CADMIUM
(Data in metric tons of cadmium content unless otherwise noted)

Domestic Production and Use: Two companies in the United States produced refined cadmium in 2019. One company, operating in Tennessee, recovered primary refined cadmium as a byproduct of zinc leaching from roasted sulfide concentrates. The other company, operating in Ohio, recovered secondary cadmium metal from spent nickel-cadmium (NiCd) batteries. Domestic production and consumption of cadmium were withheld to avoid disclosing company proprietary data. Cadmium metal and compounds are mainly consumed for alloys, coatings, NiCd batteries, pigments, and plastic stabilizers. For the past 4 years, the United States has been a net importer of unwrought cadmium metal and cadmium metal powders and a net exporter of wrought cadmium products and cadmium pigments.

Production, refined
Imports for consumption:
  Unwrought cadmium and powders 237 240 274 273 350
  Wrought cadmium and other articles (gross weight) 18 (2) 2 1 20
  Cadmium waste and scrap (gross weight) 71 52 20 20 70
Exports:
  Unwrought cadmium and powders 350 157 223 41 20
  Wrought cadmium and other articles (gross weight) 246 371 205 99 70
  Cadmium waste and scrap (gross weight) (2) 12 (2) (2) 6
Consumption, reported, refined
  W  W  W  W  W
Price, metal, annual average, dollars per kilogram
  1.47 1.34 1.75 2.89 2.60
Stocks, yearend, producer and distributor
  W  W  W  W  W
Net import reliance as a percentage of apparent consumption
  E <25 <25 <50 <50

Recycling: Secondary cadmium is mainly recovered from spent consumer and industrial NiCd batteries. Other waste and scrap from which cadmium can be recycled includes copper-cadmium alloy scrap, some complex nonferrous alloy scrap, cadmium-containing dust from electric arc furnaces, and cadmium telluride (CdTe) solar panels.

Import Sources (2015–18): China, 25%; Australia, 22%; Canada, 21%; Peru, 10%; and other, 22%.

Tariff: Item Number Normal Trade Relations
  Cadmium oxide 2825.90.7500 Free.
  Cadmium sulfide 2830.90.2000 3.1% ad val.
  Pigments and preparations based on cadmium compounds 3206.49.6010 3.1% ad val.
  Unwrought cadmium and powders 8107.20.0000 Free.
  Cadmium waste and scrap 8107.30.0000 Free.
  Wrought cadmium and other articles 8107.90.0000 4.4% ad val.

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile: None.

Prepared by Robert M. Callaghan [(703) 648–7709, rcallaghan@usgs.gov]
CADMIUM

Events, Trends, and Issues: Most of the world’s primary cadmium metal was produced in Asia, and leading global producers, in descending order of production, were China, the Republic of Korea, and Japan. A smaller amount of secondary cadmium metal was recovered from recycling NiCd batteries. Although detailed data on the global consumption of primary cadmium were not available, NiCd battery production was thought to have continued to account for most global cadmium consumption. Other end uses for cadmium and cadmium compounds included alloys, anticorrosive coatings, pigments, polyvinyl chloride (PVC) stabilizers, and semiconductors for solar cells.

The average monthly cadmium price began 2019 averaging $2.80 per kilogram in January and trended upward to about $3.06 per kilogram in March. Prices began decreasing in May, falling to an average of about $2.40 per kilogram in August.

In 2019, a U.S.-based CdTe thin-film solar-cell producer continued constructing a second manufacturing plant in Ohio. The facility was expected to be completed in 2019 and reach its full production rate in 2020. The plant would triple the company’s U.S. CdTe solar cell manufacturing capacity to 1.8 gigawatts per year.

World Refinery Production and Reserves:

<table>
<thead>
<tr>
<th></th>
<th>Refinery production</th>
<th>Reserves(^6)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2018</td>
<td>2019(^6)</td>
</tr>
<tr>
<td>United States(^1)</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Canada</td>
<td>1,680</td>
<td>1,600</td>
</tr>
<tr>
<td>China</td>
<td>8,200</td>
<td>8,200</td>
</tr>
<tr>
<td>Japan</td>
<td>1,980</td>
<td>1,900</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>1,500</td>
<td>1,400</td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Mexico</td>
<td>1,360</td>
<td>1,400</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1,100</td>
<td>1,100</td>
</tr>
<tr>
<td>Peru</td>
<td>765</td>
<td>770</td>
</tr>
<tr>
<td>Russia</td>
<td>1,200</td>
<td>1,000</td>
</tr>
<tr>
<td>Other countries</td>
<td>2,310</td>
<td>2,300</td>
</tr>
<tr>
<td>World total (rounded)</td>
<td>25,100</td>
<td>25,000</td>
</tr>
</tbody>
</table>

World Resources: Cadmium is generally recovered from zinc ores and concentrates. Sphalerite, the most economically significant zinc ore mineral, commonly contains minor amounts of cadmium, which shares certain similar chemical properties with zinc and often substitutes for zinc in the sphalerite crystal lattice. The cadmium mineral greenockite is frequently associated with weathered sphalerite and wurtzite.

Substitutes: Lithium-ion and nickel-metal hydride batteries can replace NiCd batteries in many applications. Except where the surface characteristics of a coating are critical (for example, fasteners for aircraft), coatings of zinc, zinc-nickel, aluminum, or tin can be substituted for cadmium in many plating applications. Cerium sulfide is used as a replacement for cadmium pigments, mostly in plastics. Barium-zinc or calcium-zinc stabilizers can replace barium-cadmium stabilizers in flexible PVC applications. Amorphous silicon and copper-indium-gallium-selenide photovoltaic cells compete with cadmium telluride in the thin-film solar-cell market. Research efforts continued to advance new thin-film technology based on perovskite material as a potential substitute.