



# 2007 Minerals Yearbook

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**PARAGUAY AND URUGUAY [ADVANCE RELEASE]**

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# THE MINERAL INDUSTRIES OF PARAGUAY AND URUGUAY

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## PARAGUAY

In 2007, Paraguay's mineral industries included cement, iron and steel, and petroleum derivatives. Paraguay's hydropower sources were three hydroelectric dams in the Parana River, which produces the largest amount of electrical power in the world. The three dams were the Central Acaray, which was managed by the state-owned Administración Nacional de Electricidad; the Itaipu, which was a joint venture with Brazil; and the Yacyreta, which was a joint venture with Argentina. Paraguay had no natural gas or oil reserves but was a major producer and exporter of hydroelectric power. To meet its crude oil and petroleum products demand, Paraguay relied completely on imports of approximately 25,400 barrels per day (bbl/d) based on 2007 estimates (U.S. Energy Information Administration, 2008; World Bank, The, 2008).

In 2007, the sectors that contributed to Paraguay's gross domestic product (GDP) were services (60%), agriculture (22.4%), and industry (17.6%). A combination of economic growth in Argentina and Brazil, which led to increased demand for Paraguayan exports, and high world prices for Paraguay's agricultural exports helped to improve Paraguay's economy. Paraguay also depended on trade with its partners in the Mercado Común del Cono Sur (MERCOSUR), which, in terms of trade value, was the second ranked trade association in the Americas and the eighth ranked worldwide. MERCOSUR is a free trade zone, which includes Argentina, Brazil, Paraguay, and Uruguay (Banco Central del Paraguay, 2008, p. 15-16; U.S. Central Intelligence Agency, 2008; World Bank, The, 2008).

In 2007, Paraguay's exports constituted about \$6.9 billion compared with \$3.1 billion in 2006; mineral and energy exports included cement, crude oil, and electricity. The mining sector accounted for less than 1% of the GDP (Banco Central del Paraguay, 2008; U.S. Central Intelligence Agency, 2008).

## Production

In 2007, Paraguay produced mostly cement, clays, petroleum derivatives, pig iron, and steel. Paraguay lacks mineral reserves and identified resources. Data on mineral production are provided in table 1.

## Structure of the Mineral Industry

The mineral industry of Paraguay was owned mostly by Paraguayan state-owned firms (table 2). The structure of the country's mineral industry could change to a privately owned, Government-regulated regime. The Ministerio de Obras Públicas y Comunicaciones (MOPC) [Ministry of Public Works and Communications] reported that the Paraguayan Senate was

expected to approve exploration permits and mining concession contracts by 2008. Among the mining concession contracts under review by the Senate were Canada-based Latin American Minerals' Paso Yobai gold project, which is located in Guaira Department, and Compatriot Cue Minerals' Yuty uranium project, which is located in Caazapa Department. Crescent Resources Ltd. of Canada was exploring for uranium at its Oviedo property (Mercosur Noticias, 2008).

Paraguay's foreign direct investment (FDI) inflows increased to \$142 million in 2007 from a revised \$110 million in 2006, or by 29%; this increase was mostly attributable to the high international prices of several commodities, including cement, hydroelectric power, steel, sugar, textiles, and wood products (Economic Commission for Latin America and the Caribbean, 2008).

## Commodity Review

### Metals

**Iron and Steel.**—Based on the world crude steel production report of the International Iron and Steel Institute, Paraguay produced 132,000 metric tons (t) of crude steel in 2007 compared with 118,000 t in 2006, which was an increase of almost 12%. The production of pig iron totaled 148,000 t in 2007 compared with 136,000 t in 2006, or increased by almost 9% (table 1; International Iron and Steel Institute, 2008).

### Industrial Minerals

**Cement.**—The Industria Nacional del Cemento (INC), which was a Paraguayan state-owned company, was the only cement producer in Paraguay. INC's cement production was at about the same level as in 2006. The Villeta cement plant was expected to be able to meet about 20% of the future (2009-12) demand for cement in Paraguay. In 2007, the National Customs Department registered almost 150,000 t of imported cement. Paraguay's consumption (700,000 t) was satisfied almost 80% by domestic production (550,000 t) and 20% by imports (Portal Paraguayo de Noticias, 2007; Ministerio de Industria y Comercio, 2008).

