



# 2011 Minerals Yearbook

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PHILIPPINES [ADVANCE RELEASE]

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# THE MINERAL INDUSTRY OF THE PHILIPPINES

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In 2011, one of the main mineral commodities produced in the Philippines was nickel. The country also produced other mineral commodities, such as cement, chromium, copper, gold, marine salt, and silver (table 1).

## Minerals in the National Economy

In 2011, the mining and quarrying sector (at constant 2000 prices) contributed about 1.19% to the Philippines' gross domestic product (GDP) compared with 1.16% in 2010. The construction sector contributed 5.1% to the GDP compared with 5.7% in 2010 (Bangko Sentral ng Pilipinas, 2012).

In 2010, (the latest year for which data were available), the gross value of mineral production (including metallic and nonmetallic mineral commodities) was \$3.2 billion.<sup>1</sup> In 2011, the gross value of the output of metals increased by 14% to \$2.83 billion (2.07% of the GDP) from \$2.48 billion in 2010. The value of gold produced in 2011 alone amounted to \$1.46 billion (1.07% of the GDP) (Mines and Geosciences Bureau, 2012c).

## Government Policies and Programs

The 1995 Philippine Mining Act regulates mineral resource development, requires the Government to monitor mining data (production, trade, and value) and maintain a database of mineral reserves, and encourages direct investment by the private and public sectors in mineral exploration and development activities in the Philippines. The Government grants exploration permits to qualified applicants to explore for mineral resources; exploration permits are valid for a period of 2 years and are renewable for not more than 4 years for exploration of nonmetallic minerals and 6 years for exploration of metallic minerals (Mines and Geosciences Bureau, 2010).

The 1995 Philippine Mining Act allows for three types of mining agreements. The first is a mineral agreement in which the Government grants a domestic contractor (a Filipino individual or corporation) an exclusive right to conduct mining operations in the contracted area. The agreement is valid for 25 years and is renewable for an additional 25 years. The second type of mining agreement is a Financial or Technical Assistance Agreement (FTAA), which is available to domestic and foreign corporations for a maximum area of 81,000 hectares (ha) onshore or 324,000 ha offshore; this agreement is valid for a period of 25 years and is renewable for another 25-year period. The third type of agreement is a mineral production-sharing agreement for properties with a maximum area of 16,200 ha; this permit, which is open to domestic and foreign corporations, is valid for a period of 25 years and is renewable for another 25-year period (Mines and Geosciences Bureau, 2012d).

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<sup>1</sup>Where necessary, values have been converted from Philippine pesos (PHP) to U.S. dollars (US\$) at the rate of PHP43.31=US\$1.00 for 2011 and PHP45.11=US\$1.00 for 2010.

In January, the Department of Environmental and Natural Resources of the Philippines (DENR) ordered its regional offices of the Mines and Geosciences Bureau (MGB) to suspend acceptance and processing of all types of new mining applications, including exploration permits, mineral-production-sharing agreements, financial and technical assistance agreements, and industrial sand and gravel permits. Based on Memorandum Order 2011-01, the measure is intended to ensure that older mining applications are processed and successfully implemented before new ones are considered. The measure also enables the identification of inactive mining projects. At the time of the memorandum's release, the DENR had identified more than 2,000 applications that were awaiting approval. The Department had been firm in taking final action against exploration contracts that had been expired for more than 5 years and with contracts that had not complied with the 3-year work program requirement for 2 consecutive years. These initiatives were part of the Department's effort to reform the mining sector, implement a use-or-lose policy for mining applications that are not compliant with the Government's mining regulations, and reduce the number of properties in an inactive status. In 2011, more than 900 inactive mining permits were cancelled or revoked to make way for new prospective mining applications (Department of Environmental and Natural Resources, 2011; Office of the President of the Philippines, 2011; Olchondra, 2011a).

Also in January, the Province of Romblon, which is an island Province located in the Mimaropa region, imposed a moratorium on all mining activities in the Province (including exploration, excavation, and extraction of metallic minerals), citing environmental concerns. The Provincial government was concerned about the effects of mine tailings contamination on farm lands and water systems. The ruling echoed the environmental code passed in June 2010 by South Cotabato Province (located in the Soccsksargen region in Mindanao), which banned the use of open pit mining as a method to extract mineral resources in the Province because of the potential for adverse environmental, food security, and health effects. The ban in South Cotabato Province was likely to affect mostly the Tampakan copper and gold mining project. The project, which was valued at \$5.2 billion, was proposed to be commissioned in 2016 and would use an open pit mining method (Yahoo News, 2011).

