Molybdenum is a refractory metallic element used principally as an alloying agent in cast iron, steel, and superalloys to enhance hardenability, strength, toughness, and wear- and corrosion-resistance. To achieve desired metallurgical properties, molybdenum, primarily in the form of MoX or FeMo, is commonly used in combination with or added to chromium, manganese, nickel, niobium (columbium), tungsten, or other alloy metals. The versatility of molybdenum in enhancing a variety of alloy properties has ensured it a significant role in contemporary industrial technology, which increasingly requires materials that can sustain high stress, expanded temperature ranges, and highly corrosive environments. Significant uses of molybdenum are as a refractory metal and in numerous chemical applications, including catalysts, lubricants, and pigments. Molybdenum has become increasingly important in green technology, particularly in the manufacture of biofuels, catalysts, ethanol, solar panels, and wind turbines.

U.S. molybdenum reserves were estimated to have been about 2.7 million metric tons (Mt) in 2015; about 31% of world molybdenum reserves. About 90% of U.S. reserves occur in large, low-grade porphyry molybdenum deposits mined or anticipated to be mined primarily for molybdenum and in low-grade porphyry copper deposits as an associated metal sulfide. These deposits are in Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, and Utah.

Production

Domestic primary and byproduct molybdenum mine production data were derived from three separate voluntary surveys by the U.S. Geological Survey. These surveys are “Molybdenum Ore and Concentrate” (annual), “Molybdenum Concentrate” (monthly), and “Molybdenum Concentrates and Molybdenum Products” (monthly). Surveys were sent to all 10 U.S. operations (two primary molybdenum mines, eight byproduct mines) that currently produce molybdenum concentrates and products from ore, and all responded, representing 100% of U.S. concentrate production reported in table 1.

As of December 31, 2015, U.S.-rated capacity for mines and mills was estimated to have decreased 14% to 85,900 metric tons per year (t/yr) of contained metal. Rated capacity is defined as the maximum quantity of product that can be produced in a period of time on a normally sustainable long-term operating rate, based on the physical equipment of the plant and given acceptable routine operating procedures involving energy, labor, maintenance, and materials. Capacity included plants that were temporarily closed but could be brought into production within a short period of time with minimal capital expenditure.

Primary molybdenum production continued at the Climax Mine and the Henderson Mine in Colorado. Freeport-McMoRan Copper & Gold Inc. (FCX) operated the Henderson underground mine and the Climax open pit mine. Both mines produced high-purity, chemical-grade molybdenum concentrates, which were further processed into value-added molybdenum chemical products. Production from both mines in 2015 totaled 21,770 t of molybdenum, compared with 23,130 t in 2014 (Freeport-McMoRan Copper & Gold Inc., 2016a, p. 47). The Climax Mine restarted commercial operations in May 2012 and included a 25,000-metric-ton-per-day (t/d) mill facility. Molybdenum production from Climax totaled 10,400 t in 2015, a 10% increase from the 9,500 t produced in 2014 (Freeport-McMoRan Copper & Gold Inc., 2016b, p. 15–16). The Henderson operation consisted of a large underground mining complex that fed a 32,000-t/d concentrator. Henderson had the capacity to produce 18,140 t/yr of molybdenum concentrate. The majority of the molybdenum concentrate produced at Henderson was shipped to FCX’s Fort Madison, IA, processing facility. Henderson announced that it revised its operating plans to incorporate a 65% reduction in operating rates to accelerate its debt reduction plans (Freeport-McMoRan Copper & Gold Inc., 2016b, p. 13).

The Thompson Creek Mine in Idaho was placed on care-and-maintenance status in 2014 and did not produce any

Thompson Creek Metals Co. Inc. (TCMC) continued to operate its metallurgical roasting facility in Langeloth, PA. The facility has the capacity to roast 16,300 t/yr of raw molybdenum concentrate and the capacity to process more than 4,000 t/yr of MoX into FeMo. The Langeloth facility also processed nonmolybdenum catalysts for various customers, primarily in the food industry (Thompson Creek Metals Co. Inc., undated b).

Byproduct mines included the Bagdad, Mission, Morenci, Pinto Valley, and Sierrita Mines in Arizona; the Continental Pit Mine in Montana; the Robinson Mine in Nevada; and the Bingham Canyon Mine in Utah (table 2). In the case of byproduct molybdenum recovery at a copper mine, all mining costs associated with molybdenum concentrate production are allocated to the primary metal (copper). In 2015, byproduct molybdenite recovery accounted for approximately 56% of the U.S. molybdenum concentrate production.

The Bagdad operation of FCX included a 75,000-t/d concentrator that produced copper and molybdenum concentrates, as well as a pressure-leach plant that processed molybdenum concentrate. Bagdad produced approximately 4,080 t of molybdenum concentrate in both 2014 and 2015 (Freeport-McMoRan Copper & Gold Inc., 2016a, p. 10).

The Morenci operation of FCX consisted of two concentrators capable of milling 115,000 t/d of ore to produce copper and molybdenum concentrates. FCX owns an 85% undivided interest in Morenci, with the remaining 15% owned by Sumitomo Metal Mining Arizona, Inc. Morenci’s production, including the joint-venture partner’s share, totaled 3,600 t of molybdenum concentrate, compared with the 453 t produced in 2014 (Freeport-McMoRan Copper & Gold Inc., 2016a, p. 11).

The Sierrita operation of FCX included a 102,000-t/d concentrator that produced copper and molybdenum concentrates. It also had molybdenum facilities consisting of a leaching circuit, two molybdenum roasters, and a packaging facility. The molybdenum facilities processed concentrate from Sierrita, other FCX mines, and third-party sources. Molybdenum concentrate production at Sierrita in 2015 was 9,500 t, a 13% decrease compared with 10,900 t of molybdenum concentrate produced in 2014 (Freeport-McMoRan Copper & Gold Inc., 2016b, p. 14).

FCX’s Chino Mine is an open pit copper-mining complex located in southwestern New Mexico’s Grant County. Chino did not produce molybdenum in 2015 but did produce approximately 450 t of molybdenum concentrate in 2014 (Freeport-McMoRan Copper & Gold Inc., 2016b, p. 16).

Rio Tinto plc (London, United Kingdom) reported that molybdenum concentrate production at its Bingham Canyon Mine (operated by its subsidiary Kennecott Utah Copper Corp.) was 7,600 t of molybdenum concentrate compared with 11,500 t of molybdenum concentrate produced in 2014. Production in 2015 was affected by ongoing recovery from the 130-Mt landslide on the northeast wall of the mine that occurred in April 2013. Work to stabilize the wall continued in 2015, and the company expected production volumes to recover as this work is completed in 2016 and 2017 (Rio Tinto plc, 2016, p. 34).

