

PAPUA NEW GUINEA

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Papua New Guinea comprises the eastern one-half of the island of New Guinea, which is one of the largest islands in the world; the archipelago includes an additional 3 islands (Bougainville, New Britain, and New Ireland) and about 600 smaller islets, atolls, and coral reefs. The 463,000-square kilometer (km²) nation is east of Indonesia between the Coral Sea and the South Pacific Ocean and lies just north of the Australian Continent. Papua New Guinea was formed by the merger between the Australian territory of Papua and the German colonial possession of New Guinea following World War I. Australia administered Papua New Guinea until 1975 when it became an independent state.

Mining has played a prominent role in Papua New Guinea's economy. In 1888, the first significant discovery of gold was made when the search for new bonanza alluvial gold deposits brought Australian miners from Queensland to Sudest Island in the Louisiade Archipelago. This discovery was followed by gold rushes on Misima and Woodlark Islands in the Solomon Sea and then on the mainland, which culminated in the discovery at Wau in 1922 and the adjacent Edie Creek in 1926. Hardrock mines were established on Misima, Sudest, and Woodlark Islands when the alluvial gold was exhausted, but only on Misima did gold mining continue following World War I. The rich discoveries at Edie Creek led to the establishment of a number of underground hardrock mines near there and at nearby Wau, as well as the large-scale dredging operations in the Bulolo Valley, which started in 1932. By 1939, eight large dredges were operating in the Wau-Bulolo Valley, and, except for the interruption during World War II, dredging continued until 1965 when the last dredge was abandoned. Spurred on by the fabulous riches of Edie Creek, prospectors subsequently ventured into other parts of the mainland and the outer islands; they eventually mined gold at Kainantu, Mount Hagen, and Porgera in the Highlands, along the Sepik River in the north, and at Kupei on Bougainville Island (Papua New Guinea Chamber of Mines and Petroleum, 2000, p. 9.)

Petroleum exploration also is not new to Papua New Guinea. Oil companies have been searching diligently since the first reports in 1911 of oil seeps near Kerema along the coast of the Gulf of Papua. Although first oil was not successfully discovered for another 11 years, 94 wells had been drilled in the country in search of recoverable oil and gas reserves by the time of independence. Buoyed by the successful discovery of oil in 1986, exploration activity increased, and in 1989 alone, 32 wells were drilled. Exploration drilling produced a series of further discoveries at Agogo, Gobe Main, SE Gobe, and South Mananda and an even larger number of gas discoveries at Angore, Elevala, Hides, Ketu, Pandora A, Pandora B, P'nyang, and South East Hedinia on which more than \$1 billion had been spent (Papua New Guinea Chamber of Mines and Petroleum, 2000, p. 6-9).

Although changes in Government leadership have been

peaceful since independence, Papua New Guinea has struggled to develop nationhood status in its 26-year existence. The country's population is diverse and spread out in isolated villages. Ethnic strife has become commonplace as evidenced by the Bougainville civil unrest and tribal skirmishes in the Highlands. These conflicts have had a negative impact on exploration, financial investment, and mining. Land disputes have become common because land is communally held and the country has no real system of land registration.

Government Policies and Programs

In 2001, the Government of Papua New Guinea launched its 20-year industrial development plan. Under its plan, the Government was to emphasize export-oriented development as the basis for the country's industrial development. Because Papua New Guinea has a predominantly mineral-based economy (copper and gold have been the leading exports since 1972), the Government has identified the mining industry as the sector to lead the country's development (Resource Information Unit, 2002b).

Effective with the fiscal budget to begin in January 2002, the mining levy that was established in 1998 was to be phased out for established operations in four equal increments by 2006. The levy was abolished for new mining companies established in 2001. The mining levy was being eliminated to improve the viability of existing projects so as to assure their continuance despite low world prices by enabling them to mine lower grade ores that otherwise would not be mined if the levy remained (PNG Resources, 2001b).