### Mineral Fuels

**Natural Gas.**—Paraguay had the potential to produce natural gas; however, the country did not consume natural gas because of the lack of domestic production and the absence of import pipelines. In June 2006 (which was the latest year data for which were available), the Governments of Bolivia and Paraguay approved a plan to construct a pipeline from southern Bolivia to Asuncion, Paraguay. The pipeline would have an initial capacity of 700 million cubic feet per day and would require an

initial investment of about \$2 billion (U.S. Energy Information Administration, 2008).

Paraguay had attracted some interest from international natural gas companies, including Chaco Resources Plc. Chaco obtained exploration permits and production concessions for the Curupaty and the San Pedro blocks from the Paraguayan Congress in August 2005, and Chaco then entered into a 4-year exploration phase. Chaco's future (2009) plans for its Paraguay properties included the analysis and interpretation of historical seismic data for all locations in order to produce regional structural maps of key seismic horizons and opportunities for joint venture partnerships for exploration (Alexander's Gas and Oil Connections, 2007; Chaco Resources Plc, 2007).

**Petroleum.**—State-owned Petróleos Paraguayos (Petropar) had a monopoly on all crude oil and petroleum product sales and imports in Paraguay. Petropar operated the country's sole refinery, the 7,500-bbl/d Villa Elisa unit. Paraguay consumed 28,000 bbl/d in 2007. Energy cooperation between Paraguay and Venezuela was possible by the latter building an oil refinery in Paraguay that could process its heavy crude. This effort could help satisfy Paraguay's crude demand and Venezuela's supply to Paraguay could reach 15,000 bbl/d in the form of gasoil. The Paraguayan Government announced that crude oil had been discovered in the western Chaco region and that exploration for oil in the Emilia well, which is located within the Boqueron block, would continue. Currently, however, no hydrocarbon reserves had been proven at the Emilia prospect, which was considered the country's most potentially productive unit with an estimated recoverable resource of 40 million barrels of oil (Ministerio de Industria y Comercio, 2008).

## Outlook

Paraguay's economy was expected to continue to grow, but its GDP will be highly dependent on MERCOSUR's economic stability and growth in the foreseeable future. The cement industry was expected to grow and be able to meet about 50% of Paraguay's future (2008-12) cement demand, and the remaining demand would be covered by imports. The Paraguayan mineral fuels industry is set to continue its exploration activities during 2008 and beyond owing to Chaco's continued exploration efforts.

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## URUGUAY

Uruguay's GDP continued to grow, increasing by nearly 7% in 2007 as a result of high commodity prices for Uruguayan exports, a strong local currency (peso), economic growth in MERCOSUR (whose member countries are Argentina, Brazil, Paraguay, and Uruguay), and lower international interest rates. The sectors that contributed to the country's GDP were services (58%), industry (32%), and agriculture (10%). The mining sector accounted for less than 1% of the GDP. Unemployment decreased to 9.2% in 2007 from 10.7% in 2006. Uruguay's economy was characterized by an export-oriented agricultural sector. The \$1.2 billion pulp mill in Fray Bentos came online in November 2007; construction of the mill was the largest foreign investment in Uruguay's history (U.S. Central Intelligence Agency, 2008; World Bank, The, 2008).

Uruguay's mineral industries included clays, semiprecious gemstones, gold, iron and steel, sand and gravel, and stone. Imports of such goods as chemicals, machinery, petroleum and petroleum derivatives, and vehicles amounted to \$5.6 billion in 2007. Import partners included Argentina (21%), Brazil (17.7%), the United States (9.1%), China (8.4%), Paraguay (7.4%), Venezuela (4.8%), Nigeria (4.4%), and others (27.2%). Uruguay had no proven natural gas or oil reserves but it does have substantial hydroelectric capacity (U.S. Central Intelligence Agency, 2008; U.S. Energy Information Administration, 2008).

## Production

In 2007, Uruguay produced mostly agate, cement, clays, gravel, gold, iron ore, marble, and steel. Data on mineral production are provided in table 1.