In March 2011, the regional office of the MGB in central Mindanao Island proposed through its development council committee the creation of two new offices to help strengthen the mineral industry in the region. The two offices would function as mineral industry development bodies within the MGB in central Mindanao. One office would standardize mining policy and promote responsible mining across the region; the other office would gather the regional mineral industry stakeholders to enhance cooperation among industry leaders.

The former Regional Minerals Development Council, which had a function similar to the one proposed for the standardization of policy office, was abolished in December 2010 by the previous Government administration when the agency to which it belonged was abolished. Unlike the former Regional Minerals Development Council, the new office will focus on the harmonization of mining policies and on promoting responsible mining in the region (Business World Philippines, 2011).

## Production

In 2011, the Philippines Department of Energy reported a 3.5% increase in the production of coal to 6,881,000 metric tons (t) from 6,650,000 t in 2010. The coal was used mainly by the Philippine cement industry and for the generation of power domestically. According to the Department of Energy of the Philippines's energy plan for 2009 to 2030, the country was expecting to produce about 9 million metric tons (Mt) of coal by 2015 (table 1; Intellasia.net, 2010).

In 2011, the Philippines produced 241,000 t of nickel, which was an increase of 18% compared with that of 2010. Production of metals also increased significantly for zinc (96%) and chromite (72%) compared with that of 2010. Production also increased for all industrial minerals, including clay, dimension stone, and feldspar. The metallic mineral commodities for which production decreased in 2011 included manganese (61%), and gold (24%) (table 1).

## Structure of the Mineral Industry

In 2011, an estimated 210,000 people, or 0.6% of the total employment in the country, were employed in the mining and quarrying industry (Mines and Geosciences Bureau, 2012a). Some of the main producers of mineral commodities in the Philippines were CGA Mining Ltd. of Australia (gold and silver); Lafayette Mining Ltd. of Australia (copper, gold, and silver); Lepanto Consolidated Mining Co. of the Philippines (copper, gold, and silver); Nickel Asia Corp. of the Philippines (nickel); Philex Mining Corp. of Canada (copper, gold, and silver); and TVI Resources Development Philippine Inc. (gold and silver), which was the Philippines affiliate of TVI Pacific Inc. of Canada. The country's major mineral industry facilities are listed in table 2.

## Mineral Trade

In 2011, total trade in the Philippines increased modestly by 1.6% to \$108.186 billion from \$106.430 billion in 2010. The country's total exports were valued at \$48.042 billion compared with \$51.498 billion in 2010, which was a decrease of 6.7%; however, the total value of imports in 2011 increased by 9.5% to \$60.144 billion from \$54.933 billion in 2010. In 2011, the Philippines' total mineral exports were valued at \$2.836 billion, which was about 6% of the country's total exports. In terms of minerals, the Philippines exported mainly copper, gold, and nickel, and these exports went mainly to Australia, Canada, China, and Japan. In 2011, imports of iron and steel and mineral fuels and related materials (including coal, coke, and crude petroleum) were valued at \$13.81 billion (about 23% of the country's total import value) compared with \$10.82 billion

in 2010, which was an increase of about 28%. Imports of nonferrous metals increased in 2011 by 45% to \$904.8 million from \$625.9 million in 2010; however, imports of metal ores and metal scrap decreased in 2011 by 42.4% to \$713.8 million from \$1,238.6 million in 2010 (National Statistical Coordination Board, 2011; Republic of the Philippines National Statistics Office, 2012a, b).

## Commodity Review

### Metals

**Nickel.**—In 2011, the production of nickel increased by 18% to 241,000 t from 204,000 t (revised) in 2010 (table 1). In April, Nickel Asia Corp. of the Philippines and Sumitomo Metal Mining Co. Ltd. of Japan announced that they had agreed to jointly invest \$1.4 billion in the construction of a second nickel plant to be located near Nickel Asia's Taganito nickel mining operations in Surigao del Norte. The new plant was under construction during 2011 and was to use high-pressure acid-leach technology to process limonite or low-grade nickel ore. The plant was expected to be in production by 2013. Nickel Asia would hold a 22.5% stake in the project, and Sumitomo would hold a 55% stake (Stainless Steel World, 2011).

