MOLYBDENUM
(Data in metric tons of molybdenum content unless otherwise noted)

Domestic Production and Use: In 2015, 56,300 metric tons of molybdenum, valued at about $1.0 billion (based on an average oxide price), was produced at 10 mines. Molybdenum ore was produced as a primary product at two mines—both in Colorado—whereas eight copper mines (five in Arizona, one each in Montana, Nevada, and Utah) recovered molybdenum as a byproduct. Three roasting plants converted molybdenite concentrate to molybdic oxide, from which intermediate products, such as ferromolybdenum, metal powder, and various chemicals, were produced. Iron and steel and superalloy producers accounted for about 74% of the molybdenum consumed.

Salient Statistics—United States:

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production, mine</td>
<td>63,700</td>
<td>61,500</td>
<td>61,000</td>
<td>68,200</td>
<td>56,300</td>
</tr>
<tr>
<td>Imports for consumption</td>
<td>21,100</td>
<td>19,800</td>
<td>20,200</td>
<td>25,300</td>
<td>22,200</td>
</tr>
<tr>
<td>Exports</td>
<td>56,700</td>
<td>48,900</td>
<td>53,100</td>
<td>65,100</td>
<td>63,400</td>
</tr>
</tbody>
</table>

Consumption:
- Reported[^1]         | 19,100    | 19,400    | 18,600    | 19,500    | 19,000   |
- Apparent[^2]         | 26,100    | 33,100    | 29,800    | 27,900    | 15,600   |

Price, average value, dollars per kilogram[^3]  
- 2011: 34.34  
- 2012: 28.09  
- 2013: 22.85  
- 2014: 25.84  
- 2015*: 17.80

Stocks, consumer materials  
- 2011: 1,810  
- 2012: 1,770  
- 2013: 1,820  
- 2014: 2,010  
- 2015*: 1,750

Employment, mine and plant, number  
- 2011: 940  
- 2012: 940  
- 2013: 960  
- 2014: 1,000  
- 2015*: 950


Recycling: Molybdenum is recycled as a component of catalysts, ferrous scrap, and superalloy scrap. Ferrous scrap comprises revert scrap, and new and old scrap. Revert scrap refers to remnants manufactured in the steelmaking process. New scrap is generated by steel mill customers and recycled by scrap collectors and processors. Old scrap is largely molybdenum-bearing alloys recycled after serving their useful life. The amount of molybdenum recycled as part of new and old steel and other scrap may be as much as 30% of the apparent supply of molybdenum. There are no processes for the separate recovery and refining of secondary molybdenum from its alloys. Molybdenum is not recovered separately from recycled steel and superalloys, but the molybdenum content of the recycled alloys is significant, and the molybdenum content is reused. Recycling of molybdenum-bearing scrap will continue to be dependent on the markets for the principal alloy metals of the alloys in which molybdenum is found, such as iron, nickel, and chromium.

Import Sources (2011–14): Ferromolybdenum: Chile, 83%; Canada, 9%; United Kingdom, 4%; and other, 4%. Molybdenum ores and concentrates: Mexico, 31%; Canada, 28%; Peru, 23%; Chile, 17%; and other, 1%.

Tariff: Item  Number  Normal Trade Relations 12–31–15
- Molybdenum ore and concentrates, roasted 2613.10.0000 12.8¢/kg + 1.8% ad val.
- Molybdenum ore and concentrates, other 2613.90.0000 17.8¢/kg.
- Molybdenum chemicals:  
  - Molybdenum oxides and hydroxides 2825.70.0000 3.2% ad val.  
  - Molybdates of ammonium 2841.70.1000 4.3% ad val.  
  - Molybdates, all others 2841.70.5000 3.7% ad val.  
- Molybdenum pigments, molybdenum orange 3206.20.0020 3.7% ad val.  
- Ferroalloys, ferromolybdenum 7202.70.0000 4.5% ad val.
- Molybdenum metals:  
  - Powders 8102.10.0000 9.1¢/kg + 1.2% ad val.  
  - Unwrought 8102.94.0000 13.9¢/kg + 1.9% ad val.  
  - Wrought bars and rods 8102.95.3000 6.6% ad val.  
  - Wrought plates, sheets, strips, etc. 8102.95.6000 6.6% ad val.  
  - Wire 8102.96.0000 4.4% ad val.  
  - Waste and scrap 8102.97.0000 Free.  
  - Other 8102.99.0000 3.7% ad val.

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

Government Stockpile: None.