## Structure of the Mineral Industry

The mineral industry of Uruguay was mostly owned by Uruguayan state-owned firms (table 2). Uruguay's FDI inflows decreased to \$879 million in 2007 from \$1.4 billion in 2006 (Economic Commission for Latin America and the Caribbean, 2008).

## Commodity Review

### Metals

**Gold.**—Gold production in Uruguay decreased to 2,820 kilograms (kg) in 2007 from 3,000 kg in 2006 (table 1). Uruguay Mineral Exploration Inc. (UME), which was a privately-owned company, was the only gold producer in Uruguay. UME's investment was about \$63.1 million in 2007 compared with \$51.2 million in 2006, which was an increase of 23.2% and equal to about 1.2% of the country's total export value in 2007 (Burgis, 2007; Uruguay Minerals Inc., 2008).

### Industrial Minerals

**Cement.**—In 2007, the cement industry continued to be an important employer because demand for cement continued to increase as a result of construction in Uruguay's coastal cities and in southern Brazil. Compañía Uruguaya de Cemento Portland S.A. (CPSA), which was a Uruguayan state-owned company, was the only cement producer in Uruguay. In 2007, CPSA's cement production was at about the same level as in 2006 (Burgis, 2007).

### Mineral Fuels

**Natural Gas.**—In 2007, the Uruguayan Government announced the completion of an appraisal of natural gas reserves in Uruguay's offshore Punta del Este basin. According to the Administración Nacional de Combustibles, Alcohol y Portland (ANCAP), significant natural gas discoveries in the continental shelf could contain up to 85 billion cubic meters (3 trillion cubic feet) of proven reserves and production could start by 2015 (Business News Americas, 2008).

Two pipelines supply Uruguay with Argentina's natural gas. The first, CR. Federico Slinger or Gasoducto del Litoral, runs 20 kilometers (km) from Colon, Argentina to Paysandu, Uruguay. The pipeline, which was constructed and operated by ANCAP has an operating capacity of 138,800 cubic meters per day (4.9 million cubic feet per day). The second is the Gasoducto Cruz del Sur (GCDS), which was operated by a consortium led by British Gas plc. This pipeline extends 210 km from Argentina's natural gas grid to Montevideo and has a capacity of 5.1 million cubic meters per day (180 million cubic feet per day). The GCDS project also held a concession for a possible pipeline extension of 870-km to Porto Alegre, Brazil. Argentina, however, had begun to disrupt its natural gas exports to Chile and Uruguay because of natural gas output shortages (U.S. Energy Information Administration, 2008).

**Petroleum.**—The state-owned oil company ANCAP operated Uruguay's single oil refinery, La Teja, which had a production capacity of 50,000 bbl/d. To meet its oil consumption demand, Uruguay relied completely on imports (mainly from Venezuela) of approximately 35,700 bbl/d based on 2007 estimates. In 2007, ANCAP and its Venezuelan counterpart, Petróleos de Venezuela S.A. (PDVSA), signed a joint-venture agreement to explore for and produce heavy oil from Ayacucho Block 6, which is located in Venezuela's Orinoco heavy oil belt (LatinPetroleum Magazine, 2008; U.S. Energy Information Administration, 2008).

### Outlook

Uruguay's economy was expected to continue to grow during 2008-10. This growth, however, is highly dependent on continued regional economic stability and particularly that of Argentina and Brazil, which are the leading members of MERCOSUR, and upon availability of supplies of imported natural gas and petroleum.

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TABLE 1  
PARAGUAY AND URUGUAY: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

