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Gemstones

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In 2019, the estimated value of natural gemstones produced in the United States was $9.22 million and the estimated value of U.S. production of synthetic gemstones was $94.3 million (table 1). The value of U.S. gemstone imports was $24.4 billion (table 8), and the value of U.S. gemstone exports and reexports (combined) was estimated to be $20.1 billion. In 2019, world production of natural diamond totaled 138 million carats, of which an estimated 79.5 million carats were gem quality (table 11). The value of diamond imported into the United States in 2019 was $21.7 billion (tables 5, 8). This value was the combination of $19.6 billion of cut but unset diamonds greater than 0.5 carat, $1.76 billion of cut but unset diamonds not more than 0.5 carat, and $357 million of rough or uncut natural diamonds (table 5).

In this chapter, the terms "gem" and "gemstone" refer to mineral or organic material (such as amber, pearl, petrified wood, and shell) used for personal adornment, display, or object of art because they possess beauty, durability, and (or) rarity. Of more than 4,000 mineral species, only about 100 possess all these attributes and are considered gemstones. Silicates other than quartz are the largest group of gemstones in terms of chemical composition; oxides and quartz are the second largest (table 9). Gemstones are subdivided into natural diamond and natural nondiamond gems. In addition, synthetic gemstones and gemstone simulants are discussed but listed separately from natural gemstones (tables 1, 7, 8, 10). Synthetic gemstones have the same chemical, optical, and physical properties as their natural gemstone counterparts. "Cultured" and "laboratory-created" are also terms used to refer to synthetic gemstones. Simulants have appearances like those of natural gemstone materials, but have different chemical, optical, and physical properties.

Trade data in this chapter are from the U.S. Census Bureau. All percentages in the chapter were calculated using unrounded data. Information on industrial-grade diamond and industrial-grade garnet can be found in the U.S. Geological Survey (USGS) Minerals Yearbook, volume I, Metals and Minerals chapters on industrial diamond and industrial garnet, respectively.

Gemstones have captured the attention of humans since prehistoric times. They have been valued as treasured objects throughout history by all societies in all parts of the world. Amber, amethyst, coral, diamond, emerald, garnet, jade, jasper, lapis lazuli, pearl, rock crystal, ruby, serpentine, and turquoise are some of the first stones known to have been used for making jewelry. In addition to jewelry, gemstones are used for collections, decorative art objects, and exhibits.

Production

U.S. gemstone production data were based on a survey conducted by the USGS of more than 250 domestic gemstone producers. The survey provided a foundation for estimating the scope and level of domestic gemstone production during the year. However, the USGS survey did not represent all gemstone activity in the United States, which included thousands of professional and amateur collectors. Consequently, the USGS supplemented its survey with estimates of domestic gemstone production from related published data, contacts with gemstone dealers and collectors, and information gathered at gem and mineral shows.

Commercial mining of gemstones has never been extensive in the United States. More than 60 varieties of gemstones have been produced commercially from domestic mines, but most of the deposits are small compared with those of other domestic mining operations. In the United States, much of the current gemstone mining is conducted by individual collectors, gem clubs, and hobbyists rather than by commercial operations.

The commercial gemstone industry in the United States consisted of individuals and companies that mined gemstones or harvested shell and pearl, firms that manufactured synthetic gemstones, and individuals and companies that cut and polished natural and synthetic gemstones. The domestic gemstone industry was focused on the production of nondiamond gemstones and the cutting and polishing of large diamond stones. Gemstone industry employment was estimated to be between 1,200 and 1,500 individuals.

Most natural gemstone producers in the United States were small businesses that were widely dispersed and operated independently from each other. The small producers had an average of three employees, including those who worked part time. The number of gemstone mines operating from year to year fluctuated because the uncertainty associated with the discovery and marketing of gem-quality minerals made it difficult to obtain financing for developing and sustaining economically viable operations.

The total value of natural gemstones produced in the United States was estimated to be $9.22 million during 2019 (table 1). This production value was a 3% decrease from that in 2018.

Natural gemstone materials indigenous to the United States were collected or produced in every State and in 2019, there was production of at least $1,630 worth of gemstone materials. The leading 13 States accounted for 96% of the total value of gemstones produced, as reported by survey respondents. These States were, in descending order of production value, Arizona, Oregon, California, Nevada, Montana, Maine, Arkansas, Colorado, Utah, Idaho, Tennessee, North Carolina, and New York. Some States were known to produce a single gemstone material—Hawaii produced coral and Tennessee produced freshwater pearls, for example. Other States produced a variety of gemstones—for example, Arizona's gemstone deposits included agate, amethyst, azurite, chrysocolla, garnet, jade, jasper, malachite, obsidian, onyx, opal, peridot, petrified wood, smithsonite, and turquoise. A wide variety of gemstones

also was found and produced in California, Idaho, Montana, Nevada, North Carolina, and Oregon.

In 2019, the United States had only one active operation in a known diamond-bearing area, Crater of Diamonds State Park near Murfreesboro, AR. The State of Arkansas maintains a dig-for-fee operation for tourists and amateur collectors at the park; Crater of Diamonds is the only diamond mine in the world that is open to the public for collecting diamonds. The diamonds occur in a lamproite breccia tuff associated with a volcanic pipe and in the soil developed from the lamproite breccia tuff. The largest diamond found in 2019 was a 3.72-carat yellow diamond (Crater of Diamonds State Park, 2020). During 2019, 491 diamonds having an average weight of 0.202 carat were recovered at Crater of Diamonds. Of the 491 diamond stones recovered, 18 weighed more than 1 carat. Since the diamond-bearing pipe and the adjoining area became a State park in 1972, 33,785 diamond stones with a total weight of 6,769.62 carats have been recovered (Waymon Cox, Park Interpreter, Crater of Diamonds State Park, written commun., June 11, 2020). Exploration has demonstrated that this diamond deposit contains an estimated 78.5 million metric tons of diamond-bearing rock (Howard, 1999, p. 62). An Arkansas law prohibits commercial diamond mining in the park.

During 2019, there were many dig-for-fee operations and locations for mining and collecting gemstones across the country. Many of them were known for a particular gem type. Arizona had collecting locations for copper minerals, peridot, and turquoise; California had tourmaline collecting operations; Colorado had dig-for-fee amazonite, amethyst, aquamarine, smoky quartz, topaz, and turquoise locations; Idaho had garnet and opal mines; Montana had dig-for-fee garnet locations and sapphire mines; Nevada had many dig-for-fee opal mines; North Carolina had emerald-collecting locations; Oregon had many sunstone mines; and Virginia had collecting locations for amazonite, beryl, garnet, and staurolite.

In addition to natural gemstones, synthetic gemstones and gemstone simulants were produced in the United States in 2019. Synthetic gemstones that have been produced in the United States include alexandrite, azurite, chrysocolla, cubic zirconia, diamond, emerald, garnet, malachite, moissanite, ruby, sapphire, spinel, and turquoise. However, during 2019, only cubic zirconia, diamond, moissanite, and turquoise were produced commercially. Simulants of amber, azurite, chrysocolla, coral, lapis lazuli, malachite, travertine, and turquoise also were manufactured in the United States. In addition, certain colors of synthetic sapphire and spinel, used to represent other gemstones, are classified as simulants.

Synthetic gemstone production in the United States was valued at $94.3 million in 2019, which was a 45% increase compared with that in 2018 (table 1). Five companies in five States, representing virtually the entire U.S. synthetic gemstone industry, reported production to the USGS. The States with reported synthetic gemstone production were Arizona, California, Maryland, New York, and North Carolina.

Although the simulant industry was not surveyed, the value of U.S. simulant gemstone output was estimated to be more than $100 million in 2019.

In 1954, scientists at General Electric Co. manufactured the first synthetic bits of diamond grit using a high-pressure, high-temperature (HPHT) method. In 1956, the first commercially available synthetic diamond was produced by HPHT at General Electric. High-quality diamonds of 1 carat or more are difficult to produce consistently, even in the controlled environment of a laboratory using the HPHT method. After more than 60 years of development, several synthetic-diamond companies were able to produce relatively large high-quality industrial diamonds that had the same characteristics and properties as mined industrial diamonds, and billions of carats of synthetic diamonds were manufactured annually by the HPHT process, mostly for industrial applications (Linares, 2013).

In 1954, a patent was issued for a diamond growth technique using chemical vapor deposition (CVD). The CVD technique transforms carbon into plasma, which is then precipitated onto a substrate as diamond. Initially, gem-quality CVD synthetic diamond was not possible, but in the mid-1980s, scientists discovered how to reproducibly grow small polycrystalline diamonds and films of microscopic diamond crystals to cover surfaces using the CVD process (Linares, 2013).

In the early 2000s, Apollo Diamond Inc. (Boston, MA) further developed CVD technology as a method for growing single, extremely pure, gem-quality diamond crystals that were large and suitable for use in jewelry. The CVD technique uses high-energy microwaves in a chamber to energize a methane gas into plasma, which then precipitates carbon atoms onto flat diamond wafer seeds as diamond. In developing this process, synthetic diamond producers discovered the temperature, gas composition, and pressure combination that resulted in the growth of a single diamond crystal and were able to produce synthetic stones that ranged from 1 to 2 carats. The size of the diamonds produced was limited only by the size of the diamond seeds and the growing chamber (table 10).

Scio Diamond Technology Corp. (Greenville, SC) acquired the diamond-growing process patents and equipment from Apollo Diamond in 2011 (Sim, 2016). The average size of synthetic diamond crystals grown by Scio Diamond more than doubled and Scio Diamond produced synthetic single-crystal diamonds for finished sizes that averaged from 0.75 to 2 carats for jewelry. These CVD diamonds were appropriate also for industrial uses because they were free of defects and could be grown along a specific crystallographic plane (Scio Diamond Technology Corp., 2015; Bailey, 2016). Scio Diamond continued producing synthetic single-crystal diamond stones until the end of 2016, when they shut down their production facility owing to financial difficulties (Scio Diamond Technology Corp., 2017). In November 2018, Scio Diamond was sold to Adamas One Corp., a Nevada-based company, and the sale was completed in December (Bates, 2019a, b). Adamas One did not report any diamond production during 2019.

