2009 Minerals Yearbook

PAPUA NEW GUINEA

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The Mineral Industry of Papua New Guinea

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Papua New Guinea is located northeast of Australia in Melanasia and is composed of the eastern portion of the island of New Guinea and several groups of surrounding islands. The country's economy relied heavily upon its mineral exports, which include copper, gold, and crude petroleum. Papua New Guinea's territorial waters are the site of the world's first offshore metals mining project, Nautilus Minerals Inc. of Canada's Bismark Sea Development Project, which was being developed to produce primarily copper and gold with byproducts of lead, molybdenum, silver, and zinc from hydrothermal seafloor massive sulfide (SMS) ores located about 1,600 meters (m) below sea level in Papua New Guinea's territorial waters (George, 2010).

Much of Papua New Guinea's mineral resources are associated with the New Guinea mobile belt. The New Guinea mobile belt is a geologic structure that runs the length of the Island of New Guinea and hosts porphyry gold and copper and epithermal gold mineralization. In 2009, there were between 25 and 30 recognized base- and precious-metal operations that were active for exploration, target outline, reserves development, feasibility, or production in Papua New Guinea. Copper and gold were the primary commodities of interest, but many deposits were also prospective for, or producing, lead, molybdenum, silver, and zinc. The country was also recognized for its deposits of high-performance metals (which are used in applications that apply high temperature and stress, that require corrosion resistant materials, and that meet other industrial material requirements), including cobalt and nickel, iron sands, titanium, vanadium, and for its deposits of platinum-group metals (palladium and platinum).

Minerals in the National Economy

Although the value of Papua New Guinea's mineral exports decreased in 2009 compared with that of 2008, the nominal gross domestic product (GDP) growth rate was estimated to be 4.5% in 2009, which was the eighth consecutive year of increased GDP growth rates in the country that together averaged about 3%. Papua New Guinea's economic growth in 2009 was attributed to a recovery in commodities prices in the second half of 2009; a fiscal stimulus plan that was implemented in 2009 whereby the Government withdrew from public trust fund savings accumulated during commodities boom years from about 2005 through 2007; and continuation of plans for a $15 billion liquefied natural gas (LNG) project developed by Exxon Mobil Corp. with its joint-venture partners. The LNG project was expected to have its first cargo deliveries in 2013 or 2014. The LNG project resulted in increased private investment in 2009 and was expected to stimulate business opportunities in most other sectors of the economy, including communications, construction, financial services, manufacturing, and transportation. The project was reportedly a source of local conflict regarding property rights issues, however, which, along with such other factors as financing, permitting, and construction, could affect the timeline of the project (Asian Development Bank, 2010, p. 242; Tradingmarkets.com, 2010).

In 2009, the lingering effects of the global recession of 2008 resulted in decreased demand for many primary commodities and significant decreases in the international prices of many of those commodities; as a result, the export volumes and prices of Papua New Guinea's commodities were adversely affected (primarily copper, as gold prices rebounded in 2009), and the mineral sector recorded decreased earnings. The country's mineral sales decreased by 6.0% in the third quarter of 2009 compared with an increase of 15% in the second quarter, although this was in part owing to decreased production at the Lihir, the Porgera, and the Simberi gold mines, which had been shut down because of maintenance or landowner issues. In the manufacturing sector, total sales increased by 13.0% in the third quarter of 2009 compared with a decrease of 6.9% in the previous quarter, which was attributed in part to increased refinery production (Bank of Papua New Guinea, 2010, p. 8-9).

Government Policies and Programs

The Mining Act of 1992 is the law that regulates mining in Papua New Guinea. All minerals are deemed to be the property of the state, including those existing on, in, or below the surface of any land and those contained in any water lying on any land in Papua New Guinea. All land and any water lying over the land are available for exploration and mining. Areas of reserve may be excluded from mining activities if it is considered in the best interest of the state and when public notice is published; however, consent may be granted for exploration and mining on reserved land by the Minister responsible for that reserved land (Pacific Islands Legal Information Institute, 2010).