Mineral Park Inc., a subsidiary of Mercator Minerals Ltd. (Vancouver, British Columbia, Canada) announced that it was placing its mill and Mineral Park Mine near Kingman, AZ, on care-and-maintenance status as of December 29, 2014 (Metal Bulletin, 2015).

Consumer

Statistics on consumption of molybdenum in end-use applications by U.S. metal consumers were developed from the voluntary “Consolidated Consumers Survey.” For this survey, molybdenum consumers were canvassed on a monthly or annual basis. Reported consumption and stocks data in tables 1 and 3 include estimates to account for nonrespondents.

In 2015, U.S.-reported consumption of molybdenum contained in concentrate for roasting decreased compared with that of 2014. Reported consumption of molybdenum contained in concentrate was withheld to avoid disclosing company proprietary data. Domestic mine production of molybdenum concentrate was roasted, exported for conversion, or purified to lubricant-grade MoS₂. MoX was the leading form of molybdenum used by industry, particularly in making stainless steel. Superalloy industry consumption decreased in 2015 compared with that of 2014 (table 3).

Metallurgical applications dominated reported molybdenum use in 2015, accounting for approximately 88% of 2015 total reported consumption. In 2015, FeMo accounted for 21% of the molybdenum-bearing materials used to make steel (not including tool steel, which was withheld) (table 3). Nonmetallurgical applications included catalysts, chemicals, lubricants, and pigments. The dominant nonmetallurgical use was in catalysts, principally catalysts related to petroleum refining.

Stocks

At yearend 2015, producer plus consumer industry stocks increased compared with yearend 2014 stocks. Inventories of molybdenum in concentrate at mines and plants increased (table 1). Stocks of molybdenum in FeMo, MoX, metal powders, and other products decreased compared with stocks of 2014 (table 3).

Prices

In 2015, the average monthly price for domestic MoX, as published by CRU Group, ranged from $4.625 to $9.422 per pound in 2015, compared with $9.538 to $14.747 per pound in 2014. The average monthly price for domestic FeMo ranged from $6.050 to $10.775 per pound of molybdenum content, compared with $11.389 to $19.063 per pound reported in 2014 (fig. 1). Both FeMo and MoX prices continued to decrease in 2015 until December 2015, when both FeMo and MoX prices increased slightly. Prices have not been this low since early 2003; the average annual MoX price for 2003 was $5.34 per pound.

Foreign Trade

Molybdenum enters into international trade largely in raw and roasted concentrates and FeMo. U.S. exports of
molybdenum ore and concentrates (including roasted and other concentrates) were 78% of total U.S. molybdenum concentrate production in 2015. Exports of molybdenum ore and concentrates totaled approximately 36,800 t with 49% of this total going to the Netherlands. The Netherlands features prominently in international trade of molybdenum concentrates and molybdenum-containing products, both as a transiting and warehouse location and as the location for one of Climax Molybdenum Co.’s processing facilities in Rotterdam.

In 2015, molybdenum-containing exports (excluding molybdenum ore and concentrates) collectively totaled approximately 5,310 t (gross weight) valued at $135 million (tables 4, 6). Imports for consumption of all molybdenum-containing products collectively totaled approximately 31,200 t (gross weight) valued at $323 million (table 9).

World Review

World molybdenum reserves and production capacity were concentrated in a few countries. In 2015, world mine output was estimated to have been 235,000 t (molybdenum contained in concentrate), of which, in descending order of production, China, Chile, the United States, Peru, Mexico, and Armenia provided about 94% (table 10).

According to the International Molybdenum Association, global molybdenum consumption in 2015 decreased to 229,700 t compared with the record high of 253,600 t in 2014. The leading consumer of molybdenum in 2015 continued to be China, where consumption decreased to 80,600 t in 2015 from 91,600 t in 2014. Europe was the second leading consumer at 60,100 t in 2015 compared with 65,000 t in 2014 (S&P Global Platts, 2016).

Armenia.—The Zangezur Copper-Molybdenum Combine was expected to increase total ore production by 10% in 2016. A second ball mill started operation in 2015. Ore production at the mine was 18.2 Mt in 2015 and the company expected to produce 20.1 Mt in 2016. The company’s shareholders are Cronimet Mining AG (60%), Pure Iron Plant OJSC (15%), Armenian Molybdenum Production Ltd. (12.5%), and Zangezur Mining Ltd. (12.5%) (Armenpress, 2016).

Canada.—Thompson Creek Metals Co. Inc., along with joint-venture partner, Sojitz Moly Resources Inc., placed the Endako molybdenum mine on care-and-maintenance status in July 2015 owing to weak molybdenum prices (Thompson Creek Metals Co. Inc., undated a).

At its Gibraltar Mine in south-central British Columbia, Taseko Mines Ltd. produced 437 t of molybdenum in 2015, a 59% decrease from the 1,057 t of molybdenum produced in 2014. Molybdenum production decreased because the company idled its molybdenum circuit at the end of July. There was no molybdenum production in the fourth quarter of 2015 (Taseko Mines Ltd., 2016, p. 4–5).

Chile.—In 2015, Amerigo Resources Ltd. produced only 44 t of molybdenum at its Minera Valle Central (MVC) processing facility compared with 263 t in 2014 because molybdenum was only produced in the first quarter of 2015. In 2016, the company expects no molybdenum production owing to prevailing low molybdenum prices (Amerigo Resources Ltd., 2016a). Amerigo processed tailings from El Teniente’s Colihues tailings pond as well as fresh tailings from the mine’s concentrator. The plant extracted copper from tailings discharged from Corporación Nacional del Cobre de Chile’s (CODELCO’s) El Teniente concentrators. The tailings were then returned to El Teniente’s tailings disposal system. The MVC facility has a capacity of 175,000 t/d and processed 58 Mt of tailings in 2014 (Amerigo Resources Ltd., 2016b, p. 12–13).

Antofagasta plc (London, United Kingdom) announced that 2015 byproduct molybdenum production at its Los Pelambres Mine was 10,100 t, a 28% increase compared with 7,900 t of molybdenum produced in 2014. Antofagasta anticipated 2016 molybdenum production to be approximately 8,000 to 9,000 t (Antofagasta plc, 2016, p. 4). Antofagasta also announced that it was constructing a new molybdenum plant at Centinela. The feasibility study was ongoing in 2015 and the project was delayed to preserve cash in 2016. The new plant was expected to produce approximately 2,400 t/yr of molybdenum concentrate and was expected to be completed in 2017 (Antofagasta plc, 2016, p. 2, 3, 17, 48).