Charles & Colvard, Ltd., in North Carolina, was the only U.S. manufacturer of moissanite, a gem-quality synthetic silicon carbide and an excellent diamond simulant. The company used a proprietary patented technology. Moissanite was marketed for its own gem qualities; it exhibits a higher refractive index (brilliance) and higher luster than diamond.

Moissanite's hardness is between that of corundum (ruby and sapphire) and that of diamond, which makes it very durable. Charles & Colvard reported that moissanite sales increased by 16% to $32.2 million in fiscal year ending June 30, 2019, compared with $27.9 million in fiscal year 2018. During the last 6 months of calendar year 2019, moissanite sales were $18.3 million, an increase of 9% compared with $16.7 million during the same period in 2018 (Charles & Colvard, Ltd., 2019, p. 37; 2020, p. 24).

U.S. mussel shells are used as a source of mother-of-pearl and as seed material for culturing pearls. The value of U.S. shell production decreased by 13% to $281,000 in 2019 compared with $325,000 in 2018 (table 1). These mussel shell data include only freshwater mussel shells. In some regions of the United States, shell from mussels was used more as a gemstone based on its own merit rather than as seed material for pearls. This shell material was processed into mother-of-pearl and used in beads, jewelry, and watch faces.

Consumption

Although the United States accounted for only a small portion of total global gemstone production, it was the world's leading diamond and nondiamond gemstone market, accounting for more than 35% of world gemstone consumption in 2019. In the United States, the majority of domestic consumers designated diamond as their favorite gemstone. The popularity of diamonds is evidenced by the diamond market accounting for 90% of the total value of the U.S. gemstone apparent consumption in 2019. The total value of U.S. apparent consumption for all gemstones during the year was estimated to be $23.5 billion, a 10% decrease compared with $26.0 billion in 2018. The U.S. apparent consumption for unset natural gem-quality diamond during the year was estimated to be $21.2 billion, an 11% decrease compared with $23.9 billion in 2018. Domestic markets for natural, unset nondiamond gemstones totaled $2.26 billion in 2019, a 9% increase compared with $2.07 billion in 2018.

U.S. jewelry store annual retail sales increased to $32.6 billion in 2019 from retail sales of $32.1 billion in 2018 (Sabanoglu, 2021). U.S. retail holiday season (November 1 through December 24) total sales in the jewelry sector increased by 1.8% compared with those in 2018; online jewelry sales increased by 8.8% during the same period. This trend in strong online jewelry sales growth started before the holiday season and continued through the end of 2019 (Business Wire, Inc., 2019).

Prices

Gemstone prices are influenced by many factors including qualitative characteristics such as beauty but also quantitative characteristics such as clarity, defects, demand, durability, and rarity. Diamond pricing is complex; values can vary significantly depending on time, place, and the subjective valuations of buyers and sellers. More than 14,000 categories are used to assess rough diamond, and more than 100,000 different combinations of carat, clarity, color, and cut values can be used to assess polished diamond.

Nondiamond gemstone prices generally are influenced by market supply and demand considerations, and diamond prices are supported by producer controls on the quantity and quality of supply. Value of production and prices of gemstones produced and (or) sold in the United States are listed in tables 1, 2, and 3. Free alongside ship values for diamond gemstone exported or reexported are listed in table 4. Customs values for diamond and other gemstones imported are listed in tables 5 through 8.

De Beers Group UK Ltd. (London, United Kingdom) remained a significant force in the diamond market, influencing the price of gem-quality diamond sales worldwide in 2019, accounting for an estimated 31% share of global rough diamond sales in terms of value compared with 35% share in 2018. De Beers' production was about 21% of total global quantity and 31% of total global value in 2019 (De Beers Group UK Ltd., 2020a, p. 3). Since 2000, De Beers' control of world diamond pricing has decreased gradually. Flexible pricing mechanisms set the stage for new methods of rough diamond sales in addition to rough diamonds being sold through a limited number of sightholder sales, the method used for years by De Beers. Rough diamonds also were sold by auctions, placed sales, tender sales, and term contracts (De Beers Group UK Ltd., 2019b, p. 7). In October 2019, De Beers Group Auctions (a subsidiary of De Beers Group UK Ltd.) launched its digital auction portal, which allowed customers to bid for natural diamonds online. This new platform featured easy navigation, efficient bidding, price protection, transparency, and security. Registered bidders could get an overview of all auctions on the portal and could quickly refer to each lot on offer (Creamer Media Pty Ltd, 2019).

Foreign Trade

During 2019, the value of total U.S. natural gemstone trade (exports plus imports) with all countries and localities was $44.6 billion, which was an 11% decrease from that in 2018. Total U.S. natural gemstone trade with all countries and localities, excluding reexports, was valued at $25.5 billion. Diamond accounted for 87% of the 2019 gemstone trade total value, excluding reexports. In 2019, U.S. import quantities of cut diamond decreased by 5% compared with those in 2018, and the value decreased by 13% (tables 5, 8). U.S. import quantities of rough and unworked diamond in 2019 decreased slightly, and the value decreased by 41% compared with that in 2018 (tables 5, 8). The United States remained the world's leading diamond importer and was a significant international diamond transit center as well as the world's leading gem-quality diamond market. In 2019, U.S. export and reexport quantities of gem-grade diamond decreased by 7% compared with 2018, and the value decreased by 11% (table 4). The large quantity of reexports reflected the significance of the United States in the world's diamond supply network.

The value of U.S. natural gemstone imports decreased by 13% to $23.9 billion in 2019 compared with $27.4 billion in 2018 (table 8). This decrease was due to large decreases in cut and uncut diamond and decreases in cut emerald, ruby, and sapphire import values. The largest uncut diamond import value

decreases were for those imports from Angola, Botswana, and Lesotho, with a total combined value decrease of $252 million (table 5, 8). The largest cut but unset diamond import value decreases were for those imports from Angola, Belgium, China, India, Israel, and South Africa, with a total combined value decrease of $3.33 billion (table 5, 8). The largest emerald import value decreases were for those imports from France, India, and Israel, with a total combined value decrease of $97.9 million (table 6, 8). The largest ruby import value decreases were for those imports from Burma, France, and India, with a total combined value decrease of $58.4 million (table 6, 8). The largest sapphire import value decreases were for those imports from France, India, and Thailand, with a total combined value decrease of $57.8 million (table 6, 8). Import values of synthetic gemstone increased by 74% to $457 million in 2019 compared with $263 million 2018 (tables 7, 8). This increase was due to large increases in synthetic gemstone imports from Hong Kong, India, Israel, and the United Kingdom, with a combined value increase of $213 million (table 7). The marketing of imported synthetic gemstones and enhanced gemstones as natural gemstones and the mixing of synthetic materials with natural stones in imported parcels continued to be an issue for some domestic jewelers and sales companies in 2019. In addition, some simulants were marketed as natural or synthetic gemstones during the year, as in previous years.

World Review

The worldwide gemstone industry had two distinct sectors: (1) diamond mining and marketing and (2) nondiamond gemstone production and sales. Most diamond supplies were controlled by a few major mining companies; prices were influenced by consumer demand and supply availability and, to a lesser extent, by controlling the quality and quantity of the diamonds relative to demand, a function that had been performed by De Beers sightholder sales. Unlike diamond, nondiamond gemstones were primarily produced at relatively small, low-cost operations with few dominant producers; prices were influenced only by consumer demand and supply availability.

In 2019, global natural rough diamond production decreased by 7% to 138 million carats from 147 million carats in 2018 (table 11). The value of worldwide rough diamond production decreased by 6% to $13.6 billion from the 2018 value of $14.5 billion (Kimberley Process, The, 2019, 2020). Of the 138 million carats of total natural diamond production, 79.5 million carats (58% of total diamond production) consisted of gemstone diamond and 58.0 million carats (42% of total diamond production) consisted of industrial diamond. Most production was concentrated in a few regions—Africa [Angola, Botswana, Congo (Kinshasa), Namibia, and South Africa], Asia (northeastern Siberia and Yakutia in Russia), Australia, North America (Northwest Territories in Canada), and South America (Brazil). The world's leading natural rough diamond producers were Russia, producing 45.3 million carats (33% of total world production); Botswana, 23.7 million carats (17%); Canada, 18.6 million carats (14%); Congo (Kinshasa), 13.5 million carats (10%); Australia, 13.0 million carats (9%); Angola, 9.15 million carats (7%); South Africa, 7.18 million carats (5%); and other countries, 7.16 million carats (5%). In 2019, Russia was the world's leading gem diamond producer, producing 31% of the total quantity; followed by Canada, 23%; Botswana, 20%; Angola, 10%; South Africa, 7%; Congo (Kinshasa), 3%; and Namibia, 2%. These seven countries produced 96% (by quantity) of the world's gemstone diamond output in 2019 (table 11).

During 2019, OJSC ALROSA and De Beers remained the two leading diamond producers by quantity and value. ALROSA's production was about 26% of total global quantity and 24% of total global value; De Beers' production was about 21% of total global quantity and 31% of total global value (De Beers Group UK Ltd., 2020a, p. 3).

