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GEMSTONES [ADVANCE RELEASE]

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GEMSTONES

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In 2007, the estimated value of natural gemstones produced in the United States was more than $11.9 million, and the estimated value of U.S. laboratory-created gemstone production was more than $73.5 million. The total estimated value of U.S. gemstone production was almost $85.4 million. The value of U.S. gemstone imports was $20.1 billion, and the value of combined U.S. gemstone exports and reexports was estimated to be $12.3 billion.

In this report, the terms "gem" and "gemstone" mean any mineral or organic material (such as amber, pearl, petrified wood, and shell) used for personal adornment, display, or object of art because it possesses beauty, durability, and rarity. Of more than 4,000 mineral species, only about 100 possess all these attributes and are considered to be gemstones. Silicates other than quartz are the largest group of gemstones in terms of chemical composition; oxides and quartz are the second largest (table 1). Gemstones are subdivided into diamond and colored gemstones, which in this report designates all natural nondiamond gems. In addition, laboratory-created gemstones, cultured pearls, and gemstone simulants are discussed but are treated separately from natural gemstones (table 2). Trade data in this report are from the U.S. Census Bureau. All percentages in the report were computed using unrounded data. Current 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 fascinated 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. These stones served as symbols of wealth and power. Today, gems are worn more for pleasure or in appreciation of their beauty than to demonstrate wealth. 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 of more than 230 domestic gemstone producers conducted by the USGS. The survey provided a foundation for projecting 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 includes 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 relatively small compared with those of other mining operations. In the United States, much of the current gemstone mining is conducted by individual collectors, gem clubs, and hobbyists rather than by businesses.

The commercial gemstone industry in the United States consists of individuals and companies that mine gemstones or harvest shell and pearl, firms that manufacture laboratory-created gemstones, and individuals and companies that cut and polish natural and laboratory-created gemstones. The domestic gemstone industry is focused on the production of colored gemstones and on the cutting and polishing of large diamond stones. Industry employment is estimated to range from 1,000 to 1,500 workers (U.S. International Trade Commission, 1997, p. 1).

Most natural gemstone producers in the United States are small businesses that are widely dispersed and operate independently. The small producers probably have an average of less than three employees, including those who only work part time. The number of gemstone mines operating from year to year fluctuates because the uncertainty associated with the discovery and marketing of gem-quality minerals makes it difficult to obtain financing for developing and sustaining economically viable operations (U.S. International Trade Commission, 1997, p. 23).

The total value of natural gemstones produced in the United States during 2007 was estimated to be more than $11.9 million (table 3). This production value was a 5% increase from that of 2006.

Natural gemstone materials indigenous to the United States are collected, produced, and/or marketed in every State. During 2007, all 50 States produced at least $1,000 worth of gemstone materials. Nine States accounted for 84% of the total value, as reported by survey respondents. These States were, in order of declining value of production, Tennessee, Oregon, Arizona, California, Arkansas, Alabama, Montana, North Carolina, and Idaho. Some States were known for the production of a single gemstone material—Tennessee for 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. There is also a wide variety of gemstones found and produced in California, Idaho, Montana, and North Carolina.

During 2007, the United States had only one operation in known diamond-bearing areas from which diamonds were produced. That diamond operation is in Crater of Diamonds State Park near Murfreesboro in Pike County, AR, where a digfor-fee operation for tourists and rockhounds is maintained by the State of Arkansas. Crater of Diamonds is the only diamond mine in the world that is open to the public. The diamonds occur in a lamproite breccia tuff associated with a volcanic pipe and in the soil developed from the lamproite breccia tuff. In 2007, 1,024 diamond stones with an average weight of 0.247 carats were recovered at the Crater of Diamonds State Park. Of the 1,024 diamond stones recovered, 44 weighed more than 1 carat. Since the diamond-bearing pipe and the adjoining area became a State park in 1972, 26,881 diamond stones with a total carat weight of 5,324.65 have been recovered (Kimberly Garland, interpreter, Crater of Diamonds State Park, written commun., January 16, 2008). Exploration has demonstrated that there is about 78.5 million metric tons (Mt) of diamond-bearing rock in this diamond deposit (Howard, 1999, p. 62). An Arkansas law enacted early in 1999 prohibits commercial diamond mining in the park (Diamond Registry Bulletin, 1999).

There have been no commercially operated diamond mines in the United States since 2002. Diamond was produced at the Kelsey Lake diamond mine, located close to the Colorado-Wyoming State line near Fort Collins, CO, for several years until April 2002. The Kelsey Lake property has now been fully reclaimed.

The success of the Canadian diamond industry has stimulated interest in exploration for commercially feasible diamond deposits in the United States in Alaska, Colorado, Minnesota, Montana, and Wyoming. Microscopic and larger diamonds and some diamond indicator minerals have been found in all of these States. Parts of Alaska have similar geologic terrain to the diamond producing areas of Canada’s Northwest Territories, and there are similarities between the geology in other Canadian areas where diamond deposits have been found and the geology in Minnesota (Diamond Registry Bulletin, 2005a). A diamond-bearing kimberlite was found in a 32.4-hectare site known as the Homestead property near Lewistown, MT; and diamonds have been found in the stream beds and glacial valleys of Montana for years (Associated Press, 2004). Studies by the Wyoming Geological Survey have shown that Wyoming has the potential for a large diamond-mining business. Wyoming has many of the same geologic conditions that are found in the Canadian diamond-producing areas, and there is good evidence of hundreds of kimberlite pipes in the State. More than 20 diamondiferous kimberlite pipes and 1 diamondiferous mafic breccia pipe have been identified in southern Wyoming. The State Line and the Iron Mountain kimberlite fields of Wyoming are two of the largest kimberlite fields in the United States, and the Leucite Hills lamproite field in Wyoming is the largest lamproite field in the United States (Associated Press, 2002).

In addition to natural gemstones, laboratory-created gemstones and gemstone simulants are produced in the United States. Laboratory-created or synthetic gemstones have the same chemical, optical, and physical properties as the natural gemstones. Simulants have an appearance similar to that of a natural gemstone material, but they have different chemical, optical, and physical properties. Laboratory-created gemstones that have been produced in the United States include alexandrite, diamond, emerald, garnet, moissanite, ruby, sapphire, spinel, turquoise, and zirconia. However, during 2007, only diamond, moissanite, and turquoise were produced commercially. Simulants of coral, lapis lazuli, malachite, and turquoise also are manufactured in the United States. In addition, certain colors of laboratory-created sapphire and spinel, used to represent other gemstones, are classified as simulants.

