



# 2010 Minerals Yearbook

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## PAPUA NEW GUINEA

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# THE MINERAL INDUSTRY OF PAPUA NEW GUINEA

By Susan Wacaster

Copper, gold, and silver were the major commodities produced in Papua New Guinea in 2010. The country was estimated to be the 10th ranked producer of gold in the world, and its gold production total, which was similar to that of such countries as Brazil and Peru, accounted for about 2.4% of the world total. Primary geologic structures that contributed to the formation of economic mineral occurrences include continental cratons, volcanic island arc terrain, and a central collisional fold belt. The Wau Graben formed in the central fold belt coincident with volcanic activity that resulted in significant gold and silver deposits (George, 2011; Harmony Gold Mining Ltd., 2011, p. 155).

Other metallic mineral resources that may occur in subeconomic deposits, had not yet been extensively explored, or were under development included chromium, cobalt, iron ore, manganese, molybdenum, nickel, platinum-group elements, and zinc. Occurrences of industrial minerals include economically important limestone and phosphate rock deposits and minor deposits of asbestos, diatomite, graphite, pozzolan, silica, and sulfur. Papua New Guinea also has significant natural gas resources, and exploration had recently begun for coalbed methane.

At least six precious and (or) base-metal projects in Papua New Guinea had projected startup dates between 2010 and 2015, including the Ramu nickel-cobalt project. Some of those projects had reached or had nearly completed the feasibility stage, including Marengo Mining Ltd. of Australia's Yandera project, which is a copper-molybdenum (with lesser amounts of gold, iron ore, rhenium, and silver) porphyry deposit in the Bismark intrusive complex. Both the Ramu and the Yandera projects are located in the Madang Province within the Papua New Guinea mobile belt.

## Minerals in the National Economy

The year-on-year growth of the current dollar gross domestic product (GDP) of Papua New Guinea was about 7% in 2010. The country's domestic economic activity increased in 2010 compared with that of 2009 as the world economy gradually recovered from the economic slowdown and as both the global demand for mineral commodities, which accounted for more than 60% of Papua New Guinea's total exported goods, and the international prices for mineral products increased. Those trends were borne out domestically by increased employment and private sector activity (Bank of Papua New Guinea, 2011, p. 7–11).

Government spending increased in Papua New Guinea and inflation increased to 7.2% compared with 5.7% in 2009. The total nominal value of sales increased in all sectors, except the building and construction sector, and employment increased in the mineral sector. For the 12 months to September 2010, sales in the mineral sector increased by 8.4% compared with

the previous 12 months. In the period of July, August, and September, mineral sector sales increased by 17.5% following a decrease of 19.2% in the previous three months; this increase was attributable to the higher international prices for copper, crude oil, and gold and to increased production from the Ok Tedi Mine, the Simberi Island Mine, and the Tolukuma Hill Mine (Bank of Papua New Guinea, 2011, p. 2, 7–8).

## Government Policies and Programs

The Mineral Resources Authority Act of 2005 provided for the establishment of the Mineral Resources Authority and defined the agency's powers and functions. Those functions included (1) promoting the development and exploitation of the country's mineral resources; (2) overseeing the administration and enforcement of the Mining Development Act of 1955, the Mining Act (Bougainville Copper Agreement) of 1967, the Mining Safety Act of 1977, the Mining Act of 1992, the Ok Tedi Agreement, and any other legislation relating to the development of Papua New Guinea's mineral resources; and (3) acting as the agent for the state as required in relation to any international mining agreement.

In 2010, Ok Tedi Mining Ltd. set up the Ok Tedi Fly River Development Program in Western Province to help improve the standard of education in communities affected by operations of the Ok Tedi Mine. The program would help schools in the Province by providing student materials, teaching resources for teachers, and advice on elementary curriculum materials. Ok Tedi Mining also announced a waste management program to reduce and manage the industrial waste products from production activities in sustainable ways, including disposal of such materials as conveyor scrap, used mill liner materials, scrap metal, used tires, and waste oil (Ok Tedi Mining Ltd., 2011a, b).

## Production

There was little change in the production volumes of Papua New Guinea's primary mineral commodities in 2010. Data on mineral production are in table 1.

## Structure of the Mineral Industry

The Papua New Guinea Chamber of Mines and Petroleum is an industry association that represents the interests of the mining and petroleum industry in Papua New Guinea. The Chamber has a current membership of more than 170 companies, most of which are active in the mining and petroleum industry in the country. The group's primary role is to promote and support the industry by presenting concerns and issues facing the industry to the Government along with proposals for addressing those issues (Papua New Guinea Chamber of Mines and Petroleum, 2011).

