



# 2006 Minerals Yearbook

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## PHILIPPINES

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# THE MINERAL INDUSTRY OF THE PHILIPPINES

By Yolanda Fong-Sam

The Philippines generated approximately 3.7% of the total world production of nickel in 2006 (Kuck, 2008). Other minerals produced in the Philippines included cement, chromium, copper, gold, marine salt, and silver (table 1).

## Minerals in the National Economy

In 2006, the mining and quarrying sector contributed 1.15% of the Philippine gross domestic product; the construction sector contributed 3.58% (Bangko Sentral ng Pilipinas, 2007).

## Government Policies and Programs

In December 2004, the Philippines achieved a major success in its effort to revitalize the mining industry when the Supreme Court of the Philippines confirmed the legality of the 1995 Philippine Mining Act, including the Financial or Technical Assistance Agreement (FTAA), which regulates mineral resources development, requires the Government to maintain an inventory of mineral reserves, and promotes direct investment in mineral exploration and development activities in the Philippines. The Act also promotes the revitalization of the mining industry by providing fiscal reforms and incentives. In addition, the Philippine Government simplified the mining permit process and reduced the length of time needed for investors to receive the approvals for a mineral production agreement from a period of 3 to 5 years to 6 months. Preceding the December 2004 decision, in 1997, a group of nongovernmental organizations (NGOs) had asked the Supreme Court to nullify both the 1995 Philippine Mining Act and the FTAA, which allowed the direct participation of foreign-owned corporations in the mining industry of the Philippines. The NGOs claimed that the Act's provisions were unconstitutional (Mining Journal, 2005; 2006).

The 1995 Philippine Mining Act allows for three types of mining rights in the country. The first is an exploration permit for properties with a maximum area of 32,000 hectares onshore or 81,000 hectares offshore that is valid for a period of 2 years and is renewable to a maximum of 8 years. The second type of mining right is a financial or technical assistance agreement for properties with a maximum area of 81,000 hectares onshore or 324,000 hectares offshore that is valid for a period of 25 years and is renewable for another 25-year period. The third is a mineral production-sharing agreement for properties with a maximum area of 16,200 hectares onshore and (or) 40,500 hectares offshore that is valid for a period of 25 years and is renewable for another 25-year period (Mines and Geosciences Bureau, 2007c).

## Production

During 2006, the mining sector of the Philippines experienced both increases and decreases in mineral production compared

with that of 2005. Increases in production were observed mainly for the following commodities: nickel (121.05%), chromium (22.71%), silver (22.56%), and mined copper (5.15%). The mineral commodities that experienced significant production decreases were cement (22.34%), coal (20.09%), crude petroleum (12.98%), and gold (3.60%). Additional data on mineral production are provided in table 1.

The remarkable increase in nickel production was driven by high prices on the world market and an increase in demand during the second quarter of 2006—a trend that continued to the end of the year. The increase in copper and silver production was owing to the high levels of world demand, which were reflected in the prices of these minerals. Gold mine production plunged beginning in the second quarter of 2006 despite high average prices on the world market in the first part of the year. Prices dropped suddenly during the month of June and continued to fall into the third quarter. Gold production in the Philippines was affected mainly by a decrease in the purchase of panned gold by the Bangko Sentral ng Pilipinas (Philippines Central Bank) in June and a decrease in small-scale gold mining production in August and September. The production of crude petroleum started to decline during the second quarter of 2006 as the Australian oil company Nido Petroleum Ltd. reported a decrease in production at its Matinloc and Nido oilfields. The decrease in coal production was in response to decreased demand from local powerplants (Mines and Geosciences Bureau, 2007a; National Statistical Coordination Board, 2007a-c).

## Structure of the Mineral Industry

The significant producers of mineral commodities in the Philippines were Hinatuan Mining Corp. (nickel), Lepanto Consolidated Mining Company (gold and silver), Philex Mining Corp. of Canada (copper), and TVI Pacific Inc. (gold and silver). Table 2 is a list of major mineral industry facilities.