In 2002, the international rough diamond certification system, the Kimberley Process Certification Scheme (KPCS), was agreed upon by the United Nations (UN) member nations, the diamond industry, and related nongovernmental organizations to prevent the shipment and sale of conflict diamonds. Conflict diamonds are diamonds that originate from areas controlled by forces or factions opposed to legitimate and internationally recognized Governments and are used to fund military action in opposition to those Governments or in contravention of the objectives of the United Nations Security Council. The KPCS monitors rough diamond trade in both gemstone and industrial diamond. The KPCS includes the following key elements: the use of forgery-resistant certificates and tamper-proof containers for shipments of rough diamonds; internal controls and procedures that provide credible assurance that conflict diamonds do not enter the legitimate diamond market; a certification process for all exports of rough diamonds; the gathering, organizing, and sharing of import and export data on rough diamonds with other participants of relevant production; credible monitoring and oversight of the international certification scheme for rough diamonds; effective enforcement of the provisions of the certification scheme through dissuasive and proportional penalties for violations; self-regulation by the diamond industry that fulfills minimum requirements; and sharing information with all other participants on relevant rules, procedures, and legislation as well as examples of national certificates used to accompany shipments of rough diamonds. India assumed the chair of the KPCS from January 1 through December 31, 2019. As of December 31, 2019, the 55 participants represented 81 nations (including the 28 member nations of the European Union counted as a single participant). The participating nations in the KPCS account for approximately 99.8% of the global production and trade of rough diamonds (Kimberley Process, The, 2021).

Globally, the production value of rough natural gemstones other than diamond was estimated to be more than $1.15 billion in 2019, based on total value of world rough nondiamond gemstone exports. Most nondiamond gemstone mines are small, low-cost, and widely dispersed operations that are often in remote regions. Foreign countries with major gemstone deposits other than diamond are Afghanistan (aquamarine, beryl, emerald, kunzite, lapis lazuli, ruby, and tourmaline), Australia (beryl, opal, and sapphire), Brazil (agate, amethyst, beryl, ruby, sapphire, topaz, and tourmaline), Burma (beryl, jade, ruby, sapphire, and topaz), Colombia (beryl, emerald, and sapphire), Kenya (beryl, garnet, and sapphire), Madagascar (beryl, rose

quartz, sapphire, and tourmaline), Mexico (agate, opal, and topaz), Sri Lanka (beryl, ruby, sapphire, and topaz), Tanzania (garnet, ruby, sapphire, tanzanite, and tourmaline), and Zambia (amethyst and beryl). In addition, pearls are cultured throughout the South Pacific; Australia, China, French Polynesia, and Japan were key producers in 2019.

The global nonferrous mineral exploration budget decreased by 3% to an estimated $9.8 billion in 2019 from $10.1 billion in 2018 (S&P Global Market Intelligence, 2020). The global diamond exploration budget was about 3% of the nonferrous mineral exploration budget. The success rate in diamond exploration has been estimated to be less than 1%, and no major new deposits large enough to replace production from mines that are closing in the near future have been discovered in more than 20 years (Kumar, 2019; Petra Diamonds Ltd., undated).

Australia.—Rough diamond production in Australia was 13.0 million carats during 2019, an 8% decrease compared with 14.1 million in 2018, accounting for 9% of total global production. Australia's diamond production was valued at $159 million, a 12% decrease compared with that in 2018 (Kimberley Process, The, 2019, 2020).

A large, white, octahedral-shaped 28.84-carat diamond was recovered in March 2019 at the Argyle diamond mine, located in Western Australia. The Argyle Mine is scheduled to close in 2020 (ABC News, 2019).

Botswana.—Rough diamond production in Botswana was 23.7 million carats during 2019, a slight decrease compared with the revised 24.4 million carats in 2018, accounting for 17% of total global production. Production was valued at $3.43 billion, a slight decrease compared with that in 2018 (Kimberley Process, The, 2019, 2020).

The Karowe Diamond Mine, owned by Lucara Diamond Corp., announced the recovery of a 1,758-carat diamond in April 2019. The diamond was of "variable quality" and larger than a tennis ball. The Karowe Diamond Mine had previously produced more than 12 diamonds larger than 300 carats (ABC News, 2019).

The Jwaneng diamond mine in the Kalahari Desert of south-central Botswana was wholly owned by Debswana Diamond Co. (Pty.) Ltd., which is a 50–50 joint venture between the Government of Botswana and De Beers Group. The company was planning the Cut-9 expansion project to extend the mine life to 2035 and was expected to extract an additional 53 million carats of rough diamonds from 44 million tons of ore (De Beers Group UK Ltd., 2019a).

Canada.—Canada was the world's third-largest producer of rough diamond by both volume and value during 2019. Canadian rough diamond production was 18.6 million carats, a 20% decrease compared with that in 2018, accounting for 14% of total global production (table 11). Rough diamond production in Canada was valued at $1.70 billion, a decrease of 19% compared with that in 2018 (Kimberley Process, The, 2019, 2020).

The Diavik Diamond Mine in the Northwest Territories was jointly owned by Rio Tinto Group (60%) and Dominion Diamond Corp. (40%). In 2019, Diavik was Canada's largest diamond mine in terms of quantity of diamond production. The mine plan was built on four diamond-bearing kimberlite pipes. The four kimberlite pipes that were being mined in 2019, A21, A154 South, A154 North, and A418, are very high grade. An expansion project of the A21 kimberlite pipe pit was begun by Diavik during 2016 and continued in 2017 and 2018. The first kimberlite ore from the A21 kimberlite pipe was delivered in March 2018, and the pit reached full production level during the fourth quarter of 2018. The expansion project was done to extend the Diavik Diamond Mine's life by 2 years from 2023 to 2025 (Lazenby, 2018; Rio Tinto Group, 2020).

The Ekati Diamond Mine, which opened in 1998, was Canada's first operating commercial surface and underground diamond mine, located at Lac de Gras, Northwest Territories. Dominion Diamond Mines ULC had an 80% controlling interest in the Ekati Diamond Mine. Underground operations at the mine's Koala kimberlite pipe were ended and final reclamation was initiated and completed in February 2019. The Ekati Diamond Mine's production from other pipes on the property continued throughout 2019. During 2019, Dominion Diamond Mines ULC updated the Ekati mine's life-of-mine plan to include the Point Lake project development, with the Jay kimberlite pipe development to follow. Dominion applied to continue its diamond exploration of the Lac de Gras and Glowworm Lake regions (Dominion Diamond Mines ULC, 2019, p. 5, 13).

The Gahcho Kué Mine in the Northwest Territories commenced commercial production in March 2017 and continued diamond production throughout 2018 and 2019. Gahcho Kué is an open pit operation, mining three kimberlite pipes: 5034, Hearne, and Tuzo. The mine, with an estimated mine life of 12 years, was jointly owned by De Beers Canada, Inc. (51%) and Mountain Province Diamonds Inc. (49%). The mine owners anticipated average annual diamond production of 4.5 million carats (Diamond Loupe, The, 2018; De Beers Group UK Ltd., 2020b).

The Renard Mine was Quebec's first diamond mine and was wholly owned by Stornoway Diamond Corp. The Renard Mine reached commercial production levels in January 2017. Stornoway announced in September 2018 that it had completed rampup of its planned sustainable underground mine production. The Renard Mine continued diamond production throughout 2019. The mine had a 14-year mine life and an average annual diamond production of 1.6 million carats (Mining Technology, 2018; Stornoway Diamond Corp., 2019).

The Victor Mine was Ontario's first diamond mine. It reached commercial production in 2008. The mine completed mining operations in March 2019, and processing of ore ended in June 2019. The mine was in the formal closure and rehabilitation phase in 2019 (De Beers Group UK Ltd., undated).

Lesotho.—Rough diamond production in Lesotho was 1.11 million carats during 2019, a 14% decrease from that in 2018, but accounted for less than 1% of total global production. Diamond production in Lesotho had a value of $290 million, a 23% decrease compared with that in 2018 (Kimberley Process, The, 2019, 2020).

The Liqhobong Diamond Mine in the Maluti Mountains of northern Lesotho began ramping up production in late 2016 and had its first full year of commercial production in 2018. During 2019, 829,000 carats of diamond were recovered from 3.7 million tons of ore at Liqhobong, a grade of 22.6 carats per 100 tons for the year. In June 2019, Liqhobong was estimated

to contain probable reserves of 25.2 million tons grading at 22 carats per 100 tons, containing 5.62 million carats of diamond. The combined indicated and inferred resources were estimated to be 73.3 million tons graded at 28 carats per 100 tons, containing 20.2 million carats of diamond. The mine was owned by Firestone Diamonds plc (75%) and the Government of Lesotho (25%) (Firestone Diamonds plc, 2018; Mining Technology, 2021).

Russia.—Rough diamond production in Russia was 45.3 million carats during 2019, a 5% increase compared with that in 2018, accounting for 33% of total global production. Diamond production in Russia was valued at $4.12 billion, a 3% increase compared with that in 2018 (Kimberley Process, The, 2019, 2020). Five of the ten largest diamond mines in the world that have reserves containing more than 1 billion carats of diamonds are in Russia. These 10 mines did not include alluvial diamond mining projects (Mining Technology, 2019).

ALROSA officially commissioned and mining was started at the Verkhne-Munskoe diamond field in Yakutia near the end of 2018. ALROSA estimated that the deposit would yield 1.8 million carats of rough diamonds per year and the estimated reserves of the Verkhne-Munskoe Diamond Field were sufficient to operate for more than 20 years. The development of the Verkhne-Munskoe diamond deposit was ALROSA's largest investment project. The first four kimberlite pipes being developed were Zapolyarnaya, Deimos, Novinka, and Komsomolskaya-Magnitnaya. Open pit mining at the Komsomolskaya-Magnitnaya Mine was finished in 2019 (ALROSA Group, 2018, 2021).

South Africa.—Rough diamond production in South Africa was 7.18 million carats during 2019, a 28% decrease compared with that in 2018, accounting for 5% of total global production. Production in South Africa was valued at $873 million, a 29% decrease compared with that in 2018 (Kimberley Process, The, 2019, 2020).

De Beers operated the Venetia Mine in Limpopo Province, where it was conducting a $2 billion project to take the mine underground and extend its operating life into the 2040s (De Beers Group UK Ltd., 2018).

Outlook

As domestic and global luxury spending increases, sales of gemstones and jewelry are expected to increase as well. As the gemstone and jewelry industries and their consumers become more comfortable with e-commerce, internet sales of diamonds, gemstones, and jewelry are expected to continue expanding. Internet sales are expected to add to and partially replace "brick-and-mortar" store sales.