At least seven precious and (or) base-metal operations were active in the country in 2010, including the Hidden Valley Mine (jointly owned by Harmony Gold Mining Co. Ltd. of South Africa and Newcrest Mining Ltd. of Australia); the Lihir Island gold mine (100% owned by Newcrest Mining Ltd. of Australia); the Ok Tedi copper, gold, and silver mine [70% owned by PNG Sustainable Development Program Ltd. (PNGSDP)]; the Porgera gold mine (95% owned by Barrick Gold Corp. of Canada); the Simberi Island gold mine (100% owned by Allied Gold Mining plc of Australia); the Sinivit gold, silver, and copper mine (92% owned by New Guinea Gold Corp. of Canada); and the Tolukuma Hill gold mine (100% owned by Petromin PNG Holdings Ltd.). Table 2 is a list of major mineral facilities.

## Mineral Trade

In 2010, increases in the value of copper, gold, crude petroleum, and petroleum refinery products contributed to a 26.3% increase in the value of all goods exported from Papua New Guinea to \$5.9 billion. Total mineral export receipts were about \$4.6 billion in 2010, which was an increase of 28.1% compared with that of 2009. Mineral export receipts, excluding crude petroleum, were \$3.7 billion and accounted for about 63% of total goods exported in 2010 compared with 62% in 2009. Gold export volumes were 61.5 metric tons (t) (about 98% of the total gold produced) in 2010, which was a 3.9% decrease compared with that of 2009. This decrease was attributable to decreased production at some mines because of the extraction of lower grade ores. The average price received for gold exports increased by 22.5% in 2010 compared with that of 2009, however, and this increase in price offset the decrease in export volume and resulted in receipts of \$2.5 billion (an increase of 17.7% compared with that of 2009). Copper export receipts increased by 52.5% to \$1.2 billion compared with that of 2009 (Bank of Papua New Guinea, 2011, p. 12–13).

Crude oil export volumes decreased by 0.5% to about 10.1 Mbbl in 2010 (about an estimated 80% of all crude oil produced) compared with that of 2009 because of the continued decline in production from mature oilfields at the Central Moran, the Gobe Main, the Kutubu, and the South East Gobe operations. Crude oil exports totaled \$858 million and accounted for about 15% of total goods exports in 2010 compared with 13.6% in 2009. The value of exported refined petroleum products increased by 31.1% to \$237.9 million and accounted for 4% of the goods exported in 2010 compared with 3.1% in 2009. The increase in value offset the decline in the export volume (Bank of Papua New Guinea, 2011, p. 12–13).

## Commodity Review

### Metals

**Cobalt and Nickel.**—The \$1.5 billion Ramu nickel and cobalt project [a joint venture between China's MCC Ramu NiCo (85%), Highlands Pacific Ltd. of Australia (8.56%), and Mineral Resources Development Corp. (6.44%)] was nearing completion in 2010. In March, however, construction was halted

by an injunction by the National Court over land rights issues pertaining to the proposed deep-sea tailings dump. The deep-sea method had been developed because of the risk associated with building a tailings dam in the highlands of Papua New Guinea where earthquakes and (or) heavy rainfall can cause dam failure, which could result in severe environmental damage, such as was the case at the Ok Tedi Mine. The Ramu nickel project is located about 135 kilometers (km) from a processing plant near the coast, and the ore would be transferred to the plant for processing by a slurry pipeline. The land debate was brought about by individuals concerned about possible damaging effects to the water quality and lands surrounding the bay where the tailings would be released. By mid-2011, the National Court of Madang had declined to grant a permanent injunction and the project was expected to come into production by yearend 2012 (Highlands Pacific Ltd., 2011; PNGIndustryNews.net, 2011b).

Regency Mines plc (50%) of the United Kingdom's Mambare nickel (and lesser cobalt) project and Resource Mining Corp. Ltd.'s Wowo Gap nickel (and lesser amounts of cobalt, gold, palladium, and platinum) projects were in the resource development and feasibility stage, respectively.

**Copper.**—In 2010, the value of output from the Ok Tedi Mine accounted for almost 20% of Papua New Guinea's GDP. The mine was owned by Papua New Guinea Sustainable Development Program (PNGSDP) and the Government in 2010. PNGSDP was created in 2002 to use profits from the mine to support sustainable development projects for the people of PNG, particularly in Western Province where the mine is located. The Ok Tedi Mine had been scheduled for shutdown in 2013. There had been discussion of continuing operations for another 15 to 20 years but at a scaled-back production level, which would still have significant economic impact, especially for the community of Tabubil. In 2010, Ok Tedi produced 159,821 t of copper from 22 million metric tons (Mt) of ore compared with 166,669 t of copper from 22.6 Mt of ore in 2009 (Ok Tedi Mining Ltd., 2010; PNGIndustryNews.net, 2011a).