In May, Nickel Asia finalized a shareholder's agreement with Sumitomo that endorsed the latter's participation in Nickel Asia's gold exploration subsidiary Cordillera Exploration Co. Inc. (Cexci). By November, Sumitomo had acquired a 25% interest in Cexci's equity shares after investing \$1.8 million. Sumitomo had the option to acquire an additional 15% interest by investing another \$2.8 million, for a total of 40% equity interest. Nickel Asia's main goal for the agreement was to fund exploration activities on Cexci's four gold and copper properties located in the Cordillera Central in northern Luzon. Cexci's original exploration permit (granted in 2006) had expired, and the company had applied for a renewal in 2009. As a condition for the permit renewal and in accordance with the country's Mining Law, Cexci was required to surrender 40% of its original property acreage. Renewal of the exploration permit was granted in November 2011 (Gao, 2011; Nickel Asia Corp., 2011).

In October, the British company ENK plc produced its first 50 kilograms (kg) of nickel hydroxide during the trial phase of the pilot plant at its Acoje nickel project on Luzon Island. The company expected to produce about 2.4 metric tons per year (t/yr) of the nickel hydroxide. Production was expected to commence formally in mid-2013. The Acoje project covers an area of 3,765 ha and had estimated inferred and indicated resources of 50.14 Mt at grades of 1.08% nickel and 0.05% cobalt (Australia's Paydirt, 2011; ENK plc, 2012).

**Copper, Gold, Silver, and Zinc.**—In 2011, the mined copper production in the country totaled 63,835 t of metal content, which was an increase of 9.3% compared with the 58,412 t produced in 2010. Copper mine output at the Carmen Copper Corp.'s Toledo Copper Complex was 32,206 t compared with 27,241 t in 2010 (an increase of 18%); at Rapu-Rapu Processing Inc.'s polymetallic project, production reached 6,810 t compared with 5,972 t in 2010 (an increase of 14%); and at Philex Mining Corp.'s Padcal copper project, production increased by 6.6% to 17,216 t in 2011 from 16,157 t in 2010. Copper production

decreased by 16% at TVI Resources' Canatuan mining project, however (Mines and Geosciences Bureau, 2012b).

Gold production decreased by 23.8% to 31,120 kg in 2011 from 40,847 kg in 2010 (table 1). Based on gold purchases by the Bangko Sentral ng Pilipinas (Philippines Central Bank), small-scale mines produced 17,389 kg of gold in 2011 compared with 25,232 kg of gold in 2010, which was a decrease of 31%. Significant decreases in production were reported at the Banahaw gold project, where gold production dropped by 31% to 2,219 kg in 2011 from 3,225 kg in 2010; at the Masbate gold project, where production decreased by 24% to 4,197 kg from 5,536 kg; and at the Victoria gold project, where production decreased by 21% to 564 kg from 712 kg. Some gold production increases were reported in polymetallic projects that produced gold as a byproduct, however; for example at the Toledo Copper Complex, where production increased by 15.8% to 213 kg of gold in 2011 from 184 kg in 2010 (Mines and Geosciences Bureau, 2012b).

In April, TVI Resources submitted an application to the MGB for a declaration of mining feasibility for its Balabag gold and silver project, which included a report on the economics of mining the property and the capital cost of such activity. The property covers a 52-square-kilometer (km<sup>2</sup>) area and is located in Zamboanga del Norte Province in Mindanao. While the company was awaiting Government approval of the mining feasibility application, the company continued with its scheduled activities, which included sample drilling, a ground penetration study, and an environmental impact assessment, among other activities (TVI Pacific Inc., 2012a).

In May, Philex announced that it had reached an agreement with First Metro Investment Corp. of the Philippines and the Bank of the Philippine Islands to acquire 5% of the shares from the Lepanto Consolidated Mining Corp. Lepanto had a 40% interest in the Far Southeast Gold project, which is located in the municipality of Mankayan, Benguet Province, Luzon Island. The Far Southeast Gold ore body is a gold-rich porphyry copper deposit (Thomson Reuters, 2011a).