Exploration permits are issued for an initial 2-year period and may be extended for an additional 2-year period. Mining leases may be granted for a period not to exceed 20 years and may be extended for 10 years. Special mining leases may be granted to exploration license holders who are also a party to a mining development contract for a term not to exceed 40 years, but which may be extended for 20-year terms. Mining leases are granted for areas of land not to exceed 60 square kilometers. In accordance with the Mining (Safety) Act of 1977 and the Water Resources Act of 1982, a mining lease entitles the holder to exclusive occupancy for mining and mining purposes and to ownership of all minerals lawfully mined from that land. Mining easements are granted for the same term as the term of the tenement for which the easement will be used and may also be extended. In accordance with the Mining (Safety) Act of 1977, mining easements authorize the holder to exclusive occupancy of the land over which the easement was granted. The holder of a tenement is liable to pay compensation to the landowner(s) for losses, including loss of possession or use of the natural surface of the land, damage to the natural surface of the land, severance of tenement land from other land held by the landowner, loss or restriction of right of way or easement, loss of improvements to the land, loss of earnings, disruption of agricultural activities, and social disruption (Pacific Islands Legal Information Institute, 2010).

Production

In 2009, the production volume of Papua New Guinea's economically important mineral commodities tended to decrease compared with that of 2008, with the exception of copper, which increased by 4.4% to 166,700 metric tons (t). Of the commodities for which production decreased, most decreased by less than 10%, except for marketed natural gas, which decreased by 11.5% to about 100 million cubic meters. That decrease was owing to an unexpected shutdown at a loading terminal that required Oil Search Ltd. to cut back production.

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities. In 2009, Papua New Guinea was undergoing a high level of exploration activity in both the minerals and mineral fuels sectors. At the beginning of 2010, 50 petroleum prospecting licenses and 30 applications were pending and more than 300 current exploration licenses and license renewals and 110 exploration applications for nonfuel minerals were active. The base- and precious-metals producers and their respective properties in Papua New Guinea in 2009 included Allied Gold Ltd. of Australia's Simberi Island gold mine in New Ireland Province; Barrick Gold Corp. of Canada's Porgera gold mine in Enga Province; Lihir Gold Ltd.'s Lihir Island gold mine; Newcrest Mining Ltd. of Australia's Hidden Valley gold and silver mine in Morobe Province; New Guinea Gold Corp. of Canada's Sinivit copper, gold, and silver mine in East New Britain Province; and Ok Tedi Mining Ltd.'s Ok Tedi copper, gold, and silver mine in Western Province (Papua New Guinea Chamber of Mines and Petroleum, 2010).

Employment in the mineral sector increased by 0.4% in the fourth quarter of 2009 compared with an increase of 0.2% in the previous quarter, but for the year ending on December 31, 2009, employment in the mining sector decreased by 3.3% (Bank of Papua New Guinea, 2010, p. 2, 8-10).

Mineral Trade

In 2009, the total value of goods exported by Papua New Guinea decreased to about $4.6 billion, which was a 24.0% decrease compared with that of 2008. The decrease was owing to decreases in the values of copper, crude oil, refined petroleum products, and other nonmineral exports. The weighted average price of Papua New Guinea's mineral exports decreased by 14.5% compared with that of 2008. Total mineral exports were valued at about $3.4 billion, which was a decrease of about 24% compared with the value in 2008. Decreases in the values of copper, crude oil, refined petroleum products, and other nonmineral exports reportedly offset any increase in the value of exported gold when gold commodity prices began to rebound in the latter part of the year.

The value of exported minerals, excluding crude oil, was about $2.8 billion in 2009 and accounted for 62% of total goods exported compared with 53% in 2008. The value of petroleum exports decreased by about 45% to about $600 million and accounted for about 14% of the total goods exported in 2009 compared with 22.4% in 2008. The volume of exported petroleum was about 10 million barrels (Mbbl), which was an 18% decrease compared with that of 2008. The reduction of petroleum export volumes reflected lower extraction and production rates owing to natural decline from existing wells and the shutting down of facilities at the Gobe Main, the Moran, and the Southeast Gobe oilfields that offset an increase in production at the Kutubu oilfield. Refined petroleum product exports were valued at about $144.5 million, which was a 26% decrease compared with the value in 2008 and accounted for about 3.3% of the total goods exported in 2009 compared with 3.2% in 2008 (Asian Development Bank, 2010, p. 242-243; Bank of Papua New Guinea, 2010, p. 13).