CODELCO, the state-controlled copper and molybdenum producer, announced that it produced 27,700 t of molybdenum in 2015 compared with 30,600 t in 2014. CODELCO attributed the 10% decrease in molybdenum production to lower output from the Chuquicamata Division. The Chuquicamata open pit mine produced 12,640 t of molybdenum in 2015, a 14% decrease compared with the 14,620 t of molybdenum produced in 2014 (Corporación Nacional del Cobre de Chile, 2016, p. 71).

CODELCO, through its subsidiary MOLYB Ltd., continued building its molybdenum concentrate treatment plant, located in Mejillones, Antofagasta Region. The plant was scheduled to begin operations in the second half of 2016 and was expected to produce 16,500 t/yr of molybdenum trioxide and 30,000 t/yr of sulfuric acid. It was also expected to produce rhenium as a byproduct (Corporación Nacional del Cobre de Chile, 2016, p. 107).

The Sierra Gorda project, in the Antofagasta Region in northern Chile, was a joint venture among KGHM International Ltd., Sumitomo Metal Mining Co., Ltd., and Sumitomo Corp. under the company Sierra Gorda SCM. The Sierra Gorda Mine produced 7,000 t of molybdenum concentrate in 2015. The company expected to complete a rampup phase in 2016 and was expected to produce between 18,100 and 22,600 t/yr of molybdenum concentrate (KGHM Polska Miedź S.A., 2016, p. 99, 101).

China.—Liaoning Hongda Molybdenum Industry Co. Ltd. suspended all molybdenum production in 2015. Inner Mongolia Zhongxi Mining Co. Ltd. announced a 2,000-t decrease in production of molybdenum concentrate during the first 3 quarters of 2015. This was offset by Yichun Luming molybdenum mine increasing its production by 12,000 t. Jinduicheng Molybdenum Co. Ltd. (JDC) and China Molybdenum Co., Ltd. both announced that their 2015 molybdenum production levels remained unchanged from 2014 levels (Tungsten & Molybdenum Monthly, 2016, p. 11). JDC operated the Jinduicheng open pit molybdenum mine, two concentrators, one smelter, and two processing plants in Jinduicheng, Hua County, in northwest Shaanxi Province.

Korea, Republic of.—From 2010 to 2014, NMC Resource Corp. produced molybdenum at the Moland Mine, located 170 km southeast of Seoul. According to the company, the
main crushing circuit was installed underground to reduce noise and dust, and the tailings are trucked to a nearby cement plant to be used as raw material, eliminating the need for a tailings pond (NMC Resource Corp., 2014, p. 11). In the first quarter of 2015, Dong Won Corp., a significant shareholder of the company, acquired all outstanding securities of NMC (Marketwired, 2015).

**Peru.**—The Cerro Verde Mine of FCX is an open pit copper and molybdenum mining complex, 16 km southwest of Arequipa. The Cerro Verde expansion project commenced operations in September 2015. The project expanded the concentrator facilities to a capacity of approximately 6,800 t/yr of molybdenum concentrate. Production in 2015 was approximately 3,200 t of molybdenum concentrate compared with 5,000 t in 2014 (Freeport-McMoRan Copper & Gold Inc., 2016a, p. 39).

Southern Copper’s Toquepala Mine, located in southern Peru, 870 km from Lima, produced 7,923 t of molybdenum concentrate in 2015 compared with 7,000 t of molybdenum concentrate in 2014 (Southern Copper Corp., undated). Southern Copper announced that the construction permit for the Toquepala expansion project was approved in April. The Toquepala expansion project was expected to increase annual molybdenum production by 3,100 t in 2018. Southern Copper’s Cúajone Mine in southern Peru produced 4,440 t of molybdenum concentrate in 2015 compared with 4,000 t of molybdenum concentrate in 2014 (Southern Copper Corp., 2016, p. 5–6, 8, 20).

**Outlook**

The principal uses for molybdenum are expected to continue to be in catalysts and chemicals and as an additive in steel manufacturing, most importantly alloy and stainless steel. Molybdenum plays a vital role in the energy industry, and it may become an increasingly important factor in environmental protection technology, where it is used in high-strength steels for automobiles to reduce weight and improve fuel economy and safety. Molybdenum-based catalysts have a number of important applications in the petroleum and plastics industries. A major use is in the hydrosulfurization of petroleum, petrochemicals, and coal-derived liquids. Production of ultra-low-sulfur diesel fuels is expected to more than double the amount of molybdenum used in oil refineries (Roskill Information Services Ltd., 2012, p. 305). Molybdenum not only allows for economical fuel refining, it also contributes to a safer environment through lower sulfur emissions. Analysts expect global demand for catalysts to continue to increase as there are no practical alternatives to molybdenum in many of its catalytic applications. The need for companies to reduce carbon dioxide emissions from coal-fired power stations will require plants to run at higher temperatures, resulting in greater demand for higher grade molybdenum-bearing steels. Growth in molybdenum use is expected to continue in stainless steels and full alloy steels mainly in the consumer product and transportation industries (Roskill Information Services Ltd., 2016, p. 1–2).

In 2015, global consumption of molybdenum decreased by 9% from the previous year (International Molybdenum Association, 2015; CPM Group, 2015). This decrease was mainly attributed to a slowdown in China as well as a weaker demand for tubular goods from oil-producing countries (Roskill Information Services Ltd., 2016, p. 1). New and expanded molybdenum byproduct capacity at copper operations in the early 2010s led to oversupply by 2015, despite the efforts of many primary molybdenum producers to cut production. A number of mine closures in 2014 and 2015, including the North-American-based Thompson Creek Mine, Endako Mine (TCMC), and Mineral Park Mine (Mercator), reduced global molybdenum supply by over 10,000 t; however, this loss of molybdenum was offset by the Sierra Gorda Mine in Chile as well as the Yichun Luming Mine in China.

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Molybdenum. Ch. in Mineral Commodity Summaries, annual.

Other

Chemical & Engineering News.
Roskill Information Services Ltd.
Engineering and Mining Journal.
Metal Bulletin.
Metal Bulletin, monthly.