Also in May, the Provincial Board of Batangas Province backed the decision of Crazy Horse Resources Inc. of Canada to develop the Taysan Copper Gold Project. In Resolution No. 253, the Government expressed its support to Crazy Horse's proposed approach to develop the property, including its selected open pit mining method. Also in May, the company entered into an agreement with a private local company to acquire approximately 16 ha in the port facility of Batangas. The Taysan project, which comprises a total area of 11,254 ha, is located in Batangas Province, Luzon Island, about 100 kilometers (km) south of Manila and 20 km east of Batangas City, which is the Provincial capital. The proposed Taysan project consists of two exploration permits and three exploration permit applications, all originally obtained by Taysan Copper Corp (TCC). In November 2010, Crazy Horse acquired 100% interest in the Taysan project through its wholly owned subsidiary Asia Arc Mining Resources Inc. By the end of 2011, the company reported its estimated measured and indicated resources for the project to be 459 Mt grading 0.26% copper, 0.10 grams per metric ton (g/t) gold, 0.8 g/t silver, and 3.3% magnetite. The project had an estimated cost

of \$521 million and an expected mine life of 24 years (Crazy Horse Resources Inc., 2011, p. 12, 15, 26, 32, 35; 2012a, b).

In May, Philex announced that it had finalized an exploration and joint-development agreement with Manila Mining Corp. (MMC) for the Kalayaan project, which is located in Surigao del Norte, Mindanao. The project had an exploration permit under the name Kalayaan Copper Gold Resources Inc., which was a wholly owned subsidiary of MMC. In the transaction, Philex acquired 5% interest in the Kalayaan project, with the option to obtain an additional 55% by funding approximately \$25 million for all predevelopment expenses and a feasibility study for the project. Under the agreement, Philex and MMC would jointly participate in the development phase of the project. The Kalayaan project covers an area of 286 ha and is located directly north of Philex's primary project in the area, the Silangan project, which hosts the Bayugo and Boyongan deposits. Drilling work started in the Kalayaan project in December 2011 (Manila Bulletin, 2011; Thomson Reuters, 2011b; Philex Mining Corp., 2012). In October, Philex announced that under the right economic conditions and higher metal prices, the company could extend the mine life of the Silangan gold-copper-silver project for up to 50 years. The company planned to reach the goal by mining lower grade ore from its Bayugo and Boyongan deposits, although no specifics were offered regarding the grade at which it would be mined. The Bayugo and Boyongan deposits had a measured and indicated resource of more than 4 Mt of copper (reported as 9 billion pounds) at a cutoff grade of 0.5% copper equivalent and about 156,000 kg of gold (reported as 5 million troy ounces). The cutoff grade was based on a copper price of \$2.75 per pound and a gold price of \$900 per troy ounce. The cost to develop this project was estimated to be about \$1 billion during a period of 3 years. The project was expected to be commissioned in 2017 (Olchondra, 2011b).

In June, Indophil Resources NL of Australia announced that it had submitted an application to the Government requesting an environmental compliance certificate for the Tampakan copper-gold mining project. As part of the permit application process, in December 2011, the company submitted the final mine environmental impact assessment to be evaluated as part of the environmental certificate package. This application followed the submission of the feasibility study of the project, which was submitted to the Government in April 2010, and was still pending approval as of the end of 2011. The feasibility study indicated the potential for the project to produce an average of 450,000 t/yr of copper during its first 5 years of production, and an average of 375,000 t/yr of copper and about 11,200 kilograms per year (kg/yr) of gold (reported as 360,000 troy ounces per year) for a minimum of 17 years. The Tampakan site covered an area of 10,000 ha and was operated by Sagittarius Mines, Inc. (SMI). The project, which was owned by Xstrata plc of the United Kingdom (62.5%) and Indophil (37.5%), is located in South Cotabato Province near the town of Tampakan on the southern island of Mindanao. By the end of 2011, Xstrata completed a mineral resource reestimation, which resulted in an increase of the mineral resources at Tampakan to 2.94 billion metric tons of ore at grades of 0.51% copper and 0.19 g/t gold at a cutoff grade of 0.2% copper, which represented 15 Mt of copper and 547,000 kg of gold (reported as 17.6 million troy ounces).

The project, which was planned as an open pit mining operation to be commissioned by 2016, was under an FTAA for a term of 25 years. In early January 2012, the Philippines Environmental Management Bureau denied Tampakan's permit application under the condition that it would be reevaluated once an environmental code dispute banning all open pit mining in the Province had been resolved. The environmental code measure was passed by South Cotabato Province in June 2010 and consisted of a Provincial ordinance that banned the use of open pit mining as a method to extract resources (Indophil Resources NL, 2012a, b; Sagittarius Mines, Inc., 2012).