## Mineral Trade

In 2006, total trade of the Philippines amounted to \$99.18 billion. The total value of exports increased by about 15% to an estimated \$47.41 billion from \$41.26 billion in 2005. The export of cathodes and sections of cathodes of refined copper, and petroleum products in 2006 was valued at approximately \$2.15 billion, which represented about 4.5% of the total exports. Exports of these commodities increased by approximately 127% in 2006 compared with the previous year.

Likewise, the total value of imports increased by about 9% in 2006 to \$51.77 billion from \$47.42 billion in 2005. The value of Philippine imports of iron and steel and mineral fuels and related materials was \$9.19 billion in 2006, which represented an increase of approximately 20% compared with their import value of \$7.66 billion in 2005. The value of these imports

accounted for approximately 17.8% of the total value of imports in the country (National Statistics Office of the Philippines, 2007).

The Philippines' main trading partner in 2006 was the United States, which accounted for 17.3% of the country's total trade; exports to and imports from the United States were valued at \$8.69 billion and \$8.44 billion, respectively. The second major trading partner was Japan (15.3% of total trade); exports to Japan were valued at \$7.92 billion and imports from Japan were valued at \$7.27 billion. The country's third and fourth ranked trading partners were China and Singapore, which accounted for 8.3% and 7.9% of the Philippines total trade, respectively. Exports to China were valued at \$4.63 billion and imports from China were valued at \$3.65 billion; exports to Singapore were valued at \$3.51 billion and imports from Singapore were valued at \$4.38 billion (National Statistics Office of the Philippines, 2007).

## Commodity Review

### Metals

**Chromium.**—Chromite production increased by 22.71% in 2006 to 46,728 metric tons (t) from 38,081 t in 2005 (table 1). The Philippines produced three grades of chromite: chemical, metallurgical, and refractory. As reported by the Mines and Geosciences Bureau, production of all three chromite grades increased in 2006. Metallurgical chromite increased by 26% (to 25,534 t in 2006 from 20,025 t in 2005); refractory, by 157.4% (to 4,711 t in 2006 from 1,830 t in 2005); and chemical, by 3.4% (to 16,783 t in 2006 from 16,226 t in 2005) (Mines and Geosciences Bureau, 2007b).

**Copper.**—Mined copper production in 2006 totaled 17,161 t, which was an increase of 5.15% compared with the 16,320 t produced in the previous year (table 1). The Padcal copper project, which was owned by Philex, was the country's only copper producer (mined and milled) since 2001 when the Placer copper project (which was owned by Manila Mining Corp.) and the Sipalay copper project (Maricalum Mining Corp.) ceased operations. Philex expected its expansion project at the Padcal Sto. Tomas II copper deposit, which is located in Tuba, Benguet Province, to be finished by 2007. The company has operated the Sto. Tomas II deposit for about 50 years (Mines and Geosciences Bureau, 2007a).

Glencore International AG of Switzerland held a 90% share of the Philippines' sole copper smelter and refinery facility, the Philippine Associated Smelting and Refining Corp. (PASAR). PASAR's facilities are located in Isabel on Leyte Island. In early 2006, PASAR expanded its smelter input capacity to 720,000 metric tons per year (t/yr) of concentrate. Future plans for this facility included the increase of the refinery capacity from 172,500 t/yr to 215,000 t/yr of copper cathodes (Glencore International AG, 2007; Philippine Associated Smelting and Refining Corp., 2007).

**Gold.**—Philippines gold production in 2006 totaled 36,141 kilograms (kg), which is equivalent to a decrease of 3.6% compared with the 37,490 kg produced in 2005 (table 1). A decrease in gold production was reported in the following four main gold projects: the Acupan SSM project of Benguet Corp. (11% decline); Diwalwal State Utilization Project of the

National Resources Mining Development Corp. (reported no production during 2006 because it was conducting a feasibility study); and the Teresa and the Victoria gold projects of Lepanto Consolidated Mining Corp. (34% and 15% decrease, respectively) (Mines and Geosciences Bureau, 2007a, b).