TABLE 1
SALIENT MOLYBDENUM STATISTICS1
(Metric tons of contained molybdenum)

<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><strong>United States:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentrate:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>63,700</td>
<td>60,400 *</td>
<td>61,000</td>
<td>68,200</td>
<td>47,400</td>
</tr>
<tr>
<td>Shipments</td>
<td>62,800</td>
<td>60,200 *</td>
<td>68,100</td>
<td>71,900 *</td>
<td>50,500</td>
</tr>
<tr>
<td>Reported consumption</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Imports for consumption</td>
<td>14,700 *</td>
<td>12,000</td>
<td>13,100</td>
<td>15,800</td>
<td>12,900</td>
</tr>
<tr>
<td>Exports</td>
<td>47,200</td>
<td>43,500</td>
<td>48,600</td>
<td>60,500</td>
<td>36,800</td>
</tr>
<tr>
<td>Stocks, December 31:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentrate, mine and plant</td>
<td>3,520</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Product producers3</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Consumers</td>
<td>1,810</td>
<td>1,770</td>
<td>1,820</td>
<td>2,010</td>
<td>1,880</td>
</tr>
<tr>
<td>Total</td>
<td>5,330</td>
<td>1,770</td>
<td>1,820</td>
<td>2,010</td>
<td>1,880</td>
</tr>
<tr>
<td><strong>Primary products:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Shipments</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Reported consumption</td>
<td>19,100</td>
<td>19,400</td>
<td>18,600</td>
<td>19,500 *</td>
<td>17,600</td>
</tr>
<tr>
<td>Imports for consumption</td>
<td>6,450</td>
<td>7,830</td>
<td>7,190</td>
<td>9,510</td>
<td>5,210</td>
</tr>
<tr>
<td>World, mine production</td>
<td>264,000 *</td>
<td>256,000</td>
<td>258,000</td>
<td>268,000 *</td>
<td>235,000 *</td>
</tr>
</tbody>
</table>

1Estimated. *Revised. W Withheld to avoid disclosing company proprietary data.
1Data are rounded to no more than three significant digits; may not add to totals shown.
2Molybdenum concentrates roasted to make molybdenum oxide.
3Includes ammonium, calcium, and sodium molybdate; briquets; ferromolybdenum; molybdenum hexacarbonyl; molybdenum metal; molybdenum pentachloride; molybdic acid; pellets; phosphomolybdic disulfide; and technical and purified molybdic oxide.
### Table 2: Molybdenum-Producing Mines in the United States in 2015

<table>
<thead>
<tr>
<th>State and mine</th>
<th>County</th>
<th>Operator</th>
<th>Source of molybdenum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bagdad</td>
<td>Yavapai</td>
<td>Freeport-McMoRan Copper &amp; Gold Inc.</td>
<td>Copper-molybdenum ore, concentrated.</td>
</tr>
<tr>
<td>Mission Complex</td>
<td>Pima</td>
<td>ASARCO LLC&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Do.</td>
</tr>
<tr>
<td>Morenci</td>
<td>Greenlee</td>
<td>Freeport-McMoRan Copper &amp; Gold Inc.</td>
<td>Do.</td>
</tr>
<tr>
<td>Pinto Valley</td>
<td>Gila</td>
<td>Capstone Mining Corp.</td>
<td>Do.</td>
</tr>
<tr>
<td>Sierrita</td>
<td>Pima</td>
<td>Freeport-McMoRan Copper &amp; Gold Inc.</td>
<td>Do.</td>
</tr>
<tr>
<td>Colorado:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climax</td>
<td>Lake</td>
<td>do.</td>
<td>Molybdenum ore, concentrated.</td>
</tr>
<tr>
<td>Henderson</td>
<td>Clear Creek</td>
<td>do.</td>
<td>Do.</td>
</tr>
<tr>
<td>Montana, Continental Pit</td>
<td>Silver Bow</td>
<td>Montana Resources</td>
<td>Copper-molybdenum ore, concentrated.</td>
</tr>
<tr>
<td>Nevada, Robinson</td>
<td>White Pine</td>
<td>Robinson Nevada Mining Company&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Do.</td>
</tr>
<tr>
<td>Utah, Bingham Canyon</td>
<td>Salt Lake</td>
<td>Kenncott Utah Copper LLC&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Do.</td>
</tr>
</tbody>
</table>

Do., do. Ditto.