In June, Oceana Gold Corp. of Australia (92%) announced that it had begun construction of its Didipio gold-copper project, which is located to the north of the island of Luzon in northern Philippines, approximately 270 km north of the capital city of Manila. The commissioning of the project was expected in the fourth quarter of 2012, and production was planned to start by the end of 2012. The project was under an FTAA for an area of about 158 km<sup>2</sup> and had an estimated mine life of 16 years as an open pit mining operation, and approximately 8 additional years as an underground operation. Once in operation, the company forecasted annual production of more than 3,100 kg of gold (reported as 100,000 troy ounces), and 14,000 t of copper in concentrate. The measured and indicated resources for the Didipio project were approximately 66,600 kg of gold (reported as 2.14 million troy ounces), and 290,000 t of copper; reserves were estimated to be about 52,300 kg of gold (reported as 1.68 million troy ounces) and 230,000 t of copper. After the commissioning of Didipio, the company planned to conduct a feasibility study to increase the plant's capacity from 3.5 million metric tons per year (Mt/yr) to 5 Mt/yr, which was expected to increase production to about 4,700 kg/yr of gold (reported as 150,000 troy ounces per year) and 20,000 t/yr of copper (OceanaGold Corp., 2012a, b).

In July 2011, TVI Resources announced that it had completed the first zinc concentrate shipment in its Canatuan copper and zinc mining project. By the end of the year, the project reported a total production for the year of 3,694 t of zinc. The Canatuan mining project is a polymetallic mine located in the Zamboanga del Norte Province in Mindanao. The company completed an expansion project in April 2010 that consisted of the construction of a zinc circuit to produce zinc concentrate. During 2011, an additional zinc flotation device was added to increase the capacity and production of copper and zinc concentrates (Mines and Geosciences Bureau, 2012b; TVI Pacific Inc., 2012b).

In October, FCF Minerals Corp. (a local subsidiary of Metals Exploration plc of the United Kingdom) announced that the DENR had approved its request for a declaration of the mining project feasibility of its Runruno polymetallic project. The approval of this permit allowed the company to start the design, development, and construction phase of the project, which was to include the construction of a processing plant and other infrastructure. The Runruno copper, gold, and molybdenum project, which is located in Nueva Vizcaya Province about 322 km north of Manila, was planned as an open pit mining operation at an estimated cost about \$168 million. The company was expecting to start the construction of the processing plant in the latter half of 2012 and to have it commissioned and

producing by the end of 2013. The company had identified areas with gold and molybdenum mineralization within the Runruno project area as well as zones with gold and copper anomalies. As of March 2011, the Runruno resources were estimated to be 43,200 kg of gold (reported as 1.39 million troy ounces) and 11,600 t of molybdenum (reported as 25.6 million pounds); total ore resources were estimated to be 25.7 Mt at grades of 1.69 g/t gold and 470 parts per million molybdenum (Metals Exploration plc., 2012a, b).

### *Industrial Minerals*

**Cement.**—In early 2011, Eagle Cement Co. started commercial production. The company, which was based in Akle, San Ildefonso, Bulacan, was a manufacturer and distributor of cement. The company served the areas of Manila and the Provinces of Nueva Ecija and Nueva Vizcaya. Eagle Cement plant had the capacity to produce 1.5 Mt/yr of cement (Maxwell-Cook, 2011).

### **Outlook**

Beginning in 2012, foreign direct investment in the Philippines could be affected by the DENR mandate that acceptance and processing of all types of new mining applications be suspended effective January 2011. The measure, which was designed to ensure the processing of older applications and identify inactive mining projects, could discourage investors, as the waiting time for the approval of new applications could be delayed indefinitely. On the other hand, the measure could also revitalize the mining industry by having inactive mining projects become available to new prospectors.

In April, the DENR forecasted that total mining investment in the Philippines would reach \$18 billion by the year 2016. The DENR estimated that the cumulative mining investment in the country from 2004 to 2011 was \$4.453 billion; 2004 was the year that the Philippines Supreme Court approved a measure that allowed foreign investors to have full ownership of large-scale mining projects in the country. By 2016, the country expects several mining investment projects that started in 2010 and 2011 to be commissioned; among them are the Tampakan copper-gold project (estimated to cost more than \$5 billion); the Kingking copper and gold project developed by St. Augustine Gold and Copper Ltd. of the United States, and CGA Mining Ltd. of Australia (\$1.8 billion); and a hydrometallurgical nickel processing plant by Nickel Asia and Sumitomo (\$1.4 billion), among other projects (Olchondra, 2011a; Mines and Geosciences Bureau, 2012c).