In Papua New Guinea, all minerals on and below the surface of any land are the property of the State, which has the right to allow suitable persons to explore for, mine, and sell mineral resources. The right to explore for, mine, and sell mineral resources is granted in the form of mineral tenements, which are for a fixed term over a fixed area and are granted to persons or companies committed to programs of exploration or mining development approved by the State. Tenements are not granted for the purpose of retaining mineral rights indefinitely. The Mining Act of 1992 simplified the administration of and reduced the types of tenements available, which are as follows:

- Exploration license—Granted for a term not exceeding 2 years and renewable for 2-year terms over an area not exceeding 2,500 km².
- Mining lease (ML)—Granted for a term not exceeding 20 years and renewable for terms of up to 10 years. Normally these are granted for small- to medium-scale mines and some alluvial mine developments. The holder must comply with approved proposals for development and other prescribed mining lease conditions.
- Special mining lease (SML)—Granted for a term not exceeding 40 years and renewable for terms up to 20 years.

Normally SMLs are granted for large-scale projects and require a mining development contract (MDC) to be negotiated. The holder must comply with approved proposals for development and other prescribed mining lease conditions.

- Alluvial mining lease—Granted for a term not exceeding 5 years and renewable for terms of up to 5 years for an area not exceeding 5 hectares. The holder must be a landowning citizen.
- Lease for mining purposes—Granted for the same term as that of the tenement with which it is associated. It is granted for construction of the project infrastructure and facilities.
- Mining easement—Granted for the same term as the tenement with which it is associated. It is granted for construction and operation of project facilities such as roads, power transmission lines, waterways, pipelines, bridges, or tunnels.

All tenements with the exception of SMLs are granted by the Minister for Mining on recommendation by the Mining Advisory Board. SMLs are granted by the head of state (Papua New Guinea Department of Mining, 2001).

The Petroleum Act of 1992 deals with the types of petroleum licenses that are available, registration of interests and dealings in tenements, compensation for owners and occupiers of affected lands, and payments of rents, fees, and royalties. The following types of licenses may be issued under the Act:

- Petroleum prospecting license—Confers the exclusive right to explore for petroleum, but the holder is required to enter into a further agreement with the Government regarding exploration and development within the tenement area.
- Petroleum development license—Gives tenure to recover and own the petroleum and to construct and operate all necessary facilities.
- Pipeline license—Confers the authority to construct and operate a pipeline system and related facilities.

In 2001, the real gross domestic product (GDP) declined by 3.3% led by a 9.0% decrease in the mining sector (Asian Development Bank, 2001¹). The mining and petroleum sectors contributed an estimated 15.5% and an estimated 9%, respectively, to the nation's GDP in 2001. About 70% of Papua New Guinea's export income was derived from these two sectors, although they employed only about 2% of the country's workforce. The majority of the population, which was estimated to be about 85%, relied on subsistence and commercial agriculture and fishing. Papua New Guinea's mineral resources were difficult and expensive to mine, and exploration and mining were hampered by rugged terrain, the high cost of developing infrastructure, and the nation's poor road infrastructure. Nevertheless, Papua New Guinea was the 11th largest gold and the 13th largest copper mining country in the world in 2001 (World Bureau of Metal Statistics, 2002, p. 37, 79).

Environment

The Department of Environment and Conservation is the Government agency responsible for environmental protection and conservation of Papua New Guinea's diverse natural environment and serves as the regulatory and monitoring agency for the extraction of all mineral resources in the country.

¹References that include a section twist (§) are found in the Internet References Cited section.

Before a company can develop a mine in Papua New Guinea, an MDC between the Government and the developer must be signed. A prerequisite of the MDC is that a strict environmental regulation process be followed. The country's statutory regulations for mining projects were covered under separate Acts of Parliament—the Environmental Contaminants Act, the Environmental Planning Act, and the Water Resources Act. In December 2000, the Government combined these acts into a single Environment Act.

The Environment Act 2000 includes a sequence of steps that mining companies are required to complete; these include the submission of an environmental plan (EP). An EP has to be approved by the Minister for Environment and Conservation before any mining or construction activity can begin. (In other countries, an EP may be called an environmental impact statement or an environmental impact assessment).