Global rough diamond production decreased by 7% during 2019 owing to mine closures, lower output as mines neared the end of their mine life, mining operations transitioning from open pit to underground mining, and falling alluvial output. The world's largest diamond mines have matured and are past their peak production levels. The Argyle Mine in Australia and Diavik Mine in Canada are expected to close by the end of 2025. As these mines are depleted, global production is expected to continue to decline in quantity. The global supply of natural diamond is forecast to steadily decrease to about 120 million carats per year by 2030 (De Beers Group UK Ltd., 2019b, p. 7; Petra Diamonds Ltd., undated).

Synthetic diamonds and other gemstones are expected to continue affecting the natural gemstone industry in unexpected ways. New regulations, increased industry acceptance, and increased consumer acceptance of synthetic gemstones are anticipated and will have a great effect on the industry. More synthetic gemstones, simulants, and treated gemstones are likely to enter the marketplace and necessitate more transparent industry trade standards to maintain customer confidence.

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TABLE 1
ESTIMATED VALUE OF U.S. NATURAL GEMSTONE PRODUCTION,
BY GEM TYPE[1]

(Thousand dollars)

	Natural gems		Synthetic gems	
Gem materials	2018	2019	2018	2019
Beryl	162	110	--	--
Coral, all types	10	10	--	--
Cubic zirconia	XX	XX	12,000	12,000
Diamond	39	50	25,000	50,000
Garnet	36	29	--	--
Gem feldspar	451	450	--	--
Geodes and nodules	63	57	--	--
Moissanite	XX	XX	27,900	32,200
Opal	121	116	--	--
Quartz:				
Macrocrystalline[2]	591	614	--	--
Cryptocrystalline[3]	817	821	--	--
Sapphire and ruby	483	312	--	--
Shell	325	281	--	--
Topaz	15	13	--	--
Tourmaline	252	257	--	--
Turquoise	755	611	75	75
Other	5,360	5,490	--	--
Total	9,470	9,220	65,000	94,300

XX Not applicable. -- Zero.

[1]Table includes data available through June 17, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Macrocrystalline quartz (crystals recognizable with the naked eye) includes amethyst, aventurine, blue quartz, citrine, hawk's eye, prasiolite, prase, quartz, cat's eye, rock crystal, rose quartz, smoky quartz, and tiger's eye.

[3]Cryptocrystalline quartz (microscopically small crystals) includes agate, carnelian, chalcedony, chrysoprase, fossilized wood, heliotrope, jasper, moss agate, onyx, and sard.

TABLE 2
PRICES PER CARAT OF U.S. CUT ROUND DIAMONDS, BY SIZE AND QUALITY IN 2019

Weight (carats)	Color[1]	Clarity[2]	Representative price per carat		
			January[3]	June[4]	December[5]
0.25	G	VS1	$1,650	$1,600	$1,600
Do.	do.	VS2	1,575	1,530	1,525
Do.	do.	SI1	1,250	1,250	1,250
Do.	H	VS1	1,600	1,500	1,500
Do.	do.	VS2	1,500	1,420	1,420
Do.	do.	SI1	1,200	1,200	1,200
0.50	G	VS1	3,000	3,000	3,000
Do.	do.	VS2	2,765	2,770	2,765
Do.	do.	SI1	2,300	2,300	2,300
Do.	H	VS1	2,700	2,700	2,700
Do.	do.	VS2	2,685	2,690	2,685
Do.	do.	SI1	2,250	2,250	2,250
1.00	G	VS1	6,610	6,610	6,610
Do.	do.	VS2	6,200	6,200	6,200
Do.	do.	SI1	5,550	5,550	5,550
Do.	H	VS1	6,000	6,000	6,000
Do.	do.	VS2	5,600	5,600	5,600
Do.	do.	SI1	5,070	5,070	5,070
2.00	G	VS1	12,480	12,500	12,480
Do.	do.	VS2	11,310	11,300	11,310
Do.	do.	SI1	9,400	9,400	9,400
Do.	H	VS1	10,920	10,900	10,920
Do.	do.	VS2	9,750	9,750	9,750
Do.	do.	SI1	8,720	8,720	8,720

Do., do. Ditto.

[1]Gemological Institute of America (GIA) color grades: D—colorless; E—rare white; G, H, I—traces of color.

[2]GIA clarity terms: IF—no blemishes; VVS1—very, very slightly included; VS1—very slightly included; VS2—very slightly included, but not visible; SI1—slightly included.

[3]Source: The Gem Guide, v. 38, no. 1, January/February 2019, p. 26–28.

[4]Source: The Gem Guide, v. 38, no. 4, August/September 2019, p. 26–28.

[5]Source: The Gem Guide, v. 38, no. 6, November/December 2019, p. 26–28.

TABLE 3
PRICES PER CARAT OF U.S. CUT COLORED GEMSTONES IN 2019

Gemstone	Price range per carat	
	January[1]	December[2]
Amethyst	$30–35	$30–35
Aquamarine	325–375	325–375
Citrine	13–22	13–22
Emerald	3,250–4,500	3,250–4,500
Opal, fire	180–250	180–250
Opal, white (also jelly opal)	65–80	65–80
Pearl, cultured saltwater[3]	5	5
Peridot	165–180	165–180
Rhodolite garnet	65–90	65–90
Ruby	2,640–3,600	2,640–3,600
Sapphire, blue	950–1,700	950–1,700
Tanzanite	375–395	375–395
Topaz, blue	7–8	7–8
Topaz, yellow	175–250	175–250
Tourmaline, green	135–200	135–200
Tourmaline, pink	170–200	170–200

[1]Source: The Gem Guide, v. 38, no. 1, January/February 2019, p. 54–55, 60, 64, 72–74, 77, 80–83, and 90. These figures are approximate wholesale purchase prices paid by retail jewelers on a per stone basis for 1 to less than 1 carat, fine-quality stones.

[2]Source: The Gem Guide, v. 38, no. 6, November/December 2019, p. 54–55, 60, 64, 72–74, 77, 80–83, and 90. These figures are approximate wholesale purchase prices paid by retail jewelers on a per stone basis for 1 to less than 1 carat, fine-quality stones.

[3]Prices are per 4.5–5-millimeter pearl.

TABLE 4
U.S. EXPORTS AND REEXPORTS OF DIAMOND (EXCLUSIVE OF INDUSTRIAL DIAMOND), BY COUNTRY OR LOCALITY[1, 2]

Country or locality	2018 Quantity (carats)	2018 Value[3] (thousands)	2019 Quantity (carats)	2019 Value[3] (thousands)
Exports:				
Aruba	1,350	$4,150	1,180	$4,220
Australia	73,900	6,630	17,900	4,870
Belgium	14,100	74,800	25,400	10,300
Brazil	33,100	9,720	11,100	2,720
Canada	41,500	64,700	29,600	58,100
Cayman Islands	3,760	1,420	1,310	1,060
China	1,040	2,270	1,380	676
Denmark	1,750	1,180	1,530	987
France	22,400	13,600	1,370	30,300
Germany	1,780	968	2,250	1,630
Hong Kong	761,000	182,000	593,000	83,300
India	620,000	412,000	291,000	120,000
Indonesia	1,930	343	6,570	389
Israel	54,800	177,000	34,900	61,800
Italy	24,800	6,390	11,200	5,190
Japan	2,990	1,480	3,150	1,690
Mexico	253,000	114,000	286,000	51,900
Netherlands	124	302	80	687
Panama	5,550	12,800	977	720
Singapore	6,680	492	2,430	1,120
Sint Maarten	5,990	15,700	13,200	20,000
South Africa	2,160	1,580	89	88
Switzerland	5,860	25,400	4,780	6,280
Taiwan	2,150	3,160	11,300	1,910
Thailand	56,500	13,600	536,000	25,000
United Arab Emirates	183,000	11,700	80,700	14,700
United Kingdom	21,900	11,900	4,820	5,210
Vietnam	885	876	468	77
Other	12,900	14,200	22,400	13,600
Total	2,220,000	1,180,000	2,000,000	529,000
Reexports:				
Armenia	33,600 r	5,840 r	29,400	4,670
Aruba	2,400	6,470	3,250	6,960
Australia	5,250	68,000	5,750	73,500
Austria	309	23,700	2,690	10,000
Belgium	691,000	2,900,000	597,000	2,420,000
Botswana	2,580	8,240	782	67,700
Brazil	11,300	2,900	17,700	5,030
Canada	93,200 r	134,000	113,000	198,000
China	54,200	60,800	20,700	41,700
Dominican Republic	15,400	6,390	2,810	4,550
France	4,290	133,000	3,470	263,000
Germany	18,500	9,000	14,200	3,390
Hong Kong	2,390,000	3,040,000	2,020,000	2,800,000
India	2,780,000 r	4,820,000	2,410,000	4,250,000
Indonesia	8,790	303	18,500	3,360
Ireland	2,870	10,800	2,960	11,200
Israel	911,000	4,550,000	1,380,000	4,030,000
Italy	60,800	78,600	55,400	69,300
Japan	39,200	56,200	33,400	33,800
Korea, Republic of	562	77	20	117
Laos	2,230	1,450	1,770	1,020
Lebanon	2,900	2,570	2,430	1,480
Malaysia	10,400	2,180	422	1,460
Mexico	16,200	11,600	15,400	11,700

See footnotes at end of table.