The industrial minerals and construction materials sector in the country had a steady increase in production during 2011, which benefited from the demand in the Southeast Asia region. The Philippines is likely to be a key supplier and producer of these mineral commodities, as well as a significant producer of such metals as chromium, nickel, and zinc. The production of metallic minerals will continue to be important to the Philippine economy, as many established projects have started to expand their facilities and production capacities. Similarly, the production of copper, gold, and nickel is expected to increase as major exploration activities result in new discoveries

and increases in resources and as proposed developments are commissioned in the near future, such as the Didipio gold-copper project (2012); Nickel Asia's second nickel plant in the country (2013); the Runruno polymetallic project (2013); the Tampakan copper-gold project (2016); and the Silangan gold-copper-silver project (2017).

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TABLE 1  
PHILIPPINES: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2007	2008	2009	2010	2011
<b>METALS</b>					
Chromium, chromite, gross weight	31,592	15,268	14,322	14,807	25,483
Cobalt, mine output, Co content <sup>3</sup>	1,000	1,200 <sup>e</sup>	1,500 <sup>e</sup>	2,200	2,200 <sup>e</sup>
Copper:					
Mine output, Cu content	22,862	21,235	49,060	58,412	63,835
Metal:					
Smelter	220,000	239,700	230,100	216,200	205,000
Refined	160,200	174,600	178,000	171,900	164,000
Gold, mine output, Au content kilograms	38,792	35,726	37,047	40,847	31,120
Iron and steel, steel, crude thousand metric tons	718	711	824	1,050 <sup>r</sup>	1,200
Lead, metal, secondary refined	34,000	34,000	32,000 <sup>r</sup>	30,000 <sup>r</sup>	34,000
Manganese, Mn content (43%)	2,200	5,500	3,600	4,900	1,900
Nickel, mine output, Ni content <sup>4,5</sup>	136,000	75,000	144,000	204,000	241,000
Silver, mine output, Ag content kilograms	27,754	14,224	33,808	41,004	45,530
Zinc, mine output, Zn content	7,394	1,619	10,035	9,268	18,170
<b>INDUSTRIAL MINERALS</b>					
Cement, hydraulic thousand metric tons	13,048	13,369	14,865	15,900	16,063
Clays:					
Bentonite	1,148	1,422	1,413	1,475	2,087
Red	6,742	7,181	7,357	7,050	8,243
White	7,224	8,745	8,519	8,857	12,246
Other	4,883	5,601	5,599	5,878	8,143
Feldspar	14,837	15,838	16,394	15,882	22,050
Lime	3,822	4,299	4,327	4,524	5,934
Perlite	4,515	4,593	4,606	4,756	6,272
Phosphate rock	1,961	2,271	2,257	2,308	2,778
Salt, marine	437,689	510,059	516,066	557,644	720,146
Sand and gravel:					
Silica sand thousand metric tons	221	270	284	296	352
Other <sup>6</sup> thousand cubic meters	40,076	46,659	46,602	49,009	58,815
Stone:					
Crushed, broken, other <sup>7</sup> do.	2,810	3,077	3,069	3,258	4,259
Dolomite	1,092,748	1,150,035	1,176,991	1,259,152	1,431,118
Limestone <sup>8</sup> thousand metric tons	26,419	31,528	33,090	35,540	42,526
Marble, dimension, unfinished cubic meters	4,791	5,410	5,629	6,001	8,043
Pumice	1,912	2,063	2,064	2,274	2,797
Quartz <sup>e</sup>	50,000	50,000	50,000	50,000	50,000
Tuff	16,490	17,570	18,830	19,166	22,106
Volcanic cinder <sup>9</sup> cubic meters	6,177	6,519	6,686	7,325	9,219
Sulfur, all forms <sup>e</sup>	180,000	180,000	180,000	180,000	180,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coal, all grades thousand metric tons	3,401	3,610	4,687	6,650	6,881
Gas, natural, gross million cubic meters	3,687	3,881	3,909	3,681	3,975
Petroleum:					
Crude thousand 42-gallon barrels	184	965	2,920	3,059	2,326
Refinery products: <sup>e</sup>					
Liquefied petroleum gas do.	2,951 <sup>10</sup>	3,556 <sup>10</sup>	3,286 <sup>10</sup>	3,500	3,500
Gasoline do.	12,491 <sup>10</sup>	11,988 <sup>10</sup>	9,153 <sup>10</sup>	9,000	9,000
Jet fuel do.	46,000	46,000	46,000	46,000	46,000
Kerosene do.	7,277 <sup>10</sup>	6,596 <sup>10</sup>	1,002 <sup>10</sup>	1,000	1,000
Distillate fuel oil do.	170,000	23,871 <sup>10</sup>	17,541 <sup>10</sup>	17,500	17,500
Residual fuel oil do.	21,226 <sup>10</sup>	15,975 <sup>10</sup>	10,776 <sup>10</sup>	10,000	10,000
Refinery fuel and losses do.	230,000	2,307 <sup>10</sup>	2,068 <sup>10</sup>	2,000	2,000
Other do.	1,725 <sup>10</sup>	2,882 <sup>10</sup>	4,635 <sup>10</sup>	4,500	4,500
Total do.	492,000	113,000	94,500	93,500	93,500