In December 2005, Crew Gold Corp. of the United Kingdom finalized the acquisition of 72.87% of the Masara gold mine from Apex Mining Company of the Philippines. The mine is located in the southeastern part of Mindanao Island. During 2006, Crew Gold commissioned the mine to add a processing facility to expand the mine's annual capacity to produce between 150,000 and 200,000 troy ounces (4,666 and 6,221 kg) of gold, and between 300,000 and 400,000 troy ounces (9,331 and 12,441 kg) of silver. Other improvements to the mine included the construction of a processing plant with an input capacity of 2,900 metric tons per day (Crew Gold Corp., 2006, p. 1, 4, 14).

The Canatuan polymetallic mining project was a gold- and copper-rich deposit that was owned by TVI Pacific Inc. [an affiliate of TVI Resource Development Phils. Ltd. (TVIRD)]. The oxide portion of the deposit contains gold and silver; underneath is the sulfide portion, which contains copper and zinc. The Canatuan project is located in the Province of Zamboanga del Norte on Mindanao Island. On January 18, 2007, the board of directors of TVI Pacific announced its approval for the construction of a sulfide flotation plant at the Canatuan project (TVI Pacific Inc., 2007a, b).

The polymetallic Rapu-Rapu mining project is located in the Province of Albay in east-central Philippines and had been operated by Lafayette Mining Ltd. since 2004. TVI held a 2.5% share of the net smelter return royalty in the project. The construction of the Rapu-Rapu project was begun in July 2004 soon after Lafayette announced the completion of the gold plant commissioning phase, and by July 2005, gold production had started. In November 2005, Lafayette completed the precommissioning of the base-metal flotation plant; activities were subsequently suspended because of an ongoing investigation related to a discharge of processed water from the facility. In February 2007, the Rapu-Rapu project received a "final lifting order" from the Philippines Pollution Adjudication Board and the Department of Environmental and Natural Resources for satisfactory environmental management practices (TVI Pacific Inc., 2007a).

On November 23, 2006, the Canadian company Olympus Pacific Minerals Inc. announced that the company and its affiliates had entered into a memorandum of agreement with Philippine companies Abra Mining and Industrial Corp., and Jabel Corp. to earn jointly a 60% interest in the Capcapo gold-copper project, which is located in the Province of Abra in northern Luzon Island (Olympus Pacific Minerals, Inc. 2006, p. 11, 17).

**Nickel.**—The production of nickel in 2006 soared by 121% to 58,879 t from 26,636 t in 2005 (table 1). Nickel production in 2006 represented a large increase that followed 2 years of significant production decreases in 2003 and 2004 (table 1). The projects that reported increases in 2006 included the Cagdianao nickel project of Cagdianao Mining Corp., which increased production by 43.5% to 8,425 t in 2006 from 5,870 t in 2005; the Coral Bay nickel project of Coral Bay Nickel Corp., an affiliate of Sumitomo Metal Mining Co. Ltd. of Japan,

which increased production by 102% to 8,242 t from 4,081 t in 2005; the Rio Tuba nickel project of Rio Tuba Nickel Mining Corp., which increased production by 17.4% to 3,785 t from 3,225 t; and the South Dinagat project of Hinatuan Mining, which increased production by 6.1% to 3,482 t from 3,281 t. In February 2006, the Tagana-an nickel project of Hinatuan Mining started its commercial production, which represented 25,983 t of nickel production and the equivalent of 44% of the total nickel produced in the Philippines in 2006 (Mines and Geosciences Bureau, 2007a, b).

Sumitomo Metal Mining was the lead developer and operator of the Coral Bay nickel project and held a 54% equity stake in the project. The nickel refining project is located on Palawan Island in the southwestern part of the Philippines. A high pressure acid leach (HPAL) process was used to recover cobalt and nickel from low-grade ore. The HPAL process was incorporated into the processing plant and, in early 2005, the facility started production of nickel-cobalt mixed sulfide, which is a byproduct obtained as part of the process to produce refined nickel. By 2009, Sumitomo Metal Mining was expecting to double the nickel production capacity at the Coral Bay facility by adding a second plant. This addition would increase the recovered nickel capacity to 20,000 t/yr (Sumitomo Metal Mining Co., Ltd., 2006, p. 23).