Laboratory-created gemstone production in the United States was valued at more than $73.5 million during 2007, which was a 41% increase compared with that of 2006. This was owing to very large increases in the production of laboratory-created diamonds combined with a large increase in laboratory-created moissanite production. The value of U.S. simulant gemstone output was estimated to be more than $100 million. Four companies in four States, representing virtually the entire U.S. laboratory-created gemstone industry, reported production to the USGS. The States with reported laboratory-created gemstone production were, in descending order of production value, North Carolina, Florida, Massachusetts, and Arizona.

Since the 1950s, when scientists manufactured the first laboratory-created bits of diamond grit using a high-pressure, high-temperature (HPHT) method, this method of growing diamonds has become relatively commonplace in the world as a technology for laboratory-created diamonds, so much so that thousands of small plants all over China are now using the HPHT method and producing laboratory-created diamonds suitable for cutting as gemstones. Gem-quality diamonds of one carat or more are harder to manufacture because at that size it is difficult to consistently produce diamonds of high quality, even in the controlled environment of a lab using the HPHT method. But after 50 years of development, that situation is changing and several laboratory-created diamond companies are producing high-quality diamonds that equal those produced from mines (Park, 2007).

Gemesis Corp. in Sarasota, FL, consistently produced gem-quality laboratory-created diamond and reported an eighth year of production in 2007. The laboratory-created diamonds are produced using equipment, expertise, and technology developed by a team of scientists from Russia and the University of Florida. The weight of the laboratory-created diamond stones range from 1.5 to 2 carats, and most of the stones are yellow, brownish yellow, colorless, and green (Weldon, 1999). Gemesis uses diamond-growing machines, each machine capable of growing 3-carat rough diamonds by generating HPHT conditions that recreate the conditions in the Earth’s mantle where natural diamonds form (Davis, 2003). Gemesis could be producing as much as 30,000 to 40,000 stones each year, and annual revenues may reach $70 million to $80 million (Diamond Registry Bulletin, 2001). Gemesis diamonds are available for retail purchase in jewelry stores and on the Internet, and the prices of the Gemesis laboratory-created diamonds are below those of natural diamond but above the prices of simulated diamond (Weldon, 2003).

Apollo Diamond, Inc., near Boston, MA, developed and patented a method for growing extremely pure, gem-quality diamond with flawless crystal structure by chemical vapor deposition (CVD). The CVD technique transforms carbon into plasma, which is then precipitated onto a substrate as diamond. CVD has been used for more than a decade to cover large surfaces with microscopic diamond crystals, but until this process, no one had discovered the temperature, gas composition, and pressure combination that resulted in the growth of a single diamond crystal. CVD diamond precipitates as nearly 100% pure, almost flawless diamond, and therefore may not be distinguishable from natural diamond by some tests (Davis, 2003). In 2006, Apollo Diamond Inc. produced laboratory-created stones that range from 1 to 2 carats and expected to expand to larger stones in the future. Growth of CVD diamonds is limited only by the size of the seed placed in the diamond growing chamber. Late in 2006, Apollo started selling jewelry directly to consumers through a jeweler in Boston, MA. In 2007, the company increased its production of large stones and is now selling online through an Apollo Diamond Web store (O'Connell, 2007). Apollo planned to start selling diamonds in the jewelry market at costs 10% to 30% below those of comparable natural diamonds (Hastings, 2005). CVD diamond's highest value, besides its use as gemstones, is as a material for high-tech uses. CVD diamond could be used to make extremely powerful lasers; to create cellular telephones that fit into a watch, and storage devices for MP3 players that could store 10,000 movies, not just 10,000 songs; to create frictionless medical replacement joints; to create windows on spacecraft; to create surgical diamond blades and scalpels; to create tweeters for audio equipment; or to create coatings for cars that would not scratch or wear out. The greatest potential use for CVD diamond is in computers and other electronic devices that utilize processors (Maney, 2005; Park, 2007).

The Carnegie Institution of Washington Geophysical Laboratory and the University of Alabama jointly developed and patented the CVD process and apparatus to produce ½-inch-thick 10-carat single diamond crystals at very rapid growth rates (100 micrometers per hour). This faster CVD method uses microwave plasma technology and allows multiple crystals to be grown simultaneously. This size is about five times that of commercially available laboratory-created diamonds produced by HPHT methods and other CVD techniques. A researcher at the Carnegie Institution stated, "High-quality crystals over 3 carats are very difficult to produce using the conventional approach. Several groups have begun to grow diamond single crystals by CVD, but large, colorless, and flawless ones remain a challenge. Our fabrication of 10-carat, half-inch CVD diamonds is a major breakthrough" (Willis, 2004; Carnegie Institution of Washington, 2005; Science Blog, 2005). Apollo Diamond and the Carnegie Institution have noted that diamonds produced by the CVD method are harder than natural diamonds and diamonds produced by HPHT methods.

In 2007, Charles & Colvard, Ltd., in North Carolina, entered its 10th year of producing and marketing moissanite, a gem-quality laboratory-created silicon carbide. Moissanite is also an excellent diamond simulant, but it is being marketed for its own gem qualities. Moissanite exhibits a higher refractive index (brilliance) and higher luster than diamond. Its hardness is between those of corundum (ruby and sapphire) and diamond, which gives it durability (Charles & Colvard, Ltd., 2007).

U.S. shell production increased by 3% in 2007 compared with that of 2006. U.S. mussel shells are used as a source of mother-of-pearl and as seed material for culturing pearls. Pearl producers in Japan are using manmade seed materials or seed materials from China and other sources in addition to the stockpiled material. There also has been an increase in the popularity of darker and colored pearls and freshwater pearls that do not use U.S. seed material. In some regions of the United States, shell from mussels is being used more as a gemstone based on its own merit rather than as seed material for pearls. This shell material is being processed into mother-of-pearl and used in beads, jewelry, and watch faces.

Consumption

Although the United States accounted for little of the total global gemstone production, it was the world's leading gemstone market. It is estimated that U.S. gemstone markets accounted for more than 35% of world gemstone demand in 2007. The U.S. market for unset gem-quality diamond during the year was estimated to be about $19.0 billion, an increase of 10% compared with that of the previous year. Domestic markets for natural, unset nondiamond gemstones totaled approximately $1.22 billion in 2007, which was an increase of 9% from that of 2006.