**Gold.**—In 2010, the Hidden Valley Mine started precommissioning production. The gold and silver operation, which was owned jointly by Harmony Gold Mining Co. Ltd. and Newcrest Mining Ltd. (50% each), produced 465 kilograms (kg) of gold and 2,423 kg of silver for the year. Total proven and probable reserves of gold at Hidden Valley were estimated to be about 51,000 kg of contained gold. The Tolukuma gold mine is an underground and open pit mine in the Owen Stanley Range that produced about 1,500 kg of gold in 2010 and employed about 600 people. The Porgera Mine completed its 20th year of production in 2010. Barrick Gold Corp. reported that production at Porgera decreased by 6% to about 17,000 kg in 2010 compared with that of 2009 because of a water shortage from insufficient rainfall that affected mill throughput as well as mine wall stability issues that precluded mining in higher grade zones. In 2010, Porgera had estimated proven and probable resources of about 230,000 kg of contained gold (Barrick Gold Corp., 2011, p. 165; Harmony Gold Mining Co. Ltd., 2011, p. 93, 156; Petromin PNG Holdings Ltd., 2011, p. 24)

Gold production from the Sinivit Mine in 2010 was about 170 kg compared with 197 kg in 2009. The operation started up in 2008 and had not yet reached maximum production owing to

a variety of complications with construction, weather, contract disputes, and mine structure. The Ok Tedi Mine produced about 15,000 kg of gold in 2010 compared with about 16,000 kg in 2009. The decrease was owing to decreased head grade of the ore and an employee strike (New Guinea Gold Corp., 2010a, p. 5, 8; 2010b, p. 5–6; Allied Gold Ltd., 2011, p. 4).

### Mineral Fuels

**Natural Gas.**—The infrastructure for the PNG LNG Project, which was a major liquefied natural gas operation, was about 15% complete by yearend. The infrastructure was to include a pipeline that would run 700 km from the Hides and Juha wellheads in the Southern Highlands to Port Moresby and would also include an offshore oil export platform. The controversial \$14 million project, which was expected to double the country's GDP, was scheduled to come online in 2014, and had brought about protests concerning environmental and land rights issues. The project was a joint venture among Exxon Mobil Corp. of the United States (32%), Oil Search Ltd. of Australia (29%), Independent Public Business Corp. of Papua New Guinea (16.6%), Santos Ltd. of Australia (13.5%), and other minor owners (Oil Search Ltd., 2011, p. 22–23).

### Outlook

Economic activity is expected to remain strong in Papua New Guinea in 2011 if the prices and production volumes of Papua New Guinea's mineral exports remain high. This positive trend could be threatened if international economies do not continue to recover and, at the end of 2010, uncertainty remained because of the European debt crisis, international petroleum supply and price variability, high unemployment rates in some advanced countries, and the residual effects on trade resulting from the 2010 Tomodachi earthquake in Japan. The construction phase of the PNG LNG Project is expected to contribute to increased economic activity in most sectors of the economy, and the startup of the Ramu nickel mine is expected to contribute to continued growth in the mining sector (and the economy as a whole) in the near term; any startup delays, however, could affect these economic projections, especially if any loans to the country are being financed based upon future production, sales, and revenue to be generated from those projects.

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TABLE 1  
PAPUA NEW GUINEA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

Commodity <sup>2</sup>	2006	2007	2008	2009	2010 <sup>p</sup>
Copper, mine output, Cu content metric tons	194,355	169,184	159,650	166,700	160,000
Gas, natural, marketed million cubic meters	155	142	113	100	100 <sup>e</sup>
Gold, mine output, Au content kilograms	58,349	57,549	67,463	63,600	62,900
Petroleum, crude thousand 42-gallon barrels	17,886	15,418	13,993	12,806	12,500 <sup>e</sup>
Silver, mine output, Ag content kilograms	51,098	48,677	51,300	50,000	46,000 <sup>e</sup>

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. <sup>p</sup>Preliminary.

<sup>1</sup>Table includes data available through October 7, 2010.

<sup>2</sup>In addition to the commodities listed, cement, crude construction materials (common clays, sand and gravel, and stone), and refined petroleum products are produced, but available general information is inadequate to make a reliable estimate of output.