| Country and commodity   | 2003                | 2004                 | 2005                  | 2006    | 2007    |
|---|---------------------|----------------------|-----------------------|---------|---------|
| PARAGUAY <sup>2</sup>   |                     |                      |                       |         |         |
| Cement, hydraulic <sup>c</sup> thousand metric tons           | 520                 | 470                  | 550                   | 600     | 600     |
| Clays: <sup>c</sup>   |                     |                      |                       |         |         |
| Kaolin  | 66,600              | 66,600               | 66,000                | 66,000  | 66,000  |
| Other, unspecified  | 230,000             | 230,000              | 230,000               | 230,000 | 230,000 |
| Gypsum <sup>c</sup>   | 4,500 <sup>3</sup>  | 4,500                | 4,500                 | 4,500   | 4,500   |
| Iron and steel:   |                     |                      |                       |         |         |
| Pig iron  | 98,000 <sup>4</sup> | 119,000 <sup>4</sup> | 124,000 <sup>4</sup>  | 136,000 | 148,000 |
| Semimanufactures <sup>c</sup>                                 | 51,600              | 51,600               | 51,500                | 51,500  | 51,500  |
| Steel, crude  | 91,000 <sup>4</sup> | 109,000 <sup>4</sup> | 101,000 <sup>4</sup>  | 118,000 | 132,000 |
| Lime <sup>c</sup>   | 90,000              | 90,000               | 90,000                | 90,000  | 90,000  |
| Petroleum, refinery products: <sup>c</sup>                    |                     |                      |                       |         |         |
| Distillate fuel oil thousand 42-gallon barrels                | 600                 | 600                  | 600                   | 600     | 600     |
| Gasoline do.  | 660                 | 660                  | 660                   | 660     | 660     |
| Jet fuel do.  | 20                  | 20                   | 20                    | 20      | 20      |
| Kerosene do.  | 250                 | 250                  | 250                   | 250     | 250     |
| Liquefied petroleum gas do.                                   | 630                 | 630                  | 630                   | 630     | 630     |
| Residual fuel oil do.   | 460                 | 460                  | 460                   | 460     | 460     |
| Unspecified do.   | 40                  | 40                   | 40                    | 40      | 40      |
| Total do.   | 2,660               | 2,660                | 2,660                 | 2,660   | 2,660   |
| Pigments, mineral, natural, ocher <sup>c</sup>                | 250                 | 250                  | 250                   | 250     | 250     |
| Sand, including glass sand <sup>c</sup>                       | 25,500              | 25,500               | 25,500                | 25,500  | 25,500  |
| Stone: <sup>c</sup>   |                     |                      |                       |         |         |
| Dimension thousand metric tons                                | 70                  | 70                   | 70                    | 70      | 70      |
| Crushed and broken:   |                     |                      |                       |         |         |
| Limestone, for cement and lime                                | 16,300              | 16,300               | 16,000                | 16,000  | 16,000  |
| Marble  | 750                 | 750                  | 750                   | 750     | 750     |
| Other   | 2,000               | 2,000                | 2,000                 | 2,000   | 2,000   |
| Talc, soapstone, pyrophyllite <sup>c</sup>                    | 200                 | 200                  | 200                   | 200     | 200     |
| URUGUAY   |                     |                      |                       |         |         |
| Aluminum, secondary <sup>c</sup>                              | 45                  | 45                   | 45                    | 45      | 45      |
| Barite <sup>c</sup>   | 15                  | 15                   | 15                    | 15      | 15      |
| Bentonite   | 230 <sup>5</sup>    | 122 <sup>5</sup>     | 195 <sup>5</sup>      | 515     | 515     |
| Cement, hydraulic <sup>c</sup> thousand metric tons           | 1,050               | 1,050                | 1,050                 | 1,050   | 1,050   |
| Clays, unspecified  | 35,444 <sup>5</sup> | 47,519 <sup>5</sup>  | 70,209 <sup>r,5</sup> | 82,162  | 82,200  |
| Coke, gashouse <sup>c</sup>                                   | 5,000               | 5,000                | 5,000                 | 5,000   | 5,000   |
| Feldspar  | 2,450 <sup>5</sup>  | 2,450 <sup>5</sup>   | 2,150 <sup>5</sup>    | 2,470   | 2,500   |
| Gemstones, semiprecious:                                      |                     |                      |                       |         |         |
| Agate   | 5,361 <sup>5</sup>  | 14,560 <sup>5</sup>  | 10,166 <sup>r,5</sup> | 18,369  | 18,400  |
| Amethyst  | 390 <sup>5</sup>    | 435 <sup>5</sup>     | 433 <sup>5</sup>      | 468     | 500     |
| Gold <sup>6</sup> kilograms                                   | 1,550 <sup>r</sup>  | 2,334                | 3,151                 | 3,000   | 2,820   |
| Gypsum <sup>c</sup> thousand metric tons                      | 1,130               | 1,130                | 1,130                 | 1,150   | 1,150   |
| Iron and steel:   |                     |                      |                       |         |         |
| Iron ore  | 5,941 <sup>5</sup>  | 9,319 <sup>5</sup>   | 12,436 <sup>5</sup>   | 15,525  | 15,525  |
| Metal:  |                     |                      |                       |         |         |
| Ferroalloys, electric-furnace ferrosilicon crust <sup>c</sup> | 200                 | 200                  | 200                   | 200     | 200     |
| Semimanufactures <sup>c</sup>                                 | 32,300              | 32,000               | 32,000                | 32,000  | 32,000  |
| Steel, crude  | 41,000 <sup>4</sup> | 58,000 <sup>4</sup>  | 64,000 <sup>4</sup>   | 57,000  | 71,000  |
| Lime <sup>c</sup>   | 10,000              | 10,000               | 10,000                | 10,000  | 10,000  |