In the United States, about two-thirds of domestic consumers designate diamond as their favorite gemstone when surveyed (Wade, 2006). The U.S. colored gemstone market posted an overall increase in sales during 2007 compared with the sales in 2006. The popularity of colored gemstones, colored laboratory-created gemstones, and "fancy" colored diamonds continued to increase in 2007. This was indicated by increased values of U.S. imports for consumption in some colored stone categories (emerald, rubies and sapphires, and cultured pearls) in 2007 compared with the values from 2006 (table 10). Colored stone popularity also was evidenced by their general sales increase in 2007 (Zborowski, 2007). Another indication reported by the Natural Color Diamond Association, was that demand for colored diamonds rose sharply during the first half of 2007, and the trend was expected to continue. This increased demand pushed prices up for colored diamond stones. The largest demand for colored stones was in the Asian and United States markets with increased sales of champagne, cognac, grey, black, pink, orange and yellow stones (Diamond Registry Bulletin, 2007a).

Prices

Gemstone prices are governed by many factors and qualitative characteristics, including beauty, clarity, defects, demand, durability, and rarity. Diamond pricing, in particular, is complex; values can vary significantly depending on time, place, and the subjective valuations of buyers and sellers. There are more than 14,000 categories used to assess rough diamond and more than 100,000 different combinations of carat, clarity, color, and cut values used to assess polished diamond (Pearson, 1998).

Colored gemstone prices are generally influenced by market supply and demand considerations, and diamond prices are supported by producer controls on the quantity and quality of supply. Values and prices of gemstones produced and/or sold in the United States are listed in tables 3 through 5. In addition, customs values for diamonds and other gemstones imported, exported, or reexported are listed in tables 6 through 10.

De Beers Group companies remain a significant force affecting the price of gem-quality diamond worldwide because they mine a significant portion of the world's gem-quality diamond produced each year, and they also purchase diamonds from Russia. In 2007, De Beers companies produced 51.1 million carats, which maintained the record production of 2006. De Beers companies also sort and valuate a large portion (by value) of the world's annual supply of rough diamond through De Beers' subsidiary Diamond Trading Co. (DTC), which has marketing agreements with other producers. In 2007, DTC had diamond sales of $5.92 billion, which were down about 4% from those of 2006 (De Beers Group, 2007, 2008). In 2007, there were about 200,000 diamond jewelry retail outlets worldwide. From these retail outlets, about 45% of diamond jewelry was sold in the United States, 33% in Asia, and 11% in Europe. Increase in sales was approximately 6% compared with that of 2006. There were an estimated 32,000 retail outlets specializing in fine jewelry in the United States. Of these jewelry-only retailers, 79% are small, independent businesses that are highly competitive in their local markets. The remaining 21% are major national and regional chains and online retailers. The estimated U.S. retail jewelry market was $65.3 billion during 2007. The market shares by type of outlet were (in decreasing value order): local independents, 21%; national and regional chains, 15%; department stores, 13%; television shopping networks, 11%; Internet auction sites, 11%; discount chains, 8%; Internet jewelry sites, 6%; and others (catalogs, boutiques, and other outlets), 15% (Profile America, Inc., 2008).

Foreign Trade

During 2007, total U.S. gemstone trade with all countries and territories was valued at about $32.4 billion, which was an increase of 16% from that of 2006. Diamond accounted for about 95% of the 2007 gemstone trade total. In 2007, U.S. exports and reexports of diamond were shipped to 85 countries and territories, and imports of all gemstones were received from 98 countries and territories (tables 6–10). During 2007, U.S. trade in cut diamond and unworked diamond increased by 10% and by 6%, respectively, compared with that of 2006. The United States remained the world's leading diamond importer and is a significant international diamond transit center as well as the world's leading gem-quality diamond market. The large volume of reexports shipped to other centers reveals the significance that the United States has in the world's diamond supply network (table 6).

Imports of laboratory-created gemstone decreased by 2% for the United States in 2007 compared with trade in 2006. Laboratory-created gemstone imports from Austria, China, Germany, Hong Kong, India, Sri Lanka, Switzerland, and Thailand, with more than $500,000 in imports from each country, made up about 89% (by value) of the total domestic imports of laboratory-created gemstones during the year. Prices of certain imported laboratory-created gemstones, such as amethyst, were very competitive. The marketing of imported laboratory-created gemstones and enhanced gemstones as natural gemstones, and the mixing of laboratory-created materials with natural stones in imported parcels, continued to be problems for some domestic producers in 2007. There also were problems with some simulants being marketed as laboratory-created gemstones during the year.

World Review

The gemstone industry worldwide has two distinct sectors—diamond mining and marketing and colored gemstone production and sales. Most diamond supplies are controlled by a few major mining companies; prices are supported by managing the quality and quantity of the gemstones relative to demand, a function performed by De Beers through DTC. Unlike diamond, colored gemstones are primarily produced at relatively small, low-cost operations with few dominant producers; prices are influenced by consumer demand and supply availability.

In 2007, world natural diamond production totaled about 169 million carats—92.6 million carats gem quality and 76.7 million carats industrial grade (table 11). 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 and Venezuela). In 2007, Russia led the world in total diamond output quantity (combined gemstone and industrial). Botswana was the world's leading gemstone diamond producer, followed by Russia, Canada, Angola, South Africa, Congo (Kinshasa), and Namibia in descending quantity order. These seven countries produced 96% (by quantity) of the world's gemstone diamond output in 2007.

In 2002, the international rough-diamond certification system, the Kimberley Process Certification Scheme (KPCS), was agreed upon by United Nations (UN) member nations, the diamond industry, and involved nongovernmental organizations. 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 (Weldon, 2001). Canada acted as the chair and secretariat of the KPCS for the first 2 years, and in October 2004, Russia assumed these duties. The list of participating countries has expanded to include 47 nations that have met the minimum requirements of the agreement. The rough diamond-trading entity of Chinese Taipei has also met the minimum requirements of the KPCS. The KPCS was implemented to solve the problem of conflict diamonds—rough diamonds used by rebel forces and their allies in several countries to help finance warfare aimed at subverting governments recognized as legitimate by the UN. The participating nations in the KPCS account for approximately 98% of the global production and trade of rough diamonds (Diamond Registry Bulletin, 2005b; Kimberley Process, 2008). Discussions about the possible participation of several other countries are ongoing.

Globally, the value of production of natural gemstones other than diamond was estimated to have exceeded $2 billion in 2007. Most nondiamond gemstone mines are small, low-cost, and widely dispersed operations in remote regions of developing nations. 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 and in other equatorial waters; Australia, China, French Polynesia, and Japan are key producers.

Canada.—Canadian diamond production continued increasing in 2007 to about 18 million carats. Diamond exploration continued in many parts of Canada, and many new deposits have been found and are being developed. In 2007, Canada produced about 11% of the world's combined natural gemstone and industrial diamonds.

