

GEMSTONES

By Gordon T. Austin

Webster's dictionary defines a gem as "any jewel, whether stone, pearl or the like, having value and beauty that are intrinsic and not derived from its setting; a precious or, sometimes, a semiprecious stone cut and polished for ornament. A stone of value because it is carved or engraved, as a cameo or intaglio." Additionally, the dictionary states that gemstone or gem material is a stone or material from which a gem may be cut. So a gem, gemstone, or gem material may be described as inorganic or organic minerals used for personal adornment, display, or to manufacture objects of art because they possess beauty, rarity, and durability.

Production

In 1994, the value of natural gemstones produced from deposits in the United States was \$50.5 million. Production of gemstones, in order of importance, included faceting rough, lapidary rough, carving material, specimen material, natural and cultured freshwater pearls, mother of pearl, saltwater pearls, shell, fossil ivory, amber, and coral. In 1994, all 50 States produced at least \$1,000 worth of gem materials. Ten States accounted for 93% of the total value of production of natural gemstones. The States, in order of declining value of production, were Tennessee, Arkansas, Alabama, Kentucky, Arizona, Montana, Oregon, California, and Utah. Certain States were known best for the production of a single gem material (i.e., Tennessee for freshwater pearls and Arkansas for quartz). Other States produced a variety of gemstones. Tennessee, Arkansas, Alabama, and Kentucky, in declining order of value of production, were the major producers of freshwater mussel shell and pearl. Arizona produced the greatest variety. Production included agate, amethyst, antlerite, azurite, chrysocolla, fire agate, garnets, jade, malachite, obsidian, onyx, peridot, petrified wood, precious opal, shattuchite, smithsonite, and turquoise. California, Idaho, Montana, and North Carolina also produced a variety of gemstones. Historically, North Carolina is the only State to have produced all four of the major gems: diamond, emerald, ruby, and sapphire. (*See table 1.*)

Laboratory grown synthetic gemstones have essentially the same appearance and optical,

physical, and chemical properties as the natural material that they represent. Synthetic gemstones produced in the United States include alexandrite, coral, diamond, emerald, garnet, lapis lazuli, quartz, ruby, sapphire, spinel, and turquoise. Laboratory grown simulants have an appearance similar to that of a natural gem material but have different optical, physical, and chemical properties. The gemstone simulants produced in the United States include coral, cubic zirconia, lapis lazuli, malachite, and turquoise. Additionally, certain colors of synthetic sapphire and spinel, used to represent other gemstones, would be classed as simulants. Colored and colorless varieties of cubic zirconia are the major simulants produced. In 1994, the reported value of production of U.S. synthetic and simulant materials was \$22.2 million. (*See table 2.*)

Fourteen firms, four in California; four in Arizona; and one each in Michigan, New Jersey, New York, North Carolina, Ohio, and Washington, produced synthetic and simulant gem material. Production included the manufacture of alexandrite, amethyst, azurite/malachite, cubic zirconia, emerald, lapis, ruby, sapphire, and turquoise. The States in descending order of value of production were California, New York, New Jersey, Washington, Arizona, Michigan, New Mexico, and Ohio.

The U.S. Bureau of Mines estimates U.S. production from the "Natural and Synthetic Gem Material Survey," a voluntary survey of U.S. operations, and from Bureau estimates of unreported production. Of the 387 operations surveyed, 84% responded, 84% of the natural gemstone producers and 95% of the synthetic and simulant producers. The Bureau estimated the production by nonresponding operations, by professional collectors, and by amateur or hobbyist collectors. The basis for these estimates was information from published data, conversations with gem and mineral dealers, analyses of gem and mineral shows and sales statistics, and from information informally supplied by collectors.

The value of production by individual gemstone can be reported for those materials that have three or more producers and if one producer does not account for more than 75% of the total or if two do not account for 95% or more of the production. (*See table 3.*)

Consumption

Consumption of domestic gemstones was in the manufacture of jewelry, for exhibit in gem and mineral collections, for decorative purposes in statuettes, vases, and other art objects, and certain industrial applications.

