Bauxite and Alumina

By Luke H. Baumgardner and Ruth A. Hough

The world aluminum industry began to recover in the second quarter of 1983 as demand for the metal increased and aluminum prices rose sharply. However, domestic bauxite and alumina production declined in 1983 with respect to 1982 levels. World bauxite production was also lower, although world alumina output registered a small increase over that of 1982.

The discovery of an 82-million-metric-ton bauxite deposit averaging 42.5% alumina was reported in the Kalihandi area of Orissa State, India. In Brazil, Cia. Brasileira de Aluminio reported the discovery of a 60-million-ton bauxite deposit at Cataguases, Minas Gerais.

Kaiser Aluminum & Chemical Corp. closed its alumina plant at Baton Rouge, LA in March, and Reynolds Metals Co. permanently shut down its Hurricane Creek alumina plant in August.

Domestic Data Coverage.—Domestic production data for bauxite and alumina are developed by the Bureau of Mines from three separate voluntary surveys of U.S. operations. Typical of these surveys are the quarterly and annual Production of Bauxite Surveys. Of the 17 operations to which a survey form was sent, all responded, representing 100% of domestic 1983 bauxite production as shown in tables 1, 2, and 18.

Table 1.—Salient bauxite statistics

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>United States:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production: Crude ore (dry equivalent)</td>
<td>1,821</td>
<td>1,559</td>
<td>1,510</td>
<td>722</td>
<td>679</td>
</tr>
<tr>
<td>Value</td>
<td>$24,875</td>
<td>$22,363</td>
<td>$26,459</td>
<td>$12,394</td>
<td>$11,936</td>
</tr>
<tr>
<td>Exports (as shipped)</td>
<td>15</td>
<td>21</td>
<td>29</td>
<td>69</td>
<td>74</td>
</tr>
<tr>
<td>Imports for consumption*</td>
<td>12,780</td>
<td>14,367</td>
<td>12,802</td>
<td>10,122</td>
<td>7,601</td>
</tr>
<tr>
<td>Consumption (dry equivalent)</td>
<td>16,679</td>
<td>15,982</td>
<td>13,625</td>
<td>9,217</td>
<td>8,966</td>
</tr>
<tr>
<td>World Production</td>
<td>$86,522</td>
<td>$89,215</td>
<td>$85,323</td>
<td>$77,755</td>
<td>$76,916</td>
</tr>
</tbody>
</table>

1Excludes calcined bauxite. Includes bauxite imported to the U.S. Virgin Islands.

Legislation and Government Programs.—National Defense Stockpile goals for metal-grade bauxite remained at 21.3 million tons of Jamaica-type ore and 6.2 million tons of Suriname-type ore. The goal for calcined refractory-grade bauxite was 1.4 million tons, while the goal for calcined abrasive-grade bauxite was increased from 762,000 tons to 1 million tons.

General Services Administration (GSA) agreed to acquire 2 million tons of metal-grade bauxite from Jamaica during the fiscal years 1983 and 1984. Payment for the first half of the Government stockpile acquisition was to be by cash and the balance through the exchange of U.S. surplus agricultural products. Delivery of the ore to stockpile sites in Texas and Louisiana began in July 1983 and was expected to be completed in 1984. The GSA inventory for December 31, 1983, reported 203,000 tons of calcined refractory-grade bauxite, 10.6 million tons of Jamaica-type metal-grade bauxite, and 5.4 million tons of Suriname-type metal-grade bauxite.
For the first time since bauxite mining began in the United States in 1899, virtually no domestic bauxite was mined for use in the production of aluminum metal. The ore was used to produce special grades of aluminas or for chemical, refractory, or other nonalumina uses. Of the three companies in Arkansas involved in processing bauxite, only two, the Aluminum Co. of America (Alcoa) and American Cyanamid Co., mined local bauxite. Porocel Corp. produced activated bauxite from purchased ore. Bauxite mined in Alabama and Georgia by A. P. Green Refractories Co., Harbison-Walker Refractories Co., and Mullite Co. of America was shipped to the chemical and refractory industries. A small quantity of the bauxite produced in Alabama and Arkansas was calcined for use in the production of oil and gas well proppants.

By yearend, only six of the nine U.S. Bayer alumina plants, including the St. Croix, U.S. Virgin Islands, refinery, were operating to produce alumina for the aluminum industry. Alcoa's Mobile, AL, plant closed in 1982, Kaiser closed its Baton Rouge, LA, Bayer plant in March 1983, and Reynolds shut down its Bayer operations at Hurricane Creek, AR, in August 1983. Both the Kaiser and the Reynolds plants were continuing to produce special grades of alumina products. Lower domestic production was offset by an increase in alumina imports, which exceeded domestic output for the first time since the United States began importing substantial quantities of alumina in 1967.

Domestic refineries shipped an estimated 3.32 million tons of calcined alumina to U.S. primary aluminum plants in 1983. Shipments of calcined alumina to the abrasive, ceramic, chemical, and refractory industries and alumina exports accounted for the balance of the total 3.54 million tons of calcined alumina produced.