The Ekati Diamond Mine, Canada's first operating commercial diamond mine, completed its ninth full year of production in 2007. Ekati produced 3.67 million carats of diamond from 4.33 million metric tons (Mt) of ore (BHP Billiton Ltd., 2008). BHP Billiton Ltd. has an 80% controlling ownership in Ekati, which is in the Northwest Territories in Canada. Ekati has estimated reserves of 60.3 Mt of ore in kimberlite pipes that contain 54.3 million carats of diamond, and BHP Billiton projected the mine life to be 25 years. Approximately one-third of the Ekati diamond production is industrial-grade material (Darren Dyck, senior project geologist, BHP Diamonds, Inc., oral commun., May 27, 2001).

The Diavik Diamond Mine, also in the Northwest Territories, completed its fifth full year of production. In 2007, Diavik produced 11.9 million carats of diamond (Diavik Diamond Mines Inc., 2008). At yearend 2006, Diavik estimated the mine's remaining proven and probable reserves to be 24.5 Mt of ore in kimberlite pipes, containing 81.7 million carats of diamond, and projected the mine life to be 16 to 22 years (Diavik Diamond Mine Dialogue, 2007). The mine is an unincorporated joint venture between Diavik Diamond Mines Inc. (60%) and Harry Winston Diamond Mines Ltd. (40%). In November, Diavik announced approval of its investment in the underground mining phase of the Diavik Diamond Mine. Underground diamond production will begin in 2009 and continue beyond 2020. Open pit mining is expected to cease in 2012, at which time Diavik will become an all-underground mine (Diavik Diamond Mine Dialogue, 2008). The mine is expected to produce a total of about 110 million carats of diamond at a rate of 8 million carats per year (Diavik Diamond Mines Inc., 2000, p. 10–12; Diavik Diamond Mine Dialogue, 2007).

Canada's third diamond mine, the Jericho Diamond Mine wholly owned by Tahera Diamond Corp., completed its first full year of production. The Jericho mine is located in Nunavut. In 2007, Jericho produced 375,000 carats (Abazias Diamonds, 2008). Tahera estimated the Jericho Diamond Mine's reserves at 2.6 Mt of ore and 3.11 million carats of diamond (Tahera Diamond Corp., 2007).

Diamond exploration continued in Canada, with several other commercial diamond projects and additional discoveries located in Alberta, British Columbia, the Northwest Territories, the Nunavut Territory, Ontario, and Quebec. Canada produced about 11% of the world's combined natural gemstone and industrial diamond production in 2007.

Côte d'Ivoire.—In 2007, the UN Security Council continued the ban on rough diamond trade with the Côte d'Ivoire. The ban was originally implemented in 2004 and continued in 2006 under resolution 1643 (2005). The UN Security Council deemed Côte d'Ivoire to be a threat to international peace and security because the profits from its trade of rough diamonds were used to arm civil conflict within Côte d'Ivoire. The sanctions were aimed at stemming civil conflict in Côte d'Ivoire. According to the World Diamond Council, Côte d'Ivoire is the only remaining source of conflict diamonds (Diamond Registry Bulletin, 2006, 2007c).

Liberia.—The UN removed diamond sanctions against Liberia. The move was followed by the European Union also lifting its embargo on rough diamond trade from Liberia. Liberia was accepted as a member state to the Kimberley Process Certification Scheme in May 2007. The United States added Liberia to its list of diamond trading partners in June (Diamond Registry Bulletin, 2007b).

Namibia.—Mining began in January 2007 at the marine project of Bonaparte Diamond Mines NL, located off the coast of Namibia. During the first quarter, 21,942 diamonds weighing more than 9,000 carats were recovered (Diamond Registry Bulletin, 2007d).

Outlook

There are indications of possible continued growth in the U.S. diamond and jewelry markets in 2008. Historically, diamonds have proven to hold their value despite wars or economic depressions (Schumann, 1998, p. 8).

Independent producers, such as Ekati and Diavik in Canada, will continue to bring a greater measure of competition to global markets. More competition presumably will bring more supplies and lower prices. Further consolidation of diamond producers and larger amounts of rough diamond being sold outside DTC will continue as the diamond industry adjusts to De Beers' reduced influence on the industry.

More laboratory-created gemstones, simulants, and treated gemstones will enter the marketplace and necessitate more transparent trade industry standards to maintain customer confidence.

During 2007, online sales rose to 6% of all retail jewelry sales, compared with 3.5% in 2006. Internet sales of diamonds, gemstones, and jewelry are expected to continue to grow and increase in popularity, as will other forms of e-commerce that emerge to serve the diamond and gemstone industry. This is likely to take place as the gemstone industry and its customers become more comfortable with and learn the applications of new e-commerce tools (IDEX Magazine, 2006; Profile America, Inc., 2008).

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TABLE 1
GUIDE TO SELECTED GEMSTONES AND GEM MATERIALS USED IN JEWELRY

Name	Composition	Color	Practical size[1]	Cost[2]	Mohs	Specific gravity	Refraction	Refractive index	May be confused with	Recognition characteristics
Amber	Hydrocarbon	Yellow, red, green, blue	Any	Low to medium	2.0–2.5	1.0–1.1	Single	1.54	Synthetic or pressed plastics, kaurigum	Fossil resin, color, low density, soft and trapped insects.
Apatite	Chlorocalcium phosphate	Colorless, pink, yellow, green, blue, violet	Small	Low	5.0	3.16–3.23	Double	1.63–1.65	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.	3.5–4.0	3.7–3.9	do.	1.72–1.85	Dumortierite, hauynite, lapis lazuli, lazulite, sodalite	Color, softness, crystal habits and associated minerals.
Benitoite	Barium titanium silicate	Blue, purple, pink, colorless	do.	High	6.0–6.5	3.64–3.68	do.	1.76–1.80	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	7.5–8.0	2.63–2.80	do.	1.58	Synthetic spinel, blue topaz	Double refraction, refractive index.
Bixbite	do.	Red	Small	Very high	7.5–8.0	2.63–2.80	do.	1.58	Pressed plastics, tourmaline	Refractive index.
Emerald, natural	do.	Green	Medium	do.	7.5	2.63–2.80	do.	1.58	Fused emerald, glass, tourmaline, peridot, green garnet doublets	Emerald filter, dichroism, refractive index.
Emerald, synthetic	do.	do.	Small	High	7.5–8.0	2.63–2.80	do.	1.58	Genuine emerald	Lack of flaws, brilliant fluorescence in ultraviolet light.
Golden (heliodor)	do.	Yellow to golden	Any	Low to medium	7.5–8.0	2.63–2.80	do.	1.58	Citrine, topaz, glass, doublets	Weak-colored.
Goshenite	do.	Colorless	do.	Low	7.5–8.0	2.63–2.80	do.	1.58	Quartz, glass, white sapphire, white topaz	Refractive index.
Morganite	do.	Pink to rose	do.	do.	7.5–8.0	2.63–2.80	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)	1.49–1.66	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.	5.0–6.0	2.54–2.78	XX	1.55–1.56	Purple marble	Color, locality.
Chrysoberyl:										
Alexandrite	Beryllium aluminate	Green by day light, red by artificial light	Small to medium	High	8.5	3.50–3.84	Double	1.75	Synthetic	Strong dichroism, color varies from red to green, hardness.