Another nickel project in the Philippines was Crew Gold Corp.'s Mindoro nickel project, which was owned by Aglubang Mining Corp. (AMC) and Alagag Mining Corp. (AMI), which in turn were owned by a consortium of Crew Minerals ASA (40%) and a group of associated Philippine partners (60%). AMC and AMI had a mineral production-sharing agreement with the Philippine Government until 2020. The nickel project is located on Mindoro Island about 200 kilometers (km) south of the capital city of Manila (Crew Gold Corp., 2006, p. 28).

United Kingdom-based Toledo Mining Corporation Plc had mining interests in two main nickel projects in the Philippines—the Berong Deposits and the Celestial/Ipilan Deposit, which are located on the Island of Palawan. The company had a 56.1% interest in the Berong Deposits, which consisted of the Berong, the Long Point, the Moorson, and the Ulugan deposits. In the case of the Celestial/Ipilan nickel laterite deposit, the company could earn 52% interest in the project and had the right to increase its share to 71.2% (Toledo Mining Corp. Plc, 2008a, b).

**Silver.**—Output of silver in 2006 achieved a record high compared with the past 5 years (table 1). Production during 2006 reached 23,471 kg, which was an increase of 22.56% compared with the previous year's reported production of 19,150 kg. The main contributor to the increase in silver production was the Canatuan polymetallic mining project, which was owned by TVIRD. The Canatuan project produced 18,521 kg of silver, or an equivalent of 78.9% of the total silver produced in the country in 2006 (Mines and Geosciences Bureau, 2007a, b; TVI Pacific Inc., 2007a, p. 9).

## Outlook

In 2007, exploration and investment activities for base metals and precious metals in the Philippines will likely continue as projects that started in 2005 and 2006 progress. Mineral

production in 2007 will likely be highly influenced by the world market prices and the demand for commodities, although based on 2006 performance, the commodity production in the Philippine mining sector will likely continue to be dominated by nickel. Total production of nickel for 2007 is expected to increase as a result of the Tagana-an nickel project starting commercial production in early 2006, in addition to increases in production in the Cagdianao nickel project and the Rio Tuba nickel project.