An EP can be an extremely comprehensive and sophisticated document that requires input from a range of experts in a number of different fields of specialty. It usually takes from 1 to 2 years to prepare. Also included in the EP are the license conditions and approvals required for mine development. Before the Minister approves an EP, the community is consulted on the terms of the EP and the findings and potential impacts that could arise from the future mine. The environmental regulation process adopted by the Government was based on similar processes and standards adopted in most other countries, which include Australia and the United States, throughout the world (Lihir Direct, 2001).

Production

The country's producing mines centered on four very large operations, one medium-sized enterprise, and a large small-scale sector that included numerous mechanized alluvial gold mines and primitive manual gold panning-sluicing workings by individuals. The major operations were the Lihir gold mine in New Ireland Province, the Ok Tedi copper-gold mine in Western Province, the Misima gold-silver mine in Milne Bay Province, and the Porgera gold mine in Enga Province. The smaller Tolukuma gold-silver mine in Central Province also was a significant producer. Projects in the petroleum sector included the Central Moran, Gobe Main, Kutubu, and SE Gobe Oilfields in Gulf and Southern Highlands Provinces. These facilities produced virtually all the country's mine (excluding clays, sand and gravel, and stone used for construction purposes) and petroleum production. Two projects were in an advanced stage of exploration-development—the Morobe gold-silver prospect in Morobe Province and the Ramu nickel prospect in Madang Province.

Commodity Review

Metals

Copper.—In 2001, all the country's copper production was mined from the Ok Tedi Mine at the headwaters of the Ok Tedi River on Mount Fubilan in the Star Mountains, which is located about 18 kilometers (km) east of the border with the Indonesian

Province of Papua and 20 km northwest of the town of Tabubil where Ok Tedi Mining Ltd. (OTML), which was the mine operator, was headquartered. Copper production at Ok Tedi began in 1987 following 3 years of gold-only production. The opencut operation used conventional truck-and-shovel methods to mine approximately 30 million metric tons per year (Mt/yr) of ore and 55 Mt/yr of waste rock. About 200,000 metric tons per year (t/yr) of copper-in-concentrate and 12,500 kilograms per year (kg/yr) of gold-in-concentrate were produced. The final concentrate, which contained about 34% copper and 20 grams per metric ton gold, was then thickened and piped 137 km to handling facilities at Kiunga for filtering and drying before shipment down the Fly River in 2,500-metric-ton (t) barges (Resource Information Unit, 2002b, p. 51).

Waste rock and tailings from the Ok Tedi Mine have been discharged into the Ok Tedi River ever since successive major landslides forced the abandonment of construction at the tailings dam site shortly after mining startup in 1984. The resulting buildup of mine sediment in the lower Ok Tedi and Fly Rivers produced flooding and sediment deposition on the flood plain that led to about a 100-km² vegetation die-back. As a result, OTML had been at the focus of several tailings pollution claims and causing BHP Billiton Ltd., which was the majority owner in the operation, to review its position. Although BHP Billiton Ltd. would have preferred to close the Ok Tedi Mine, the Papua New Guinean Government asserted that early closure was unacceptable because of the adverse economic and social impacts that would result from the loss of the income generated by the mine for the economy.

Therefore, during the fourth quarter, BHP Billiton Ltd. proposed an agreement to end its membership in the OTML joint venture by yearend 2001 or early 2002. Under the agreement, the other OTML partners the Government of Papua New Guinea and Canadian-based Inmet Mining Corp. will retain their 30% and 18% interests, respectively, in the Ok Tedi Mine. BHP Billiton Ltd. was to transfer its 52% interest to an independent company, which would set up a long-term fund to receive allocations for sustainable development after the mine is closed, and OTML will set up a new foundation to allow it to continue its development programs in Western Province (PNG Resources, 2001c). Under the current life-of-mine plan, mining operations were expected to cease around mid-2010 when readily accessible ore was exhausted (BHP Billiton Ltd., 2001).