See footnotes at end of table.

TABLE 1—Continued

GUIDE TO SELECTED GEMSTONES AND GEM MATERIALS USED IN JEWELRY

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

See footnotes at end of table.

TABLE 1—Continued

GUIDE TO SELECTED GEMSTONES AND GEM MATERIALS USED IN JEWELRY

Name	Composition	Color	Practical size[1]	Cost[2]	Mohs	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	6.5–7.5	3.15–4.30	Single strained	1.79–1.98	Synthetics, spinel, glass	Single refraction, anomalous strain.
Hematite	Iron oxide	Black, black-gray, brown-red	Medium to large	Low	5.5–6.5	5.12–5.28	XX	2.94–3.22	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	6.5–7.0	3.3–3.5	Crypto-crystalline	1.65–1.68	Nephrite, chalcedony, onyx, bowenite, vesuvianite, grossularite	Luster, spectrum, translucent to opaque.
Nephrite	Complex hydrous silicate	do.	do.	do.	6.0–6.5	2.96–3.10	do.	1.61–1.63	Jadeite, chalcedony, onyx, bowenite, vesuvianite, grossularite	Do.
Jet (gagate)	Lignite	Deep black, dark brown	do.	Low	2.5–4.0	1.19–1.35	XX	1.64–1.68	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.	5.0–6.0	2.50–3.0	XX	1.50	Azurite, dumortierite, dyed howlite, lazulite, sodalite, glass	Color, crystal habit, associated minerals, luster, and localities.
Malachite	Hydrated copper carbonate	Light to black-green banded	do.	do.	3.5–4.0	3.25–4.10	XX	1.66–1.91	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	2.65–2.69	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	5.0–5.5	2.35–2.60	XX	1.45–1.55	Aegirine-augite, gadolinite, gagate, hematite, pyrolusite, wolframite	Color, conchoidal fracture, flow bubbles, softness, and lack of crystal faces.
Opal	Hydrated silica	Reddish orange, colors flash in white gray, black, red, or yellow	do.	Low to high	5.5–6.5	1.9–2.3	Single	1.45	Glass, synthetics, triplets, chalcedony	Color play (opalescence).
Peridot	Iron magnesium silicate	Yellow and/or green	Any	Medium	6.5–7.0	3.27–3.37	Double (strong)	1.65–1.69	Tourmaline, chrysoberyl	Strong double refraction, low dichroism.
Quartz:										
Agate	Silicon dioxide	Any	Large	Low	7.0	2.58–2.64	XX	XX	Glass, plastic, Mexican onyx	Cryptocrystalline, irregularly banded, dendritic inclusions.

See footnotes at end of table.

TABLE 1—Continued
GUIDE TO SELECTED GEMSTONES AND GEM MATERIALS USED IN JEWELRY

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

See footnotes at end of table.

TABLE 1—Continued

GUIDE TO SELECTED GEMSTONES AND GEM MATERIALS USED IN JEWELRY

Name	Composition	Color	Practical size[1]	Cost[2]	Mohs	Specific gravity	Refraction	Refractive index	May be confused with	Recognition characteristics
Rhodochrosite	Manganese carbonate	Rose-red to yellowish, stripped	Large	Low	4.0	3.45–3.7	Double	1.6–1.82	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.	5.5–6.5	3.40–3.74	do.	1.72–1.75	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	do.	3.5	2.6–2.85	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	2.5–4.5	2.6–2.85	XX	XX	Cultured and glass or plastic imitation	Luster, iridescence, x-structure, ray.
Spinel, natural	Magnesium aluminum oxide	Any	Small to medium	Medium	8.0	3.5–3.7	Single	1.72	Synthetic, garnet	Refractive index, single refraction, inclusions.
Spinel, synthetic	do.	do.	Up to 40 carats	Low	8.0	3.5–3.7	Double	1.73	Spinel, corundum, beryl, topaz, alexandrite	Weak double refraction, curved striae, bubbles.
Spodumene:										
Hiddenite	Lithium aluminum silicate	Yellow to green	Medium	Medium	6.5–7.0	3.13–3.20	do.	1.66	Synthetic spinel	Refractive index, color, pleochroism.
Kunzite	do.	Pink to lilac	do.	do.	6.5–7.0	3.13–3.20	do.	1.66	Amethyst, morganite	Do.
Tanzanite	Complex silicate	Blue to lavender	Small	High	6.0–7.0	3.30	do.	1.69	Sapphire, synthetics	Strong trichroism, color.
Topaz	do.	White, blue, green, pink, yellow, gold	Medium	Low to medium	8.0	3.4–3.6	do.	1.62	Beryl, quartz	Color, density, hardness, refractive index, perfect in basal cleavage.
Tourmaline	do.	Any, including mixed	do.	do.	7.0–7.5	2.98–3.20	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	2.60–2.83	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.	6.0–7.0	2.60–3.20	XX	XX	XX	Olive green, pink, gray-blue colors.
Zircon	Zirconium silicate	White, blue, brown, yellow, or green	Small to medium	Low to medium	6.0–7.5	4.0–4.8	Double (strong)	1.79–1.98	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 2
LABORATORY-CREATED GEMSTONE PRODUCTION METHODS

Gemstone	Production method	Company/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.	1980s.
Cubic zirconia	Skull melt	Various producers	1970s.
Emerald	Flux	Chatham Created Gems	1930s.
Do.	do.	Gilson	1960s.
Do.	do.	Kyocera Corp.	1970s.
Do.	do.	Lennix	1980s.
Do.	do.	Russia	1980s.
Do.	do.	Seiko Corp.	1980s.
Do.	Hydrothermal	Biron Corp.	1980s.
Do.	do.	Lechleitner	1960s.
Do.	do.	Regency	1980s.
Do.	do.	Russia	1980s.
Ruby	Flux	Chatham Created Gems	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	1970s.
Do.	Melt pulling	Kyocera Corp.	1980s.
Do.	Verneuil	Various producers	1900s.
Do.	Zone melt	Seiko Corp.	1980s.
Star ruby	Melt pulling	Kyocera Corp.	1980s.
Do.	do.	Nakazumi Earth Crystals Co.	1980s.
Do.	Verneuil	Linde Air Products Co.	1940s.
Star sapphire	do.	Linde Air Products Co.	1940s.