TABLE 2  
PAPUA NEW GUINEA: STRUCTURE OF THE MINERAL INDUSTRY IN 2010

(Metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities <sup>1</sup>	Annual capacity <sup>c</sup>
Cement	thousand metric tons	Papua New Guinea-Halla Cement Pty. Ltd. (Halla Cement Corp., 50%, and Government, 50%)	Lae, Morobe Province	200
Copper	do.	Ok Tedi Mining Ltd., operator (National Papua New Guinea Sustainable Development Program Ltd., 70%, and Government, 30%)	Ok Tedi open cut, Western Province, 20 km northwest of Tabubil and 390 km southwest of Wewak	170
Gold	thousand kilograms	Newcrest Mining Ltd., operator, 100%	Lihir open cut, Lihir Island, New Ireland Province, 700 km northeast of Port Moresby	26
Do.		Allied Gold Mining plc, 100%	Simberi Island open cut, New Ireland Province	3
Do.		Newcrest Mining Ltd., 50%, and Harmony Gold Mining Co. Ltd., 50%	Hidden Valley open cut, Morobe Province, 90 km southwest of Lae	8
Do.		Ok Tedi Mining Ltd. (Papua New Guinea Sustainable Development Program Ltd., 70%, and Government, 30%)	Ok Tedi open cut, Western Province, 20 km northwest of Tabubil and 390 km southwest of Wewak	17
Do.		Porgera Joint Venture (Barrick Gold Corp., 95%, and Mineral Resources Development Corp., 5%)	Porgera open cut and underground mines, Enga Province, 620 km northwest of Port Moresby	22
Do.		Petromin PNG Holdings Ltd., 100%	Tolukuma Hill underground mine and small open pit, Central Province, 100 km north of Port Moresby	2
Do.		New Guinea Gold Corp. (New Guinea Gold Corp., 92%)	Sinivit open pit, East New Britain Province, about 50 km south southwest of Rabaul	1
<b>Petroleum:</b>				
Crude	thousand 42-gallon barrels per day	Petroleum development license 2: Chevron Niugini Ltd. (operator and manager), 19.37%; Oil Search (Kutubu) Ltd., 27.14%; Orogen Minerals Ltd., 25.44%; Exxon Mobil Corp., 14.52%; Petroleum Resources (Kutubu) Ltd., 6.75%; Merlin Petroleum Co., 6.78% Petroleum development license 5: Exxon Mobil Corp. (operator and manager), 47.5%, and Oil Search Ltd., 52.5%	Central Moran oilfield, Southern Highlands Province (includes Agogo and Iaqufi-Hedinia fields). Onshore Papuan Basin, petroleum development licenses 2 and 5	20
Do.	do.	Chevron Niugini Ltd. (operator and manager), 19.37%; Oil Search Ltd., 27.14%; Orogen Minerals Ltd., 30.19%; Exxon Mobil Corp., 14.52%; Merlin Petroleum Co., 6.78%; Petroleum Resources Ltd. (Gobe), 2.0%	Gobe Main oilfield, Southern Highlands Province. Onshore Papuan Basin, petroleum development license 4	11
Do.	do.	Chevron Niugini Ltd. (operator and manager), 19.37%; Oil Search Ltd., 27.14%; Orogen Minerals Ltd., 25.44%; Exxon Mobil Corp., 14.52%; Petroleum Resources (Kutubu) Ltd., 6.75%; Merlin Petroleum Co., 6.78%	Kutubu oilfield, Southern Highlands Province. Onshore Papuan Basin, petroleum development license 2	16
Do.	do.	Santos Ltd. (operator and manager), 15.5%; Southern Highlands Petroleum Ltd., 39.14%; Orogen Minerals Ltd., 20.5%; Oil Search Ltd., 15.50%; Cue PNG Oil Co. Ltd., 5.42%; Petroleum Resources (Gobe) Ltd., 2.0%; Mountains West Exploration, Inc., 1.94%	South East Gobe oilfield, Gulf and Southern Highlands Provinces. Onshore Papuan Basin, petroleum development licenses 3 and 4	11
Refinery products	do.	InterOil Corp.	Port Moresby	33
Silver	thousand kilograms	Newcrest Mining Ltd., 50%, and Harmony Gold Mining Co. Ltd., 50%	Hidden Valley open cut, Morobe Province, 90 km southwest of Lae	124
Do.	do.	Ok Tedi Mining Ltd. (operator) (National Papua New Guinea Sustainable Development Program Ltd., 70%, and Government, 30%)	Ok Tedi open cut, Western Province, 20 km northwest of Tabulio and 390 km southwest of Wewak	30
Do.	do.	Porgera Joint Venture (Barrick Gold Corp., 95%, and Mineral Resources Development Corp., 5%)	Porgera open cut and underground mines, Enga Province, 620 km northwest of Port Moresby	4

<sup>c</sup>Estimated. Do., do. Ditto.

<sup>1</sup>Abbreviations used for units of measure in this table include the following: km, kilometer.