Papua New Guinea exported about 63,300 kilograms (kg) of gold in 2009, which was the same as in 2008, but was slightly less than the amount of gold production that was reported by the active gold producing companies in the country. The average free-on-board (f.o.b.) price received for Papua New Guinea's gold exports was $32,300 per kilogram in 2009, which was an increase of about 15% compared with that of 2008. The price increase was owing to increased demand for gold-based investments as an alternative to international equity markets. Total exports of gold were valued at about $2.03 billion in 2009, which was about 15% higher than in 2008. About 154,000 t of copper was exported, which was a decrease of about 17% compared with copper exports in 2008. The average f.o.b. price of Papua New Guinea's copper exports was about $5,017 per metric ton, which was a decrease of 32% compared with exports in 2008 and was attributable to a collapse of copper prices in the world market in the third quarter of 2009. Copper exports were valued at about $771.2 million in 2009, which was a 44% decrease compared with the value in 2008 (Bank of Papua New Guinea, 2010, p. 13-14).

The total value of imported goods was almost $3.0 billion in 2009, which was an 8.0% decrease compared with the value in 2008; the decrease was owing in part to a decrease in the volume of imports by all sectors. The value of imports by the mining industry declined by almost 18% compared with that of 2008 to $555 billion; the decrease was attributable to lower capital expenditure undertaken by the Ok Tedi Mine. The value of petroleum imports decreased by 19.0% compared with that of 2008 to about $250.5 million (Bank of Papua New Guinea, 2010, p. 16).

Commodity Review

Metals

Cobalt and Nickel.—Two significant cobalt and nickel projects were under development in 2009, including Regency Mines plc of the United Kingdom's Mambare nickel laterite project and the Ramu chromium, cobalt, and nickel project. The Mambare project was wholly owned by Regency Mines between August and November 2009, but then became a 50-50 joint venture with Direct Nickel Pty Ltd. of Australia; the mine was expected to start up in mid-2010. Regency projected that the Mambare Mine could produce as much as 20,000 metric tons per year (t/yr) of nickel within 4 years of startup and could ramp up to 60,000 t/yr. The Ramu laterite project, which was expected to start up in late 2010, was a joint venture between the China Metallurgical Corp.'s (MCC) Ramu NiCo Ltd. and a consortium of Chinese companies (85%); Ramu Nickel Ltd., which was a subsidiary of Highlands Pacific Ltd. of Australia (8.6%); and Mineral Resources Ramu Ltd., which was a subsidiary of Mineral Resources Development Corp. (MRDC) of Papua New Guinea (6.4%). MCC was responsible for 100% of the project funding as of August 2009. Beginning in August 2009, Ramu was expected to produce 31,500 t/yr of nickel and 3,300 t/yr of cobalt for 20 years, and Highlands Pacific reported that resources at the property may have the potential to extend the mine life by another 15 to 20 years (Highlands Pacific Ltd., 2009a, b; Regency Mines plc, 2009; 2010)

Copper.—In 2009, several known copper projects, most of which were based on polymetallic porphyry deposits, were in the target outline, reserves development, or feasibility stages, and one operation, the Ok Tedi Mine, was in the production phase. Marengo Mining Ltd. of Australia's Yandera project in the Madang Province was being developed to produce copper and molybdenum with byproduct gold, iron ore, silver, and rhenium from porphyry deposits. The company was continuing with a definitive feasibility study of Yandera that was targeting production of 125,000 t/yr of copper and about 1,700 t/yr of molybdenum during the first 6 years of production, which was expected to start up in 2013 (Marengo Mining Ltd., 2010, p. 3).

The Frieda River copper and gold project is located in the East Sepik Province. The project prefeasibility study commenced in January 2009 and was expected to be completed in the third quarter of 2010. The project was a joint venture between Xstrata plc of Switzerland (81.82%) and Highlands Pacific (18.18%). As of February 2010, Frieda River was expected to produce 160,000 t/yr of copper and about 8,000 kilograms per year (kg/yr) of gold during a 25-year mine life; operations were not expected to start up until 2016, however (Xstrata plc, 2010, p. 48).

As of yearend 2009, Ok Tedi Mining had projected the potential closure of the Ok Tedi Mine for the year 2013. Under section 4.3 of Papua New Guinea's Mine Closure and Decommissioning Code of 2001, the company is required to submit a comprehensive closure plan to the Department of Mining and to the Departments of Environment and Conservation 4 years before the expected date for cessation of commercial production. The mine closure plan was being compiled at the same time that the company was considering a feasibility plan to extend the life of the mine by another 7 years. The extension would allow the company to produce an estimated 90 Mt of ore containing about 700,000 t of copper and about 70,000 kg of gold during the 7-year period compared with its current annual copper and gold production of 160,000 t and 17,000 kg, respectively. The company reported that the most significant effect associated with mine closure would be the requirement to dispose of an estimated 280 Mt of waste rock and tailings from open cut mining and mill processing. The feasibility study was scheduled for completion by the end of 2010 (Ok Tedi Mining Ltd., 2010).