<sup>1</sup>Wholly owned subsidiary of Grupo México, S.A.B. de C.V.
<sup>2</sup>Wholly owned subsidiary of KGHM International Ltd.
<sup>3</sup>Wholly owned subsidiary of Rio Tinto plc.
<table>
<thead>
<tr>
<th>End use</th>
<th>Molybdic oxides</th>
<th>Ferromolybdenum</th>
<th>Ammonium and sodium molybdate</th>
<th>Molybdenum scrap</th>
<th>Other</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td><strong>2014:</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Steel:</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td>W 192,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>W 192,000</td>
<td></td>
</tr>
<tr>
<td>High-strength low-alloy</td>
<td>W 110,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>110,000</td>
</tr>
<tr>
<td>Stainless and heat-resisting</td>
<td>2,190,000</td>
<td>715,000</td>
<td>--</td>
<td>(3)</td>
<td>131,000</td>
<td>3,030,000</td>
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<tr>
<td>Full alloy</td>
<td>3,590,000</td>
<td>3,160,000</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>6,750,000</td>
</tr>
<tr>
<td>Tool</td>
<td>607,000</td>
<td>W</td>
<td>--</td>
<td>(3)</td>
<td>--</td>
<td>607,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,380,000</td>
<td>4,180,000</td>
<td>--</td>
<td>--</td>
<td>131,000</td>
<td>10,700,000</td>
</tr>
<tr>
<td>**Cast irons (gray, malleable, ductile iron)</td>
<td>W 346,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>346,000</td>
</tr>
<tr>
<td><strong>Superalloys</strong></td>
<td>668,000</td>
<td>W</td>
<td>--</td>
<td>(3)</td>
<td>1,040,000</td>
<td>1,710,000</td>
</tr>
<tr>
<td><strong>Alloys (other than steels, cast irons, superalloys):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Welding materials (structural and hard-facing)</strong></td>
<td>--</td>
<td>39,900</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>39,900</td>
</tr>
<tr>
<td><strong>Other alloys</strong></td>
<td>2,600</td>
<td>70,900</td>
<td>--</td>
<td>--</td>
<td>33,000</td>
<td>107,000</td>
</tr>
<tr>
<td><strong>Mill products made from metal powder</strong></td>
<td>W 2,170,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>2,170,000</td>
</tr>
<tr>
<td><strong>Cemented carbides and related products</strong></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>77</td>
</tr>
<tr>
<td><strong>Chemical and ceramic uses:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pigments</strong></td>
<td>W 8,220</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>8,220</td>
</tr>
<tr>
<td><strong>Catalysts</strong></td>
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<td>--</td>
<td>W</td>
<td>937,000</td>
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<tr>
<td><strong>Other</strong></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td><strong>Miscellaneous and unspecified uses:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lubricants</strong></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>176,000</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>1,080,000</td>
<td>110,000</td>
<td>(3)</td>
<td>(3)</td>
<td>4,270,000</td>
<td>5,460,000</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td>9,070,000</td>
<td>4,740,000</td>
<td>8,220</td>
<td>--</td>
<td>5,660,000</td>
<td>19,500,000</td>
</tr>
<tr>
<td><strong>Stocks, December 31</strong></td>
<td>644,000</td>
<td>373,000</td>
<td>3,950</td>
<td>(6)</td>
<td>(6)</td>
<td>2,010,000</td>
</tr>
<tr>
<td><strong>2015:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Steel:</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td>W W W</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>W W</td>
</tr>
<tr>
<td>High-strength low-alloy</td>
<td>W 106,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>106,000</td>
</tr>
<tr>
<td>Stainless and heat-resisting</td>
<td>2,170,000</td>
<td>682,000</td>
<td>--</td>
<td>(3)</td>
<td>W</td>
<td>2,850,000</td>
</tr>
<tr>
<td>Full alloy</td>
<td>3,240,000</td>
<td>2,170,000</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>5,410,000</td>
</tr>
<tr>
<td>Tool</td>
<td>607,000</td>
<td>W</td>
<td>--</td>
<td>(3)</td>
<td>--</td>
<td>607,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,020,000</td>
<td>2,960,000</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>8,980,000</td>
</tr>
<tr>
<td>**Cast irons (gray, malleable, ductile iron)</td>
<td>W 330,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>330,000</td>
</tr>
<tr>
<td><strong>Superalloys</strong></td>
<td>485,000</td>
<td>W</td>
<td>--</td>
<td>(3)</td>
<td>1,080,000</td>
<td>1,570,000</td>
</tr>
<tr>
<td><strong>Alloys (other than steels, cast irons, superalloys):</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Welding materials (structural and hard-facing)</strong></td>
<td>--</td>
<td>W</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td><strong>Other alloys</strong></td>
<td>1,410</td>
<td>100,000</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>102,000</td>
</tr>
<tr>
<td><strong>Mill products made from metal powder</strong></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td><strong>Cemented carbides and related products</strong></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>77</td>
</tr>
<tr>
<td><strong>Chemical and ceramic uses:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pigments</strong></td>
<td>W (3)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>W</td>
</tr>
<tr>
<td><strong>Catalysts</strong></td>
<td>W (3)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td><strong>Miscellaneous and unspecified uses:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lubricants</strong></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>152,000</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>1,680,000</td>
<td>364,000</td>
<td>10,500</td>
<td>(3)</td>
<td>4,370,000</td>
<td>6,430,000</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td>8,190,000</td>
<td>3,750,000</td>
<td>10,500</td>
<td>--</td>
<td>5,600,000</td>
<td>17,600,000</td>
</tr>
<tr>
<td><strong>Stocks, December 31</strong></td>
<td>600,000</td>
<td>357,000</td>
<td>5,970</td>
<td>(6)</td>
<td>(6)</td>
<td>1,880,000</td>
</tr>
</tbody>
</table>

1Revised. W Withheld to avoid disclosing company proprietary data; included in “Miscellaneous and unspecified uses: Other.” -- Zero.
2Data are rounded to no more than three significant digits; may not add to totals shown.
3Includes calcium molybdate.
4Withheld to avoid disclosing company proprietary data; included in “Miscellaneous and unspecified uses: Other,” under “Other.”
5Includes ingot, wire, rod, and sheet.
6Includes construction, mining, oil and gas, and metal working machinery.
7Withheld to avoid disclosing company proprietary data; included in “Total.”
<table>
<thead>
<tr>
<th>Product and country</th>
<th>Quantity Value (metric tons) (thousands)</th>
<th>Quantity Value (metric tons) (thousands)</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oxides and hydroxides, gross weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>612 $12,700 418 $6,160</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>161 3,250 197 2,570</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>283 3,440 26 280</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estonia</td>
<td>-- -- 36 417</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>2 54 4 84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>18 368 26 462</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kuwait</td>
<td>98 2,170 245 5,280</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>129 2,430 116 1,490</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>270 5,930 154 1,540</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td>140 2,490 72 1,050</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (9 countries)</td>
<td>28 $663 $4 125</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,740 33,500</td>
<td>1,300 19,400</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Molybdates, all, gross weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>381 5,210 369 3,630</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>(5) 19 100 1,320</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>64 962 83 1,310</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>407 6,010 462 6,680</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>526 6,180 756 6,340</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (34 countries)</td>
<td>218 $3,740 $248 2,970</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,600 22,100</td>
<td>2,020 22,300</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ferromolybdenum, contained weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>564 17,600 485 13,400</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colombia</td>
<td>(5) 18 1 29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>(5) 26 1 37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>27 686 82 1,700</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td>(5) 6 (5) 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>591 18,400 569 15,100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Molybdenum, other, gross weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>174 19,300 127 7,690</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>(5) 24 29 778</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>105 4,610 80 3,100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>95 7,320 101 7,830</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>80 4,140 92 4,640</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Israel</td>
<td>63 4,910 87 6,850</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>103 5,160 104 5,380</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>161 24,000 139 15,900</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taiwan</td>
<td>74 3,260 117 8,320</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>202 9,430 110 5,660</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (52 countries)</td>
<td>266 $15,500 $195 11,800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,320 97,700</td>
<td>1,180 77,900</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Revised.  -- Zero.
2Data are rounded to no more than three significant digits; may not add to totals shown.
3Harmonized Tariff Schedule of the United States.
4Presentation of annual data is based on the quantities (gross weight or contained weight) of the ten leading countries in 2015.
5Presentation of annual data is based on the quantities (gross weight or contained weight) of the five leading countries in 2015.
6Ferromolybdenum contains about 60% to 65% molybdenum.
7Includes powder, unwrought, waste and scrap, wire, wrought, and other.
8Includes HTS codes 8102.10.0000, 8102.94.0000, 8102.95.0000, 8102.96.0000, 8102.97.0000, and 8102.99.0000.

