

## PAPUA NEW GUINEA

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**M**ining products maintained their position as the leading primary export commodity of Papua New Guinea during 2002 and also remained a significant contributor to gross domestic product (GDP). Mineral product exports accounted for 52% of total exports, equivalent to some Kn3.1 billion, or approximately US\$800 million (Table 1). Mining is estimated to have contributed 15% of real GDP (Table 2). This percentage may be expected to increase slightly in the medium term with the new gold mine development at Kainantu.

In addition, employment directly attributable to mining is estimated to account for 5% of the total available workforce; furthermore this figure represents about 20% of the total formal rural workforce. The indirect employment figure derived from support services, contractors etc not classified as mining but working on mining related projects, obviously makes the overall employment figure due to mining significantly higher.

### **Fiscal review**

A review of the fiscal regime in PNG was undertaken in 2002 with the view to proposing a more attractive regime for the sector.

A number of new incentives were adopted. These include:

- the abolition of additional profits tax in the mining sector;
- relaxation of the ring-fence provision to allow a deduction for tax purposes of up to 25% of a pool of exploration expenses, provided that this does not reduce tax payable by more than 25%;
- double deduction of pre-production exploration costs. The first 100% deduction would be allowed as a deduction against assessable income. The second deduction would only arise once a mine commences commercial operations. The exploration costs associated with the mine could be added to the exploration pool and depreciated in accordance with the general rules;
- a new accelerated depreciation arrangement of a 25% declining balance depreciation pool for all assets for any new mineral development irrespective of their useful life;
- elimination of the loss carry forward time limit;
- government agreement to review its position on equity participation in mining projects. The PNG mining regulatory system provides the government with an option to take a paid equity stake of up to 30% in a project at the time a Special Mining Lease is issued. Needless to say, the requirement of State equity is considered by the mining industry as a disincentive to investment in PNG.

## The mines

PNG's mines produced 211,315 t of copper, 63,156 kg of gold and 64,007 kg of silver during 2002.

Shipping of **Ok Tedi** concentrate was negatively affected by low river levels caused by the dry El Nino conditions from September to December 2002. The stockpiled concentrate will be exported in early 2003. A total of 30,387 t of ore was mined and 30,365 t milled with a head grade of 0.78% Cu and 0.8 g/t Au. Gold and copper recoveries at Ok Tedi improved by 70.6% and 88.1% respectively. Total ore reserves at Ok Tedi stand at 288 Mt at an average grade of 0.85% Cu and 0.91 g/t Au. This equates to 2.03 Mt of recoverable copper and 5.75 Moz of recoverable gold.

The operating company Ok Tedi Mining Ltd (OTML) is owned 52% by PNG Sustainable Development Program Co. Ltd (SDP), 30% by the PNG Government and 18% by Inmet Mining Corp. of Canada. SDP is an independently managed trust company. Benefit distribution from the Trust during the remaining estimated ten-year mine life will be one-ninth to the people of Western Province, two-ninths to the rest of PNG and two-thirds to a long term fund.

At the **Porgera** mine, election-related vandalism of power pylons along the Porgera – Hides powerline caused prolonged power outages resulting in mill closure and lost production during the third quarter of the year. The mine lost approximately 1,500 kg of gold production for the 2002 calendar year as a consequence of the disruptions. A total of 11,033 t of ore was mined from underground and open-pit operations. Approximately 4,349 t of ore averaging 5.15 g/t Au was milled, with an average recovery of 84.8%. Reserves at a gold price of US\$300/oz stand at 58.1 Mt averaging 3.34 g/t Au, which equates to 6.24 Moz of contained gold.

Placer Dome increased its equity to 75% during the year through a takeover offer of AurionGold. The other equity holders are Oilsearch with 15% and Mineral Resources (Porgera) with 10%.

**Misima** treated 5,940 t of stockpiled low-grade ore at an average grade of 0.85% Au and 10.2 g/t Ag for 2002. Most non-operational activities on Misima currently relate to mine closure issues and rehabilitation. Misima still has approximately 242,603 oz of gold and 2.20 Moz of silver in its stockpiled reserve base. Operations will cease in 2004.

At **Lihir** gold production for the year was 607,087 oz. Gross cash costs amounted to US\$243/oz for the year. Mining costs were a little over US\$1.20/t. Total ore mined was 9.3 Mt and the total pit movement for the year of 40 Mt was a 25.3% increase on the previous year. Ore milled during the fourth quarter reached a record 1.06 Mt bringing the annual total milled to 3.8 Mt. A heat-recovery circuit was commissioned during the year to offset falling sulphur grades in the ore, and a new pebble-crushing circuit was commissioned late in the year. Gold recovery for the fourth quarter was 88.7% and was affected by high throughput rates, operation of the flotation plant and

poor carbon regeneration kiln availability. Engineering work on de-bottlenecking the gold-recovery circuit has commenced, with improvements expected by the end of 2003. In addition, there are plans to commission a 6 MW geothermal plant late in 2003, with a view to expansion to 25 MW.