Prices

Demand, beauty, durability, rarity, freedom from defects, and perfection of cutting decide the value of a gem. In establishing the price of gem diamond, the CSO's control over output and prices of diamond rough also is a major factor. (*See tables 4 and 5.*)

Foreign Trade

During 1994, the total value of all gemstones exported and reexported was about \$2.24 billion, diamonds accounted for 87% of the total or \$1.94 billion, while cut diamonds accounted for 78% of the total or \$1.74 billion. The value of exports plus reexport of natural rough colored gemstones was about \$29.5 million and the value of exports plus reexports of cut natural gemstones was about \$198 million. Synthetic rough and cut exported plus reexports for the year were valued at \$14.0 million and \$12.9 million, respectively. Exported and reexported natural and cultured pearls were valued at \$1.02 million and \$6.13 million, respectively. During the year \$34.4 million of coral and shell was exported and reexported.

The value of gems and gemstones imported increased 12% to a record high \$6.44 billion. The value of imported gem diamonds accounted for about 89% of the total. (*See tables 6, 7, 8, 9, and 10.*)

World Review

Diamond sales by De Beers Centenary AG was \$4.3 billion in 1994, a decrease of 2.7% compared with 1993 sales of \$4.4 billion. Sales during the first half of 1994 were \$2.6 billion, 4% more than the \$2.5 billion for the first half of 1993, second half of 1994 sales were only \$1.7 billion, 8% less than the \$1.8 billion sales for the second half of 1993. De Beers controls

about 80% of the rough, uncut diamonds sold in the world. During the past 5 years De Beers annual sales were: 1994, \$4.25 billion; 1993, \$4.40 billion; 1992, \$3.42 billion; 1991, \$3.93 billion; and 1990, \$417 billion. During the same period De Beers' stocks of diamonds were: 1994, \$4.38 billion; 1993, \$4.10 billion; 1992, \$3.36 billion; 1991, \$3.03 billion; and 1990, \$2.68 billion. During 1994 was the first time ever that De Beers' stock of diamonds were greater than its annual sales of diamonds. Sales of colored stones remained strong.

Natural diamond production occurs in Africa, Asia, Australia, and South America. The principal producing localities are as follows: in Africa—Angola, Botswana, Namibia, the Republic of South Africa, and Zaire; in Asia—Russia (northeastern Siberia and in the Yakutia); in Australia; and in South America—Venezuela and Brazil. (*See table 11.*)

Foreign countries in which major gemstone deposits (other than diamond) occur are Afghanistan (beryl, kunzite, ruby, tourmaline); Australia (beryl, opal, sapphire); Brazil (agate, amethyst, beryl, kunzite, ruby, sapphire, tourmaline, topaz); Burma (beryl, jade, ruby, sapphire, topaz); Colombia (beryl, sapphire); Kenya (beryl, garnet, sapphire); Madagascar (beryl, rose quartz, sapphire, tourmaline); Mexico (agate, opal, topaz); Sri Lanka (beryl, ruby, sapphire, topaz); Tanzania (tanzanite, garnet, ruby, sapphire, tourmaline); and Zambia (amethyst, beryl).

OUTLOOK

World demand for gem diamond can be expected to rise because of increasing effective personal incomes and the populations of the United States and other industrialized countries. Also demand will increase because of highly effective promotional efforts. These promotions are changing social customs in many eastern countries, particularly the use of diamond engagement rings. The changes are resulting in significant growth in the diamond market. Demand for other precious gems will continue to grow as diamonds become more expensive and the popularity and acceptance of colored gemstones increase. Demand for synthetic and simulant gemstones for both personal and industrial consumption is expected to increase. The diversity of sizes, types, uses, and values of gems and gemstones precludes any meaningful forecasting of future demand.

OTHER SOURCES OF INFORMATION

Bureau of Mines Publications

Gem Stones, Ch. in Mineral Commodity

Summaries.

Mineral Facts and Problems, 1985.

Mineral Industry Surveys, Annual Advance Summary Supplement: Directory of Principal Gem Stone Producers in the United States, 1993.

Mineral Industry Surveys, Annual Advance Summary Supplement: An Overview of Gemstone Production in the United States.