TABLE 4—Continued
U.S. EXPORTS AND REEXPORTS OF DIAMOND (EXCLUSIVE OF INDUSTRIAL DIAMOND), BY COUNTRY OR LOCALITY[1, 2]

Country or locality	2018 Quantity (carats)	2018 Value[3] (thousands)	2019 Quantity (carats)	2019 Value[3] (thousands)
Reexports:—Continued				
Namibia	10,500 r	$8,380 r	6,160	$5,100
Netherlands	342	1,870	272	1,760
Panama	60	477	1,010	1,580
Russia	4,010	40,700	6,420	49,200
Singapore	23,200	64,900	6,500	49,400
Sint Maarten	16,800 r	38,500 r	46,700	36,600
South Africa	15,100	95,900	16,900	147,000
Switzerland	111,000	1,270,000	83,100	1,210,000
Taiwan	25,300	4,160	759	496
Thailand	134,000	121,000	124,000	122,000
Ukraine	8,990	2,570	10,300	3,280
United Arab Emirates	596,000	762,000	502,000	649,000
United Kingdom	37,200	357,000	59,500	549,000
Vietnam	46,100	59,200	46,100	72,500
Other	9,120	10,700	19,800	24,600
Total	8,190,000 r	18,800,000	7,680,000	17,200,000
Grand total	10,400,000 r	20,000,000	9,670,000	17,800,000

rRevised.
[1]Table includes data available through June 3, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Schedule B of the United States codes 7102.31.0000, 7102.39.0010, and 7102.39.0050.
[3]Values are free alongside ship.

Source: U.S. Census Bureau.

TABLE 5

U.S. IMPORTS FOR CONSUMPTION OF DIAMOND, BY KIND, WEIGHT, AND COUNTRY OR LOCALITY[1]

Kind, weight, and country or locality of origin	2018 Quantity (carats)	2018 Value[2] (thousands)	2019 Quantity (carats)	2019 Value[2] (thousands)
Rough or uncut, natural:[3, 4]				
Angola	12,200	$43,800	1,840	$7,700
Australia	4,430	2,980	2,340	3,490
Botswana	483,000	251,000	468,000	86,900
Brazil	5,510	5,060	3,060	1,720
Canada	156,000	32,200	119,000	23,300
Congo (Kinshasa)	1,890	1,950	3,030	921
Guyana	6,880	1,980	1,000	658
India	20,000	58	5,260	8
Lesotho	2,610	90,600	931	17,500
Namibia	45,200	34,700	64,500	42,700
Russia	30,900	40,600	96,300	68,500
Sierra Leone	374	973	1,520	1,260
South Africa	165,000	100,000	151,000	91,200
United Arab Emirates	--	--	11,200	7,880
Other	1,430	3,050	2,860	3,740
Total	935,000	609,000	932,000	357,000
Cut but unset, not more than 0.5 carat:[5]				
Armenia	2,120	985	3,820	1,680
Australia	2,340	1,630	1,910	1,270
Belgium	141,000	89,100	174,000	63,100
Botswana	16,000	18,900	24,200	26,400
Brazil	2,000	1,440	3,120	911
Cambodia	29,500	18,900	27,700	22,900
Canada	13,300	11,100	11,900	9,870
China	83,900	38,600	31,300	23,300
Germany	1,160	400	5,840	941
Hong Kong	139,000	22,300	146,000	17,400
India	4,400,000	1,430,000	4,390,000	1,220,000
Israel	789,000	295,000	799,000	237,000
Italy	7,070	1,160	1,330	445
Laos	11,100	11,300	6,250	6,270
Mauritius	19,700	32,000	18,400	31,300
Mexico	38,500	4,860	6,620	3,420
Russia	3,460	6,530	2,770	5,430
South Africa	15,100	11,100	8,280	9,640
Sri Lanka	9,650	8,710	5,480	5,560
Thailand	49,200	7,470	31,800	10,100
United Arab Emirates	2,850	1,690	6,500	1,750
United Kingdom	17,100	3,020	19,000	3,400
Vietnam	57,200	46,600	56,800	49,700
Other	7,250	4,060	13,200	5,830
Total	5,860,000	2,070,000	5,790,000	1,760,000
Cut but unset, more than 0.5 carat:[6]				
Angola	1,050	201,000	358	52,900
Armenia	6,950	3,360	6,460	2,690
Australia	6,370	65,800	6,730	95,900
Belgium	305,000	3,060,000	245,000	2,270,000
Botswana	28,700	210,000	37,500	160,000
Brazil	556	26,400	1,220	35,800
Canada	22,700	101,000	15,900	60,400
China	37,000	222,000	22,900	132,000
Colombia	236	337	351	2,210
Congo (Kinshasa)	242	4,400	124	2,540
France	1,890	56,400	2,200	41,800
Germany	364	4,180	577	1,350
Guinea	20	45	1	52

See footnotes at end of table.

TABLE 5—Continued

U.S. IMPORTS FOR CONSUMPTION OF DIAMOND, BY KIND, WEIGHT, AND COUNTRY OR LOCALITY[1]

Kind, weight, and country or locality of origin	2018		2019	
	Quantity (carats)	Value[2] (thousands)	Quantity (carats)	Value[2] (thousands)
Cut but unset, more than 0.5 carat:[6]—Continued				
Hong Kong	42,300	$149,000	58,500	$197,000
India	2,790,000	8,460,000	2,520,000	7,460,000
Israel	1,410,000	7,600,000	1,290,000	6,840,000
Italy	1,660	29,200	1,760	24,100
Japan	654	2,280	647	1,720
Lesotho	98	15,300	85	10,400
Mauritius	11,400	46,800	13,000	62,700
Namibia	18,600	78,900	14,200	57,800
Russia	51,700	274,000	42,500	317,000
Singapore	134	857	108	3,720
South Africa	34,500	1,120,000	38,500	885,000
Spain	707	6,940	605	1,560
Switzerland	6,970	356,000	9,500	492,000
Thailand	24,900	58,800	9,170	61,200
Ukraine	2,440	2,640	6,290	6,570
United Arab Emirates	6,490	106,000	11,100	129,000
United Kingdom	6,430	135,000	6,900	134,000
Vietnam	4,080	16,100	2,560	7,400
Other	7,200	20,500	5,980	35,300
Total	4,840,000	22,400,000	4,370,000	19,600,000

-- Zero.

[1]Table includes data available through May 18, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Customs value.

[3]Includes some natural advanced diamond.

[4]Harmonized Tariff Schedule of the United States (HTS) code 7102.31.0000.

[5]HTS code 7102.39.0010.

[6]HTS code 7102.39.0050.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF GEMSTONES, OTHER THAN DIAMOND, BY KIND AND COUNTRY OR LOCALITY[1]

Kind and country or locality	2018 Quantity (carats)	2018 Value[2] (thousands)	2019 Quantity (carats)	2019 Value[2] (thousands)
Emerald:[3]				
Afghanistan	14,700	$5,100	5,610	$15,500
Belgium	892	2,140	612	2,650
Brazil	132,000	19,300	95,800	18,400
Burma	121	310	--	--
Canada	1,250	331	215	321
China	18,000	2,340	484	135
Colombia	398,000	205,000	288,000	195,000
France	11,200	74,400	4,120	37,900
Germany	39,100	3,350	20,500	3,180
Hong Kong	96,600	30,500	315,000	39,800
India	1,740,000	140,000	1,140,000	115,000
Israel	190,000	102,000	182,000	66,500
Italy	46,100	34,800	54,300	61,500
Japan	639	312	3,460	287
Madagascar	4	7	20	48
Mozambique	2,520	194	253	549
South Africa	22,400	3,260	26,400	4,600
Sri Lanka	2,370	211	762	912
Switzerland	9,630	53,100	48,700	86,100
Tanzania	3,000	60	2,320	328
Thailand	666,000	26,500	646,000	23,900
United Arab Emirates	6,280	3,560	672	2,590
United Kingdom	3,360	23,700	5,150	32,300
Zambia	478,000	67,200	649,000	64,900
Other	1,360	2,740	5,630	2,900
Total	3,880,000	801,000	3,490,000	775,000
Ruby:[4]				
Afghanistan	5,010	90	5	2
Belgium	3,060	1,720	73	304
Brazil	3	5	541	13
Burma	17,600	61,300	6,050	40,800
Canada	354	283	48	159
China	21,000	1,080	13,300	50
France	7,180	40,900	811	14,300
Germany	38,900	1,570	11,800	1,140
Hong Kong	66,200	18,400	109,000	17,600
India	1,340,000	35,800	858,000	24,600
Israel	20,900	3,980	8,000	4,750
Italy	6,230	19,300	7,610	22,300
Kenya	1,250	23	10,100	99
Madagascar	13,200	2,310	104,000	2,790
Malaysia	--	--	6,200	9
Mauritania	2,350	50	--	--
Mozambique	78,700	46,700	75,200	66,300
Nigeria	1,700	14	6,590	132
South Africa	18,700	1,250	5,630	2,110
Sri Lanka	2,060	6,980	2,350	8,920
Switzerland	3,280	34,900	6,420	37,800
Tanzania	5	6	14,300	259
Thailand	2,330,000	94,400	2,470,000	94,600
United Arab Emirates	1,990	5,140	137	189
United Kingdom	1,320	12,100	9,530	3,630
Zambia	2,360	257	3,560	1,670
Other	2,320	1,310	24,100	693
Total	3,990,000	390,000	3,750,000	345,000

See footnotes at end of table.