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

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2002	2003	2004	2005	2006
<b>METALS</b>					
Chromium, chromite, gross weight	22,000	33,780	42,140	38,081 <sup>r</sup>	46,728
Copper:					
Mine output, Cu content	18,364	20,414	15,984	16,320	17,161
Metal:					
Smelter	137,800	111,600	120,000	170,000	162,000
Refined	144,315	171,152	174,628	172,000	181,000
Gold, mine output, Au content kilograms	35,850	37,844	35,464	37,490	36,141
Iron and steel, steel, crude <sup>c</sup> thousand metric tons	530	550	550	550	550
Lead, metal, secondary refined	26,000	27,000	29,000	30,000	29,000
Nickel, mine output, Ni content	24,148	19,537	16,973	26,636 <sup>r</sup>	58,879
Silver, mine output, Ag content kilograms	8,800	9,533	9,315	19,150	23,471
<b>INDUSTRIAL MINERALS</b>					
Cement, hydraulic thousand metric tons	13,400	13,067	13,346	15,494	12,033
Clays:					
Bentonite	2,550 <sup>r</sup>	3,720 <sup>r</sup>	3,560	1,000 <sup>r,3</sup>	1,000 <sup>e</sup>
Red	5,000 <sup>e</sup>	5,000 <sup>e</sup>	8,920	3,530	4,000 <sup>e</sup>
White	7,650 <sup>r</sup>	20,700 <sup>r</sup>	13,310	12,220	13,000 <sup>e</sup>
Other <sup>c</sup>	800	800	6,500	13,400 <sup>3</sup>	13,000 <sup>e</sup>
Feldspar	30,000 <sup>e</sup>	30,000 <sup>e</sup>	32,110	11,850	12,000 <sup>e</sup>
Lime <sup>e</sup>	9,000	9,000	9,000	9,000	9,000
Perlite <sup>e</sup>	6,000	6,000	5,510 <sup>3</sup>	4,410 <sup>3</sup>	4,500
Phosphate rock <sup>e</sup>	400,000	400,000	400,000	400,000	400,000
Pyrite and pyrrhotite, including cuprous, gross weight <sup>c</sup>	300,000	300,000	300,000	300,000	300,000
Salt, marine	460,980 <sup>r</sup>	429,160	427,620	420,950	425,000 <sup>e</sup>
Sand and gravel:					
Silica sand thousand metric tons	156 <sup>r</sup>	170	237	224	250 <sup>e</sup>
Other <sup>4</sup> thousand cubic meters	37,774 <sup>r</sup>	36,359 <sup>r</sup>	36,133	36,792	37,000 <sup>e</sup>
Stone:					
Dolomite <sup>e</sup>	800,000	750,000	1,408,870 <sup>3</sup>	874,730 <sup>3</sup>	900,000
Limestone <sup>5</sup> thousand metric tons	20,000 <sup>e</sup>	16,432	20,959	21,236	21,000 <sup>e</sup>
Marble, dimension, unfinished cubic meters	3,840 <sup>r</sup>	49,060 <sup>r</sup>	4,740	5,120	5,000 <sup>e</sup>
Volcanic cinder <sup>e</sup> do.	2,000	2,000	8,470 <sup>3</sup>	8,660 <sup>3</sup>	9,000
Tuff <sup>e</sup>	1,500	1,500	19,250 <sup>3</sup>	17,850 <sup>3</sup>	18,000
Quartz <sup>e</sup>	50,000	50,000	50,000	50,000	50,000
Crushed, broken, other <sup>e,6</sup> thousand cubic meters	2,500	2,500	2,500	2,500	2,500
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	1,665	2,029	2,727	3,165	2,529
Petroleum:					
Crude thousand 42-gallon barrels	2,020	2,000 <sup>e</sup>	139	208	181
Refinery products: <sup>e</sup>					
Liquefied petroleum gas do.	25,200	25,200	30,600 <sup>3</sup>	31,000	31,000
Gasoline do.	79,800	79,800	127,600 <sup>3</sup>	128,000	128,000
Jet fuel do.	29,400	29,400	45,800 <sup>3</sup>	46,000	46,000
Kerosene do.	21,000	21,000	17,700 <sup>3</sup>	18,000	18,000
Distillate fuel oil do.	168,000	168,000	170,000	170,000	170,000
Residual fuel oil do.	215,000	215,000	234,200 <sup>3</sup>	234,000	234,000
Refinery fuel and losses do.	230,000	230,000	230,000	230,000	230,000
Other do.	225,000	225,000	225,000	225,000	225,000
Total do.	993,000	993,000	996,000	1,100,000	1,100,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>Table includes data available through November 16, 2007.



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

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

<sup>3</sup>Reported figure.

<sup>4</sup>Includes "pebbles" and "soil" not further described.

<sup>5</sup>Excludes limestone for road construction.

<sup>6</sup>Includes materials described as rock, crushed or broken; stones, cobbles, and boulders; rock aggregates; and broken adobe.