By yearend 2009, Nautilus Minerals Inc. had 45 exploration licenses, 18 exploration license applications, and 1 mining lease application for Papua New Guinea's territorial waters in the Bismark Sea, and the company had received the final environmental permit for the Solwara 1 project for a term of 25 years. Solwara 1 was part of Nautilus' Bismark Sea Development Project, which was to produce seafloor massive sulfide (SMS) ore from water depths of between 1,500 to 2,500 m (Nautilus Minerals, Inc., 2010, p. 1-4).

According to Nautilus, the Bismark Sea Development Project was in an engineering and commercial evaluation phase in 2009. In 2008, Nautilus had suspended the project during the global economic downturn but planned to move forward with the project when approval was given by the Board of Directors. The first ore production would be scheduled for delivery 30 months after project sanction. Preliminary resource estimates for the Solwara 1 deposit included indicated resources of 870,000 t grading 6.5% copper, 4.8 grams per metric ton (g/t) gold, 23 g/t silver, and 0.4% zinc and inferred resources of 1.3 Mt grading 7.5% copper, 7.2 g/t gold, 37 g/t silver, and 0.8% zinc (Nautilus Minerals, Inc., 2010, p. 1-4).

Production for the Solwara 1 operation was planned to commence at a rate of 1.2 million metric tons per year (Mt/yr) of dewatered ore. The operational plan would require seafloor mining tools to excavate the massive sulfide material from the seafloor and a riser and lifting system to pump excavated material as slurry to a production support vessel (PSV) with dewatering facilities. The slurry would be dewatered at the surface and then transferred to cargo barges and delivered to the Port of Rabaul for stockpiling at an onshore facility. The ore would then be offloaded into bulk carriers for transportation to a conventional concentrator processing facility (Nautilus Minerals, Inc., 2010, p. 1-3, 9).

Environmental concerns regarding the Bismark Sea Project had been significant. The Solwara 1 project was deemed to be a Level 3 activity under Papua New Guinea's Environment Act 2000. Level 3 activities are defined as those that may result in serious environmental harm. Nautilus conducted workshops and sponsored multidisciplinary study groups connected with the environmental impact assessment process to assist the company in engineering out potential hazards. The Solwara 1 deposit occurs in what is called the North Su volcanic center, which is a volcanic seamount where sulfide-rich chimneys actively vent hydrothermal fluids. Impacts to the seafloor, its hydrothermal chimneys, and associated vent fauna were identified as primary environmental issues. Other concerns involved possible effects to the entire water column, which contains a wide variety of animal species. There could be water-quality hazards from the effects of potential volcanic or seismic activity; desalination (to create potable water for the PSV) with resultant brine discharge; discharge of slurry waste water; pre-stripping and movement of surface sediment; noise; and equipment or infrastructure failures. Local concerns included whether benefits would reach people or Provincial governments directly affected by the project and the Government's capacity to regulate the project (Nautilus Minerals Inc., 2010, p. 21-29).

Gold.—The Hidden Valley Mine started precommissioning production between June and December 2009. The gold and silver operation was owned jointly by Harmony Gold Mining Co. Ltd. (50%) and Newcrest (50%). The operation was expected to reach commercial production by June 2010, which would involve processing 42 Mt/yr of ore from two open pits to produce about 8,000 kg/yr gold and about 124,000 kg/yr of silver during a 10-year mine life. For the year that ended on June 30, 2009, the Hidden Valley Mine, produced just 14 kg of gold. In October, the remaining sections of the processing plant were completed, and during the last quarter of 2009, the mine produced about 1,300 kg of gold and 1,600 kg of silver. In their August 2009 resource and reserves statement, Newcrest reported that the deposit had proven and probable reserves of about 75,000 kg of contained gold and about 1.4 million kg of contained silver (Harmony Gold Mining Co. Ltd., 2008, p. 42-43; 2010, p. 3; Newcrest Mining Ltd., 2009a, p. 7; 2009b, p. 23; 2010).