<table>
<thead>
<tr>
<th>State</th>
<th>Mine production</th>
<th>Shipments from mines and processing plants to consumers¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crude</td>
<td>Dry equivalent</td>
</tr>
<tr>
<td>1981:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alabama and Georgia</td>
<td>342</td>
<td>258</td>
</tr>
<tr>
<td>Arkansas</td>
<td>1,909</td>
<td>1,245</td>
</tr>
<tr>
<td>Total</td>
<td>1,847</td>
<td>1,519</td>
</tr>
<tr>
<td>1982:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alabama and Georgia</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Arkansas</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Total</td>
<td>896</td>
<td>732</td>
</tr>
<tr>
<td>1983:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alabama and Georgia</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Arkansas</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Total</td>
<td>826</td>
<td>679</td>
</tr>
</tbody>
</table>

¹Revised. W Withheld to avoid disclosing company proprietary data.
²May exclude some bauxite mixed in clay products.
³Computed from values assigned by producers and from estimates of the Bureau of Mines.
⁴Data may not add to totals shown because of independent rounding.
Table 3.—Recovery of dried, calcined, and activated bauxite in the United States
(Thousand metric tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Crude ore treated</th>
<th>Total processed bauxite recovered&lt;sup&gt;1&lt;/sup&gt; As recovered</th>
<th>Dry equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>234</td>
<td>120</td>
<td>795</td>
</tr>
<tr>
<td>1983</td>
<td>298</td>
<td>140</td>
<td>225</td>
</tr>
</tbody>
</table>

1Revised.
1Dried, calcined, and activated bauxite. May exclude some bauxite mixed in clay products.

Table 4.—Percent of domestic bauxite shipments, by silica content

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 8</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>From 8 to 15</td>
<td>55</td>
<td>92</td>
<td>95</td>
<td>83</td>
<td>-</td>
</tr>
<tr>
<td>More than 18</td>
<td>44</td>
<td>38</td>
<td>35</td>
<td>37</td>
<td>W</td>
</tr>
</tbody>
</table>

W Withheld to avoid disclosing company proprietary data.

Table 5.—Production and shipments of alumina in the United States
(Thousand metric tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Calcined alumina</th>
<th>Other alumina&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Total&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As produced or shipped&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Calculated equivalent</td>
<td></td>
</tr>
<tr>
<td>Production&lt;sup&gt;3&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>5,550</td>
<td>700</td>
<td>5,550</td>
</tr>
<tr>
<td>1980</td>
<td>6,310</td>
<td>720</td>
<td>7,030</td>
</tr>
<tr>
<td>1981</td>
<td>5,690</td>
<td>700</td>
<td>5,190</td>
</tr>
<tr>
<td>1982</td>
<td>3,640</td>
<td>680</td>
<td>4,320</td>
</tr>
<tr>
<td>1983</td>
<td>5,670</td>
<td>710</td>
<td>5,580</td>
</tr>
<tr>
<td>Shipments&lt;sup&gt;4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>6,160</td>
<td>720</td>
<td>5,880</td>
</tr>
<tr>
<td>1980</td>
<td>5,610</td>
<td>715</td>
<td>5,320</td>
</tr>
<tr>
<td>1981</td>
<td>3,760</td>
<td>420</td>
<td>4,150</td>
</tr>
<tr>
<td>1982</td>
<td>3,680</td>
<td>670</td>
<td>4,150</td>
</tr>
</tbody>
</table>

3Estimated.
Data may not add to totals shown because of independent rounding.
1Hydrate, activated, tabular, and other aluminas. Excludes calcium and sodium aluminates.
2Includes only the end product if one type of alumina was produced and used to make another type of alumina.

Table 6.—Capacities of domestic alumina plants,<sup>1</sup> December 31
(Thousand metric tons per year)

<table>
<thead>
<tr>
<th>Company and plant</th>
<th>1982</th>
<th>1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Co. of America:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bauxite, AR</td>
<td>340</td>
<td>340</td>
</tr>
<tr>
<td>Mobile, AL</td>
<td>950</td>
<td>950</td>
</tr>
<tr>
<td>Point Comfort, TX</td>
<td>1,400</td>
<td>1,400</td>
</tr>
<tr>
<td>Total</td>
<td>2,690</td>
<td>2,690</td>
</tr>
<tr>
<td>Martin Marietta Aluminum Inc.: St. Croix, VI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2,690</td>
<td>2,690</td>
</tr>
<tr>
<td>Kaiser Aluminum &amp; Chemical Corp.:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baton Rouge, LA</td>
<td>955</td>
<td>955</td>
</tr>
<tr>
<td>Gramercy, LA</td>
<td>770</td>
<td>770</td>
</tr>
<tr>
<td>Total</td>
<td>1,725</td>
<td>1,725</td>
</tr>
<tr>
<td>Orniet Corp.: Bursaid, LA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,725</td>
<td>1,725</td>
</tr>
<tr>
<td>Reynolds Metals Co.:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hurricane Creek, AR</td>
<td>650</td>
<td>650</td>
</tr>
<tr>
<td>Corpus Christi, TX</td>
<td>1,400</td>
<td>1,400</td>
</tr>
<tr>
<td>Total</td>
<td>2,050</td>
<td>2,050</td>
</tr>
<tr>
<td>Grand total</td>
<td>7,485</td>
<td>7,485</td>
</tr>
</tbody>
</table>

<sup>1</sup>Capacity may vary depending upon the bauxite used.

CONSUMPTION AND USES

During the year, 91% of the total 9.1 million tons of bauxite consumed by U.S. industry was refined to various forms of alumina. The production of 1 ton of calcined
alumina required an average of 2.01 tons (dry basis) of bauxite. Only one of the nine domestic alumina plants processed domestic bauxite. Metal-grade bauxite from three previous sources, the Dominican Republic, Haiti, and Suriname, was not imported in 1983.

Consumption data include quantities of bauxite consumed by the Canadian abrasives industry for subsequent use in U.S. plants for the manufacture of abrasive end products. Consumption of other special grades included bauxite used for cement, petroleum refining, and the steel industry.

Alcoa joined Norton Co. in a joint venture at Fort Smith, AR, to produce sintered bauxite proppants for use in propping open rock strata in deep oil and gas wells. Alcoa’s mines at Bauxite, AR, supplied the low-iron bauxite. The high-strength spherical beads are pumped into fractures in the producing formation and enhance well flow by increasing permeability. A proppant plant owned by the General Abrasives Div. of Dresser Industries Inc. was nearing completion at Eufaula, AL, and was scheduled to start production in June 1984. The world market for proppants was estimated at 100,000 tons per year.