Source: U.S. Census Bureau.
## Table 5
U.S. Exports of Molybdenum Ore and Concentrates (including Roasted and Other Concentrates), by Country

<table>
<thead>
<tr>
<th>Country</th>
<th>2014 Quantity</th>
<th>2014 Value</th>
<th>2015 Quantity</th>
<th>2015 Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(metric tons contained Mo)</td>
<td>(thousands)</td>
<td>(metric tons contained Mo)</td>
<td>(thousands)</td>
</tr>
<tr>
<td>Belgium</td>
<td>11,000</td>
<td>$199,000</td>
<td>3,910</td>
<td>$61,200</td>
</tr>
<tr>
<td>Canada</td>
<td>2,210</td>
<td>51,500</td>
<td>1,690</td>
<td>32,000</td>
</tr>
<tr>
<td>China</td>
<td>1,430</td>
<td>24,200</td>
<td>477</td>
<td>6,830</td>
</tr>
<tr>
<td>India</td>
<td>498</td>
<td>12,400</td>
<td>252</td>
<td>3,750</td>
</tr>
<tr>
<td>Japan</td>
<td>6,480</td>
<td>146,000</td>
<td>2,900</td>
<td>45,400</td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>1,320</td>
<td>27,200</td>
<td>1,350</td>
<td>20,100</td>
</tr>
<tr>
<td>Mexico</td>
<td>7,060</td>
<td>185,000</td>
<td>2,530</td>
<td>55,800</td>
</tr>
<tr>
<td>Netherlands</td>
<td>17,300</td>
<td>343,000</td>
<td>18,100</td>
<td>275,000</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>11,200</td>
<td>215,000</td>
<td>5,110</td>
<td>78,600</td>
</tr>
<tr>
<td>Vietnam</td>
<td>60</td>
<td>1,420</td>
<td>274</td>
<td>5,110</td>
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<tr>
<td>Other (15 countries)</td>
<td>1,990</td>
<td>37,600</td>
<td>249</td>
<td>3,430</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60,500</strong></td>
<td><strong>1,240,000</strong></td>
<td><strong>36,800</strong></td>
<td><strong>587,000</strong></td>
</tr>
</tbody>
</table>

1Revised.
2Data are rounded to no more than three significant digits; may not add to totals shown.
3Presentation of annual data is based on the quantities (gross weight or contained weight) of the ten leading countries in 2015.

Source: U.S. Census Bureau.

## Table 6
U.S. Exports of Molybdenum Products

<table>
<thead>
<tr>
<th>Item</th>
<th>HTS code</th>
<th>2014 Gross weight (metric tons)</th>
<th>2014 Contained Mo (metric tons)</th>
<th>2014 Value (thousands)</th>
<th>2015 Gross weight (metric tons)</th>
<th>2015 Contained Mo (metric tons)</th>
<th>2015 Value (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdenum ore and concentrates, roasted</td>
<td>2613.10.0000</td>
<td>NA</td>
<td>27,600</td>
<td>$565,000</td>
<td>NA</td>
<td>18,100</td>
<td>$282,000</td>
</tr>
<tr>
<td>Molybdenum ore and concentrates, other</td>
<td>2613.90.0000</td>
<td>NA</td>
<td>32,900</td>
<td>678,000</td>
<td>NA</td>
<td>18,700</td>
<td>305,000</td>
</tr>
<tr>
<td>Molybdenum chemicals:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxides and hydroxides</td>
<td>2825.70.0000</td>
<td>1,740</td>
<td>NA</td>
<td>33,500</td>
<td>1,300</td>
<td>NA</td>
<td>19,400</td>
</tr>
<tr>
<td>Molybdates, all</td>
<td>2841.70.0000</td>
<td>1,600</td>
<td>NA</td>
<td>22,100</td>
<td>2,020</td>
<td>NA</td>
<td>22,300</td>
</tr>
<tr>
<td>Ferromolybdenum</td>
<td>7202.70.0000</td>
<td>857 *</td>
<td>592</td>
<td>18,400</td>
<td>815</td>
<td>569</td>
<td>15,100</td>
</tr>
<tr>
<td>Molybdenum powders</td>
<td>8102.10.0000</td>
<td>269</td>
<td>NA</td>
<td>11,900</td>
<td>191</td>
<td>NA</td>
<td>7,470</td>
</tr>
<tr>
<td>Molybdenum unwrought, bars and rods</td>
<td>8102.94.0000</td>
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<td>NA</td>
<td>1,880</td>
<td>36</td>
<td>NA</td>
<td>1,320</td>
</tr>
<tr>
<td>Molybdenum waste and scrap</td>
<td>8102.97.0000</td>
<td>182</td>
<td>NA</td>
<td>3,970</td>
<td>206</td>
<td>NA</td>
<td>4,350</td>
</tr>
<tr>
<td>Molybdenum wire</td>
<td>8102.96.0000</td>
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<td>NA</td>
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<td>27</td>
<td>NA</td>
<td>2,890</td>
</tr>
<tr>
<td>Molybdenum, other</td>
<td>Various</td>
<td>795 *</td>
<td>NA</td>
<td>75,900</td>
<td>722</td>
<td>NA</td>
<td>61,900</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>XX</strong></td>
<td><strong>XX</strong></td>
<td><strong>1,410,000</strong></td>
<td><strong>XX</strong></td>
<td><strong>XX</strong></td>
<td><strong>722,000</strong></td>
</tr>
</tbody>
</table>

1Revised. NA Not available. XX Not applicable.
2Data are rounded to no more than three significant digits; may not add to totals shown.
3Harmonized Tariff Schedule of the United States.
4Includes HTS codes 8102.95.0000 and 8102.99.0000.