In March 2001, BHP Ltd. and Billiton Plc agreed to a \$31.5 billion merger to establish the diversified global resources group BHP Billiton Group. The merger, which was approved by the shareholders of the separate companies in mid-May, was achieved through a dual-listed company structure on June 29, 2001, in which BHP Billiton Ltd. and BHP Billiton Plc continued to exist as separate companies but operated as a combined group known as BHP Billiton. The headquarters of BHP Billiton Ltd. and the global headquarters of the combined BHP Billiton Group were located in Melbourne, Australia. BHP Billiton Plc was located in London, United Kingdom. The Group's supporting offices were located in Adelaide, South Australia, Australia; Houston, Texas, U.S.A.; Johannesburg, South Africa; Santiago, Chile; Toronto, Ontario, Canada; and Vancouver, British Columbia, Canada (Resource Information Unit, 2002b, p. 173).

Gold.—In mid-1999, Japan's Nippon Mining and Metals Co. agreed to earn a 50% interest in the Kainantu goldfields, which is a 261-km² area in Eastern Highlands Province, by solely funding an expenditure of \$3.5 million; Highlands Pacific Ltd. would remain as project manager. During the first quarter, 2001, Nippon agreed to withdraw from the joint venture pending consent of both company boards. This would result in Highlands Pacific's 100% ownership of the project, although Nippon would retain a \$2 million production royalty at Kainantu for production in excess of 25,000 ounces (776 kg/yr) (Highlands Pacific Ltd., 2001b; Resource Information Unit, 2002b, p. 104). In September, Highlands Pacific began a project feasibility study and was aiming to commit to a 100,000- to 120,000-ounce-per-year (3,110- to 3,732-kg/yr) development in the second quarter of 2002.

The Lihir gold deposit is one of the world's largest gold resources. It was discovered in 1982 by a Niugini Mining-Kennecott Exploration joint venture. By 1991, extensive drilling had delineated three huge deposits—the Coastal, Lienetz, and Minifie. An SML was granted in March 1995. First gold was poured in May 1997, and commercial production began the following October. Mining was based on two overlapping pits that would supply high-grade ore for direct processing in the initial 15-year period and lower grade ore that was to be stockpiled for processing during the following 17 years (Resource Information Unit, 2002b, p. 105). Gold production for 2001 was a record 20,153 kilograms (kg) (Lihir Direct, 2002).

In May, mining ceased at the Misima opencut gold and silver operation, although gold and silver continued to be recovered during the balance of the year from low-grade stockpiles. The Misima Mine is located on Misima Island in the D'Entrecasteaux Islands Group, Milne Bay Province, approximately 240 km southeast of the Papua New Guinean mainland. It was a mature operation that was experiencing a decline in production as its gold grade dropped. Its throughput subsequently fell as mining became more confined in the deeper parts of the open cut, and the ore became, on average, harder. The ore had been free milling, which required only crushing and grinding prior to treatment in a conventional carbon-in-pulp (CIP) circuit (Resource Information Unit, 2001, p. 53). Placer Dome Inc., which was the operator and 80% shareholder, anticipated the end of mining owing to ore depletion, although it also expected that milling of stockpiled material would continue until late in 2004 (Placer Dome Inc., 2002a\$).

The Porgera Mine is an open-cut gold mine in the Highlands of the country about 620 km northwest of the capital city of Port Moresby. Although first production at Porgera was from high-grade underground workings, opencut mining progressively increased from 1995 until 1997 when underground mining concluded. The gold present in Porgera's high-sulfide ore was refractory, and treatment consisted of conventional crushing and grinding followed by bulk flotation of the sulfides. The resulting concentrate was then oxidized in autoclaves, and the gold was recovered by cyanide leaching in a conventional CIP plant.

Opencut mining at yearend was in Stages 4 and 5 of a five-stage surface mining plan; Stage 3 mining was completed in 2001. Stage 4 production began in 2001 and was to be the

principal source of ore until completion in 2004; stage 5 was under development at yearend and was to contribute ore between 2003 and 2006. Production in 2001 from the mine was 23,658 kg (Placer Dome Inc., 2002b§).