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**MOLYBDENUM**

**Events, Trends, and Issues:** U.S. estimated mine output of molybdenum in concentrate in 2015 decreased by 17% from that of 2014. U.S. imports for consumption decreased by 12% from those of 2014, and U.S. exports decreased slightly from those of 2014. Reported U.S. consumption of primary molybdenum products decreased slightly from that of 2014. Apparent consumption decreased by 44% from that of 2014.

The average molybdenum price for 2015 was lower than that of 2014. Primary molybdenum production continued at the Climax Mine in Lake County and Summit County, CO, but primary production at the Ashdown Mine in Humboldt County, NV, and at the Questa Mine in Taos County, NM, continued to be suspended. The Thompson Creek Mine in Custer County, ID, and the Mineral Park Mine in Mohave County, AZ, were put on care and maintenance at yearend 2014 and did not reopen in 2015. The decline in U.S. molybdenum production was attributed mainly to the closure of the Thompson Creek Mine. The Chino Mine, a copper mine in Grant County, NM, did not produce molybdenum in 2015. Both the Mission Mine in Pima County, AZ, and the Pinto Valley Mine in Gila County, AZ, produced molybdenum in 2015.

**World Mine Production and Reserves:** Reserves for Iran were updated from Iran Mines and Mining Industries Summit data.

<table>
<thead>
<tr>
<th>Country</th>
<th>2014</th>
<th>2015e</th>
<th>Reserves5 (thousand metric tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>68,200</td>
<td>56,300</td>
<td>2,700</td>
</tr>
<tr>
<td>Armenia</td>
<td>7,100</td>
<td>7,300</td>
<td>150</td>
</tr>
<tr>
<td>Australia</td>
<td>—</td>
<td>—</td>
<td>190</td>
</tr>
<tr>
<td>Canada</td>
<td>9,700</td>
<td>9,300</td>
<td>260</td>
</tr>
<tr>
<td>Chile</td>
<td>48,800</td>
<td>49,000</td>
<td>1,800</td>
</tr>
<tr>
<td>China</td>
<td>103,000</td>
<td>101,000</td>
<td>4,300</td>
</tr>
<tr>
<td>Iran</td>
<td>4,000</td>
<td>4,000</td>
<td>43</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>—</td>
<td>—</td>
<td>130</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>NA</td>
<td>NA</td>
<td>100</td>
</tr>
<tr>
<td>Mexico</td>
<td>14,400</td>
<td>13,000</td>
<td>130</td>
</tr>
<tr>
<td>Mongolia</td>
<td>2,000</td>
<td>2,000</td>
<td>160</td>
</tr>
<tr>
<td>Peru</td>
<td>17,000</td>
<td>18,100</td>
<td>450</td>
</tr>
<tr>
<td>Russia5</td>
<td>4,800</td>
<td>4,800</td>
<td>250</td>
</tr>
<tr>
<td>Turkey</td>
<td>1,300</td>
<td>1,400</td>
<td>100</td>
</tr>
<tr>
<td>Uzbekistan5</td>
<td>530</td>
<td>520</td>
<td>60</td>
</tr>
<tr>
<td><strong>World total (rounded)</strong></td>
<td><strong>281,000</strong></td>
<td><strong>267,000</strong></td>
<td><strong>11,000</strong></td>
</tr>
</tbody>
</table>

**World Resources:** Identified resources of molybdenum in the United States are about 5.4 million tons and, in the rest of the world, about 14 million tons. Molybdenum occurs as the principal metal sulfide in large low-grade porphyry molybdenum deposits and as an associated metal sulfide in low-grade porphyry copper deposits. Resources of molybdenum are adequate to supply world needs for the foreseeable future.

**Substitutes:** There is little substitution for molybdenum in its major application as an alloying element in steels and cast irons. In fact, because of the availability and versatility of molybdenum, industry has sought to develop new materials that benefit from the alloying properties of the metal. Potential substitutes for molybdenum include boron, chromium, niobium (columbium), and vanadium in alloy steels; tungsten in tool steels; graphite, tantalum, and tungsten for refractory materials in high-temperature electric furnaces; and cadmium-red, chrome-orange, and organic-orange pigments for molybdenum orange.

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*Reported consumption of primary molybdenum products.
*Apparent consumption of molybdenum concentrates roasted to make molybdenum oxide.
*Time-weighted average price per kilogram of molybdenum contained in technical-grade molybdic oxide, as reported by Ryan’s Notes.
*Defined as imports – exports + adjustments for industry stock changes.
*See Appendix C for resource/reserve definitions and information concerning data sources.