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

Name	Composition	Color	Practical size1/	Cost2/	Mohs	Specific gravity	Refraction	Refractive index	May be confused with-	Recognition characters
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	Fossil resin, soft.
Beryl:										
Aquamarine	Beryllium aluminum silicate	Blue-green to light blue	Any	Medium to high	7.5-8.0	2.63-2.80	Double	1.58	Synthetic spinel, blue topaz	Double refraction, refractive index.
Bixbite	do.	do.	Small	Very high	7.5-8.0	2.63-2.80	do.	1.58	Pressed plastics, tourmaline	Refractive index.
Emerald	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	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	
Goshenite	do.	do.	Any	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	Any	Low	7.5-8.0	2.63-2.80	do.	1.58	Kunzite, tourmaline, pink sapphire	Refractive index.
Calcite:										
Marble	Calcium carbonate	White, pink, red, blue, green, or brown	Any	Low	3.0	2.72	Double (strong)	1.49-1.66	Silicates, banded agate, alabaster gypsum	Translucent.
Mexican onyx	do.	do.	Any	Low	3.0	2.72	do.	1.6	do.	Banded, translucent.
Chrysoberyl:										
Alexandrite	Beryllium aluminate	Green by day, red by artificial light	Former U.S.S.R. (small), Sri Lanka (medium)	High	8.5	3.50-3.84	Double	1.75	Synthetic	Dichroism, inclusions in synthetic sapphire.
Catseye	do.	Greenish to brownish	Small to large	do.	8.5	3.50-3.84	do.	1.75	Synthetic, shell	Gravity and translucence.

See footnotes at end of table.

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Chrysolite	do.	Yellow, green, and/or brown	Medium	Medium	8.5	3.50-3.84	do.	1.75	Tourmaline, peridot	Refractive index, silky.
Coral	Calcium carbonate	Orange, red, white, black, or green	Branching, medium	Low	3.5-4.0	2.6-2.7	do.	1.49-1.66	False coral	Dull translucent.
<u>Corundum:</u>										
Ruby	Aluminum oxide	Rose to deep purplish red	Small	Very high	9.0	3.95-4.10	do.	1.78	Synthetics, including spinel	Inclusions, fluorescence.
Sapphire	do.	Blue	Medium	High	9.0	3.95-4.10	do.	1.78	do.	Inclusions, double refraction, dichroism.
Sapphire, fancy	do.	Yellow, pink, white, orange, green, or violet	Medium to large	Medium	9.0	3.95-4.10	do.	1.78	Synthetics, glass and doublets	Inclusions, double refraction, refractive index.
Sapphire and 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 on 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.
Diamond	Carbon	White, blue-white, yellow, brown, green, pink, blue	Any	Very high	10.0	3.516-3.525	Single	2.42	Zircon, titania, cubic zirconia	High index, dispersion, single refraction, hardness, cut, luster.
<u>Feldspar:</u>										
Amazonite	Alkali aluminum silicate	Green	Large	Low	6.0-6.5	2.56	--	1.52	Jade	Cleavage, sheen, vitreous to pearly, opaque, grid.
Labradorite	do.	Gray with blue and bronze sheen color play	do.	Low	6.0-6.5	2.56	--	1.56	do.	Cleavage, sheen, vitreous to pearly opaque, grid.
Moonstone	do.	White	do.	Low	6.0-6.5	2.77	--	1.52-1.54	Glass or white onyx.	Blue sheen, opalescent.
Garnet	Complex silicate	Brown, black, yellow, green, ruby 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.
<u>Jade:</u>										
Jadeite	do.	Green, yellow, black, white, or mauve	Large	Low to very high	6.5-7.0	3.3-3.5	Cryptocry stalline	1.65-1.68	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	do.	Do.

See footnotes at end of table.