Measured, indicated and inferred mineral resources, inclusive of reserves, are 404.1 Mt averaging 3.16 g/t Au for 41.1 Moz of contained gold. Included within this are proved and probable reserves of 143.0 Mt averaging 3.63 g/t Au, for 16.7 Moz of contained gold, a 15% increase over the 2001 estimate.

Lihir mine is owned by the publicly listed company Lihir Gold Ltd whose major shareholders are Rio Tinto (16.3%), Mineral Resources Lihir (6.8%), institutions and public (76.9%).

The **Tolukuma** underground mine is owned and operated by Durban Roodeport Deep Ltd (DRD) of South Africa. Access to the mine is by helicopter and all mine activities are helicopter-supported. Production from 153,456 t of ore mined in 2002 totalled 63,741 oz (2,216 kg) of gold and 152,068 oz (9,090 kg) of silver, at a cost of US\$279/oz Au. The mine has produced over 431,532 oz since the start of production in 1995.

The mine life was initially estimated to be five years. However, exploration activities surrounding the known mineable reserves continue to be positive, and potential exists to extend the mine life by several more years. Resources at the end of December 2002 were approximately 300,000 oz gold.

In addition to the extensive geochemical and geological mapping programmes that are being undertaken on the exploration licences held by the company, there are plans to undertake an airborne geophysical survey during 2003.

Small-scale alluvial gold miners produced 57,182 oz of gold in 2002.

### **Exploration activity**

Mineral exploration expenditure in 2002 was focused on advanced exploration projects, with minimal expenditure on grass-roots exploration. Total spending was approximately US\$8.2 million, with most being spent on tenements around the Tolukuma mine. PNG has several advanced prospects, some of which are at an advanced stage of economic evaluation.

### **Bougainville**

The Bougainville copper project commenced operations in 1972 and was producing at an annual rate of 166,000 t of copper and 450,000 oz of gold at the time of its forced closure in 1989. Over its operating life it produced 3 Mt of copper and 305 t (9.7 Moz) of gold in concentrate.

The mine, at Panguna, was forced to close in May 1989 following an armed rebellion by disgruntled mine area landowners. Although there are significant moves towards a peaceful resolution of the conflict on the island, there is no time frame for recommissioning of mining operations on the island.

Remaining ore reserves are 691 Mt at 0.4% Cu and 0.47 g/t Au, sufficient for a mine life of 15 to 16 years at the production rate prevailing prior to closure of the operations.

### Ramu Nickel

The Ramu Project is a pre-development nickel and cobalt project located in Madang Province on the north coast of PNG. The proposed project is based on the mining of lateritic ores at the Kurumbukari mine site and the processing of those ores at a refinery site located at Basamuk Bay some 130 km from the mine site. It is proposed to produce nickel cathode, a first for PNG. However, the high capital cost of development, estimated at US\$838 million, has posed financing problems for the developers.

The completed feasibility study is based on an ore reserve of 75.7 Mt at a grade of 0.91% Ni and 0.10% Co that will support the operation for at least 20 years. Potential has been recognised to extend the life through exploration success in the surrounding area. The developers are looking at the feasibility of a smaller operation in an effort to reduce capital costs.

### Morobe project

The project is moving towards 95% ownership by Abelle Ltd with Kula Fund Ltd still holding 5%. The Morobe gold project lies in the Wau area of Morobe Province. The project comprises three principal prospects, Hidden Valley, Kaveroi Creek and Hamata. The measured, indicated and inferred resources estimated to October 2002 are:

	Measured			Indicated			Inferred		
Zone	Mt	Au g/t	Ag g/t	Mt	Au g/t	Ag g/t	Mt	Au g/t	Ag g/t
HVZ	13.7	2.4	37	15.4	2.2	36	32.0		
KCZ				13.5	2.2	47	24.0		
<b>Total</b>	<b>13.7</b>	<b>2.4</b>	<b>37</b>	<b>28.9</b>	<b>2.2</b>	<b>41</b>	<b>56.0</b>	<b>2.2</b>	<b>39</b>

The reporting is against cutoffs of 0.77g/t Au for completely and partially oxidised (transition) material, and 0.67g/t Au for fracture oxidised and fresh material.

The feasibility study assumes development of the Hidden Valley deposit, comprising the Hidden Valley Zone (HVZ) and Kaveroi Creek Zone (KCZ) within the same open pit, to produce an annual average of 310,000 oz of gold and 5.2 Moz of silver (387,000 gold equivalent ounces) over a nine-year mine life.