Source: U.S. Census Bureau.
<table>
<thead>
<tr>
<th>Product and country</th>
<th>HTS(^2) code</th>
<th>Quantity (metric tons)</th>
<th>Value (thousands)</th>
<th>Quantity (metric tons)</th>
<th>Value (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oxides and hydroxides, gross weight:</strong></td>
<td>2825.70.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td></td>
<td>225</td>
<td>$4,260</td>
<td>605</td>
<td>$7,700</td>
</tr>
<tr>
<td>China</td>
<td></td>
<td>95</td>
<td>2,000</td>
<td>134</td>
<td>2,110</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>2</td>
<td>39</td>
<td>2</td>
<td>49</td>
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<tr>
<td>Korea, Republic of</td>
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</tr>
<tr>
<td>Netherlands</td>
<td></td>
<td>--</td>
<td>--</td>
<td>12</td>
<td>215</td>
</tr>
<tr>
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<td></td>
<td>126</td>
<td>2,110</td>
<td>(3)</td>
<td>13</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td>448</td>
<td>8,410</td>
<td>756</td>
<td>10,100</td>
</tr>
<tr>
<td><strong>Molybdates, all, contained weight:</strong></td>
<td>Various(^3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td></td>
<td>918</td>
<td>15,900</td>
<td>547</td>
<td>5,570</td>
</tr>
<tr>
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<td></td>
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<td>4,230</td>
<td>459</td>
<td>5,570</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>2</td>
<td>69</td>
<td>11</td>
<td>116</td>
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<tr>
<td>Netherlands</td>
<td></td>
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<td>51</td>
<td>4</td>
<td>91</td>
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<tr>
<td>United Kingdom</td>
<td></td>
<td>21</td>
<td>224</td>
<td>9</td>
<td>150</td>
</tr>
<tr>
<td>Other (7 countries)</td>
<td></td>
<td>8</td>
<td>191</td>
<td>5</td>
<td>539</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>1,200</td>
<td>20,700</td>
<td>1,040</td>
<td>12,000</td>
</tr>
<tr>
<td><strong>Molybdenum orange, gross weight:</strong></td>
<td>3206.20.0020</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td>224</td>
<td>1,840</td>
<td>416</td>
<td>1,700</td>
</tr>
<tr>
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<td></td>
<td>1</td>
<td>7</td>
<td>44</td>
<td>215</td>
</tr>
<tr>
<td>Colombia</td>
<td></td>
<td>191</td>
<td>1,110</td>
<td>118</td>
<td>579</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>10</td>
<td>26</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>India</td>
<td></td>
<td>1</td>
<td>7</td>
<td>19</td>
<td>37</td>
</tr>
<tr>
<td>Mexico</td>
<td></td>
<td>4</td>
<td>23</td>
<td>12</td>
<td>48</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>431</td>
<td>3,010</td>
<td>609</td>
<td>2,580</td>
</tr>
<tr>
<td><strong>Ferromolybdenum, contained weight:</strong></td>
<td>7202.70.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td></td>
<td>89</td>
<td>1,940</td>
<td>55</td>
<td>1,010</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td>601</td>
<td>11,800</td>
<td>562</td>
<td>8,130</td>
</tr>
<tr>
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<td></td>
<td>6,160</td>
<td>117,000</td>
<td>883</td>
<td>13,300</td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td></td>
<td>235</td>
<td>4,430</td>
<td>740</td>
<td>11,100</td>
</tr>
<tr>
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<td></td>
<td>145</td>
<td>5,380</td>
<td>120</td>
<td>2,270</td>
</tr>
<tr>
<td>Other (7 countries)</td>
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<td>424</td>
<td>6,370</td>
<td>19</td>
<td>539</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>7,650</td>
<td>147,000</td>
<td>2,380</td>
<td>36,300</td>
</tr>
<tr>
<td><strong>Other, gross weight:</strong></td>
<td>Various(^8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Australia</td>
<td></td>
<td>--</td>
<td>--</td>
<td>10</td>
<td>221</td>
</tr>
<tr>
<td>Austria</td>
<td></td>
<td>571</td>
<td>25,000</td>
<td>248</td>
<td>11,600</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td>597</td>
<td>15,500</td>
<td>257</td>
<td>5,670</td>
</tr>
<tr>
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<td>1,500</td>
<td>52,200</td>
<td>889</td>
<td>26,100</td>
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<td>Germany</td>
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<td>213</td>
<td>7,940</td>
<td>161</td>
<td>5,530</td>
</tr>
<tr>
<td>Japan</td>
<td></td>
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<td>2,040</td>
<td>35</td>
<td>881</td>
</tr>
<tr>
<td>Korea, Republic of</td>
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<td>9</td>
<td>139</td>
<td>11</td>
<td>146</td>
</tr>
<tr>
<td>Russia</td>
<td></td>
<td>22</td>
<td>2,590</td>
<td>13</td>
<td>1,360</td>
</tr>
<tr>
<td>Taiwan</td>
<td></td>
<td>31</td>
<td>687</td>
<td>8</td>
<td>438</td>
</tr>
<tr>
<td>United Kingdom</td>
<td></td>
<td>87</td>
<td>2,620</td>
<td>43</td>
<td>1,080</td>
</tr>
<tr>
<td>Other (20 countries)</td>
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<td>228</td>
<td>7,850</td>
<td>15</td>
<td>840</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>3,310</td>
<td>117,000</td>
<td>1,690</td>
<td>53,900</td>
</tr>
</tbody>
</table>

\(^1\)Revised. -- Zero.
\(^2\)Data are rounded to no more than three significant digits; may not add to totals shown.
\(^3\)Harmonized Tariff Schedule of the United States.
\(^4\)Presentation of annual data is based on the quantities (gross weight or contained weight) of the five leading countries in 2015.
\(^5\)Includes HTS codes 2841.70.1000 and 2841.70.5000.
\(^6\)Ferromolybdenum contains about 60% to 65% molybdenum.
\(^7\)Presentation of annual data is based on the quantities (gross weight or contained weight) of the ten leading countries in 2015.
\(^8\)Includes HTS codes 8102.10.0000, 8102.94.0000, 8102.95.3000, 8102.95.6000, 8102.96.0000, 8102.97.0000, and 8102.99.0000.

Source: U.S. Census Bureau.
### Table 8

**U.S. IMPORTS OF MOLYBDENUM ORE AND CONCENTRATES (INCLUDING ROASTED AND OTHER CONCENTRATES), BY COUNTRY**

<table>
<thead>
<tr>
<th>Country</th>
<th>2014 Gross weight (metric tons)</th>
<th>2014 Value (thousands)</th>
<th>2015 Gross weight (metric tons)</th>
<th>2015 Value (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>41</td>
<td>$511</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Canada</td>
<td>11,500</td>
<td>152,000</td>
<td>2,840</td>
<td>$22,600</td>
</tr>
<tr>
<td>Chile</td>
<td>3,750</td>
<td>47,300</td>
<td>9,910</td>
<td>69,700</td>
</tr>
<tr>
<td>China</td>
<td>40</td>
<td>616</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Japan (2)</td>
<td>(2)</td>
<td>6</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>--</td>
<td>--</td>
<td>20</td>
<td>225</td>
</tr>
<tr>
<td>Mexico</td>
<td>5,940</td>
<td>85,100</td>
<td>3,370</td>
<td>49,200</td>
</tr>
<tr>
<td>Mongolia</td>
<td>61</td>
<td>845</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Netherlands</td>
<td>63</td>
<td>993</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Peru</td>
<td>7,990</td>
<td>113,000</td>
<td>8,610</td>
<td>64,100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29,400</strong></td>
<td><strong>400,000</strong></td>
<td><strong>24,700</strong></td>
<td><strong>206,000</strong></td>
</tr>
</tbody>
</table>

1. Revised. -- Zero.
2. Data are rounded to no more than three significant digits; may not add to totals shown.
3. Less than ½ unit.

Source: U.S. Census Bureau.