Because of its good flame retardant characteristics and relatively low cost, demand for hydrated alumina, the uncalcined Bayer plant product, increased in 1983 as a filler for rigid and flexible plastic products and as a carpet backing. New markets for special grades of alumina were being developed in the ceramics, abrasives, and refractories industries.

Table 7.—Bauxite consumed in the United States, by industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>Domestic</th>
<th>Foreign</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alumina</td>
<td>559</td>
<td>7,384</td>
<td>8,543</td>
</tr>
<tr>
<td>Abrasive</td>
<td>467</td>
<td>122</td>
<td>589</td>
</tr>
<tr>
<td>Chemical</td>
<td>160</td>
<td>186</td>
<td>346</td>
</tr>
<tr>
<td>Refractory</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Total</td>
<td>706</td>
<td>8,511</td>
<td>9,217</td>
</tr>
<tr>
<td>1983:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alumina</td>
<td>556</td>
<td>7,720</td>
<td>8,276</td>
</tr>
<tr>
<td>Abrasive</td>
<td>456</td>
<td>281</td>
<td>737</td>
</tr>
<tr>
<td>Chemical</td>
<td>126</td>
<td>249</td>
<td>375</td>
</tr>
<tr>
<td>Refractory</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Total</td>
<td>724</td>
<td>8,975</td>
<td>9,190</td>
</tr>
</tbody>
</table>

W Withheld to avoid disclosing company proprietary data; included with “Chemical.”

1Data may not add to totals shown because of independent rounding.

2Includes consumption by Canadian abrasive industry.

3Includes “Other.”

Table 8.—Crude and processed bauxite consumed in the United States

<table>
<thead>
<tr>
<th>Type</th>
<th>Domestic origin</th>
<th>Foreign origin</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crude and dried</td>
<td>564</td>
<td>8,180</td>
<td>8,744</td>
</tr>
<tr>
<td>Calcined and activated</td>
<td>142</td>
<td>336</td>
<td>478</td>
</tr>
<tr>
<td>Total</td>
<td>706</td>
<td>8,511</td>
<td>9,217</td>
</tr>
<tr>
<td>1983:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crude and dried</td>
<td>570</td>
<td>7,887</td>
<td>8,457</td>
</tr>
<tr>
<td>Calcined and activated</td>
<td>154</td>
<td>375</td>
<td>529</td>
</tr>
<tr>
<td>Total</td>
<td>724</td>
<td>8,262</td>
<td>8,966</td>
</tr>
</tbody>
</table>

1Data do not add to total shown because of independent rounding.
Table 9.—Production and shipments of selected aluminum salts in the United States, in 1982

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of producing plants</th>
<th>Production (thousand metric tons)</th>
<th>Total shipments including interplant transfers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aluminum sulfate:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial and municipal (17% (\text{Al}_2\text{O}_3))</td>
<td>63</td>
<td>1,046</td>
<td>977</td>
</tr>
<tr>
<td>Iron-free (17% (\text{Al}_2\text{O}_3))</td>
<td>18</td>
<td>70</td>
<td>56</td>
</tr>
<tr>
<td><strong>Aluminum chloride:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid and crystal (32° Bé)</td>
<td>3</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td><strong>Anhydrous (100% (\text{AlCl}_3))</strong></td>
<td>5</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td><strong>Aluminum fluoride, technical</strong></td>
<td>5</td>
<td>76</td>
<td>80</td>
</tr>
<tr>
<td><strong>Aluminum hydroxide, trihydrate (100% (\text{Al}_2\text{O}_3\cdot9\text{H}_2\text{O}))</strong></td>
<td>7</td>
<td>423</td>
<td>423</td>
</tr>
<tr>
<td>Other inorganic aluminum compounds(^1)</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
</tbody>
</table>

\(^1\)W Withheld to avoid disclosing company proprietary data. \(^2\)XX Not applicable.

\(^1\)Includes sodium aluminate, light aluminum hydroxide, cryolite, and alums. Source: Data are based upon Bureau of the Census report Form MA-35A, Annual Report on Shipments and Production of Inorganic Chemicals.

Table 10.—Stocks of bauxite in the United States,¹ December 31
(Thousand metric tons, dry equivalent)

<table>
<thead>
<tr>
<th>Sector</th>
<th>1982</th>
<th>1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producers and processors</td>
<td>9614</td>
<td>548</td>
</tr>
<tr>
<td>Consumers</td>
<td>6,548</td>
<td>4,961</td>
</tr>
<tr>
<td>Government</td>
<td>16,328</td>
<td>16,328</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>23,488</td>
<td>21,865</td>
</tr>
</tbody>
</table>

\(^1\)Domestic and foreign bauxite; crude, dried, calcined, activated; all grades.

Table 11.—Stocks of alumina in the United States,¹ December 31
(Thousand metric tons, calcined equivalent)

<table>
<thead>
<tr>
<th>Sector</th>
<th>1982</th>
<th>1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producers¹</td>
<td>244</td>
<td>265</td>
</tr>
<tr>
<td>Primary aluminum plants</td>
<td>1,116</td>
<td>1,161</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,960</td>
<td>1,426</td>
</tr>
</tbody>
</table>

\(^1\)Estimated. \(^¹\)Revised.

Because of the vertically integrated nature of the aluminum industry, bauxite and alumina are rarely traded on open world markets. Both commodities are normally traded under long-term contracts or through intracompany transfers. With the exception of spot sales and specialty forms and grades, prices are not listed in trade journals.

The average 1983 value for domestic crude bauxite shipments, f.o.b. mine or plant, was estimated by the Bureau of Mines to be $13.67 per ton. An average value of $88.76 per ton was estimated for domestic calcined bauxite shipments.

