



# 2011 Minerals Yearbook

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**PAPUA NEW GUINEA [ADVANCE RELEASE]**

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# THE MINERAL INDUSTRY OF PAPUA NEW GUINEA

By Susan Wacaster

In 2011, copper and gold were the major mineral commodities produced in Papua New Guinea. The country was estimated to be the 11th ranked producer of gold in the world, and it accounted for about 2.6% of the world's gold production. Papua New Guinea also has deposits of chromite; cobalt and nickel in laterite ores; and molybdenum in porphyries, dikes, and veins on the mainland and offshore (George, 2012).

## Minerals in the National Economy

Papua New Guinea's economic growth was strong in 2011. The growth was driven by high export commodity prices; by increased Government expenditures; and by the construction phase of the PNG LNG project, which was a major liquefied natural gas (LNG) project jointly financed by 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 others. The nominal value of sales decreased in the manufacturing, mineral, and retail sectors, however, which offset increases in the agriculture, building and construction, financial business, fishery, forestry, transportation, and wholesale sectors. The country's total year-on-year sales receipts decreased marginally, by 0.6% (Bank of Papua New Guinea, 2011, p. 2, 7).

In the mineral sector, year-on-year sales receipts decreased by 9.9% compared with that of 2010 owing to a shutdown at the Lihir gold mine, decreased production at the Hidden Valley Mine, and decreased metal grade and disruptions at the Porgera gold mine. The earthquake that struck Japan in 2010 also resulted in Japanese buyers declaring force majeure on contracted sales in 2011. In the building and construction sector, year-on-year sales receipts increased by 113.2%. The increase was accounted for by maintenance and upgrades to roads by the Government and donor agencies, a new contract with the Ok Tedi Mine for road maintenance, and ongoing construction activity associated with the PNG LNG project and other building projects undertaken by the private sector (Bank of Papua New Guinea, 2011, p. 2, 8).

Employment decreased in the agriculture, fishery, forestry, and manufacturing sectors whereas it increased in the building and construction, business, financial, mineral, retail, and wholesale sectors. In 2011, the country's level of employment increased by 6.5%. In the mineral sector, the level of employment increased by 8.6% because of recruitment of skilled workers for the installation of pipelines from the southern highlands to the Central Province for the PNG LNG project. Higher international prices for Papua New Guinea's mineral exports and most of its agricultural exports resulted in a 14.0% increase in the weighted average price of all exports in 2011 compared with that of 2010 (Bank of Papua New Guinea, 2011, p. 2–3, 9–10).

## 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. Mineral resources in Papua New Guinea are owned by the state. Complicated land ownership regimes exist in Papua New Guinea because there is no system of land title for customary land. The concept of landholder ownership of mineral resources has been promoted by communities in Papua New Guinea but strongly opposed by the Government (Mineral Resources Authority of Papua New Guinea, 2012, p 10).

## Production

Copper production decreased in 2011 by 18% compared with that of 2010 because of lower ore grades at the aging Ok Tedi Mine, and the shutting down of the mill on two occasions, including one 28-day period following the rupture of a pipeline carrying high-sulfur waste. Shipments of copper and gold from the mine were 10% lower than in 2010 because of the decrease in production. Data on mineral production are in table 1 (Ok Tedi Mining Ltd., 2012).

## Structure of the Mineral Industry

Several private international mining companies were majority owners or shareholders in producing metals operations in Papua New Guinea, including Newcrest Mining Ltd. of Australia, which wholly owned the Lihir Island Mine. Harmony Gold Mining Co. Ltd. of South Africa had a 50-50 joint-venture partnership with Newcrest Mining in the Hidden Valley Mine, from which the Government received a royalty of 2%. Barrick Gold Corp. of Canada operated and held a 95% interest in the Porgera Mine, and the Government held the remaining 5% share through the state-owned Mineral Resources Development Corp. New Guinea Gold Corp. of Canada was the operator of and held a 92% interest in the Sinivit Gold Mine and Gold Mines of Niugini Holdings Pty Ltd. of Papua New Guinea held the remaining 8% interest. The Ok Tedi Mine was operated by the PNG Sustainable Development Program Ltd., which held a 70% share in the operation; the Government held the remaining 30% share.

## Mineral Trade

In 2011, mineral export receipts, excluding crude oil, accounted for 56.5% of total merchandise exports compared with 61.2% in 2010. Crude oil exports accounted for 15.1% of total merchandise exports in 2011 compared with 14.2% in 2010. The increase was associated with high international commodity prices and demand for mineral commodities from China and India. The volume of mineral exports decreased by 2.1% compared with that of 2010, but the decrease in volume was offset by an increase in prices. The export volume of gold decreased by 17.1% in 2011 to 51.0 metric tons (t) because of decreased production. The export volume of copper decreased by 7.2% to 143,600 t because of the lower grade ore at Ok Tedi Mine combined with the shutdown of the mine's production plant when the pipeline carrying high-sulfur waste was damaged. The export volume of crude oil decreased by 15.5% to 8.8 million barrels compared with that of 2010 because of declining oil reserves at the Gobe main, the Kutubu, the Moran, and the South East Gobe oil fields. In turn, the export receipts for refined petroleum products decreased by 23.2% compared with that of 2010 (Bank of Papua New Guinea, 2011, p. 13–14).