TABLE 6—Continued
U.S. IMPORTS FOR CONSUMPTION OF GEMSTONES, OTHER THAN DIAMOND, BY KIND AND COUNTRY OR LOCALITY[1]

Kind and country or locality	2018 Quantity (carats)	2018 Value[2] (thousands)	2019 Quantity (carats)	2019 Value[2] (thousands)
Sapphire:[5]				
Australia	10,600	334	14,200	1,030
Austria	1,570	37	6	15
Belgium	1,690	5,010	539	1,420
Brazil	4,480	61	612	140
Burma	3,100	8,120	11,800	6,220
China	78,200	555	35,500	218
Colombia	23	550	112	183
France	11,100	68,400	4,960	38,500
Germany	84,800	2,520	38,700	3,360
Hong Kong	166,000	39,500	278,000	38,600
India	1,880,000	52,300	1,330,000	35,600
Israel	31,600	8,810	20,400	8,810
Italy	16,700	10,200	17,200	26,400
Japan	68,700	293	2,430	380
Madagascar	81,300	8,620	397,000	20,400
Moldova	186	4	66	15
Mozambique	3,460	432	7,900	914
Nigeria	21,700	411	58,600	738
South Africa	11,000	304	2,760	228
Sri Lanka	354,000	86,200	514,000	93,400
Switzerland	20,200	78,000	18,100	72,200
Taiwan	3,170	1,490	143	24
Thailand	3,880,000	104,000	4,200,000	92,700
United Arab Emirates	2,700	1,190	442	972
United Kingdom	3,160	8,040	2,370	16,200
Zambia	21,900	114	5,780	128
Other	5,790	1,460	27,400	1,230
Total	6,770,000	487,000	6,990,000	460,000
Other precious and semiprecious nondiamond gemstones:				
Rough, uncut, all countries[6]	1,650,000,000 r	34,700 r	1,540,000,000	55,300
Cut, unset, all countries[7]	NA	196,000	NA	520,000

rRevised. NA not available. -- Zero.

[1]Table includes data available through May 19, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Customs value.

[3]Harmonized Tariff Schedule of the United States (HTS) code 7103.91.0030.

[4]HTS code 7103.91.0010.

[5]HTS code 7103.91.0020.

[6]Other precious and semiprecious nondiamond gemstones, rough, uncut and simply sawn; data are for HTS codes 7103.10.2000, 7103.10.2080, and 7103.10.4000.

[7]Other precious and semiprecious nondiamond gemstones, cut but not set; data are for HTS code 7103.99.1000.

Source: U.S. Census Bureau.

TABLE 7
VALUE OF U.S. IMPORTS OF SYNTHETIC
AND IMITATION GEMSTONES, BY COUNTRY OR LOCALITY[1, 2]

(Thousand dollars)

Country or locality	2018	2019
Synthetic, cut but unset[3] and worked, not for jewelry:[4]		
Austria	1,440	1,280
Belgium	4,060	4,070
China	50,300	34,500
Germany	9,650	8,270
Hong Kong	71,200	110,000
India	101,000	263,000
Israel	3,820	13,600
Japan	709	775
Russia	8,350	4,550
Singapore	1,050	4
South Africa	407	6
Sri Lanka	605	399
Switzerland	883	1,400
Thailand	939	958
United Arab Emirates	5,470	1,180
United Kingdom	1,090	3,170
Other	2,010	9,550
Total	263,000	457,000
Imitation:[5]		
Australia	284	53
Austria	30,000	30,600
Canada	19	98
China	21,900	20,200
Czechia	1,550	1,900
El Salvador	37	31
Germany	240	250
Hong Kong	141	37
India	310	445
Italy	97	59
Japan	35	139
Korea, Republic of	263	137
Lithuania	114	88
Mexico	4	32
Pakistan	213	636
Taiwan	2,320	1,360
Thailand	92	89
United Kingdom	32	75
Vietnam	88	93
Other	107	439
Total	57,800	56,800

[1]Table includes data available through May 19, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Customs value.
[3]Harmonized Tariff Schedule of the United States (HTS) code 7104.90.1000.
[4]HTS code 7104.90.5000.
[5]HTS codes 3926.90.4000 and 7018.10.2000.

Source: U.S. Census Bureau.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF GEMSTONES[1]

(Thousand carats and thousand dollars)

Stones	2018		2019	
	Quantity	Value[2]	Quantity	Value[2]
Coral and similar materials, unworked[3]	6,570	16,900	3,920	15,800
Diamond:				
Cut but unset[4]	10,700	24,500,000	10,200	21,300,000
Rough or uncut[5]	935	609,000	932	357,000
Emerald, cut but unset[6]	3,880	801,000	3,490	775,000
Pearl:				
Cultured[7]	NA	19,700	NA	13,700
Imitation[8]	NA	1,960	154	2,010
Natural[9]	NA	8,850	NA	5,430
Ruby, cut but unset[10]	3,990	390,000	3,750	345,000
Sapphire, cut but unset[11]	6,770	487,000	6,990	460,000
Other precious and semiprecious nondiamond gemstones:				
Rough, uncut[12]	1,450,000	54,500	1,810,000	48,700
Rough, simply sawn[13]	90,900	881	295,000	2,080
Gemstones, cut but unset[14]	NA	520,000	NA	535,000
Gemstones, worked, not for jewelry[15]	NA	20,200	2,280,000	18,400
Synthetic, cut but unset[16] and worked, not for jewelry[17]	NA	263,000	95,200	457,000
Imitation[18]	NA	57,800	2,200	56,800
Total	1,570,000	27,700,000	4,520,000	24,400,000

NA Not available.
[1]Table includes data available through May 20, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Customs value.
[3]Harmonized Tariff of the United States (HTS) code 0508.00.0000.
[4]HTS codes 7102.39.0010 and 7102.39.0050.
[5]HTS code 7102.31.0000.
[6]HTS code 7103.91.0030.
[7]HTS code 7101.21.0000.
[8]HTS code 7018.10.1000.
[9]HTS codes 7101.10.3000 and 7101.10.6000.
[10]HTS code 7103.91.0010.
[11]HTS code 7103.91.0020.
[12]HTS codes 7103.10.2000 and 7103.10.2080.
[13]HTS code 7103.10.4000.
[14]HTS code 7103.99.1000.
[15]HTS code 7103.99.5000.
[16]HTS code 7104.90.1000.
[17]HTS code 7104.90.5000.
[18]HTS codes 3926.90.4000 and 7018.10.2000.

Source: U.S. Census Bureau.

TABLE 9
GUIDE TO SELECTED GEMSTONES AND GEM MATERIALS USED IN JEWELRY

Name	Composition	Color	Practical size[1]	Cost[2]	Mohs' hardness	Specific gravity	Refraction	Refractive index	May be confused with	Recognition characteristics
Amber	Hydrocarbon	Yellow, red, green, blue	Any	Low to medium	2.5–2.0	1.1–1.0	Single	1.54	Synthetic or pressed plastics, kauri gum	Fossil resin, color, low density, soft, insects.
Apatite	Chlorocalcium phosphate	Colorless, pink, yellow, green, blue, violet	Small	Low	5.0	3.23–3.16	Double	1.65–1.63	Amblygonite, andalusite, brazilianite, precious beryl, titanite, topaz, tourmaline	Crystal habit, color, hardness, appearance.
Azurite	Copper carbonate hydroxide	Azure, dark blue, pale blue	Small to medium	do.	4.0–3.5	3.9–3.7	do.	1.85–1.72	Dumortierite, hauynite, lapis lazuli, lazulite, sodalite	Color, softness, crystal habits, associated minerals.
Benitoite	Barium titanium silicate	Blue, purple, pink, colorless	do.	High	6.5–6.0	3.68–3.64	do.	1.80–1.76	Sapphire, tanzanite, blue diamond, blue tourmaline, cordierite	Strong blue in ultraviolet light.
Beryl:										
Aquamarine	Beryllium aluminum silicate	Blue-green to light blue	Any	Medium to high	8.0–7.5	2.80–2.63	do.	1.58	Synthetic spinel, blue topaz	Double refraction, refractive index.
Bixbite	do.	Red	Small	Very high	8.0–7.5	2.80–2.63	do.	1.58	Pressed plastics, tourmaline	Refractive index.
Emerald, natural	do.	Green	Medium	do.	7.5	2.80–2.63	do.	1.58	Fused emerald, glass, tourmaline, peridot, green garnet doublets	Emerald filter, dichroism, refractive index.
Emerald, synthetic	do.	do.	Small	High	8.0–7.5	2.80–2.63	do.	1.58	Genuine emerald	Lack of flaws, brilliant fluorescence in ultraviolet light.
Golden (heliodor)	do.	Yellow to golden	Any	Low to medium	8.0–7.5	2.80–2.63	do.	1.58	Citrine, topaz, glass, doublets	Weak-colored.
Goshenite	do.	Colorless	do.	Low	8.0–7.5	2.80–2.63	do.	1.58	Quartz, glass, white sapphire, white topaz	Refractive index.
Morganite	do.	Pink to rose	do.	do.	8.0–7.5	2.80–2.63	do.	1.58	Kunzite, tourmaline, pink sapphire	Do.
Calcite:										
Marble	Calcium carbonate	White, pink, red, blue, green, or brown	do.	do.	3.0	2.72	Double (strong)	1.66–1.49	Silicates, banded agate, alabaster gypsum	Translucent.
Mexican onyx	do.	do.	do.	do.	3.0	2.72	do.	1.60	do.	Banded, translucent.
Charoite	Hydrated sodium calcium hydroxi-fluoro-silicate	Lilac, violet, or white	Small to medium	do.	6.0–5.0	2.78–2.54	XX	1.56–1.55	Purple marble	Color, locality.

See footnotes at end of table.