### Frieda project

A large porphyry copper deposit was first discovered at Frieda River in the 1960s. The Exploration Licence is held by Highlands Pacific Ltd and Japanese-owned partner OMRD Frieda Co. Ltd (12.1%). Noranda has a five-year option agreement to acquire a 72% interest in the Frieda, April R and Bundi tenements.

The total porphyry copper resource is estimated to be in excess of 1,000 Mt at 0.5% Cu and 0.3 g/t Au. The high sulphidation Nena resource, which lies adjacent to the porphyry system, has reserves of 52.8 Mt at 2.0% Cu and 0.7 g/t Au, with an additional oxide gold cap of 12.8 Mt averaging 1.4 g/t Au using a cut-off grade of 0.25% Cu and 0.6 g/t Au.

### Wafi

Abelle Ltd holds the exploration licences over an advanced exploration prospect at Wafi situated in Morobe Province near Lae. The prospect has two distinct mineral occurrences. A porphyry copper prospect has been drilled out giving an indicated resource of 75.5 Mt at 1.22% Cu and 0.53 g/t Au, and an inferred resource of 24.7 Mt at 1.43% Cu and 0.96 g/t Au. Resource estimates for an epithermal gold prospect adjacent to the porphyry are given below:

	Zone A		North Zone		Link Zone		Total
Cut-off (g/t Au)	Tonnes (Mt)	Grade (g/t Au)	Tonnes (Mt)	Grade (g/t Au)	Tonnes (Mt)	Grade (g/t Au)	Au (Moz)
0.5	55.5	1.5	11.4	1.5	44.5	1.8	5.82
1	34.4	2	5	2.5	23.3	2.7	4.65
1.5	19.8	2.5	3.8	2.9	13.8	3.8	3.64
2	12.4	2.9	3.2	3.2	10.4	4.5	3
3	4	4.1	1.6	4	6.8	5.6	1.96

Abelle has resumed exploration in the area with a view to extending reserves in the 'Link zone'.

### Kainantu

A Mining Lease has been granted to Highlands Pacific for an underground development at the Irumafimpa prospect within the Kainantu Goldfield of the Eastern Highlands Province.

Additional engineering and processing information is still being gathered which will assist in bringing the project into a mining operation in 2004. The most recent inferred resource estimates, based on results to the end of June 2002, are 1.01 Mt at 38.3 g/t Au which indicates approximately 1 Moz of recoverable gold.

**Feni Is** – Paccom Ventures Inc. has signed a letter of intent to option 75% interest in the gold project. The agreement includes a commitment to commence drilling by June 30, 2003.

**Gameta** - Drilling is under way by Gold Aura Ltd to test the down-dip extensions of previously drilled gold mineralisation.

**Simberi** - Nord announced late in 2002 that it had entered into an option agreement with PGM Ventures Corp., a Toronto based explorer. The joint venture will be updating a previously completed feasibility study during 2003.

The **Malamaunda** exploration licence area held by Celtic Minerals Ltd, which is known to host epithermal-style gold mineralisation, will be flown by airborne geophysics early in 2003.

The Department of Mining has a strategy in place that should increase the level of exploration and mineral development in PNG. The short-term aspect of this strategy was the fiscal review (mentioned previously) aimed at increasing the attractiveness of PNG to mineral investors. In the longer term, a World Bank project will be implemented to build human capacity facilitate in internet access, and establish up to date, e-format geoscience databases. Further ahead, an EU-finded Sysmin grant will help create a new geophysical, geochemical and geological database.

### **World bank capacity building project**

The project is well underway and consists of the following six main functional components:

1. Policy and regulatory institutional strengthening.
2. Development of Departmental capacity to monitor and execute technical audits of exploration and mining activities.
3. Strengthening of Departmental mineral tenements management.
4. Development of project co-ordination and liaison capacity for sustainable development in mining project areas.
5. Institutional strengthening of the Geological Survey and development of geological information system (GIS) capabilities, to include: remote sensing; geophysical data interpretation; a national lithostratigraphic lexicon; and map rectification.
6. Institutional strengthening and capacity building for the Internal Revenue Commission (IRC).

### **Sysmin project**

As a result of the loss of revenues from the mining sector attributable to the 1997 drought, the PNG Department of Mining approached the EU to assess whether there were grounds to qualify for a Sysmin grant.

Comprehensive independent studies conducted in 2000 and 2001 on the mining sector confirmed the eligibility of PNG to qualify for a grant. The consultants, together with officers from the Department of Mining, devised a €50 million programme that will safeguard the future revenue stream from the mining sector.