Monthly prices for imported, calcined, refractory-grade bauxite from Guyana were published in the Engineering and Mining Journal. Quoted prices, per ton, in carload lots, delivered f.o.b. Baltimore, MD, Mobile, AL, or Burnside, LA, were as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$196.72</td>
<td>$198.14</td>
<td>$175.61</td>
<td>$174.59</td>
<td>$168.28</td>
</tr>
</tbody>
</table>

The estimated average value for domestic shipments of calcined alumina in 1983 was $244.21 per ton. Based on trade data of the Bureau of Census, imported alumina had an average value of $201.25 per ton, f.a.s. at port of shipment and $213.42 per ton, c.i.f., at U.S. ports.
Table 12.—Average value of U.S. imports of crude and dried bauxite¹
(Per metric ton)

<table>
<thead>
<tr>
<th>Country</th>
<th>1982 Port of shipment (f.a.s.)</th>
<th>1982 Delivered to U.S. ports (c.i.f.)</th>
<th>1983 Port of shipment (f.a.s.)</th>
<th>1983 Delivered to U.S. ports (c.i.f.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To U.S. mainland:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>329.47</td>
<td>40.46</td>
<td>390.82</td>
<td>43.48</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>37.05</td>
<td>45.60</td>
<td>33.48</td>
<td>38.60</td>
</tr>
<tr>
<td>Guinea</td>
<td>27.50</td>
<td>32.65</td>
<td>26.46</td>
<td>32.67</td>
</tr>
<tr>
<td>Guyana</td>
<td>31.52</td>
<td>32.75</td>
<td>32.67</td>
<td>32.67</td>
</tr>
<tr>
<td>Haiti</td>
<td>32.54</td>
<td>38.54</td>
<td>32.87</td>
<td>35.01</td>
</tr>
<tr>
<td>Jamaica</td>
<td>35.45</td>
<td>38.61</td>
<td>29.16</td>
<td>36.04</td>
</tr>
<tr>
<td>Suriname</td>
<td>46.89</td>
<td>32.72</td>
<td>42.96</td>
<td>32.55</td>
</tr>
<tr>
<td>Weighted average</td>
<td>32.52</td>
<td>40.42</td>
<td>28.71</td>
<td>37.36</td>
</tr>
</tbody>
</table>

¹Computed from quantity and value data reported to U.S. Customs Service and compiled by the Bureau of the Census, U.S. Department of Commerce. Not adjusted for moisture content of bauxite or differences in methods used by importers to determine value of individual shipments.

Table 13.—Market quotations on alumina and aluminum compounds
(Per metric ton, in bags, carlots, freight equalized)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alumina, calcined</td>
<td>$225.18</td>
<td>$415.88</td>
</tr>
<tr>
<td>Alumina, hydrated, heavy</td>
<td>298.89</td>
<td>269.44</td>
</tr>
<tr>
<td>Alumina, activated, granular, works</td>
<td>352.74</td>
<td>365.00</td>
</tr>
<tr>
<td>Aluminum sulfate, commercial, ground (17% Al₂O₃)</td>
<td>335.04</td>
<td>255.64</td>
</tr>
<tr>
<td>Aluminum sulfate, iron-free, dry (17% Al₂O₃)</td>
<td>$270.00-382.00</td>
<td>438.62</td>
</tr>
</tbody>
</table>

Source: Chemical Marketing Reporter.

FOREIGN TRADE

The United States exported 54,000 tons of calcined bauxite and 20,000 tons of dried bauxite, or a total of 104,000 tons expressed as dry equivalent. Mexico received 97% of the calcined bauxite and Canada 90% of the dried bauxite. Other exports included 14,000 tons of aluminum sulfate, 11,000 tons of aluminum oxide abrasives, and 50,000 tons of other aluminum compounds, such as aluminum fluoride and synthetic cryolite. Import duties on bauxite and alumina were suspended in 1971 by Public Law 92-151. Calcined abrasive-grade bauxite from Australia, China, Guinea, Guyana, and Suriname was processed in 1983 in Canada into fused crude aluminum oxide that was subsequently shipped to U.S. plants for use in the manufacture of abrasive and refractory products.
Table 14.—U.S. exports of alumina,1 by country
(Thousand metric tons, calcined equivalent, and thousand dollars)