TABLE 9—Continued
GUIDE TO SELECTED GEMSTONES AND GEM MATERIALS USED IN JEWELRY

Name	Composition	Color	Practical size[1]	Cost[2]	Mohs' hardness	Specific gravity	Refraction	Refractive index	May be confused with	Recognition characteristics
Chrysoberyl:										
Alexandrite	Beryllium aluminate	Green by direct sunlight or incandescent light, red by indirect sunlight or fluorescent light	Small to medium	High	8.5	3.84–3.50	Double	1.75	Synthetic	Strong dichroism, color varies from red to green, hardness.
Cat's eye	do.	Greenish to brownish	Small to large	do.	8.5	3.84–3.50	do.	1.75	Synthetic, shell	Density, translucence, chatoyance.
Chrysolite	do.	Yellow, green, and (or) brown	Medium	Medium	8.5	3.84–3.50	do.	1.75	Tourmaline, peridot	Refractive index, silky.
Chrysocolla	Hydrated copper silicate	Green, blue	Any	Low	4.0–2.0	2.4–2.0	XX	1.57–1.46	Azurite, dyed chalcedony, malachite, turquoise, variscite	Lack of crystals, color, fracture, low density, softness.
Coral	Calcium carbonate	Orange, red, white, black, purple, or green	Branching, medium	do.	4.0–3.5	2.7–2.6	Double	1.66–1.49	False coral	Dull translucent.
Corundum:										
Ruby	Aluminum oxide	Rose to deep purplish red	Small	Very high	9.0	4.10–3.95	do.	1.78	Synthetics, including spinel, garnet	Inclusions, fluorescence.
Sapphire, blue	do.	Blue	Medium	High	9.0	4.10–3.95	do.	1.78	do.	Inclusions, double refraction, dichroism.
Sapphire, fancy	do.	Yellow, pink, colorless, orange, green, or violet	Medium to large	Medium	9.0	4.10–3.95	do.	1.78	Synthetics, glass and doublets, morganite	Inclusions, double refraction, refractive index.
Sapphire or ruby, stars	do.	Red, pink, violet, blue, or gray	do.	High to low	9.0	4.10–3.95	do.	1.78	Star quartz, synthetic stars	Shows asterism, color side view.
Sapphire or ruby, synthetic	do.	Yellow, pink, blue, green, orange, violet, or red	Up to 20 carats	Low	9.0	4.10–3.95	do.	1.78	Synthetic spinel, glass	Curved striae, bubble inclusions.
Cubic zirconia	Zirconium and yttrium oxides	Colorless, pink, blue, lavender, yellow	Small	do.	8.5–8.25	5.8	Single	2.17	Diamond, zircon, titania, moissanite	Hardness, density, lack of flaws and inclusions, refractive index.
Diamond	Carbon	White, blue-white, yellow, brown, green, red, pink, blue	Any	Very high	10.0	3.525–3.516	do.	2.42	Zircon, titania, cubic zirconia, moissanite	High index, dispersion, hardness, luster.
Feldspar:										
Amazonite	Alkali aluminum silicate	Green-blue	Large	Low	6.5–6.0	2.56	XX	1.52	Jade, turquoise	Cleavage, sheen, vitreous to pearly, opaque, grid.
Labradorite	do.	Gray with blue and bronze sheen color play (schiller)	do.	do.	6.5–6.0	2.56	XX	1.56	do.	Do.
Moonstone	do.	Colorless, white, gray, or yellow with white, blue, or bronze schiller	do.	do.	6.5–6.0	2.77	XX	1.54–1.52	Glass, chalcedony, opal	Pale sheen, opalescent.
Sunstone	do.	Orange, red brown, colorless with gold or red glittery schiller	Small to medium	do.	6.5–6.0	2.77	XX	1.55–1.53	Aventurine, glass	Red glittery schiller.

See footnotes at end of table.

TABLE 9—Continued
GUIDE TO SELECTED GEMSTONES AND GEM MATERIALS USED IN JEWELRY

Name	Composition	Color	Practical size[1]	Cost[2]	Mohs' hardness	Specific gravity	Refraction	Refractive index	May be confused with	Recognition characteristics
Garnet	Complex silicate	Brown, black, yellow, green, red, or orange	Small to medium	Low to high	7.5–6.5	4.30–3.15	Single strained	1.98–1.79	Synthetics, spinel, glass	Single refraction, anomalous strain.
Hematite	Iron oxide	Black, black-gray, brown-red	Medium to large	Low	6.5–5.5	5.28–5.12	XX	3.22–2.94	Davidite, cassiterite, magnetite, neptunite, pyrolusite, wolframite	Crystal habit, streak, hardness.
Jade:										
Jadeite	Complex silicate	Green, yellow, black, white, or mauve	Large	Low to very high	7.0–6.5	3.5–3.3	Crypto-crystalline	1.68–1.65	Nephrite, chalcedony, onyx, bowenite, vesuvianite, grossularite	Luster, spectrum, translucent to opaque.
Nephrite	Complex hydrous silicate	do.	do.	do.	6.5–6.0	3.10–2.96	do.	1.63–1.61	Jadeite, chalcedony, onyx, bowenite, vesuvianite, grossularite	Do.
Jet (gagate)	Lignite	Deep black, dark brown	do.	Low	4.0–2.5	1.35–1.19	XX	1.68–1.64	Anthracite, asphalt, cannel coal, onyx, schorl, glass, rubber	Luster, color.
Lapis lazuli	Sodium calcium aluminum silicate	Dark azure-blue to bright indigo blue or even a pale sky blue	do.	do.	6.0–5.0	3.0–2.50	XX	1.50	Azurite, dumortierite, dyed howlite, lazulite, sodalite, glass	Color, crystal habit, associated minerals, luster, localities.
Malachite	Hydrated copper carbonate	Light to black-green banded	do.	do.	4.0–3.5	4.10–3.25	XX	1.91–1.66	Brochantite, chrysoprase, opaque green gemstones	Color banding, softness, associated minerals.
Moissanite	Silicon carbide	Colorless and pale shades of green, blue, yellow	Small	Low to medium	9.25	3.21	Double	2.69–2.65	Diamond, zircon, titania, cubic zirconia	Hardness, dispersion, lack of flaws and inclusions, refractive index.
Obsidian	Amorphous, variable (usually felsic)	Black, gray, brown, dark green, white, transparent	Large	Low	5.5–5.0	2.60–2.35	XX	1.55–1.45	Aegirine-augite, gadolinite, gagate, hematite, pyrolusite, wolframite	Color, conchoidal fracture, flow bubbles, softness, lack of crystal faces.
Opal	Hydrated silica	Reddish orange, colors flash in white gray, black, red, or yellow	do.	Low to high	6.5–5.5	2.3–1.9	Single	1.45	Glass, synthetics, triplets, chalcedony	Color play (opalescence).
Peridot	Iron magnesium silicate	Yellow and (or) green	Any	Medium	7.0–6.5	3.37–3.27	Double (strong)	1.69–1.65	Tourmaline, chrysoberyl	Strong double refraction, low dichroism.

See footnotes at end of table.

TABLE 9—Continued
GUIDE TO SELECTED GEMSTONES AND GEM MATERIALS USED IN JEWELRY

Name	Composition	Color	Practical size[1]	Cost[2]	Mohs' hardness	Specific gravity	Refraction	Refractive index	May be confused with	Recognition characteristics
Quartz:										
Agate	Silicon dioxide	Any color	Large	Low	7.0	2.64–2.58	XX	XX	Glass, plastic, Mexican onyx	Cryptocrystalline, irregularly banded, dendritic inclusions.
Amethyst	do.	Purple	do.	Medium	7.0	2.66–2.65	Double	1.55	Glass, plastic, fluorite	Macrocrystalline, color, refractive index, transparent, hardness.
Aventurine	do.	Green, red-brown, gold-brown, with metallic iridescent reflection	do.	Low	7.0	2.69–2.64	do.	1.55–1.54	Iridescent analcime, aventurine feldspar, emerald, aventurine glass	Macrocrystalline, color, metallic iridescent flake reflections, hardness.
Cairngorm	do.	Smoky orange or yellow	do.	do.	7.0	2.66–2.65	do.	1.55	do.	Macrocrystalline, color, refractive index, transparent, hardness.
Carnelian	do.	Flesh red to brown red	do.	do.	7.0–6.5	2.64–2.58	do.	1.54–1.53	Jasper	Cryptocrystalline, color, hardness.
Chalcedony	do.	Bluish, white, or gray	do.	do.	7.0–6.5	2.64–2.58	do.	1.54–1.53	Tanzanite	Do.
Chrysoprase	do.	Green, apple-green	do.	do.	7.0–6.5	2.64–2.58	do.	1.54–1.53	Chrome chalcedony, jade, prase opal, prehnite, smithsonite, variscite, artificially colored green chalcedony	Do.
Citrine	do.	Yellow	do.	do.	7.0	2.66–2.65	do.	1.55	do.	Macrocrystalline, color, refractive index, transparent, hardness.
Jasper	do.	Any color, striped, spotted, or sometimes uniform	do.	do.	7.0	2.66–2.58	XX	XX	do.	Cryptocrystalline, opaque, vitreous luster, hardness.
Onyx	do.	Many colors	do.	do.	7.0	2.64–2.58	XX	XX	do.	Cryptocrystalline, uniformly banded, hardness.
Petrified wood	do.	Brown, gray, red, yellow	do.	do.	7.0–6.5	2.91–2.58	Double	1.54	Agate, jasper	Color, hardness, wood grain.
Rock crystal	do.	Colorless	do.	do.	7.0	2.66–2.65	do.	1.55	Topaz, colorless sapphire	Do.
Rose	do.	Pink, rose red	do.	do.	7.0	2.66–2.65	do.	1.55	do.	Macrocrystalline, color, refractive index, transparent, hardness.
Tiger's eye	do.	Golden yellow, brown, red, blue-black	do.	do.	7.0–6.5	2.64–2.58	XX	1.54–1.53	XX	Macrocrystalline, color, hardness, chatoyancy.

See footnotes at end of table.