The Tolukuma Mine is located about 100 km north of Port Moresby. It was discovered in 1986 by Australia's Newmont Pty. Ltd. Rather than develop the project, Newmont decided to sell the tenements in 1993 to Dome Resources NL for \$6 million (Resource Information Unit, 2002b). Shortly thereafter, Dome Resources began a feasibility study on the development of the Tolukuma gold project. In 1994, Dome Resources was granted ML 104. An open pit mine and treatment plant was brought into production in December 1995, and underground mine development started in mid-1997. In 1999, Durban Roodepoort Deep Ltd. (DRD) of South Africa launched a takeover bid for Dome Resources and was successful. In November, DRD concluded a 3-year loan agreement with the Bank of South Africa for \$2.2 million to finance the capital expenditure required to increase production at the Tolukuma Mine by 50% to 3,600 kg/yr of gold. The funds were to be used to increase the size of the production fleet and to accelerate exploration activity (Durban Roodepoort Deep Ltd., 2001; PNG Resources, 2001a).

Since commissioning, Tolukuma has produced approximately 9,000 kg of gold and 32,100 kg of silver from the treatment of about 505,000 (t) of ore (Durban Roodepoort Deep Ltd., undated§). The mine site has no road access, and all equipment and staff personnel must be transported in and out by helicopter (Durban Roodepoort Deep Ltd., 2002).

Nickel.—At yearend 2001, the Ramu nickel project was 68.5% owned by Highlands Pacific and 31.5% owned by Orogen Minerals Ltd., both of which are Papua New Guinea-registered companies. The Ramu site is a predevelopment nickel and cobalt project that is located about 75 km southwest of the provincial capital of Madang on the northern coast of Papua New Guinea. A \$22 million bankable feasibility study was completed in 1998, which indicated that at a capital cost of \$838 million, a lateritic nickel mining project could produce 33,000 t/yr of nickel metal and 3,200 t/yr of cobalt sulfate at an average operating cost of \$0.41 per pound (\$0.19 per kilogram) of nickel during a 20-year mine life, although the mineral resource was expected to support a mine life of 40 years. About 4.6 Mt/yr of ore was to be mined to feed 3.2 million metric tons (Mt) of upgraded ore by a 134-km slurry pipeline to a refinery on the adjacent Rai Coast. The ore was to be processed by pressure acid leach technology. Construction of the project was projected to take up to 30 months (Highlands Pacific Ltd., undated§).

Highlands Pacific held discussions with interested parties during the fourth quarter of 2001 with an unnamed major international group undertaking due diligence; discussions were scheduled to continue during the next quarter (Highlands Pacific Ltd., 2001a).

Mineral Fuels

Petroleum and Natural Gas.—The Kutubu Oilfield, which is located in Southern Highlands Province 480 km northwest of

Port Moresby, was Papua New Guinea's first successful oilfield; production started in October 1996. At the end of 2001, 47 wells had produced about 9.6 million barrels (Mbbbl) of oil; this was a 19.8% decrease from that of 2000 (Resource Information Unit, 2002a, p. 198-199).

By the end of 1998, the Gobe Main and SE Gobe Oilfields had successfully developed ahead of schedule and under the original budget of \$335 million. Production during 2001 was 7.18 Mbbbl of oil, which was a 30% decrease from the previous year (Resource Information Unit, 2002a, p. 197).

The Moran Oilfield is located about 480 km northwest of Port Moresby in Southern Province. Its first well was spudded in June 1996, and oil was discovered the following September when the Moran-1 sidetrack encountered oil-bearing sands. Production in 2001 increased by 1.4% above that of 2000.

The Hides Gasfield, which was the first in Papua New Guinea, began production in 1992. All gas produced was sold to the Porgera joint venture for power generation at its gold mine.

The Papua New Guinea Gas Project was a 3,250-km-long enterprise initiated in 1997 to deliver natural gas from Papua New Guinea to a marine terminal facility in the Gulf of Papua for liquid petroleum gas (LPG) extraction before transporting dry gas via a pipeline to customers in eastern Australia. The original participants in the pipeline development and cost-sharing agreement, which expired December 31, 2001, were—Chevron Australia Pty. Ltd., Chevron Niugini Ltd., Merlin Petroleum Co., Oil Search Ltd., Orogen Minerals (Kutubu) Pty. Ltd., Mineral Resources Development Co. Ltd., Australian Gas Light Co. (AGL) and Malaysia's Petrolim Nasional Bhd. (Petronas) Consortium, ExxonMobil Corp., and Santos Ltd. A new agreement, possibly with a different composition, was expected to be organized early in 2002 (Resource Information Unit 2002a, p. 234).