<table>
<thead>
<tr>
<th>Country</th>
<th>1981 Quantity</th>
<th>Value</th>
<th>1982 Quantity</th>
<th>Value</th>
<th>1983 Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>1</td>
<td>541</td>
<td>1</td>
<td>486</td>
<td>(5)</td>
<td>287</td>
</tr>
<tr>
<td>Australia</td>
<td>5</td>
<td>1,202</td>
<td>(7)</td>
<td>342</td>
<td>(5)</td>
<td>396</td>
</tr>
<tr>
<td>Brazil</td>
<td>2</td>
<td>1,166</td>
<td>1</td>
<td>1,128</td>
<td>21</td>
<td>5,750</td>
</tr>
<tr>
<td>Canada</td>
<td>300</td>
<td>82,949</td>
<td>(102)</td>
<td>37,106</td>
<td>19</td>
<td>15,874</td>
</tr>
<tr>
<td>France</td>
<td>12</td>
<td>2,019</td>
<td>12</td>
<td>2,883</td>
<td>2</td>
<td>1,836</td>
</tr>
<tr>
<td>Germany, Federal Republic of</td>
<td>3</td>
<td>6,514</td>
<td>3</td>
<td>6,403</td>
<td>3</td>
<td>5,171</td>
</tr>
<tr>
<td>Ghana</td>
<td>76</td>
<td>12,862</td>
<td>160</td>
<td>20,222</td>
<td>19</td>
<td>3,173</td>
</tr>
<tr>
<td>Japan</td>
<td>8</td>
<td>10,442</td>
<td></td>
<td>7,758</td>
<td>2</td>
<td>4,802</td>
</tr>
<tr>
<td>Mexico</td>
<td>124</td>
<td>35,657</td>
<td>(54)</td>
<td>23,875</td>
<td>99</td>
<td>29,617</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1</td>
<td>1,292</td>
<td>1</td>
<td>1,573</td>
<td></td>
<td>1,170</td>
</tr>
<tr>
<td>Norway</td>
<td>141</td>
<td>21,964</td>
<td>145</td>
<td>38,055</td>
<td>265</td>
<td>59,776</td>
</tr>
<tr>
<td>Poland</td>
<td>(5)</td>
<td>20</td>
<td>(5)</td>
<td>102</td>
<td>(5)</td>
<td>117</td>
</tr>
<tr>
<td>Spain</td>
<td>20</td>
<td>4,249</td>
<td>(5)</td>
<td>152</td>
<td>(5)</td>
<td>141</td>
</tr>
<tr>
<td>Sweden</td>
<td>15</td>
<td>4,653</td>
<td>27</td>
<td>6,174</td>
<td>88</td>
<td>13,070</td>
</tr>
<tr>
<td>U.S.S.R.</td>
<td>36</td>
<td>8,670</td>
<td>(5)</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>76</td>
<td>6,284</td>
<td>6</td>
<td>6,962</td>
<td>4</td>
<td>3,750</td>
</tr>
<tr>
<td>Venezuela</td>
<td>94</td>
<td>25,685</td>
<td>(52)</td>
<td>7,208</td>
<td>52</td>
<td>12,213</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>8,497</td>
<td>5</td>
<td>7,490</td>
<td>6</td>
<td>3,374</td>
</tr>
<tr>
<td>Total</td>
<td>730</td>
<td>213,640</td>
<td>563</td>
<td>179,254</td>
<td>551</td>
<td>197,527</td>
</tr>
</tbody>
</table>

1Revised.
2Includes exports of alumina from the U.S. Virgin Islands to foreign countries. Includes exports of aluminum hydroxide (calcined equivalent) as follows: 1981—12,809 tons; 1982—7,860 tons; and 1983—8,100 tons.
3Less than 1/2 unit.
4Data do not add to total shown because of independent rounding.

Table 15.—U.S. imports for consumption of bauxite, crude and dried,1 by country
(Thousand metric tons)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>1,265</td>
<td>512</td>
<td>555</td>
</tr>
<tr>
<td>Dominican Republic2</td>
<td>149</td>
<td>163</td>
<td></td>
</tr>
<tr>
<td>Guyana</td>
<td>3,546</td>
<td>4,198</td>
<td>3,900</td>
</tr>
<tr>
<td>Haiti</td>
<td>365</td>
<td>239</td>
<td>167</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>500</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Suriname</td>
<td>108</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>12,802</td>
<td>10,122</td>
<td>7,501</td>
</tr>
</tbody>
</table>

1Includes bauxite imported to the U.S. Virgin Islands from foreign countries.
2Dry equivalent of shipments to the United States.

Note: Total U.S. imports of crude and dried bauxite (including the U.S. Virgin Islands) as reported by the Bureau of the Census were as follows: 1981—13,868,828 tons; 1982—11,049,005 tons; and 1983—7,908,202 tons.

Table 16.—U.S. imports for consumption of calcined bauxite, by country
(Thousand metric tons and thousand dollars)

<table>
<thead>
<tr>
<th>Country</th>
<th>1982 Quantity</th>
<th>Value</th>
<th>1983 Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>10</td>
<td>907</td>
<td>8</td>
<td>1,116</td>
</tr>
<tr>
<td>China</td>
<td>55</td>
<td>6,264</td>
<td>18</td>
<td>2,064</td>
</tr>
<tr>
<td>Guyana</td>
<td>52</td>
<td>9,225</td>
<td>17</td>
<td>1,415</td>
</tr>
<tr>
<td>Suriname</td>
<td>22</td>
<td>1,550</td>
<td>14</td>
<td>1,126</td>
</tr>
<tr>
<td>Other Luxembourg</td>
<td>2</td>
<td>366</td>
<td>(2)</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>131</td>
<td>17,453</td>
<td>59</td>
<td>5,622</td>
</tr>
</tbody>
</table>

1Value at foreign port of shipment as reported to U.S. Customs Service.
2Less than 1/2 unit.
3Data do not add to total shown because of independent rounding.
Table 17.—U.S. imports for consumption of alumina, 1 by country
(Thousand metric tons, calcined equivalent, and thousand dollars)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity</td>
<td>Value</td>
<td>Quantity</td>
</tr>
<tr>
<td>Australia</td>
<td>2,965</td>
<td>574,683</td>
<td>2,707</td>
</tr>
<tr>
<td>Brazil</td>
<td>142</td>
<td>11</td>
<td>3,611</td>
</tr>
<tr>
<td>Canada</td>
<td>34</td>
<td>10,222</td>
<td>130</td>
</tr>
<tr>
<td>France</td>
<td>4</td>
<td>12,479</td>
<td>5</td>
</tr>
<tr>
<td>Germany, Federal Republic of</td>
<td>8</td>
<td>9,469</td>
<td>11</td>
</tr>
<tr>
<td>Guinea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guyana</td>
<td>5</td>
<td>613</td>
<td></td>
</tr>
<tr>
<td>Jamaica</td>
<td>520</td>
<td>124,183</td>
<td>196</td>
</tr>
<tr>
<td>Japan</td>
<td>1</td>
<td>1,663</td>
<td>1</td>
</tr>
<tr>
<td>Suriname</td>
<td>448</td>
<td>192,486</td>
<td>117</td>
</tr>
<tr>
<td>Venezuela</td>
<td>7</td>
<td>1,614</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,978</td>
<td>837,992</td>
<td>3,132</td>
</tr>
</tbody>
</table>

1Revised.
2Includes imports of aluminum hydroxide. For 1982 and 1983, imports of crude and refined and ground aluminum oxide are included.
3Value at foreign port of shipment as reported to U.S. Customs Service.
4Less than 1/2 unit.
5Data may not add to totals shown because of independent rounding.