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Opal	Hydrous silica	Colors flash in white gray, black, red, or yellow	Large	Low to high	5.5-6.5	1.9-2.3	Isotropic	1.45	Glass, synthetics, triplets	Play of color.
Pearl	Calcium carbonate	White, pink, or black	Small	do.	2.5-4.0	2.6-2.85	--	--	Cultured and imitation	Luster, structure, X-ray.
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	Silica	Any color	Large	Low	7.0	2.58-2.64	--	--	Glass, plastic, Mexican onyx	Cryptocrystalline, irregularly banded, dendritic inclusions.
Amethyst	do.	Purple	do.	Medium	7.0	2.65-2.66	Double	1.55	do.	Refractive index, double refraction, transparent.
Cairngorm	do.	Smoky	do.	Low	7.0	2.65-2.66	do.	1.55	do.	Do.
Citrine	do.	Yellow	do.	Low	7.0	2.65-2.66	do.	1.55	do.	Do.
Crystal, rock	do.	Colorless	do.	Low	7.0	2.65-2.66	do.	1.55	do.	Do.
Jasper	do.	Uniform or spotted red, yellow, or green	do.	Low	7.0	2.58-2.66	--	--	do.	Opaque, vitreous.
Onyx	do.	Many colors	do.	Low	7.0	2.58-2.64	--	--	do.	Uniformly banded.
Rose	do.	Pink, rose red	do.	Low	7.0	2.65-2.66	do.	1.55	do.	Refractive index, double refraction, translucent.
Spinel	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.	Any	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:										
Kunzite	Lithium aluminum silicate	Pink to lilac	Medium	Medium	6.5-7.0	3.13-3.20	Double	1.66	Amethyst, morganite	Refractive index.
Hiddenite	do.	Yellow to green	do.	do.	6.5-7.0	3.13-3.20	do.	1.66	Synthetic spinel	Do.

See footnotes at end of table.

TABLE 1--Continued
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Tanzanite	Complex silicate	Blue	Small	High	6.0-7.0	3.30	do.	1.69	Sapphire, synthetics.	Strong trichroism.
Topaz	do.	White, blue, green	Medium	Low to medium	8.0	3.4-3.6	do.	1.62	Beryl, quartz	Refractive index.
Tourmaline	do.	All, including mixed	do.	do.	7.0-7.5	2.98-3.20	do.	1.63	Peridot, beryl, corundum, glass	Double refraction, refractive index.
Turquoise	Copper aluminum phosphate	Blue to green	Large	Low	6.0	2.60-2.83	do.	1.63	Glass, plastics	Difficult if matrix not present, matrix usually limonitic.
Zircon	Zirconium silicate	White, blue, or 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.

1/ Small-up to 5 carats; medium-up 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
SYNTHETIC GEMSTONE PRODUCTION METHODS

Gemstone	Production methods	Company	Date of first production
Ruby	Flux	Chatham	1950's
Do.	do.	Kashan	1960's
Do.	do.	J.O. Crystal (Ramaura)	1980's
Do.	do.	Douras	1990's
Do.	Zone melt	Seiko	1980's
Do.	Melt pulling	Kyocera (Inamori)	1970's
Do.	Verneuil	Various producers	1900's
Star ruby	do.	Linde (Div. of Union Carbide)	1940's
Do.	Melt pulling	Kyocera	1980's
Do.	do.	Nakazumi	1980's
Sapphire	Flux	Chatham	1970's
Do.	Zone melt	Seiko	1980's
Do.	Melt pulling	Kyocera	1980's
Do.	Verneuil	Various producers	1900's
Star sapphire	do.	Linde	1940's
Emerald	Flux	Chatham	1930's
Do.	do.	Gilson	1960's
Do.	do.	Kyocera	1970's
Do.	do.	Seiko	1980's
Do.	do.	Lennix	1980's
Do.	do.	Russia	1980's
Do.	Hydrothermal	Lechleitner	1960's
Do.	do.	Regency	1980's
Do.	do.	Biron	1980's
Do.	do.	Russia	1980's
Alexandrite	Flux	Creative crystals	1970's
Do.	Melt pulling	J.O. Crystal	1990's
Do.	do.	Kyocera	1980's
Do.	Zone melt	Seiko	1980's
Cubic zirconia	Skull melt	Various producers	1970's

TABLE 3
 VALUE OF U.S. GEMSTONE
 PRODUCTION, BY GEMSTONE 1/

(Thousand dollars)

Gem materials	1993	1994
Agate	1,410	234
Beryl	470	492
Coral (all types)	166	88
Diamonds	--	284
Garnet	233	780
Gem feldspar	701	2,620
Geode/nodules	207	127
Obsidian	10	40
Opal	639	1,120
Peridot	1,520	635
Petrified wood	234	208
Quartz	1,040	1,060
Sapphire/ruby	313	2,810
Shell	--	33,000
Topaz	8	13
Tourmaline	9,530	14
Turquoise	3,040	1,710
Total	19,500	45,200

1/ Data rounded by the U.S. Bureau of Mines to three significant digits;
 may not add to totals shown.