Do., do. Ditto.

TABLE 3

VALUE OF U.S. GEMSTONE PRODUCTION, BY TYPE[1]

(Thousand dollars)

Gem materials	2006	2007
Beryl	21	18
Coral, all types	106	150
Diamond	(2)	(2)
Garnet	44	67
Gem feldspar	1,190	1,330
Geode/nodules	47	53
Opal	380	328
Quartz:		
Macrocrystalline[3]	228	215
Cryptocrystalline[4]	147	300
Sapphire/ruby	198	283
Shell	3,270	3,370
Topaz	(2)	(2)
Tourmaline	55	59
Turquoise	202	475
Other	5,450 r	5,260
Total	11,300	11,900

[r]Revised.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Included with "Other."

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

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

TABLE 4

PRICES OF U.S. CUT DIAMONDS, BY SIZE AND QUALITY IN 2007[1]

Carat weight	Description, color[2]	Clarity[3] (GIA terms)	Representative prices		
			January[4]	June[5]	December[6]
0.25	G	VS1	$1,300	$1,300	$1,495
Do.	G	VS2	1,200	1,200	1,350
Do.	G	SI1	1,100	1,100	1,200
Do.	H	VS1	1,150	1,150	1,400
Do.	H	VS2	1,050	1,050	1,300
Do.	H	SI1	1,000	1,000	1,070
0.50	G	VS1	3,200	3,200	3,200
Do.	G	VS2	2,800	2,800	2,800
Do.	G	SI1	2,400	2,400	2,400
Do.	H	VS1	2,800	2,800	2,800
Do.	H	VS2	2,400	2,400	2,400
Do.	H	SI1	2,200	2,200	2,200
0.75	G	VS1	3,800	3,800	3,800
Do.	G	VS2	3,600	3,600	3,600
Do.	G	SI1	3,300	3,300	3,300
Do.	H	VS1	3,500	3,500	3,500
Do.	H	VS2	3,300	3,300	3,300
Do.	H	SI1	3,000	3,000	3,000
1.00	G	VS1	6,500	6,500	6,500
Do.	G	VS2	6,100	6,100	6,100
Do.	G	SI1	5,000	5,000	5,000
Do.	H	VS1	5,500	5,500	5,500
Do.	H	VS2	5,300	5,300	5,300
Do.	H	SI1	4,600	4,600	4,600

Do.Ditto.

[1]Data are rounded to no more than three significant digits.

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

[3]Clarity: IF—no blemishes; VVS1—very, very slightly included; VS1—very slightly included; VS2—very slightly included, but not visible; SI1—slightly included.

[4]Source: Jewelers' Circular Keystone, v. 178, no. 2, February 2007, p. 127.

[5]Source: Jewelers' Circular Keystone, v. 178, no. 7, July 2007, p. 157.

[6]Source: Jewelers' Circular Keystone, v. 179, no. 1, January 2008, p. 139.

TABLE 5
PRICES PER CARAT OF U.S. CUT COLORED GEMSTONES IN 2007

Gemstone	Price range per carat	
	January[1]	December[2]
Amethyst	$7–$15	$7–$15
Blue sapphire	700–1,375	700–1,375
Blue topaz	5–10	5–10
Emerald	2,400–4,000	2,400–4,000
Green tourmaline	45–60	45–60
Cultured saltwater pearl[3]	5	5
Pink tourmaline	60–125	60–125
Rhodolite garnet	18–30	18–30
Ruby	1,725–2,000	1,725–2,000
Tanzanite	300–450	300–450

[1]Source: The Guide, spring/summer 2007, p. 22, 37, 51, 65, 74, 85, 96, 98, 104, and 119. These figures are approximate current wholesale purchase prices paid by retail jewelers on a per stone basis for 1 to <2 carat, fine-quality stones.

[2]Source: The Guide, fall/winter 2007-2008, p. 22, 37, 51, 65, 74, 85, 96, 98, 104, and 119. These figures are approximate current wholesale purchase prices paid by retail jewelers on a per stone basis for 1 to <2 carat, fine-quality stones.

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

TABLE 6
U.S. EXPORTS AND REEXPORTS OF DIAMOND (EXCLUSIVE OF INDUSTRIAL DIAMOND), BY COUNTRY[1]

Country	2006 Quantity (carats)	2006 Value[2] (millions)	2007 Quantity (carats)	2007 Value[2] (millions)
Exports:				
Australia	50,100	$19	65,000	$18
Belgium	2,480,000	725	3,510,000	891
Canada	82,900	90	82,400	81
Costa Rica	67,700	7	82,200	7
France	189,000	64	192,000	168
Hong Kong	1,620,000	419	1,460,000	529
India	706,000	232	714,000	502
Israel	3,820,000	1,700	4,500,000	2,390
Japan	74,900	43	131,000	46
Mexico	864,000	129	907,000	128
Netherlands	27,600	6	9,790	2
Netherlands Antilles	15,500	51	14,900	43
Singapore	83,300	14	125,000	18
South Africa	32,000	13	48,400	12
Switzerland	142,000	129	203,000	149
Taiwan	21,800	4	34,400	6
Thailand	121,000	34	177,000	49
United Arab Emirates	226,000	61	287,000	107
United Kingdom	88,600	66	146,000	52
Other	220,000	74	225,000	105
Total	10,900,000	3,890	12,900,000	5,310
Reexports:				
Armenia	54,300	5	4,760	(3)
Australia	16,500	6	30,200	9
Belgium	4,340,000	1,070	4,540,000	1,260
Canada	260,000	162	241,000	155
Dominican Republic	107,000	15	48,700	6
France	11,500	1	11,200	2
Guatemala	96,800	10	89,000	9
Hong Kong	3,470,000	771	3,900,000	1,030
India	1,910,000	369	2,080,000	511
Israel	8,770,000	2,310	9,700,000	2,470
Japan	91,700	23	125,000	37
Malaysia	28,100	6	37,000	3
Mexico	31,500	7	33,700	5
Singapore	173,000	37	199,000	26
South Africa	396,000	55	86,400	62
Switzerland	453,000	345	519,000	523
Thailand	243,000	62	205,000	39
United Arab Emirates	513,000	131	671,000	112
United Kingdom	525,000	213	513,000	186
Other	176,000	58	184,000	70
Total	21,700,000	5,660	23,200,000	6,510
Grand total	32,600,000	9,540	36,100,000	11,800

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Customs value.
[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 7