WORLD REVIEW

World markets for metal-grade bauxite remained depressed through year-end. By midyear, some alumina plant capacity had been reactivated in response to increased smelter requirements, but the oversupply of alumina reportedly held alumina prices down to marginally economic levels. World alumina capacity increased by 1.8 million tons per year with the startup of new plants in Ireland and Venezuela and the expansion of some existing plants. The International Bauxite Association invited India to join the bauxite producers group, restoring to 11 the number of member countries, following the resignation of Haiti in December 1982.

Australia.—In Queensland, the annual capacity of the Queensland Alumina Ltd. refinery at Gladstone, the world’s largest alumina plant, was expanded by 370,000 tons to 2.4 million tons and was to reach 2.7 million tons by mid-1984. Comalco Pty. Ltd. entered the world propellant market in 1983 with sintered abrasive-grade bauxite produced from ore mined at Weipa, Queensland. Both production and shipments of metal-grade bauxite at Weipa declined from 1982 levels. This was largely due to slack demand, although a recurrence of the 1982 maritime dispute over manning of a bauxite ore carrier forced Comalco to reduce bauxite production in the second quarter. In Western Australia, Alcoa of Australia Ltd. raised alumina production in mid-1983 at its Kwinana and Pinjarra refineries from 85% to 95% of capacity. Alcoa announced that its 500,000-ton-per-year Wagerup refinery, completed in mid-1982, was to start production in February 1984. Startup of a second new Western Australia alumina plant at Worsley was also delayed. The Worsley alumina project, owned by Reynolds Australia Alumina Ltd. (40%), Shell Co. of Australia Ltd. (30%), BHP Minerals Ltd. (20%), and Kobe Alumina Associates (Australia) Pty. Ltd. (10%), was expected to start alumina production by the second quarter of 1984, although the bauxite mine to supply the plant began operating in 1983. The designed annual capacity of the refinery was 1 million tons. Reynolds’ 400,000-ton share of alumina from the Worsley plant was expected to replace, in part, the 650,000 tons of annual alumina capacity lost when Reynolds closed the Hurricane Creek refinery in Arkansas.

Brazil.—MineraçãoRio do Norte S.A. (MRN), Brazil’s only bauxite exporter, revisited its original plan to increase the annual capacity of the Trombetas mine from 3.3 million tons to 6.4 million tons and opted for a capacity increase to 4 million tons. More than 600,000 tons of Trombetas bauxite was consumed by U.S. alumina plants in 1983. Much of the increased bauxite production in 1984 was expected to go to supply MRN’s first Brazilian customer, the Aluminio do
Maranhão S.A. (Alumar) alumina-smelter complex at São Luis, Maranhão State. Alumar, a $1,300 million joint venture between Alcoa Alumínio S.A. (60%) and Billiton International Metals BV (40%), planned to start up a 500,000-ton-per-year alumina plant and a 100,000-ton-per-year primary aluminum plant in the second half of 1984. Another major project in northern Brazil, Consorcio del Construcción Albras/Aluminate (CONSAU S.A.), formerly known as the Albras-Alunorte project, remained on an indefinitely suspended status. The project, to include an 800,000-ton-per-year alumina plant and a 320,000-ton-per-year smelter located on the Amazon River near Belem, Pará State, was planned by Cia. Vale do Rio Doce (51%) and a group of 27 Japanese companies (49%).

Greece.—After years of planning and negotiating, the Governments of Greece and the Soviet Union agreed to proceed with the Joint construction of a $450 million alumina plant designed to produce 600,000 tons per year of alumina from local Greek bauxite deposits. The U.S.S.R. and Bulgaria were to purchase annually 400,000 tons and 200,000 tons, respectively. Construction was to start in 1985.

Guinea.—Compagnie des Bauxites de Guinée (CBG), the operating company for the Sangaredi bauxite mine, the largest in Guinea, was owned by Halco (Mining) Inc., 51%, and the Government of Guinea, 49%. Billiton BV of the Royal Dutch/Shell Group, Netherlands, purchased a 6% interest in Halco through Martin Marietta Aluminum Co.'s sale of part of its 20% interest in Halco. Other companies in the Halco consortium were Aluminum Co. of Canada Ltd. (Alcan) 27%, Alcoa 27%, Péchiney S.A. 10%, Vereinigte Aluminium-Werke AG 10%, and Montecatini Edison S.p.A. 6%.

Guyana.—A Government proposal in June 1983 to reduce the workweek from 5 to 3 days and a drastic retrenchment in September of the Guyana Mining Enterprise Ltd. work force led to a 6-week labor strike and a loss in production during the year. A contract with Green Construction Co., Iowa, for overburden removal and bauxite mining at the East MontgomeryMine was extended throughout the year. Recommendations by consultants—Kaiser Aluminum Technical Services on repairing the alumina plant, and USM Engineers & Consultants Inc., a United States Steel Corp. subsidiary, on improving management of the operation—were reviewed by the state-owned Bauxite Industrial Development Corp. Production of calcined abrasive-grade bauxite, produced from 1937 to 1970, was resumed in 1988 to take advantage of markets previously supplied by the Suriname Aluminum Co. (Suralco). The 355,000-ton-per-year alumina plant at Linden remained closed during the year.

Hungary.—According to Hungaropress, the Hungarian news agency, an agreement to supply the U.S.S.R. with 500,000 tons of alumina and 5,000 tons of semifinished aluminum products annually was extended to 1990 with an option for further extension to the year 2000. Hungary was to receive, in exchange, annual deliveries of 205,000 tons of primary aluminum ingot. The barter arrangement allows the U.S.S.R. to benefit from Hungarian bauxite reserves, while the latter benefits from the relatively lower Soviet smelter costs that result from hydroelectric power sources. Hungary was developing a new 650,000-ton-per-year bauxite mine at Fenyoefoe that was expected to start producing ore by mid-1984. Bauxite production was started early in 1985 at the Bito-2 Mine in County Fejer. Output from the 1.3 million-ton-per-year-capacity mine was expected to reach 400,000 tons by year-end.