TABLE 4
 PRICES OF U.S. CUT DIAMONDS, BY SIZE AND QUALITY

Carat weight	Description, color 1/	Clarity 2/ (GIA terms)	Price range	Average 4/
			per carat 3/ Jan. 1994-Jan. 1995	July 1994
0.25	G	VS1	\$1,400 - 1,400	\$1,400
.25	G	VS2	1,200 - 1,300	1,200
.25	G	SI1	970 - 975	970
.25	H	VS1	1,200 - 1,300	1,200
.25	H	VS2	1,100 - 1,150	1,100
.25	H	SI1	950 - 950	950
.50	G	VS1	3,050 - 3,050	3,050
.50	G	VS2	2,700 - 2,700	2,700
.50	G	SI1	2,400 - 2,400	2,400
.50	H	VS1	2,800 - 2,800	2,800
.50	H	VS2	2,600 - 2,600	2,600
.50	H	SI1	2,300 - 2,300	2,300
.75	G	VS1	3,650 - 3,650	3,650
.75	G	VS2	3,350 - 3,350	3,350
.75	G	SI1	2,950 - 2,950	2,950
.75	H	VS1	3,250 - 3,250	3,250
.75	H	VS2	2,950 - 2,950	2,950
.75	H	SI1	2,750 - 2,750	2,750
1.00	G	VS1	4,800 - 4,800	4,750
1.00	G	VS2	4,250 - 4,250	4,200
1.00	G	SI1	3,850 - 3,850	3,800
1.00	H	VS1	4,250 - 4,250	4,200
1.00	H	VS2	4,050 - 4,050	4,000
1.00	H	SI1	3,750 - 3,750	3,700

1/ Gemological Institute of America (GIA) color grades: D- -colorless; E- -rare white; G - H - I - -traces of color.

2/ Clarity: IF--no blemishes; VVS1--very, very slightly included; VS--very slightly included; VS2--very slightly included, but not visible; SI1--slightly included.

3/ Jeweler's Circular-Keystone. V. 166, No. 3, Mar. 1995, p. 178.

4/ Jeweler's Circular-Keystone. V. 165, No. 9, Sept. 1994, p. 114.

TABLE 5
 PRICES OF U.S. CUT COLORED GEMSTONES, BY SIZE 1/

Gemstone	Carat weight	Price range per carat in 1994 2/	Average price per carat 2/	
			Jan. 1994	Jan. 1995
Amethyst	1	\$8 - \$18	\$13.00	\$13.00
Aquamarine	1	75 - 90	82.50	82.50
Emerald	1	1,750 - 3,200	2,750.00	2,475.00
Garnet, tsavorite	1	600 - 900	750.00	750.00
Ruby	1	2,450 - 3,900	3,900.00	3,175.00
Sapphire	1	800 - 1,800	1,400.00	1,300.00
Tanzanite	1	115 - 200	150.00	157.50
Topaz	1	3 - 9	7.00	4.00
Tourmaline, red	1	60 - 125	92.50	92.50

1/ Fine quality.

2/ Jewelers' Circular-Keystone. V. 166, No. 3, Mar. 1995, p. 175. These figures represent a sampling of net prices that wholesale colored stone dealers in various U.S. cities charged its cash customers during the month for fine-quality stones.

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

Country	1993		1994	
	Quantity (carats)	Value 2/ (millions)	Quantity (carats)	Value 2/ (millions)
Exports and reexports:				
Belgium	444,000	363.9	462,000	430.1
Canada	243,000	33.6	263,000	46.0
France	9,210	10.5	11,100	26.9
Hong Kong	232,000	333.5	192,000	401.7
Israel	320,000	286.7	413,000	393.2
Japan	88,800	144.5	55,000	134.4
Singapore	14,600	35.7	14,000	35.5
Switzerland	36,600	160.4	36,200	189.9
Thailand	58,500	24.4	41,300	18.8
United Kingdom	13,900	43.5	23,300	65.8
Other	170,000	62.3	110,000	48.7
Total	1,630,000	1,499.1	1,620,000	1,791.3

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Customs value.