### Table 9

**U.S. IMPORTS FOR CONSUMPTION OF MOLYBDENUM PRODUCTS**

<table>
<thead>
<tr>
<th>Item</th>
<th>2014 HTS code</th>
<th>2014 Gross weight (metric tons)</th>
<th>2014 Contained Mo (metric tons)</th>
<th>2014 Value (thousands)</th>
<th>2015 HTS code</th>
<th>2015 Gross weight (metric tons)</th>
<th>2015 Contained Mo (metric tons)</th>
<th>2015 Value (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdenum ore and concentrates, roasted</td>
<td>2613.10.0000</td>
<td>8,260</td>
<td>5,020</td>
<td>$118,000</td>
<td>2613.10.0000</td>
<td>6,780</td>
<td>4,050</td>
<td>$76,400</td>
</tr>
<tr>
<td>Molybdenum ore and concentrates, other</td>
<td>2613.90.0000</td>
<td>21,100</td>
<td>10,800</td>
<td>282,000</td>
<td>2613.90.0000</td>
<td>18,000</td>
<td>8,830</td>
<td>129,000</td>
</tr>
<tr>
<td>Molybdenum chemicals:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxides and hydroxides</td>
<td>2825.70.0000</td>
<td>448</td>
<td>NA</td>
<td>8,410</td>
<td>2825.70.0000</td>
<td>20,700</td>
<td>1,040</td>
<td>578</td>
</tr>
<tr>
<td>Molybdates, all</td>
<td>Various^3</td>
<td>1,200</td>
<td>669</td>
<td>20,700</td>
<td>NA</td>
<td>609</td>
<td>NA</td>
<td>12,000</td>
</tr>
<tr>
<td>Molybdenum orange</td>
<td>3206.20.0020</td>
<td>431</td>
<td>NA</td>
<td>3,010</td>
<td>3206.20.0020</td>
<td>609</td>
<td>NA</td>
<td>2,580</td>
</tr>
<tr>
<td>Ferromolybdenium</td>
<td>7202.70.0000</td>
<td>7,650</td>
<td>5,110</td>
<td>147,000</td>
<td>7202.70.0000</td>
<td>2,380</td>
<td>1,610</td>
<td>36,300</td>
</tr>
<tr>
<td>Molybdenum powders</td>
<td>8102.10.0000</td>
<td>535</td>
<td>512</td>
<td>19,800</td>
<td>8102.10.0000</td>
<td>232</td>
<td>206</td>
<td>7,560</td>
</tr>
<tr>
<td>Molybdenum unwrought, bars and rods</td>
<td>8102.94.0000</td>
<td>1,310</td>
<td>1,280</td>
<td>38,400</td>
<td>8102.94.0000</td>
<td>682</td>
<td>679</td>
<td>16,500</td>
</tr>
<tr>
<td>Molybdenum waste and scrap</td>
<td>8102.97.0000</td>
<td>1,080</td>
<td>1,050</td>
<td>31,500</td>
<td>8102.97.0000</td>
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<td>516</td>
<td>11,500</td>
</tr>
<tr>
<td>Molybdenum wire</td>
<td>8102.96.0000</td>
<td>14</td>
<td>NA</td>
<td>2,200</td>
<td>NA</td>
<td>14</td>
<td>NA</td>
<td>1,860</td>
</tr>
<tr>
<td>Molybdenum, other</td>
<td>Various^4</td>
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<td>26,800</td>
<td>NA</td>
<td>239</td>
<td>NA</td>
<td>18,400</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td><strong>XX</strong></td>
<td><strong>698,000</strong></td>
<td><strong>31,200</strong></td>
<td><strong>XX</strong></td>
<td><strong>323,000</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Revised. NA Not available. XX Not applicable.
2. Data are rounded to no more than three significant digits; may not add to totals shown.
4. Includes HTS codes 2841.70.1000 and 2841.70.5000.

Source: U.S. Census Bureau.
TABLE 10  
MOLYBDENUM: WORLD MINE PRODUCTION, BY COUNTRY\(^1,2\)  
(Metric tons of contained molybdenum)

<table>
<thead>
<tr>
<th>Country(^3)</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015(^e)</th>
</tr>
</thead>
<tbody>
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<td>Armenia</td>
<td>5,745</td>
<td>6,525</td>
<td>6,900</td>
<td>7,162</td>
<td>7,200</td>
</tr>
<tr>
<td>Canada</td>
<td>8,543</td>
<td>8,936</td>
<td>7,956</td>
<td>9,358</td>
<td>2,287(^4)</td>
</tr>
<tr>
<td>Chile</td>
<td>40,889</td>
<td>35,090</td>
<td>38,715</td>
<td>48,770</td>
<td>52,579(^4)</td>
</tr>
<tr>
<td>China(^2)</td>
<td>103,000</td>
<td>105,000</td>
<td>101,000</td>
<td>92,000</td>
<td>83,000</td>
</tr>
<tr>
<td>Iran</td>
<td>3,365</td>
<td>3,516</td>
<td>3,471</td>
<td>3,494</td>
<td>3,500</td>
</tr>
<tr>
<td>Mexico</td>
<td>10,787</td>
<td>11,366</td>
<td>12,562</td>
<td>14,370</td>
<td>11,327(^4)</td>
</tr>
<tr>
<td>Mongolia</td>
<td>1,960</td>
<td>1,904</td>
<td>1,819</td>
<td>1,999</td>
<td>2,000</td>
</tr>
<tr>
<td>Peru</td>
<td>19,141</td>
<td>16,790</td>
<td>18,140</td>
<td>17,018</td>
<td>20,153(^4)</td>
</tr>
<tr>
<td>Russia</td>
<td>6,014</td>
<td>4,939</td>
<td>4,753</td>
<td>4,658</td>
<td>4,500</td>
</tr>
<tr>
<td>Turkey</td>
<td>400 (^e)</td>
<td>600 (^e)</td>
<td>800 (^e)</td>
<td>900 (^e)</td>
<td>900 (^e)</td>
</tr>
<tr>
<td>United States</td>
<td>63,700</td>
<td>60,400</td>
<td>61,000</td>
<td>68,200</td>
<td>47,400(^4)</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>557</td>
<td>522</td>
<td>490</td>
<td>450</td>
<td>450 (^e)</td>
</tr>
<tr>
<td>Total</td>
<td>264,000(^e)</td>
<td>256,000</td>
<td>258,000</td>
<td>268,000(^e)</td>
<td>235,000</td>
</tr>
</tbody>
</table>

\(^1\)Estimated. \(^2\)Revised.  
\(^3\)World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.  
\(^4\)Includes data available through August 8, 2016.  
\(^5\)In addition to the countries listed, the Republic of Korea, Kyrgyzstan, and Romania are thought to produce molybdenum, but output is not reported quantitatively, and available general information is inadequate to make reliable estimates of output levels.  
\(^6\)Reported figure.

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**Figure 1.** U.S. average monthly prices for molybdc oxide and ferromolybdenum from January 2011 through December 2015. Source: CRU Group.