Ireland.—The newly constructed Aughinish Alumina Ltd. refinery owned by Alcan (40%), Billiton (35%), and Anaconda Ireland Co. (25%) started production in September. The refinery had a designed annual capacity of 500,000 tons of alumina and was scheduled to consume about 1.6 million tons annually of bauxite imported from CBG in Guinea.

Jamaica.—Production and exports by the five companies operating bauxite mining and refining plants remained at very low levels. Because Jamaica derives more than 65% of its export earnings through sales of these commodities, the economic impact of the depressed market was severe. In March, the Government signed an agreement to supply 1 million tons of metal-grade bauxite for the U.S. National Defense Stockpile. A second agreement, signed in November, increased the quantity to be supplied to 2 million tons. The first million tons was sold by cash transaction at $33.46 per dry ton, f.o.b. Jamaican ports. The price of the second million tons was the same; however, payment by the United States was to be in the form of dairy products. Bauxite shipments to U.S. stockpile sites began in July.
and were expected to be completed by year-end 1984. Jamaica signed a contract in the first quarter of 1983 to sell annually to the U.S.S.R. 1 million tons of bauxite starting in 1984. A trial shipment of 200,000 tons was exported under this contract in 1983. The new bauxite contract replaced an earlier sales contract to supply the Soviet Union annually with 250,000 tons of alumina. Jamaica was to receive machinery and other merchandise from the U.S.S.R. in partial payment for the bauxite. The bauxite production levy agreement between the Government and the five North American bauxite and alumina producers expired at yearend 1983. Negotiations between the Government and the companies to draft a 5-year levy agreement were complicated by a devaluation that lowered the value of the Jamaican dollar by 43%, and no agreement had been reached by yearend.

**Suriname.**—Shipments of bauxite and alumina continued at low levels in 1983 as a result of weak demand, and output was further reduced by a December labor strike that closed down the bauxite mines, alumina refinery, primary aluminum smelter, and the hydroelectric powerplant. News was announced in August that NV Billiton Maatschappij Suriname, a wholly owned subsidiary of Billiton, would buy a 45% interest in the Suralco 1.4 million-ton-per-year alumina plant located at Paranam. This would end a tolling arrangement whereby part of Billiton’s bauxite production was refined to alumina in the Suralco (wholly owned subsidiary of Alcoa) plant. Suralco suspended its exports of metal-grade bauxite and closed down its refractory-grade bauxite calcining facilities early in the year. In November, the abrasive-grade bauxite calciners were also shut down. The company cited high production costs, low market prices, and diminishing reserves as reasons for ending calcined bauxite production. Withdrawal of Suralco, the world’s second largest abrasive-grade bauxite producer, left the market to Australia, China, Guinea, and Guyana.

**United Kingdom.**—British Alcan Aluminium Ltd. announced that its Burntisland alumina plant in Scotland was to be modified and the capacity expanded in 1984. Approximately $1.7 million was to be spent to increase the capacity for fine-particulate hydrated alumina. The Burntisland facility was one of the leading European alumina chemicals producers.

**Venezuela.**—The first unit of the Interamericana de Aluminio C.A. (INTERALÚMINA) refinery began producing alumina in February, and the second unit started up in September, bringing the plant to its designed annual capacity of 1 million tons. Startup was reported to have gone smoothly, and by yearend, a total of 560,000 tons of alumina had been produced with about 140,000 tons exported to Canada, Norway, and the United States. The balance was sold to Venezuela’s state-owned primary aluminum smelters, Venezolana de Aluminio and Aluminio del Caroni S.A. Bauxite feed for INTERALÚMINA was imported from Brazil, Sierra Leone, and Suriname. In July, the Government budgeted funds for the Bauxitas Venezolanas C.A. (Bauxiven) project to proceed with engineering studies to develop the Los Pijiguaos bauxite deposits in Bolivar State. Bauxiven’s objectives were to design a mining operation and an Orinoco River barge transport system to start delivery of ore to the INTERALÚMINA refinery in 1986.

### Table 18.—Bauxite: World production, by country*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australia</strong></td>
<td>27,588</td>
<td>27,179</td>
<td>25,541</td>
<td>25,695</td>
<td>24,560</td>
</tr>
<tr>
<td><strong>Brazil</strong></td>
<td>2,538</td>
<td>5,558</td>
<td>5,776</td>
<td>6,289</td>
<td>7,000</td>
</tr>
<tr>
<td><strong>China</strong></td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
</tr>
<tr>
<td><strong>Dominican Republic</strong></td>
<td>685</td>
<td>606</td>
<td>437</td>
<td>141</td>
<td>120</td>
</tr>
<tr>
<td><strong>France</strong></td>
<td>1,989</td>
<td>1,921</td>
<td>1,804</td>
<td>1,602</td>
<td>1,756</td>
</tr>
<tr>
<td><strong>Germany, Federal Republic of</strong></td>
<td>9 (9)</td>
<td>9 (9)</td>
<td>9 (9)</td>
<td>9 (9)</td>
<td>9 (9)</td>
</tr>
<tr>
<td><strong>Ghana</strong></td>
<td>214</td>
<td>225</td>
<td>151</td>
<td>64</td>
<td>63</td>
</tr>
<tr>
<td><strong>Greece</strong></td>
<td>2,612</td>
<td>3,556</td>
<td>3,216</td>
<td>2,368</td>
<td>2,990</td>
</tr>
<tr>
<td><strong>Guinea</strong></td>
<td>11,328</td>
<td>11,302</td>
<td>11,112</td>
<td>11,827</td>
<td>11,080</td>
</tr>
<tr>
<td><strong>Guyana</strong></td>
<td>2,312</td>
<td>1,544</td>
<td>1,681</td>
<td>1,450</td>
<td>1,791</td>
</tr>
<tr>
<td><strong>Haiti</strong></td>
<td>576</td>
<td>312</td>
<td>427</td>
<td>377</td>
<td>450</td>
</tr>
<tr>
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</table>