Source: Bureau of the Census, U.S. Department of Commerce.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF DIAMOND, BY KIND, WEIGHT, AND COUNTRY 1/

Kind, range, and country of origin	1993		1994	
	Quantity (carat)	Value 2/ (millions)	Quantity (carat)	Value 2/ (millions)
Rough or uncut, natural: 3/				
Belgium	144,000	\$111.7	301,000	\$174.4
Brazil	55,200	4.7	15,300	3.8
Israel	13,500	5.7	23,100	14.9
Netherlands	1,610	2.6	109	0.1
South Africa, Republic of	26,100	43.7	34,800	42.9
Switzerland	8,550	12.6	1,960	7.8
United Kingdom	1,130,000	229.3	482,000	224.8
Venezuela	161	0.1	556	0.1
Other	394,000	199.6	576,000	320.8
Total	<u>1,770,000</u>	<u>610.1</u>	<u>1,440,000</u>	<u>789.7</u>
Cut but unset, not more than 0.5 carat:				
Belgium	952,000	315.7	849,000	235.6
Brazil	5,930	2.0	27,000	3.7
Canada	5,710	1.5	10,000	2.1
Hong Kong	147,000	40.8	145,000	30.2
India	5,580,000	1,178.7	6,150,000	1,125.7
Israel	800,000	347.8	880,000	359.9
Netherlands	1,780	0.4	--	--
South Africa, Republic of	5,660	5.4	3,680	2.5
Switzerland	8,360	2.8	5,260	2.1
United Kingdom	3,150	0.6	9,750	2.1
Other	110,000	25.7	83,300	21.0
Total	<u>7,620,000</u>	<u>1,921.4</u>	<u>8,160,000</u>	<u>1785.0</u>
Cut but unset, over 0.5 carat:				
Belgium	677,000	912.2	769,000	1,026.5
Hong Kong	33,000	44.6	29,000	43.0
India	100,000	63.4	248,000	143.4
Israel	1,160,000	1,255.7	1,350,000	1,570.3
Netherlands	2,180	6.8	491	2.6
South Africa, Republic of	11,800	34.4	19,700	53.5
Switzerland	11,700	114.1	16,900	153.4
United Kingdom	14,000	35.9	14,600	45.1
Other	75,900	97.7	78,300	121.0
Total	<u>2,090,000</u>	<u>2,564.8</u>	<u>2,520,000</u>	<u>3,159.0</u>

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Customs value.

3/ Includes some natural advanced diamond.

Source: Bureau of the Census, U.S. Department of Commerce.

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

Kind and country	1993		1994	
	Quantity (carats)	Value 2/ (millions)	Quantity (carats)	Value 2/ (millions)
Emerald:				
Belgium	8,120	\$2.1	8,360	\$2.0
Brazil	1,100,000	4.0	1,140,000	6.7
Colombia	581,000	118.9	928,000	89.1
France	490	1.0	1,590	1.7
Germany	66,900	2.3	106,000	4.3
Hong Kong	272,000	21.5	295,000	12.9
India	2,090,000	26.8	2,310,000	32.8
Israel	447,000	27.9	107,000	25.4
Japan	1,440	0.2	1,940	0.6
South Africa, Republic of	660	1.0	249	0.1
Switzerland	105,000	24.1	33,200	28.1
Taiwan	581	2.5	545	0.4
Thailand	706,000	6.8	558,000	10.1
United Kingdom	6,680	0.5	4,300	4.0
Other	64,100 r/	4.8 r/	169,000	9.2
Total	5,450,000	244.4	5,670,000	227.2
Ruby:				
Belgium	4,930	0.7	26,900	1.6
Brazil	7,220	0.1	5,670	0.1
Colombia	616	0.6	7,390	0.1
France	629	0.7	393	0.7
Germany	102,000	1.2	90,900	2.6
Hong Kong	218,000	6.2	171,000	6.7
India	1,010,000	2.8	1,480,000	6.9
Israel	14,900	1.8	81,300	0.9
Japan	2,750	0.1	3,170	0.2
Switzerland	19,700	15.7	24,500	13.8
Thailand	2,180,000	47.9	2,950,000	55.8
United Kingdom	3,780	2.5	2,770	2.1
Other	35,800 r/	10.3	25,900	4.3
Total	3,600,000	90.6	4,860,000	95.9
Sapphire:				
Australia	12,400	0.1	27,200	0.5
Austria	335	(3/)	229	0.5
Belgium	18,700	0.8	16,300	1.7
Brazil	2,590	0.1	12,300	0.1
Canada	48,600	0.8	274,000	0.6
Colombia	642	0.2	7,240	0.8
France	607	0.8	739	0.1
Germany	123,000	1.0	130,000	2.6
Hong Kong	203,000	3.7	172,000	4.8
India	156,000	0.6	244,000	2.0
Israel	30,600	1.0	34,500	1.1
Japan	17,700	0.1	1,950	0.3
Singapore	1,090	0.1	8,880	0.1
Sri Lanka (ceylon)	196,000	4.5	341,000	7.7
Switzerland	32,800	7.8	17,000	12.1
Thailand	4,260,000	54.1	5,740,000	62.3
United Kingdom	5,400	0.8	7,130	1.6
Other	24,800 r/	2.8 r/	31,600	1.8
Total	5,130,000	79.3	7,060,000	100.9