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

	2006		2007	
Kind, range, and country of origin	Quantity (carats)	Value[2] (millions)	Quantity (carats)	Value[2] (millions)
Rough or uncut, natural:[3]				
Angola	42,600	$34	8,850	$43
Australia	1,350	1	228	1
Botswana	172,000	162	207,000	126
Brazil	5,840	5	31,100	5
Canada	45,300	41	45,200	56
Congo (Kinshasa)	45,800	66	37,400	147
Ghana	38,700	1	7,480	1
Guyana	24,500	3	3,890	1
India	12,300	1	228,000	1
Namibia	4,050	2	6,530	1
Russia	443,000	27	551,000	31
South Africa	332,000	384	213,000	360
Other	31,900	74	26,000	75
Total	1,200,000	801	1,370,000	848
Cut but unset, not more than 0.5 carat:				
Belgium	526,000	203	494,000	203
Canada	10,500	14	8,350	9
China	62,600	16	68,300	35
Dominican Republic	64,200	6	60,500	5
Hong Kong	390,000	70	132,000	33
India	8,560,000	1,780	7,390,000	1,660
Israel	843,000	426	696,000	380
Mauritius	5,370	11	6,540	13
Mexico	453,000	58	407,000	57
Singapore	979	1	631	1
South Africa	3,350	2	4,350	2
Switzerland	53,800	25	1,750	1
Thailand	102,000	21	105,000	25
United Arab Emirates	131,000	35	122,000	25
Other	65,000	26	39,900	16
Total	11,300,000	2,690	9,540,000	2,460
Cut but unset, more than 0.5 carat:				
Belgium	1,120,000	2,600	982,000	2,800
Canada	18,800	66	14,700	51
Hong Kong	65,600	154	31,000	87
India	1,390,000	1,480	1,690,000	2,030
Israel	2,870,000	8,140	2,850,000	9,100
Mexico	9,480	1	39,900	6
Russia	53,600	132	73,200	184
South Africa	78,200	559	84,900	712
Switzerland	11,000	191	12,800	238
Thailand	16,900	24	15,800	19
United Arab Emirates	82,500	111	53,600	78
Other	83,000	298	100	352
Total	5,790,000	13,800	5,840,000	15,700

[1]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.

Source: U.S. Census Bureau.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF GEMSTONES, OTHER THAN DIAMOND, BY KIND AND COUNTRY[1]

	2006		2007	
Kind and country	Quantity (carats)	Value[2] (millions)	Quantity (carats)	Value[2] (millions)
Emerald:				
Argentina	--	--	--	--
Belgium	137,000	$1	1,310	$1
Brazil	206,000	8	1,090,000	6
Canada	993	(3)	2,200	1.0
China	5,000	(3)	25,900	1.0
Colombia	1,020,000	86	918,000	120
France	1,020	2	1,020	1
Germany	12,400	2	49,300	2
Hong Kong	439,000	5	161,000	8
India	1,450,000	19	1,210,000	22
Israel	138,000	22	135,000	32
Italy	7,590	3	3,870	2
Namibia	--	--	--	--
Switzerland	28,200	19	6,690	8
Thailand	420,000	7	612,000	14
United Kingdom	1,320	1	771	2
Other	37,400	(3)	66	4
Total	3,910,000	175	4,220,000	218
Ruby:				
Belgium	1,760	1	6,640	1
China	17,000	(3)	2,930	1
Dominican Republic	15,700	(3)	2,340	(3)
France	2,840	4	2,580	1
Germany	9,590	2	21,100	2
Hong Kong	129,000	6	181,000	3
India	1,930,000	3	2,100,000	6
Israel	4,810	1	7,760	1
Italy	3,280	1	1,010	3
Kenya	2,000	(3)	9,550	1
Sri Lanka	2,120	1	4,300	1
Switzerland	15,000	12	9,710	23
Thailand	1,510,000	53	2,380,000	70
United Arab Emirates	2,220	(3)	157,000	1
Other	24,600	3	66,400	3
Total	3,680,000	87	4,960,000	114
Sapphire:				
Australia	2,100	(3)	4,460	2
Austria	3,060	(3)	32,800	1
Belgium	2,860	1	3,910	1
China	35,000	(3)	311,000	1
Dominican Republic	44,300	(3)	3,670	(3)
Germany	119,000	3	65,100	3
Hong Kong	336,000	9	255,000	7
India	1,680,000	5	1,740,000	7
Israel	26,700	2	23,800	3
Italy	2,860	(3)	3,650	1
Singapore	2,840	(3)	3,630	(3)
Sri Lanka	363,000	49	378,000	50
Switzerland	43,200	10	21,800	21
Thailand	4,150,000	75	3,740,000	76
United Arab Emirates	6,130	$1	4,460	$1

See footnotes at end of table.

TABLE 8—Continued
U.S. IMPORTS FOR CONSUMPTION OF GEMSTONES, OTHER THAN DIAMOND, BY KIND AND COUNTRY[1]

Kind and country	2006 Quantity (carats)	2006 Value[2] (millions)	2007 Quantity (carats)	2007 Value[2] (millions)
Sapphire—Continued:				
United Kingdom	4,220	1	9,310	2
Other	39,500	6	63,500	6
Total	6,860,000	162	6,670,000	177
Other:				
Rough, uncut:				
Australia	NA	5	NA	4
Brazil	NA	11	NA	11
Canada	NA	4	NA	3
China	NA	4	NA	4
Colombia	NA	2	NA	3
Czech Republic	NA	2	NA	2
Germany	NA	1	NA	1
India	NA	7	NA	3
Japan	NA	1	NA	1
Mexico	NA	(3)	NA	(3)
Netherlands	NA	(3)	NA	(3)
Pakistan	NA	2	NA	(3)
South Africa	NA	(3)	NA	(3)
Tanzania	NA	1	NA	2
United Kingdom	NA	(3)	NA	(3)
Other	NA	13	NA	5
Total	NA	52	NA	39
Cut, set and unset:				
Australia	NA	13	NA	14
Austria	NA	2	NA	4
Brazil	NA	18	NA	18
Canada	NA	1	NA	1
China	NA	71	NA	55
France	NA	4	NA	2
Germany	NA	44	NA	40
Hong Kong	NA	50	NA	48
India	NA	86	NA	97
Israel	NA	6	NA	5
Italy	NA	1	NA	1
South Africa	NA	3	NA	7
Sri Lanka	NA	11	NA	10
Switzerland	NA	13	NA	4
Taiwan	NA	2	NA	2
Tanzania	NA	6	NA	7
Thailand	NA	57	NA	74
United Arab Emirates	NA	1	NA	1
United Kingdom	NA	2	NA	1
Other	NA	14	NA	11
Total	NA	405	NA	402

See footnotes at end of table.