The Lihir Island Mine was the leading gold producer in Papua New Guinea. The operation was wholly owned by Lihir Gold. The operation was based upon five volcanic units and the ore body is hosted by volcanic breccias, tuffs, and monzonitic intrusive rocks. The Lihir Island Mine processed 6.5 Mt of ore to produce about 26,500 kg of gold in 2009 compared with 6.2 Mt of ore and about 24,000 kg of gold, respectively, in 2008. In June 2009, the company increased its reserves estimate by 36%, including probable reserves of 269.2 Mt grading 2.7 g/t gold for about 743,000 kg of contained gold and 61.6 Mt of stockpiled ore grading 2.46 g/t gold for an additional 152,000 kg of contained gold. The company planned to undertake an infill drill program in 2010 to further update resources (Lihir Gold Ltd., 2009b; 2010).

The Ok Tedi Mine produced 166,700 t of copper and 16,100 kg of gold from 22.6 Mt of ore in 2009 compared with 159,600 t and 16,000 kg, respectively, from 21.7 Mt of ore in 2008 (Lihir Gold Ltd., 2009a; 2010, p. 5-7; Inmet Mining Corp., 2010, p. 40).

In 2009, the Porgera Mine produced 38.1 Mt of ore and about 17,000 kg of gold compared with 45.5 Mt of ore and about 19,500 kg of gold in 2008. The decrease was owing to operational shutdowns because of wall stability issues and a power supply issue, which was reportedly the result of vandalism (Barrick Gold Corp., 2009; 2010a, p. 57-58; 2010b).

The Simberi Island Mine processed about 1.7 Mt of ore to produce about 2,300 kg of gold in 2009 compared with 416,627 t and about 1,000 kg, respectively, in 2008, which was the startup year. Despite the increased production compared with 2008, operations were halted for about 2 weeks in December after the company received an order to cease work from the Mineral Resources Authority in response to a landowner protest in the region (Miningweekly.com, 2010).

The Sinivit Mine produced about 200 kg of gold in 2009 compared with 210 kg in 2008, which was the startup year. Sinivit also produced 30 kg of silver. The operation reportedly experienced setbacks because of a dispute with a mining and earthmoving contractor that resulted in disrupted mining and crushing in July and August; excessive rainfall that restricted crushing activities, earthmoving, and vat construction; and inadequate crushing capacity. New Guinea Gold reported significant tellurium occurrences at the Sinivit Mine and that the company was investigating the recovery potential (New Guinea Gold Corp., 2010, p. 4-9).

Mineral Fuels

Natural Gas.—In 2009, ExxonMobil, through its subsidiary PNG LNG, worked to secure financing for its export LNG development project in Papua New Guinea. ExxonMobil, which was the operator, held a 33.2% interest; the other partners in the joint venture included Oil Search (Papua New Guinea's leading oil and gas producer), 29.0%; Government participants [which included Independent Public Business Corp. (IPBC), Mineral Resources Development Co. (MRDC), and Petromin PGN Holdings Ltd. (Petromin)], 19.6%; Santos Ltd. of Australia, 13.5%; and Nippon Oil of Japan, 4.7%. The project would involve construction of an LNG infrastructure to include upstream production systems with wellheads in the central highlands of the country; processing and treatment facilities (to include existing facilities, such as the Kutubu oil facility and the oil export platform at Kopi); pipelines, including a 450-kilometer subsea gas line; and a liquefaction plant in Port Moresby. Construction was expected to begin in 2010.

ExxonMobil advertised that the project would provide up to 7,500 jobs during the construction phase and would directly employ about 850 individuals when the plant starts operating; Papua New Guinea nationals would account for 20% of those employed during the construction phase and 90% of those employed during the operational phase. The LNG liquefaction plant was expected to have a capacity of about 9 billion cubic meters per year; base volumes were expected to be sold to buyers in China, Japan, and Taiwan and would reportedly contribute as much as 20% of Papua New Guinea's annual GDP when operations commence.

Some landowners stood to profit substantially from the project, and some of these landowners were reportedly able to negotiate with the Government, but there were land dispute issues with some groups, such as underrepresented indigenous communities, who may not have been involved in related agreements. Clashes among villages that resulted in the deaths of as many as 11 individuals in January 2010 sparked debate about whether the conflicts were associated with growing tension related to land ownership and LNG leases (Asian Development Bank, 2010, p. 243; Exxon Mobil Corp., 2010; Tradingmarkets.com, 2010).