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	1993		1994	
	Quantity (carats)	Value 2/ (millions)	Quantity (carats)	Value 2/ (millions)
Other:				
Rough, uncut:				
Australia		\$3		\$3
Brazil		20		27.0
Colombia		6		6.0
Hong Kong		2		1
Nigera	NA	(3/)	NA	(3/)
Pakistan		1		2.0
South Africa, Republic of		2		1
Switzerland		--		--
United Kingdom		--		--
Zambia		1		1
Other	21,800,000 r/	10 r/	30,500,000	10
Total	<u>56,200,000 r/</u>	<u>50 r/</u>	<u>97,400,000</u>	<u>50</u>
Cut, set and unset:				
Australia		4		4.0
Brazil		7 r/		8
Canada		--		1
China		2 r/		4
Germany		10 r/		20
Hong Kong	NA	20 r/	NA	20
India		8.0 r/		10
Japan		10 r/		10
Switzerland		1		2
Taiwan		4 r/		3
Thailand		20 r/		20
United Kingdom		--		--
Other	--	16.0 r/	--	20
Total	NA	100 r/	NA	100

r/ Revised. NA Not available.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Customs value.

3/ Less than 1/2 unit.

Source: Bureau of the Census, U.S. Department of Commerce.

TABLE 9
 VALUE OF U.S. IMPORTS OF SYNTHETIC AND IMITATION
 GEMSTONES, INCLUDING PEARLS, BY COUNTRY

(Million dollars) 1/

Country	1993	1994
Synthetic, cut but unset:		
Australia	3.4	2.7
Austria	3.7	5.0
China	0.7	0.9
France	1.0	1.0
Germany	10.7	10.9
Hong Kong	2.0	1.9
Italy	0.4	0.7
Japan	1.6	1.1
Korea, Republic of	2.1	1.5
Sri Lanka (ceylon)	0.7	0.7
Switzerland	3.8	3.5
Thailand	12.5	10.0
Other	1.4	1.2
Total 2/	44.1	41.1
Imitation:		
Austria	45.9	48.1
China	0.6	0.4
Germany	2.0	2.2
Japan	0.7	0.6
Taiwan	0.8	0.7
The Czech Republic	9.0	10.0
Other	0.7	0.7
Total 2/	60.0	62.7

1/ Customs value.

2/ Data may not add to totals shown because of independent rounding.

Source: Bureau of the Census.

TABLE 10
U.S. IMPORTS FOR CONSUMPTION OF GEMSTONES 1/

(Thousand carats and thousand dollars)

Stones	1993		1994	
	Quantity	Value 2/	Quantity	Value 2/
Diamonds:				
Rough or uncut	1,770	610,000	1,440	790,000
Cut but unset	9,700	4,490,000	10,700	4,940,000
Emeralds: Cut but unset	5,450	244,000	5,670	227,000
Coral and similar materials, unworked	2,800	5,440	2,400	4,630
Rubies and sapphires: Cut but unset	8,730	170,000	11,900	197,000
Pearls:				
Natural	--	2,890	--	2,360
Cultured	--	20,500	--	24,700
Imitation	--	1,960	--	1,870
Other precious and semiprecious stones:				
Rough, uncut	559,000	38,400	971,000	44,100
Cut, set and unset	--	80,800	--	94,600
Other	175	5,870	157	5,000
Synthetic:				
Cut but unset	163,000	44,100	178,000	41,000
Other	--	1,520	--	1,660
Imitation gemstone	--	58,100	--	60,900
Total	XX	5,770,000 r/	XX	6,440,000

r/ Revised. XX Not applicable.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Customs value.