TABLE 8—Continued
U.S. IMPORTS FOR CONSUMPTION OF GEMSTONES, OTHER THAN DIAMOND, BY KIND AND COUNTRY[1]

NA Not available. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Customs value.

[3]Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9
VALUE OF U.S. IMPORTS OF LABORATORY-CREATED
AND IMITATION GEMSTONES, BY COUNTRY[1, 2]

(Thousand dollars)

Country	2006	2007
Laboratory-created, cut but unset:		
Austria	882	3,420
Brazil	361	353
Canada	124	158
China	14,900	12,800
Cyprus	(3)	--
Czech Republic	112	107
France	354	272
Germany	12,700	12,800
Hong Kong	1,830	1,530
India	1,000	1,190
Ireland	(3)	--
Italy	51	35
Japan	75	176
Korea, Republic of	468	368
Netherlands	436	119
South Africa	(3)	7
Sri Lanka	2,210	3,260
Switzerland	4,550	989
Taiwan	197	187
Thailand	778	885
United Arab Emirates	60	83
Other	1,170	2,530
Total	42,300	41,300
Imitation:[4]		
Austria	72,600	72,400
Brazil	12	18
China	3,850	3,090
Czech Republic	9,250	8,510
France	118	8
Germany	1,760	1,260
Hong Kong	250	104
India	434	142
Italy	214	262
Japan	269	10
Korea, Republic of	689	439
Philippines	(3)	--
Russia	7	5
Spain	170	--
Taiwan	66	7
Thailand	49	15
United Kingdom	139	4
Other	135	305
Total	90,100	86,600

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Customs value.

[3]Less than ½ unit.

[4]Includes pearls.

Source: U.S. Census Bureau.

TABLE 10

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

(Thousand carats and thousand dollars)

	2006		2007	
Stones	Quantity	Value[2]	Quantity	Value[2]
Diamonds:				
Rough or uncut	1,200	801,000	1,370,000	848,000
Cut but unset	17,100	16,400,000	15,400	18,100,000
Emeralds, cut but unset	3,910	175,000	4,220	218,000
Coral and similar materials, unworked	5,600	24,900	6,300	16,800
Rubies and sapphires, cut but unset	10,500	249,000	11,600	291,000
Pearls:				
Natural	NA	23,600	NA	23,100
Cultured	NA	44,300	NA	55,200
Imitation	NA	4,100	NA	4,280
Other precious and semiprecious stones:				
Rough, uncut	2,270,000	31,400	1,260,000	26,400
Cut, set and unset	NA	363,000	NA	361,000
Other	NA	9,250	NA	9,510
Laboratory-created:				
Cut but unset	194,000	42,300	163,000	41,300
Other	NA	11,400	NA	11,400
Imitation gemstone[3]	NA	90,100	NA	86,600
Total	XX	18,300,000	XX	20,100,000

NA Not available. XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Customs value.

[3]Does not include pearls.

Source: U.S. Census Bureau.

TABLE 11

NATURAL DIAMOND: WORLD PRODUCTION, BY COUNTRY AND TYPE[1, 2, 3]

(Thousand carats)

Country and type[4]	2003	2004	2005	2006	2007
Gemstones:					
Angola[e]	5,130	5,490	6,400 [r]	8,300 [r]	8,700
Australia	13,981	6,058	8,577	7,305	231
Botswana[e]	22,800	23,300	23,900	24,000	25,000
Brazil[e]	400	300 [5]	300	300	300
Canada	10,756	12,618	12,314 [r]	13,278 [r]	17,998
Central African Republic[e]	250	263	300 [r]	340 [r]	370
China[e]	100	100	100	100	100
Congo (Kinshasa)	5,400 [r]	5,900 [r]	7,000 [r]	5,700 [e]	5,400
Côte d'Ivoire[e]	154 [5]	201	210 [r]	210 [r]	210
Ghana	724	725	810 [r]	780	720
Guinea	500	555	440 [r]	380 [r]	815 [e]
Guyana	413	445	357 [e]	341 [e]	350
Liberia[e]	26	7	7	7	13
Namibia	1,481	2,004	1,902	2,400 [e]	2,200
Russia[e]	20,000	23,700 [r]	23,000	23,400	23,300
Sierra Leone[e]	233	318	395	360 [e]	360
South Africa[e]	5,144 [5]	5,800	6,400	6,100 [r]	6,100
Tanzania[e]	201 [5]	258	185	230 [r]	230
Venezuela[e]	11 [5]	40	46	45	45
Other[6]	145	335 [r]	262 [r]	223 [r]	152
Total	87,800	88,400 [r]	92,900 [r]	93,800 [r]	92,600
Industrial:					
Angola[e]	570	610	680 [r]	880 [r]	970
Australia	17,087	18,172	25,730	21,915	18,960
Botswana[e]	7,600	7,800	8,000	8,000	8,000
Brazil[e]	600	600	600	600	600
Central African Republic[e]	83	88	80 [r]	85 [r]	47
China[e]	955	960	960	965	970
Congo (Kinshasa)	21,600	23,600 [r]	28,200 [r]	22,800 [r]	21,800
Côte d'Ivoire[e]	76 [5]	99	90 [r]	90 [r]	90
Ghana[e]	180	180	200 [r]	190	180
Guinea	167	185	100 [r]	95 [r]	200 [e]
Liberia[e]	14	4	4	4	9
Russia[e]	13,000	15,200 [r]	15,000	15,000	15,000
Sierra Leone	274 [e]	374 [e]	274	252	240
South Africa[e]	7,540 [5]	8,500	9,400	9,100 [r]	9,100
Tanzania[e]	36	46	35	42 [r]	40
Venezuela[e]	24 [5]	60	69	70	70
Other[7]	112 [r]	191 [r]	990 [r]	163 [r]	463
Total	69,900	76,700	90,400 [r]	80,300 [r]	76,700
Grand total	158,000	165,000 [r]	183,000 [r]	174,000 [r]	169,000

[e]Estimated. [r]Revised.

[1]World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Table includes data available through May 22, 2008.

[3]In addition to the countries listed, Nigeria and the Republic of Korea produce natural diamond and synthetic diamond, respectively, but information is inadequate to formulate reliable estimates of output levels.

[4]Includes near-gem and cheap-gem qualities.

[5]Reported figure.

[6]Includes Cameroon, Congo (Brazzaville), Gabon (unspecified), India, Indonesia, Togo (unspecified), and Zimbabwe.

[7]Includes Congo (Brazzaville), India, Indonesia, and Zimbabwe.