See footnotes at end of table.

TABLE 1—Continued  
PARAGUAY AND URUGUAY: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

| Country and commodity                      | 2003                | 2004                 | 2005                  | 2006                | 2007                |
|--|---------------------|----------------------|-----------------------|---------------------|---------------------|
| URUGUAY—Continued                          |                     |                      |                       |                     |                     |
| Petroleum, refinery products: <sup>e</sup> |                     |                      |                       |                     |                     |
| Distillate fuel oil                        | 4,200               | 8,810 <sup>3,7</sup> | 8,476 <sup>3,7</sup>  | 8,500               | 8,500               |
| Gasoline                                   | 2,200               | 1,793 <sup>3,7</sup> | 1,830 <sup>3,7</sup>  | 1,850               | 1,850               |
| Kerosene                                   | 500                 | 75 <sup>3,7</sup>    | 67 <sup>3,7</sup>     | 100                 | 100                 |
| Liquefied petroleum gas                    | 400                 | 915 <sup>3,7</sup>   | 1,005 <sup>3,7</sup>  | 1,000               | 1,000               |
| Residual fuel oil                          | 3,650               | 3,650                | 3,650                 | 3,650               | 3,650               |
| Unspecified                                | 280                 | 401 <sup>3,7</sup>   | 201 <sup>3,7</sup>    | 200                 | 200                 |
| Total                                      | 11,200              | 15,600 <sup>r</sup>  | 15,200 <sup>r</sup>   | 15,300              | 15,300              |
| Sand and gravel:                           |                     |                      |                       |                     |                     |
| Sand, common                               | 958 <sup>5</sup>    | 1,270 <sup>5</sup>   | 1,666 <sup>r,5</sup>  | 1,940               | 2,000               |
| Gravel                                     | 29,417 <sup>5</sup> | 48,023 <sup>5</sup>  | 71,711 <sup>r,5</sup> | 68,309              | 68,400              |
| Stone:                                     |                     |                      |                       |                     |                     |
| Flagstone                                  | 2,697 <sup>5</sup>  | 5,605 <sup>5</sup>   | 5,869 <sup>5</sup>    | 5,900 <sup>e</sup>  | 6,000 <sup>e</sup>  |
| Granite:                                   |                     |                      |                       |                     |                     |
| Dimension                                  | 3,768 <sup>5</sup>  | 4,834 <sup>5</sup>   | 6,270 <sup>r,5</sup>  | 7,643               | 7,650               |
| Crushed and broken, alum schist            | 1,072 <sup>5</sup>  | 625 <sup>5</sup>     | 699 <sup>5</sup>      | 700 <sup>e</sup>    | 700 <sup>e</sup>    |
| Other, rough stone <sup>5</sup>            | 5,450               | 4,950                | 10,299                | 10,300 <sup>e</sup> | 10,300 <sup>e</sup> |
| Diorite                                    | 1,019 <sup>5</sup>  | 798 <sup>5</sup>     | 226 <sup>5</sup>      | 169                 | 170                 |
| Dolomite                                   | 12,177 <sup>5</sup> | 9,839 <sup>5</sup>   | 11,159 <sup>r,5</sup> | 10,152              | 10,200              |
| Limestone                                  | 830                 | 1,052                | 1,185                 | 1,200 <sup>e</sup>  | 1,200 <sup>e</sup>  |
| Marble, in blocks and broken: <sup>e</sup> |                     |                      |                       |                     |                     |
| Onyx                                       | 121 <sup>3,5</sup>  | 122 <sup>3,5</sup>   | 120                   | 120                 | 120                 |
| Travertine                                 | 27 <sup>3,5</sup>   | -- <sup>3,5</sup>    | --                    | --                  | --                  |
| Other, unspecified                         | 115 <sup>3,5</sup>  | 120                  | 39 <sup>3,5</sup>     | 40                  | 40                  |
| Marl                                       | 3,142 <sup>5</sup>  | 3,310 <sup>5</sup>   | 4,350 <sup>5</sup>    | 6,320               | 6,400               |
| Quartz                                     | 150 <sup>e</sup>    | 1,130 <sup>5</sup>   | 104 <sup>5</sup>      | 150                 | 150                 |
| Other, including ballast                   | 1,035 <sup>5</sup>  | 1,453 <sup>5</sup>   | 1,811 <sup>5</sup>    | 1,800               | 2,000               |
| Sulfur, elemental, byproduct <sup>c</sup>  | 3,000               | 3,000                | 3,000                 | 3,000               | 3,000               |
| Talc, soapstone, pryophyllite              | 1,095 <sup>5</sup>  | 1,042 <sup>5</sup>   | 1,131 <sup>5</sup>    | 1,150               | 1,150               |
| Tuff, tufa                                 | 1,281 <sup>5</sup>  | 142 <sup>5</sup>     | 244 <sup>5</sup>      | 250                 | 250                 |