## Commodity Review

### Metals

**Cobalt and Nickel.**—The Ramu nickel and cobalt project [a joint venture between China's MCC Ramu NiCo Ltd. (85%), Highlands Pacific Ltd. of Australia (8.56%), and Mineral Resources Development Corp. (6.44%)] was precommissioning in 2011. By December, Highlands reported that the first and third high-pressure acid leach (HPAL) trains at the Basamuk treatment plant had been tested and commissioned with hot water. The HPAL #3 unit would be the first to be commissioned with ore, and HPAL #1 would follow. The proposal for ramping up production was to use these two circuits initially, and to bring the final circuit online gradually until the nameplate output of 31,150 metric tons per year (t/yr) of nickel and 3,000 t/yr of cobalt as a mixed hydroxide product was reached. Also in December, the Supreme Court of Papua New Guinea reportedly rejected an appeal to prevent operation of the deepsea tailings placement system for the Ramu operation, which ended 2 years of appeals by parties concerned about the potential damaging effects to the water quality and lands surrounding the bay where the tailings would be released (Highlands Pacific Ltd., 2011).

**Copper.**—In 2011, the Ok Tedi Mine produced 130,456 t of copper from 19.5 million metric tons (Mt) of ore compared with 159,821 t of copper from 22.1 Mt of ore in 2009. A rupture in the pyrite concentrate pipeline required the company to process low-sulfur and lower grade ore, which resulted in a decrease in the metal head grade to 0.78% from 0.84% in 2010 (Ok Tedi Mining Ltd., 2012).

**Gold.**—In 2011, the Hidden Valley Mine produced about 3,118 kilograms (kg) of gold and about 20,934 kg of silver compared with 465 kg of gold and 2,423 kg of silver in 2010, which was the operation's startup year. The Porgera Mine produced about 15,600 kg of gold in 2011 compared with about 17,000 kg in 2010. The Ok Tedi Mine produced about 13,000 kg

of gold in 2011 compared with about 15,000 kg in 2010 (Barrick Gold Corp., 2012, p. 14; Harmony Gold Mining Co. Ltd., 2012, p. 71; Ok Tedi Mining Ltd., 2012).

### Mineral Fuels

**Natural Gas.**—According to Oil Search Ltd., the PNG LNG project was on track for its first sales in 2014. Major construction at the plant site in Port Moresby began in 2011, and structural work for the two LNG trains was also started. More than one-half of the pilings for a 2.4-kilometer (km) jetty were in place by yearend, and deliveries of major equipment commenced in the second half of the year. Construction of the offshore pipeline commenced after an offshore installation vessel was mobilized. By yearend, 135 km of the 407-km offshore pipeline had been laid. Construction of the onshore pipeline had commenced in 2010 and was continuing in 2011. Welding was completed on 106 km of the onshore pipeline, including 75 km that was buried and backfilled. By yearend, all pipeline material had been delivered to Papua New Guinea and preconstruction surveys for the 292-km onshore pipeline had been completed (Oil Search Ltd., 2012, p. 22).

### Outlook

Papua New Guinea is a mineral-rich nation, and its economy is expected to continue to show positive economic growth in the short term if commodity prices remain high and construction of the PNG LNG project continues. The PNG LNG project is expected to increase the GDP of the country by 20% by 2015. Real GDP growth is then projected to decrease significantly as the project's construction slows, as extraction from some of the country's aging oilfields wind down, and as the Ok Tedi Mine is depleted. National elections were scheduled to take place in 2012, and critical issues that concern the mineral industry, such as the development of a sovereign wealth fund and landowner rights, are likely to be significant issues in the election (International Monetary Fund, 2011, p. 4, 6).

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

| Commodity <sup>2</sup>          | 2007    | 2008    | 2009    | 2010                 | 2011 <sup>e</sup> |
|---------------------------------|---------|---------|---------|----------------------|-------------------|
| Copper, mine output, Cu content | 169,184 | 159,650 | 166,700 | 159,821 <sup>f</sup> | 130,000           |
| metric tons                     |         |         |         |                      |                   |
| Gas, natural, marketed          | 142     | 113     | 100     | 100 <sup>e</sup>     | 100               |
| million cubic meters            |         |         |         |                      |                   |
| Gold, mine output, Au content   | 57,549  | 67,463  | 63,600  | 62,900               | 62,200            |
| kilograms                       |         |         |         |                      |                   |
| Petroleum, crude                | 15,418  | 13,993  | 12,806  | 12,500 <sup>e</sup>  | 12,500            |
| thousand 42-gallon barrels      |         |         |         |                      |                   |
| Silver, mine output, Ag content | 48,677  | 51,300  | 50,000  | 46,000               | 45,000            |
| kilograms                       |         |         |         |                      |                   |

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

<sup>1</sup>Table includes data available through July 20, 2012.

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

TABLE 2  
PAPUA NEW GUINEA: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(Metric tons unless otherwise specified)

| Commodity         |                                    | Major operating companies and major equity owners  | Location of main facilities <sup>1</sup>   | Annual capacity <sup>e</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.               |                                    | 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%<br>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 Tabubil 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>e</sup>Estimated. Do., do. Ditto.

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