If constructed, the proposed pipeline would be the longest in the Southern Hemisphere and would provide a new energy supply to an area that is emerging as one of the most important minerals-processing centers in the Australasian region. The estimated initial cost of the project was \$3.35 billion with a life estimated to be more than 30 years. The project was to include the following:

- A pipeline from the Kutubu oilfields and gasfields in Papua New Guinea's Southern Highlands Province to the south coast of the country;
- A pipeline from the coast to a marine terminal facility;
- The marine terminal in the Gulf of Papua, which would produce natural gas for piping to Australia and LNG for Papua New Guinea's use and export; and
- A pipeline across the Torres Strait and down Australia's Cape York Peninsula to transport natural gas to its final destination of Brisbane, Queensland.

The project was to include 635 km of pipeline within Papua New Guinea (320 km onshore, 315 km offshore) and 2,615 km within Australia (2,455 km onshore, 160 km offshore). When completed, the Project would transport natural gas from Papua New Guinean gasfields into Northern Queensland via the Torres Strait, down the Cape York Peninsula to the port city of Townsville, down to the industrial city of Gladstone, and then to the Queensland State capital city of Brisbane. The Australian

portion of the pipeline was to be built and owned by the AGL-Petronas Consortium (Resource Information Unit 2002a, p. 200).

Infrastructure

Essential elements of the transportation infrastructure included 19,600 km of roads, of which 686 km was paved and 18,914 km was unpaved. The length of inland waterways totaled about 10,940 km and was of little importance to the transportation industry. Of the 492 airports, 19 principal airports had permanent-surface runways. International shipping ports included Kieta, Lae, Madang, Port Moresby, and Rabaul. The country has no railroads. The merchant marine fleet of ships of 1,000 t or more gross included 2 bulk and 10 cargo carriers, 1 chemical tanker, 1 combination ore carrier/oil tanker, 3 petroleum tankers, 1 container ship, and 3 roll on/roll off carriers (U.S. Central Intelligence Agency, 2000§).

The vast majority of the in-place infrastructure in the country was concentrated in the Provincial capitals; therefore, the lack of infrastructure for most of the country remained a distinct hindrance for the minerals industry, which included exploration, mine construction and development, and transportation of mined products.

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Major Sources of Information

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TABLE 1
PAPUA NEW GUINEA: PRODUCTION OF MINERAL COMMODITIES 1/

Commodity 2/		1997	1998	1999	2000 r/	2001 p/
Copper, mine output, Cu content	metric tons	111,515	152,200	187,921	203,061	203,762
Gold, mine output, Au content	kilograms	48,482	61,641	65,747	74,540	67,043
Gas, natural	million cubic meters	1,192	1,378	1,353	1,438	1,434
Natural gas liquids	42-gallon barrels	94,764	105,527	105,460	224,857	186,190
Petroleum, crude	thousand 42-gallon barrels	27,592	29,479	32,020	24,967	20,423
Silver, mine output, Ag content	kilograms	49,165	59,294	66,542	79,197	69,368

p/ Preliminary. r/ Revised.

1/ Table includes data available through August 30, 2002.

2/ In addition to the commodities listed, cement and crude construction materials (common clays, sand and gravel, and stone) are produced, but output is not reported quantitatively, and available general information is inadequate to make reliable estimates.