<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. do. Ditto. -- Zero.

<sup>1</sup>Includes data available through September 2008.

<sup>2</sup>In addition to the commodities listed, construction materials (clays, miscellaneous rock, sand, and weathered tuffs) were presumably produced, but available information is inadequate to make reliable estimates of output.

<sup>3</sup>Reported figure.

<sup>4</sup>Source: International Iron and Steel Institute.

<sup>5</sup>Source: Dirección Nacional de Minería y Geología (Minerals Questionnaire 2006-07).

<sup>6</sup>Source: Uruguay Mineral Exploration Inc. Data are for fiscal year ending March 31, 2008.

<sup>7</sup>Source: Administración Nacional de Combustible, Alcohol y Portland (ANCAP). Numbers were converted into 42-gallon barrels (bbl) from thousand cubic meters using the U.S. Energy Information Administration conversion factor of 1 cubic meter = 6.289812 bbl.



TABLE 2  
PARAGUAY AND URUGUAY: STRUCTURE OF THE MINERAL INDUSTRIES IN 2007

| Country and commodity        |                            | Major operating companies or deposits   | Location or deposit name                         | Annual capacity |
|------------------------------|----------------------------|---|--|-----------------|
| <u>PARAGUAY</u>              |                            |   |  |                 |
| Cement                       | thousand metric tons       | Industria Nacional del Cemento (INC), 100%  | Plantas Vallemi y Villeta                        | 675             |
| Petroleum, refinery products | thousand 42-gallon barrels | Petróleos Paraguayos (Petropar)   | Villa Elisa refinery at Villa Elisa municipality | 2,700           |
| Steel                        | thousand metric tons       | Consorcio Siderúrgico de Paraguay (Cerro Lorito, 67%, and Cooperativa de Trabajadores de ACEPAR, 33%) | ACEPAR steel mill at Villa Hayes                 | 150             |
| <u>URUGUAY</u>               |                            |   |  |                 |
| Cement                       | thousand metric tons       | Compañía Uruguaya de Cemento Portland S.A.  | Mine and clinker plant in Lavalleja Department   | 1,100           |
| Gold                         | kilograms                  | Uruguay Mineral Exploration Inc. (UME), 100%  | Minas de Corrales Gold in Rivera Department      | 3,000           |
| Iron and steel               | thousand metric tons       | Gerdau Laisa S.A.   | Gerdau Laisa S.A.                                | 70              |
| Petroleum, refinery products | thousand 42-gallon barrels | Administración Nacional de Combustibles, Alcohol, y Portland (ANCP)                                   | La Teja oil refinery near Montevideo             | 18,000          |