See footnotes at end of table.

TABLE 1—Continued  
PHILIPPINES: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

<sup>1</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>2</sup>Revised. do. Ditto.

<sup>1</sup>Table includes data available through December 6, 2012.

<sup>2</sup>In addition to the commodities listed, the Philippines produce platinum-group metals as byproducts of other metal production, but available information is inadequate to make reliable estimates of output.

<sup>3</sup>The majority of the nickel laterite produced in the Philippines is exported to China, but whether cobalt content is recovered is not known.

<sup>4</sup>Nickel, mine output, Ni content production, in metric tons, reported by the Government was 2007—91,367; 2008—80,644; 2009—139,744; 2010—184,330 (revised); and 2011—319,354.

<sup>5</sup>Data compiled using trade data from the United Nations Comtrade database for nickel ores and concentrates imported from the Philippines by China and Japan.

<sup>6</sup>Includes "pebbles" and "soil" not further described.

<sup>7</sup>Includes materials described as rock, crushed or broken/blasted; stones, cobbles, and boulders; pebbles; rock aggregates; and broken adobe.

<sup>8</sup>Includes limestone for agriculture, cement manufacturing, industrial use, and other.

<sup>9</sup>Reported as "black cinder" for years 2007 to 2011 by the Philippines Mines and Geosciences Bureau.

<sup>10</sup>Reported figure.

TABLE 2  
PHILIPPINES: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement	Eagle Cement Co.	Plant located in Akle, San Ildefonso, Bulacan	1,500,000.
Do.	Fortune Cement Corp.	Bulacan plant at Norzagaray, Bulacan Province; Batangas plant at Taysan, Batangas Province	2,100,000.
Do.	Holcim Philippines, Inc.	Bulacan plant at Norzagaray, Bulacan Province; Davao plant at Barrio Ilang, Davao City; La Union plant at Bacnotan, La Union Province; Lugait plant at Lugait, Misamis Oriental Province	7,200,000.
Do.	Solid Cement Corp., APO Cement Corp., and Rizal Cement Corp.	Cement plants at three locations— Naga, Cebu Province (APO Cement Corp.); Antipolo City, Rizal Province (Solid Cement Corp.); Binangonan, Rizal Province (Rizal Cement Corp.)	4,300,000.
Chromite	Consolidated Mines Inc. (owner) and Benguet Corp. (operator)	Masinloc chromite mine (Coto chromite deposit) in Coto, 27 kilometers east of the Port of Mansiloc in Zambales Province	5,000.
Do.	Heritage Resources Mining Corp.	Homonhon chromite project	17,000.
Do.	Krominco Inc.	Dinagat chromite project—Redondo Mine (Mt. Redondo deposit) in the Municipality of Loreto, Dinagat Island	26,000.
Copper, concentrate	Carmen Copper Corp.	Toledo Copper Complex, in the Central Highlands of Cebu, Cebu Island	20,000.
Do.	Lafayette Mining Ltd., 75%, and LG International and Korean Resources Corp., 25%	Rapu-Rapu Mine under the Rapu-Rapu polymetallic project in Albay Province	36,000.
Do.	Lepanto Consolidated Mining Co.	Victoria and Teresa Mines in Mankayan, Benguet Province	200.
Do.	Philex Mining Corp. (through its subsidiary Philex Gold Inc.), 81%	Padcal copper project in Tuba, Benguet Province, Luzon Island	21,000.
Do.	TVI Resources Development Philippine Inc., 100%	Canatuan project, located east of Siocon, Province of Zamboanga del Norte, Mindanao Island	10,000.
Do.	Glencore International plc.	Philippine Associated Smelting and Refining Corp. (PASAR) in Isabel, Leyte Province	250,000 smelter; 173,000 refinery.