See footnotes at end of table.
### Bauxite and Alumina

#### Table 18.—Bauxite: World production, by country

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<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>U.S.S.R.</td>
<td>4,800</td>
<td>4,800</td>
<td>4,800</td>
<td>4,800</td>
<td>4,800</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>35,522</strong></td>
<td><strong>39,213</strong></td>
<td><strong>85,523</strong></td>
<td><strong>77,793</strong></td>
<td><strong>76,016</strong></td>
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</table>

Table includes data available through June 27, 1984.
Dry bauxite equivalent of crude ore.
Less than 1/2 unit.
Dry bauxite equivalent of ore processed by drying plant.
Reported figure.
*Signifies.
Bauxite processed for conversion to alumina in Jamaica plus kiln-dried ore prepared for export.
In addition to the bauxite reported in the body of the table, the U.S.S.R. produces nepheline syenite concentrates and alunite ore as sources of aluminum. Estimated nepheline syenite production was as follows, in thousand metric tons: 1978—2,600; 1979—2,500; 1980—2,000; 1981—2,000; 1982—2,500, and 1983—2,500. Estimated alunite ore production was as follows in thousand metric tons: 1976—600; 1977—600; 1978—600; 1979—600 (revised); 1980—600 (revised); and 1981—615. Nepheline syenite concentrate grades 25% to 30% alumina, and alunite ore grades 10% to 16% alumina; these commodities may be converted to their bauxite equivalent by using factors of 1 ton of nepheline syenite concentrate equals 0.35 ton of bauxite and 1 ton of alunite equals 0.34 ton of bauxite.

#### Table 19.—Alumina: World production, by country

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<td>100</td>
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*Figures presented generally represent calcined alumina; exceptions are noted individually.
*Table includes data available through June 27, 1984.
*In addition to the countries listed, Austria produces alumina (fused aluminum oxide), but output is entirely for abrasives production. Output totaled 28,223 metric tons in 1975; production data subsequent to 1973 are not available.
*Reported figure.
*Calcined alumina, plus calcined alumina equivalent of alumina hydrate.
Table 20.—World annual alumina capacity, by country
(Thousand metric tons, year-end)

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<td>(a)</td>
<td>(a)</td>
<td>(a)</td>
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<tr>
<td>Romania</td>
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<td>540</td>
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</tr>
<tr>
<td>Spain</td>
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<td>800</td>
<td>800</td>
</tr>
<tr>
<td>Suriname</td>
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<td>1,950</td>
<td>1,950</td>
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<tr>
<td>Taiwan</td>
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<td>140</td>
<td>140</td>
</tr>
<tr>
<td>Turkey</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>U.S.S.R.</td>
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<td>4,500</td>
<td>4,500</td>
</tr>
<tr>
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<td>140</td>
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<tr>
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<td>7,420</td>
<td>7,420</td>
</tr>
<tr>
<td>Venezuela</td>
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<td>1,000</td>
</tr>
<tr>
<td>Yugoslavia</td>
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<td>1,585</td>
<td>1,585</td>
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<tr>
<td>Total</td>
<td>39,195</td>
<td>39,790</td>
<td>41,310</td>
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</table>

(a) Estimated.
(b) Revised to zero.

TECHNOLOGY

Alcoa and ARCO Metals Co. announced a joint research project to perfect the technology for production of primary aluminum from kaolinic clay. ARCO was to contribute its expertise in producing aluminum chloride from clay, while Alcoa would provide smelter technology for converting the chloride to aluminum. This alternative to the conventional Bayer-Hall processes, based on bauxite as the raw material, promised significant savings in energy requirements and could draw on very large domestic resources of clay.

Toth Aluminum Corp. planned to open a new plant at Vacherie, LA, in the first quarter of 1984 to produce aluminum chloride and other metal chlorides from clay. The plant was to use a proprietary carbochlorination process in conjunction with a boron trichloride catalyst to treat kaolin clay supplied from Georgia. The company expected this first commercial plant to recover alumina from clay to produce annually about 8,000 tons of aluminum chloride for conversion to high-purity alumina for the abrasives and ceramic markets.

At Red Mountain, CO, Earth Sciences Inc. was exploring an alunite (potassium aluminum sulfate) deposit as a possible alternate source of alumina. The company reported drilling out more than 54 million tons of alunite, which, when pure, contains 37% alumina. The proposed project was economically enhanced by a plan to produce potash and sulfuric acid as coproducts.

The Bureau of Mines reviewed the state-of-the-art technology for producing aluminum chloride from kaolinic clay. The important chemical problems in producing anhydrous aluminum chloride of acceptable purity for the production of aluminum metal were identified and discussed. Preliminary studies were completed at the Bureau of Mines Tuscaloosa Research Center on the dewatering of the red mud wastes of alumina plants. High-molecular-weight polyacrylamides were found to be the most effective flocculants for red mud generated from Jamaican bauxite. Slurries containing approximately 10% solids were dewatered to about 25% solids using a baffled, rotating drum mixer to mix a commercial flocculant with the mud and a trommel screen to provide dewatering.

1Physical scientist, Division of Nonferrous Metals.
2Statistical assistant, Division of Nonferrous Metals.
3All quantities in this chapter are given in metric tons unless otherwise specified.
4Contract price was $34 per long dry ton of bauxite.
7Industrial Minerals (London), May 1983, p. 15.