continue to focus on reducing costs and improving mining efficiencies to balance the negative financial impact of the expiry of its remaining guaranteed pricing deal with the automotive sector. Current guidance suggests that production should be marginally lower in 2010 than in 2009 at a combined 515,000 oz of platinum and palladium.

## ZIMBABWE

**Supplies of metal from Zimbabwe climbed in 2009. Platinum supplies rose from 180,000 oz to 230,000 oz while supplies of palladium climbed too, rising from 140,000 oz to 180,000 oz, as expansion programmes continued at both operating mines on the Great Dyke.**

Output of platinum group metals (4E) at Mimosa – a joint venture between Aquarius Platinum and Impala – climbed from 160,000 oz to 194,000 oz during 2009. Concentrator recoveries improved gradually throughout the first three-quarters of the year, offsetting a slight decline in ore headgrade.

More importantly, the Wedza 5.5 expansion was completed in May 2009, increasing mill capacity to 185,000 tonnes and



*The expansion at Ngezi raised mill capacity and lifted platinum group metal output from Zimplats in 2009.*

**PGM Supplies: Zimbabwe**  
'000 oz

Supply	2007	2008	2009
Platinum	170	180	230
Palladium	135	140	180
Rhodium	14	15	19

platinum group metal production capacity to nearly 200,000 oz per annum. Mill throughput rose by 21 per cent to 2.24 million tonnes and production of platinum in concentrate increased by 22.2 per cent to 99,000 oz. Annual palladium and rhodium production at Mimosa rose by similar percentages to 75,000 oz and 8,000 oz respectively.

Supplies of metal from Zimplats increased in 2009 too with platinum production in matte rising to 131,000 oz. Palladium output rose to 104,000 oz and rhodium production reached 12,000 oz. The Phase 1 expansion project continued during the year and Portal 1 reached its full production capacity of some 100,000 tonnes of ore per month in June 2009. Development of Portal 4 continues and should be complete by mid-2011 and additional tonnage from these two portals – including up to 80,000 tonnes per month from Portal 4 in December – more than balanced the effects of the early closure of the open pit in late 2008. In fact, mill throughput rose by almost 50 per cent from one year earlier. The Ngezi concentrator was commissioned in July 2009 and reached full capacity in September.

At Anglo Platinum's Unki mine, also on the Great Dyke, development continued in 2009 and the first ore has now been stockpiled for processing once the concentrator is commissioned in the final quarter of 2010.

## OTHER PRODUCING COUNTRIES

**Small amounts of platinum group metals are produced as by-products of mining in a number of other countries including China and Colombia. Supplies from these minor producers were relatively flat in 2009 at roughly 115,000 oz of platinum and 160,000 oz of palladium.**

**PGM Supplies: Other Producing Countries**  
'000 oz

Supply	2007	2008	2009
Platinum	120	115	115
Palladium	150	170	160
Rhodium	4	3	3

# THE ZIMBABWEAN MINING INDUSTRY

Recent expansion in the mining of platinum group metals in Zimbabwe has finally started to make this country a significant producer.

**Platinum was discovered on Zimbabwe's Great Dyke in the early 20th century, at around the same time that the metal was found in the Bushveld Complex. However, comparatively little development has occurred in Zimbabwe in the platinum mining sector since that date.**

Interest in mining this 550 km long, 12 km wide geological structure has, though, increased in recent years. The four major platinum deposits on the Great Dyke (Hartley, Musengezi, Ngezi and Selukwe) are located in a 3-4 m thick mineralised seam which lies at shallow depths, typically of 250 m or less. The reef is platinum-rich but also has high base metal content, leading to high by-product credits and making mining potentially very economically attractive.

The Hartley mine which opened in the mid-1990s was the first serious attempt at platinum mining in Zimbabwe. Although this no longer produces any ore, active mines at Mimosa and Ngezi have since begun operations. A new mine is also under development at Unki. After several years of inactivity, exploration has restarted at a small number of other properties too.

Investment in Zimbabwean platinum mining has been gradual to date, inhibited by an uncertain political climate. The establishment in 2009 of a cross-party inclusive government in Zimbabwe has given grounds for cautious optimism over the operating environment for the mining industry, but the political situation remains somewhat fragile. In April 2010, confusion emerged over whether the new indigenisation law (equivalent to South Africa's Black Economic Empowerment rules) which required 51 per cent local ownership of large businesses would be enacted or not.

Recent expansions at Mimosa and Ngezi have increased production at both sites. Outline plans have also been developed for Phase 2 expansion at Ngezi – adding 2 million tonnes of ore to output, roughly equivalent to 200,000 oz per annum of pgm – and for Wedza Phase 6 at Mimosa. If these occur, together with production from Unki, this would make Zimbabwe the world's third largest producer of platinum as it finally starts to fulfil its potential.

**HARTLEY**

Hartley was developed in the mid-1990s by Delta Gold and BHP. Mining began in 1997 but was suspended in June 1999 due to geological problems and low productivity. Peak production was close to 150,000 oz of pgm per year. Hartley is now owned by Zimplats (which is majority owned by Impala) and, although no mining is carried out, concentrate from Ngezi is processed into matte at the Selous Metallurgical Complex at Hartley before being sold to Impala Refining Services (IRS) for further processing in South Africa.

**NGEZI**

Ngezi is owned by Zimplats. Ore from this site was crushed before being shipped 77km to Hartley and then to IRS for processing and refining. The commissioning of a new concentrator in 2009 indicates that concentrate is now shipped to Hartley for smelting. Ngezi began operations in 2001 as an open pit mine which was eventually closed in late 2008. Underground tonnage has now replaced open pit tonnage. Platinum production rose to 130,000 oz in 2009 with the completion of Portal 1 and should reach 180,000 oz by mid-2011 once the Phase 1 expansion is complete.

**UNKI**

The Unki project is a shallow (up to 250 m deep) deposit on the Selukwe Complex on the Great Dyke and is owned by Anglo Platinum. Development has started in earnest in recent years and two declines are being constructed. Mining will be mechanised and the concentrate produced is expected to be smelted at Polokwane in South Africa.

**MIMOSA**

Pilot production started at Mimosa on the Wedza Complex in the mid-1990s under Union Carbide and then Zimasco. Impala and Aquarius acquired part-ownership in 2001 and 2002 respectively and have since increased production from this shallow deposit. Ore is processed into concentrate at Mimosa and there is a life-of-mine offtake agreement with Impala Refining Services. Platinum group metal output climbed to 182,000 oz in 2009 including 99,000 oz of platinum. The completion of the Wedza 5.5 expansion has increased capacity to an annual 200,000 oz of pgm.



**GREAT DYKE**

**HARARE**

**HARTLEY**

**NGEZI**

**UNKI**

**MIMOSA**

0 50  
Scale: Kilometres