TABLE 2
PAPUA NEW GUINEA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity e/	
Cement thousand tons	PNG-Halla Cement Pty. Ltd. (Halla Cement Corp. of the Republic of Korea, 50%; Government of Papua New Guinea, 50%)	Lae, Morobe Province	500	
Cobalt do.	Ramu Nickel Ltd., 68.5%, and Orogen Minerals Ltd., 31.5%	Ramu nickel-cobalt project, Madang Province, 75 km southwest of Madang 1/	3	
Copper do.	Ok Tedi Mining Ltd., operator [BHP Billiton Ltd., 52%; Government of Papua New Guinea, 30%; Inmet Mining Corp. (Canada), 18%]	Ok Tedi opencut, Western Province, 20 km northwest of Tabubil, 390 km southwest of Wewak	210	
Gold	Lihir Gold Ltd., operator, 100%	Lihir opencut, Lihir Island, New Ireland Province, 700 km northeast of Port Moresby	18	
Do.	Misima Mines Pty. Ltd. (Placer Dome Inc., operator, 80%; Orogen Minerals Ltd., 20%)	Misima opencut, Misima Island, Milne Bay Province.	6	
Do.	Aurora Gold Ltd., manager, 50%, and CDC Financial Services (Mauritius) Ltd., 50%	Morobe opencut, 250 km north of Port Moresby, Morobe Province 2/	9	
Do.	Ok Tedi Mining Ltd., operator [BHP Billiton Ltd., 52%; Government of Papua New Guinea, 30%; Inmet Mining Corp. (Canada), 18%]	Ok Tedi opencut, Western Province, 20 km northwest of Tabubil, 390 km southwest of Wewak	20	
Do.	Placer Dome Inc., operator [Highlands Gold Properties Ltd., 25%; Placer (PNG) Ltd., 25%], Goldfields Porgera Ltd., 25%, Orogen Minerals Ltd., 20%, and Minerals Resources Porgera Ltd., 5%	Porgera opencut, Enga Province, 620 km northwest of Port Moresby	30	
Do.	Dome Resources NL, 100%	Tolukuma underground mine, Central Province, 100 km north of Port Moresby	2	
Nickel thousand tons	Ramu Nickel Ltd., 68.5%, and Orogen Minerals Ltd., 31.5%	Ramu nickel-cobalt project, Madang Province, 75 km southwest of Madang 1/	33	
Silver	Misima Mines Pty. Ltd. (Placer Dome Inc., operator, 80%, and Orogen Minerals Ltd., 20%)	Misima opencut, Misima Island, Milne Bay Province.	100	
Do.	Aurora Gold Ltd., manager, 50%, and CDC Financial Services (Mauritius) Ltd., 50%	Morobe opencut, 250 km north of Port Moresby, Morobe Province 2/	124	
Natural gas thousand cubic meters per day	Oil Search Ltd., operator, 100%	Hides Gasfield, Southern Highlands Province. Onshore Papuan Basin, petroleum development license 1	425	
Petroleum 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%, ExxonMobil Corp., 14.52%, Petroleum Resources (Kutubu) Ltd., 6.75%, and Merlin Petroleum Co., 6.78% Petroleum development license 5: ExxonMobile Corp., operator and manager, 47.5%, and Oil Search Ltd., 52.5%	Central Moran Oilfield, Southern Highlands Province (includes Agogo and Iaqui-Hedinia Fields). Onshore Papuan Basin, petroleum development licenses 2 and 5 3/	15	
Do.	do.	Chevron Niugini Ltd., operator and manager, 19.37%; Oil Search Ltd., 27.14%, Orogen Minerals Ltd., 30.19%, ExxonMobil Corp., 14.52%, Merlin Petroleum Co., 6.78%, and Petroleum Resources Ltd. (Gobe), 2.0%	Gobe Main Oilfield, Southern Highlands Province. Onshore Papuan Basin, petroleum development license 4	10
Do.	do.	Chevron Niugini Ltd., operator and manager, 19.37%, Oil Search Ltd., 27.14%, Orogen Minerals Ltd., 25.44%, ExxonMobil Corp., 14.52%, Petroleum Resources (Kutubu) Pty. Ltd., 6.75%, and Merlin Petroleum Co., 6.78%	Kutubu Oilfield, Southern Highlands Province. Onshore Papuan Basin, petroleum development license 2	50
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	10

e/ Estimated. km--kilometer(s).

1/ Special mining lease, the final stage of the permitting process, was granted in July and a bankable feasibility study was completed by yearend. Mine and plant construction would be about 30 months once a positive production decision had been made and financing was in place.

2/ Feasibility study underway.

3/ The Central Moran Oilfield [petroleum development licenses (PDL) 2 and 5] will operate as a unit when developed, and equity interest in each will be PDL-2 (45%) and PDL-5 (55%) based on the proven and probable original oil in place.