See footnotes at end of table.



TABLE 2—Continued  
PHILIPPINES: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity	
Gold, mine	kilograms	APEX Mining Company Inc.	APEX Maco operation	100.
Do.	do.	CGA Mining Ltd.	Masbate Gold Project, 350 kilometers south of Manila, Masbate Island	6,000.
Do.	do.	Lafayette Mining Ltd., 75%, and LG International and Korean Resources Corp., 25%	Rapu-Rapu Mine under the Rapu-Rapu polymetallic project in Albay Province	1,500.
Do.		Lepanto Consolidated Mining Co.	Victoria and Teresa Mines in Mankayan, Benguet Province	2,000.
Do.	do.	Philex Mining Corp. (through its subsidiary Philex Gold Inc.), 81%	Padcal Mine (Sto. Tomas II deposit) in Tuba, Benguet Province, Luzon Island	5,000.
Do.	do.	Philippine Mining Development Corp.	Diwalwal Direct State Development Project at Mount Diwalwal in Davao del Norte Province	100.
Do.	do.	Philsaga Mining Corp.	Banahaw Gold Project	NA.
Do.	do.	TVI Resources Development Philippine Inc., 100%	Canatuan project, located east of Siocon, Province of Zamboanga del Norte, Mindanao Island	500.
Nickel, mine		CRAU Mineral Resources Corp.	Santa Cruz-Candelaria Nickel project located in Zambales Province	1,000.
Do.		CTP Construction & Mining Corp.	Adlay-Cagdianao-Tandawa (ACT) nickel project in Barangay Adlay, Municipality of Carrascal, Province of Surigao del Sur	10,000.
Do.		Hinatuan Mining Corp.	South Dinagat project on Nonoc Island	4,000.
Do.		Nickel Asia Corp., 100%	Cagdianao nickel project near Barangay Valencia on Dinagat Island	10,000.
Do.	do.		Tagana-an nickel project on Hinatuan Island	30,000.
Do.		Nickel Asia Corp., 65%; Pacific Metals Co. Ltd., 33.5%; Sojitz Philippines, 1.5%	Claver nickel project (Taganito) in Surigao del Norte Province, Mindanao Island	16,000.
Do.		Nickel Asia Corp., 60%; Pacific Metals Co. Ltd., 36%; Sojitz Philippines, 4%	Rio Tuba nickel project in Barrio Rio Tuba, Municipality of Bataraza, Palawan Province.	5,000.
Do.		SR Metals, Inc.	SR Nickel project, Tubay Mine in Tubay, Agusan del Norte Province	25,000.
Do.		Toledo Mining Corporation Plc., 56.1%	Berong nickel project on Palawan Island	10,000.
Nickel, mine and plant		Coral Bay Nickel Corp. (Sumitomo Metal Mining Co. Ltd., 54%; Mitsui & Co. Ltd., 18%; Rio Tuba Nickel Mining Corp., 10%; Nickel Asia Corp., 6%)	Coral Bay nickel high pressure acid-leach (HPAL) plant on Palawan Island	24,000 nickel; 1,800 cobalt
Silver	kilograms	Lafayette Mining Ltd., 75%, and LG International and Korean Resources Corp., 25%	Rapu-Rapu Mine under the Rapu-Rapu polymetallic project in Albay Province	18,000.
Do.	do.	Lepanto Consolidated Mining Co.	Victoria and Teresa Mines in Mankayan, Benguet Province	4,000.
Do.	do.	Philex Mining Corp. (through its subsidiary Philex Gold Inc.), 81%	Padcal Mine (Santo Tomas II deposit) in Tuba, Benguet Province, Luzon Island	5,000.
Do.	do.	TVI Resources Development Philippine Inc., 100%	Canatuan project, located east of Siocon, Province of Zamboanga del Norte, Mindanao Island	17,000.
Zinc		Lafayette Mining Ltd., 75%, and LG International and Korean Resources Corp., 25%	Rapu-Rapu Mine under the Rapu-Rapu polymetallic project in Albay Province	8,000.

Do., do. Ditto. NA Not available.