On June 5, 2002, the European Commission approved the projects and programmes under the 8th EDF Sysmin for PNG. The Commissioner for Development, Mr Poul Nielson, signed the financing agreement on June 7, 2002, and the National Authorising Officer for PNG signed the Agreement on July 10, 2002. Most of the funds will be directed to projects in the mining sector. International factors such as globalisation and depressed metal prices, and the accompanying decline in mineral exploration have posed a threat to the PNG economy, which will in part be alleviated by the Sysmin grant.



The main departments involved in implementing the grant will be the Department of Mining and the Department of Environment and Conservation.

The projects fall under four main groupings:

- environmental management;
- rural enhancement through small-scale mining;
- infrastructure development; and
- mineral resource assessment.

The fundamental outcomes of this will be:

- implementation of globally-acceptable environmental standards in waste management;
- increased awareness of the health and environmental damage associated with small-scale mining activities as presently practiced, while at the same time increasing yields from small-scale mining and assisting poverty alleviation;
- construction of a purpose-built office and Womens Development center; and
- the promotion of PNG as an attractive destination for the limited global investment in the mining sector by the production of extensive airborne geophysical, geochemical and geological maps.

The project is set to start in 2003.

**Table 1. Exports 1991 – 2002 (US\$)**

Year	Oil	Metals	Agric.	Forest	Marine	Other Exports	Metals (%)
1991	-	1,055.4	189.9	94.7	10.9	84.0	1,434.9 74
1992	305.2	1,083.7	226.4	150.1	9.4	111.4	1,886.3 57
1993	833.3	968.1	275.2	418.2	7.9	72.6	2,575.3 38
1994	596.2	916.4	317.8	419.5	8.7	-	2,258.7 41
1995	624.5	1,213.0	379.1	339.3	9.3	-	2,565.1 47
1996	811.1	884.2	437.0	362.8	7.9	-	2,503.0 35
1997	594.1	687.8	541.8	302.3	6.7	-	2,132.6 32
1998	374.0	753.9	469.3	79.7	19.4	-	1,696.3 44
1999	542.2	839.9	456.9	104.3	11.9	-	1,955.2 43
2000	696.2	922.1	346.2	111.9	12.2	-	2,088.6 44
2001	562.3	894.6	238.4	92.5	23.0	-	1,810.8 49
2002	368.2	798.6	279.3	82.6	17.3	-	1,546.1 52

Source - Bank of PNG Quarterly Economic Bulletin.

**Table 2. Sectoral Contributions to the PNG Economy.**

<b>Sector</b>	<b>Exports %</b>	<b>Gdp %</b>	<b>Employment %</b>
	<b>2002</b>	<b>2002</b>	<b>2000<sup>e</sup></b>
Agric./Forestry/Fisheries	24.5	33	23
Mining	51.7	15	5
Petroleum	23.8	4	
Manufacturing	-	9	15
Construction	-	4	7
Wholesale, Retail Trade	-	5	17
Transport	-	1	
Electricity		9	
Business Services	-	15	
Community/Social/Others	-	5	33
<b>Total</b>	<b>100.0</b>		<b>100.0</b>

Source: Insights PNG, 2003; Lavantis, 2000. e estimated

**Table 3. Basic Economic Statistics**

	<b>2002 (US\$)<sup>p</sup></b>	<b>2001(US\$)</b>
Export Values (million)	1,166.8	1,457
Gold	579.5	629.5
Copper	211.7	255.7
Crude Oil	368.2	562.3
Silver	7.4	9.5
Export Volumes		
Gold (t)*	58.2	69.1
Copper (t)	138.6	170.1
Crude Oil ('000 bbls)	15,370.5	21,369.7

Source: Bank of PNG; p provisional; \* includes Alluvial sources.

**Mineral Production 2001 and 2002.**

<b>Mine</b>	<b>Au (kg)</b>	<b>Au (kg)</b>	<b>Ag (kg)</b>	<b>Ag (kg)</b>	<b>Cu (t)</b>	<b>Cu (t)</b>
	<b>2001</b>	<b>2002</b>	<b>2001</b>	<b>2002</b>	<b>2001</b>	<b>2002</b>
Ok Tedi	14,144	16,176	35,770	32,328	203,762	211,315
Porgera	23,658	19,962	3,516	3,944	-	-
Misima	5,182	4,496	20,318	22,347	-	-
Lihir	20,153	18,761	-	-	-	-
Tolukuma	2,256	1,983	9,297	4,730	-	-
Small Scale	1,689	1,779	674	658	-	-
<b>Total</b>	<b>67,083</b>	<b>63,156</b>	<b>69,575</b>	<b>64,007</b>	<b>203,762</b>	<b>211,315</b>