TABLE 2  
PHILIPPINES: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement	Fortune Cement Corp.	Fortune Cement plant at two locations— Bulacan plant at Norzagaray, Bulacan Province, and Batangas plant at Taysan, Batangas Province	2,100,000.
Do.	Holcim Philippines, Inc.	Holcim Cement plants at four locations— 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.	Cement plant in three locations— APO Cement Corp. at Naga, Cebu Province Solid Cement Corp. at Antipolo City, Rizal Province Rizal Cement Corp. at Binangonan, Rizal Province	4,300,000.
Chromite	Consolidated Mines Inc. (mineral claim owner) and Benguet Corp. (mine operator)	Mansiloc chromite mine (Coto chromite deposit) located in Coto 27 kilometers east of the Port of Mansiloc in Zambales Province	5,000.
Do.	Krominco Inc.	Redondo Mine (Mt. Redondo deposit) located in the Municipality of Loreto, Dinagat Islands Province	26,000.
Copper	Lepanto Consolidated Mining Company	Victoria and Teresa Mines located in Mankayan, Benguet Province	200.
Do.	Philex Mining Corp. (through its subsidiary Philex Gold Inc.), 81%	Padcal Copper project located in Tuba, Benguet Province, Island of Luzon	21,000.
Do.	Glencore International AG	Philippine Associated Smelting and Refining Corp. (PASAR), located in Isabel, Leyte Island	250,000 smelter; 173,000 refinery.
Do.	Lafayette Mining Ltd., 75%, and LG International and Korean Resources Corp., 25%	Rapu-Rapu Mine under the Rapu-Rapu polymetallic project, located in Albay Province	36,000. <sup>1</sup>
Gold	kilograms Lepanto Consolidated Mining Company	Victoria and Teresa Mines located in Mankayan, Benguet Province	2,000.
Do.	do. Philex Mining Corp. (through its subsidiary Philex Gold Inc.), 81%	Padcal Mine (Sto. Tomas II deposit) located in Tuba, Benguet Province	5,000.
Do.	do. TVI Resources Development Philippine Inc., 100%	Canatuan project, located east of Siocon, Zamboanga del Norte Province, Mindanao Island	500.
Do.	do. Lafayette Mining Ltd., 75%, and LG International and Korean Resources Corp., 25%	Rapu-Rapu Mine under the Rapu-Rapu polymetallic project, located in Albay	1,500. <sup>1</sup>
Nickel	Coral Bay Nickel Corp. (Sumitomo Metal Mining Co. Ltd., 54%; Mitsui & Co. Ltd. 18%; Rio Tuba Nickel Mining Corp., 10%; and Nickel Asia Corp., 6%	Coral Bay nickel high pressure acid leach (HPAL) plant located on Palawan Island in southwest Philippines	10,000. <sup>2</sup>
Do.	Nickel Asia Corp., 100%	Cagdianao nickel project located near Barangay Valencia in Dinagat Islands Province	10,000.
Do.	do.	South Dinagat project located on Nonoc Island	4,000.

See footnotes at end of table.

TABLE 2--Continued  
 PHILIPPINES: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
<b>Nickel--Continued</b>			
Do.	Nickel Asia Corp., 100%	Tagana-an nickel project located on Hinatuan Island	30,000.
Do.	Nickel Asia Corp., 65%, and Pacific Metals Co. Ltd. and Sojitz Philippines, 35%	Claver nickel project (Taganito) located in Surigao del Norte Province	12,000.
Do.	Nickel Asia Corp., 60%, and Pacific Metals Co. Ltd. and Sojitz Philippines, 40%	Rio Tuba Nickel project, located in Barrio Rio Tuba, municipality of Bataraza in Palawan Province.	5,000.
Silver	kilograms Lepanto Consolidated Mining Company	Victoria and Teresa Mines located in Mankayan, Benguet Province	4,000.
Do.	do. TVI Resources Development Philippine Inc., 100%	Canatuan project, located east of Siocon, Zamboanga del Norte Province	17,000.
Do.	do. Lafayette Mining Ltd., 75%, and LG International and Korean Resources Corp., 25%	Rapu-Rapu Mine under the Rapu-Rapu polymetallic project, located in Albay Province	18,000. <sup>1</sup>
Do.	do. Philex Mining Corp. (through its subsidiary Philex Gold Inc.), 81%	Padcal Mine (Sto. Tomas II deposit) located in Tuba, Benguet Province	5,000.
Zinc	Lafayette Mining Ltd., 75%, and LG International and Korean Resources Corp., 25%	Rapu-Rapu Mine under the Rapu-Rapu polymetallic project, located in Albay Province	8,000.

<sup>1</sup>Closed in 2006; scheduled to reopen in 2007.

<sup>2</sup>Proposed increase to 20,000 metric tons by 2009.