TABLE 9—Continued
GUIDE TO SELECTED GEMSTONES AND GEM MATERIALS USED IN JEWELRY

Name	Composition	Color	Practical size[1]	Cost[2]	Mohs' hardness	Specific gravity	Refraction	Refractive index	May be confused with	Recognition characteristics
Rhodochrosite	Manganese carbonate	Rose-red to yellowish, striped	Large	Low	4.0	3.7–3.45	Double	1.82–1.6	Fire opal, rhodonite, tugtupite, tourmaline	Color, crystal habit, reaction to acid, perfect rhombohedral cleavage.
Rhodonite	Manganese iron calcium silicate	Dark red, flesh red, with dendritic inclusions of black manganese oxide	do.	do.	6.5–5.5	3.74–3.40	do.	1.75–1.72	Rhodochrosite, thulite, hessonite, spinel, pyroxmangite, spessartine, tourmaline	Color, black inclusions, lack of reaction to acid, hardness.
Shell:										
Mother-of-pearl	Calcium carbonate	White, cream, green, blue-green, with iridescent play of color	Small	Low	3.5	2.85–2.6	XX	XX	Glass and plastic imitation	Luster, iridescent play of color.
Pearl	do.	White, cream to black, sometimes with hint of pink, green, purple	do.	Low to high	4.5–2.5	2.85–2.6	XX	XX	Cultured and glass or plastic imitation	Luster, iridescence, x-ray of internal structure.
Spinel, natural	Magnesium aluminum oxide	Any color	Small to medium	Medium	8.0	3.7–3.5	Single	1.72	Synthetic, garnet	Refractive index, single refraction, inclusions.
Spinel, synthetic	do.	do.	Up to 40 carats	Low	8.0	3.7–3.5	Double	1.73	Spinel, corundum, beryl, topaz, alexandrite	Weak double refraction, curved striae, bubbles.
Spodumene:										
Hiddenite	Lithium aluminum silicate	Yellow to green	Medium	Medium	7.0–6.5	3.20–3.13	do.	1.66	Synthetic spinel	Refractive index, color, pleochroism.
Kunzite	do.	Pink to lilac	do.	do.	7.0–6.5	3.20–3.13	do.	1.66	Amethyst, morganite	Do.
Tanzanite	Complex silicate	Blue to lavender	Small	High	7.0–6.0	3.30	do.	1.69	Sapphire, synthetics	Strong trichroism, color.
Topaz	do.	White, blue, green, pink, yellow, gold	Medium	Low to medium	8.0	3.6–3.4	do.	1.62	Beryl, quartz	Color, density, hardness, refractive index, perfect in basal cleavage.
Tourmaline	do.	Any color, including mixed	do.	do.	7.5–7.0	3.20–2.98	do.	1.63	Peridot, beryl, garnet corundum, glass	Double refraction, color, refractive index.
Turquoise	Copper aluminum phosphate	Blue to green with black, brown-red inclusions	Large	Low	6.0	2.83–2.60	do.	1.63	Chrysocolla, dyed howlite, dumortierite, glass, plastics, variscite	Difficult if matrix not present, matrix usually limonitic.
Unakite	Granitic rock, feldspar, epidote, quartz	Olive green, pink, and blue-gray	do.	do.	7.0–6.0	3.20–2.60	XX	XX	XX	Olive green, pink, gray-blue colors.
Zircon	Zirconium silicate	White, blue, brown, yellow, or green	Small to medium	Low to medium	7.5–6.0	4.8–4.0	Double (strong)	1.98–1.79	Diamond, synthetics, topaz, aquamarine	Double refraction, strongly dichroic, wear on facet edges.

Do., do. Ditto. XX Not applicable.

[1]Small, up to 5 carats; medium, 5 to 50 carats; large, more than 50 carats.

[2]Low, up to $25 per carat; medium, up to $200 per carat; high, more than $200 per carat.

TABLE 10
LABORATORY-CREATED GEMSTONE PRODUCTION METHODS[1]

Gemstone	Production method	Company or producer	Date of first production
Alexandrite	Flux	Creative Crystals Inc.	1970s.
Do.	Melt pulling	J.O. Crystal Co., Inc.	1990s.
Do.	do.	Kyocera Corp.	1980s.
Do.	Zone melt	Seiko Corp.	Do.
Cubic zirconia	Skull melt	Various producers	1970s.
Diamond	HPHT[2]	General Electric Co.	1950s.
Do.	CVD[3]	Apollo Diamond Inc.	2000s.
Do.	MPCVD[4]	CIW & UA[5]	Do.
Emerald	Flux	Chatham Created Gems, Inc.	1930s.
Do.	do.	Gilson	1960s.
Do.	do.	Kyocera Corp.	1970s.
Do.	do.	Lennix	1980s.
Do.	do.	Russia	Do.
Do.	do.	Seiko Corp.	Do.
Do.	Hydrothermal	Biron Corp.	Do.
Do.	do.	Lechleitner	1960s.
Do.	do.	Regency	1980s.
Do.	do.	Russia	Do.
Moissanite	Sublimation	Cree Research	Do.
Ruby	Flux	Chatham Created Gems, Inc.	1950s.
Do.	do.	Douras	1990s.
Do.	do.	J.O. Crystal Co., Inc.	1980s.
Do.	do.	Kashan Created Ruby	1960s.
Do.	Melt pulling	Kyocera Corp.	1970s.
Do.	Verneuil	Various producers	1900s.
Do.	Zone melt	Seiko Corp.	1980s.
Sapphire	Flux	Chatham Created Gems, Inc.	1970s.
Do.	Melt pulling	Kyocera Corp.	1980s.
Do.	Verneuil	Various producers	1900s.
Do.	Zone melt	Seiko Corp.	1980s.
Star ruby	Melt pulling	Kyocera Corp.	Do.
Do.	do.	Nakazumi Earth Crystals Co.	Do.
Do.	Verneuil	Linde Air Products Co.	1940s.
Star sapphire	do.	do.	Do.

Do., do. Ditto.

[1]Gemstones that are also synthesized, but for which the production methods are proprietary include gems such as azurite, garnet, malachite, opal, and turquoise. Gemstone amethyst, citrine, and other quartz minerals are produced by the hydrothermal method.

[2]High-pressure, high-temperature (HPHT).

[3]Chemical vapor deposition (CVD).

[4]Microwave plasma chemical vapor deposition (MPCVD).

[5]The Carnegie Institution for Science Washington Geophysical Laboratory and the University of Alabama.

TABLE 11
DIAMOND (NATURAL): WORLD PRODUCTION, BY COUNTRY OR LOCALITY AND TYPE[1]

(Thousand carats)

Country or locality and type[2]	2015	2016	2017	2018	2019
Gemstones:					
Angola[e, 3]	8,110	8,120	8,490	7,570	8,230
Australia[e, 4]	271	279	343	281	260
Botswana[e, 5]	14,600 [r]	14,700 [r]	16,000 [r]	17,200 [r]	16,600
Brazil, unspecified[6]	32	184	255	251	166
Cameroon, unspecified[7]	2	1	2	2	2
Canada, unspecified	11,677	13,036	23,234	23,194	18,638
Central African Republic[8]	--	9 [e]	38 [e]	11 [e]	21 [e]
China, unspecified	150 [e]	127 [e]	230	99	51
Congo (Brazzaville)	40	12	47	48	3
Congo (Kinshasa)[e, 9]	3,190	3,160	3,800	3,030	2,670
Côte d'Ivoire, unspecified	15	20	7	6	4
Ghana, unspecified	174	142	82	54	38
Guinea[e, 10]	134	90	145	234	183
Guyana, unspecified	118	140	52	62	55
India[11]	9 [e]	9	11	11 [e]	17 [e]
Lesotho, unspecified	304	342	1,126	1,294	1,114
Liberia[12]	41	38	43 [e]	48 [e]	33 [e]
Namibia, unspecified	2,053	1,718	1,948	2,397	2,018
Russia[e, 13]	23,500	22,600	23,900	24,200	25,400
Sierra Leone[e, 10]	400	439	231	593	649
South Africa[e, 14, 15]	3,290	3,320	3,880	3,960 [r]	5,740
Tanzania[e, 16]	184	205	259	328	313
Togo, unspecified	--	--	(17)	--	(17)
Zimbabwe[e, 18]	349	210	251	326	211
Total	68,600 [r]	68,900 [r]	84,400 [r]	85,200 [r]	82,400
Industrial:					
Angola[e, 3]	902	902	944	841	915
Australia[e, 4]	13,300	13,700	16,800	13,800	12,700
Botswana[5]	6,220 [r, e]	6,250 [r, e]	6,900 [r, e]	7,300 [r, e]	7,110
Central African Republic[8]	--	2 [e]	10 [e]	3 [e]	6 [e]
Congo (Kinshasa)[e, 9]	12,600	12,400	15,300	12,100	10,800
Guinea[e, 10]	33	23	36	59	46
India[e, 11]	25	24	30	29	45
Liberia[12]	27	25	29 [e]	32 [e]	22 [e]
Russia[e, 13]	18,400	17,700	18,800	19,000	19,900
Sierra Leone[e, 10]	100	110	58	148	162
South Africa[e, 14, 15]	4,940	4,980	5,820	5,950 [r]	1,440
Tanzania[e, 16]	33	36	46	58	104
Zimbabwe[e, 18]	3,140	1,890	2,260	2,930	1,900
Total	59,700 [r]	58,000 [r]	67,000	62,200 [r]	55,200
Grand total	128,000	127,000	151,000	147,000	138,000

See footnotes at end of table.

TABLE 11—Continued

DIAMOND (NATURAL): WORLD PRODUCTION, BY COUNTRY OR LOCALITY AND TYPE[1]

[e]Estimated. [r]Revised. -- Zero.

[1]Table includes data available through August 20, 2020. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]In addition to the countries and (or) localities listed, Belarus, Germany, Ireland, the Republic of Korea, Nigeria, and Sweden may have produced natural diamond, but available information was inadequate to make reliable estimates of output.

[3]About 90% gem quality and 10% industrial quality.

[4]About 2% gem quality and 98% industrial quality.

[5]About 70% gem and near-gem quality and 30% industrial quality.

[6]Private sector and artisanal mining. Includes near-gem and cheap-gem qualities.

[7]From artisanal mining.

[8]About 79% gem quality and 21% industrial quality.

[9]About 20% gem quality and 80% industrial quality; the majority of production is from artisanal mining.

[10]About 80% gem quality and 20% industrial quality.

[11]About 27% gem quality and 73% industrial quality.

[12]About 60% gem quality and 40% industrial quality.

[13]About 56% gem quality and 44% industrial quality.

[14]Includes artisanal mining.

[15]About 40% gem quality and 60% industrial quality.

[16]About 85% gem quality and 15% industrial quality.

[17]Less than ½ unit.

[18]About 10% gem quality and 90% industrial quality.