Outlook

In 2010, the building and construction, commerce, manufacturing, and mining and quarrying sectors are expected to experience growth whereas the petroleum sector is expected to decline. The growth in the construction sector and its effects on the other sectors is likely to be the result of the ongoing construction works at the Ramu nickel project and commencement of construction for the LNG project and related activities. Commencement of production at the Ramu Mine and the first full year of production at the Hidden Valley Mine and the Simberi Mine are expected to be the source of growth in the mining and quarrying sector. Increased production of higher grades of gold at existing mines is also expected. In the medium term, the Central Bank expects the economy to continue to grow. Mineral commodity export volumes are expected to increase in 2010 compared those of 2009, with the exception of crude oil. Copper export volumes are expected to increase owing to the export of stockpiles accumulated from 2009 (Bank of Papua New Guinea, 2010, p. 32-33).

The economic growth predictions, however, are dependent upon higher prices for the country's new export commodities of cobalt and nickel, progress being made on the Ramu project in 2010, commencement of construction for the LNG project, and higher export prices and volumes for other commodities, which would be tied to global economic recovery. Also, whereas the LNG project is expected to provide an economic boost in some sectors, the boost could be offset by increased payments from national accounts required to finance the project. The total annual GDP growth rate for Papua New Guinea in 2010, 2011, and 2012 is projected to be 8.5%, 6.2%, and 2.9%, respectively; however, the nonmineral portion of the GDP for the same years is expected to be 8.1%, 5.4%, and 3.5%. If 2010 projections are realized, the country's mineral sector would be operating at the same rate as it was during the commodities boom of 2007, when the total GDP annual growth rate was 7.2% and the nonmineral growth rate was 8.1% (Bank of Papua New Guinea, 2010, p. 32-33, 43).

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TABLE 1
PAPUA NEW GUINEA: PRODUCTION OF MINERAL COMMODITIES[1]

Commodity[2]		2005	2006	2007	2008	2009[p]
Copper, mine output, Cu content	metric tons	192,978	194,355	169,184 [r]	159,650 [r]	166,700
Gas, natural, marketed	million cubic meters	154	155	142 [r]	113 [r]	100
Gold, mine output, Au content	kilograms	68,483	58,349	57,549 [r]	67,463 [r]	63,600
Petroleum, crude	thousand 42-gallon barrels	17,113	17,886	15,418 [r]	13,993 [r]	12,806
Silver, mine output, Ag content	kilograms	51,125	51,098	48,677 [r]	51,300 [r]	50,000

[p]Preliminary. [r]Revised.

[1]Table includes data available through August 1, 2010.

[2]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 reliable estimates of output.

Sources: World Mineral Production 2002-06. Papua New Guinea Chamber of Mines and Petroleum, Papua New Guinea Mineral Production, 2003-06; Papua New Guinea Oil Production, 2003-06; Papua New Guinea Gas Production, 2003-06. December 2007 Presentation at 2008 Annual General Meeting Executive Director's Report, May 2, 2008. Bank of Papua New Guinea, 2007-2009.

TABLE 2
PAPUA NEW GUINEA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity[e]
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., 52%; Government, 30%; Inmet Mining Corp., 18%; Government of Germany, 5.8%)	Ok Tedi open cut, Western Province, 20 km northwest of Tabubil and 390 km southwest of Wewak	170
Gold	thousand kilograms	Lihir Gold Ltd., operator, 100%	Lihir open cut, Lihir Island, New Ireland Province, 700 km northeast of Port Moresby	26
Do.		Barrick Gold Corp., 95%	Kainantu underground mine, Eastern Highlands Province, 180 km west of Port Lae	1
Do.		Allied Gold Ltd., 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., 52%; Government, 30%; Inmet Mining Corp., 18%)	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%; Gold Mines of Niugini Holdings, 8%; Alcyone Resources Ltd., 1%)	Sinivit open pit, East New Britiain Province about 50 km south southwest of Rabaul	1
Natural gas	thousand cubic meters per day	Exxon Mobil Corp. (operator) (Oil Search Ltd., 21.5%)	Hides Gasfield, Southern Highlands Province. Onshore Papuan Basin, petroleum development license	140

See footnotes at end of table.

TABLE 2—Continued
PAPUA NEW GUINEA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity[e]
Petroleum:				
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%; and 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%; and 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%; and Mountains West Exploration, Inc., 1.94%	SE 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., 52%; Government, 30%; Inmet Mining Corp., 18%)	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

[e]Estimated. Do., do. Ditto.

[1]Abbreviations used for units of measure in this table included the following: km, kilometer.