Source: Bureau of the Census, U.S. Department of Commerce.

TABLE 11
NATURAL DIAMOND: WORLD PRODUCTION, BY TYPE AND COUNTRY 1/ 2/

(Thousand carats)

Country	1990			1991		
	Gem 3/	Industrial	Total	Gem 3/	Industrial	Total
Angola 4/	1,060	73	1,130	899	62	961
Australia	17,300	17,300	34,700	18,000	18,000	36,000
Botswana	12,200	5,200	17,400	11,600	4,950	16,500
Brazil	600	900	1,500	600	900	1,500 e/
Central African Republic	303	78	381	296	82	378 r/
China e/	200	800	1,000	200	800	1,000
Gabon e/	400	100	500	400	100	500
Ghana	520	130	650	560	140	700
Namibia	750	15	763	1,170	20	1,190
Russia e/	XX	XX	XX	XX	XX	XX
Sierra Leone 5/	66	12	78	160	83	243
South Africa, Republic of	3,900 r/	4,800 r/	8,710	3,800 r/	4,600 r/	8,430
U.S.S.R. e/ 6/	12,000	12,000	24,000	10,000	10,000	20,000
Venezuela	85	248	333	102	112	214
Zaire	2,910	16,500	19,400	3,000	14,800	17,800
Total	48,400	53,400	102,000	46,900	50,000	97,000
Other	4,180	4,950	9,100	4,080	4,770	8,870
Grand total	52,600 r/	58,400 r/	111,000 r/	51,000 r/	54,800	106,000 r/

Country	1992			1993		
	Gem 3/	Industrial	Total	Gem 3/	Industrial	Total
Angola 4/	1,100	80	1,180	130 r/	15 r/	145 r/
Australia	18,100 r/	22,100 r/	40,200 r/	18,800 r/	23,000 r/	41,900 r/
Botswana	11,200	4,790	15,900	10,300 r/	4,420 r/	14,700 r/
Brazil	653	665	1,320	600	900	1,500 e/
Central African Republic	307	107	414	370 r/	125 r/	495 r/
China e/	200	800	1,000	230	850	1,080
Gabon e/	400	100	500	400	100	500
Ghana	570	140	710	570 r/	140 r/	710 r/ e/
Namibia	1,520 r/	30 r/	1,550	1,120 r/	20 r/	1,140
Russia e/	9,000	9,000	18,000	8,000	8,000	16,000
Sierra Leone 5/	180 r/	116 r/	296	90	68	158
South Africa, Republic of	4,600 r/	5,600 r/	10,200 r/	4,600 r/	5,700 r/	10,300
U.S.S.R. e/ 6/	XX	XX	XX	XX	XX	XX
Venezuela	302	176	478	145 r/	155 r/	301 r/
Zaire	8,930	4,570	13,500	2,010 r/	13,600 r/	15,600 r/
Total	52,400	42,700	95,100	42,800	51,400	94,300
Other	4,880	5,800	11,300	4,860	5,900	10,800
Grand total	57,300 r/	48,500 r/	106,000 r/	47,700 r/	57,300 r/	105,000 r/

See footnotes at the end of table.

TABLE 11--Continued
 NATURAL DIAMOND: WORLD PRODUCTION, BY TYPE AND COUNTRY 1/ 2/

(Thousand carats)

Country	1994 e/		
	Gem 3/	Industrial	Total
Angola 4/	270	30	300
Australia	19,500	23,800	43,300
Botswana	11,000	5,000	16,000
Brazil e/	600	900	1,500
Central African Republic	370	125	495
China e/	230	850	1,080
Gabon e/	400	100	500
Ghana	580	145	725
Namibia	1,280	30	1,310 7/
Russia e/	8,500	8,500	17,000
Sierra Leone 5/	155	100	255
South Africa, Republic of	5,000	5,800	10,600 7/
U.S.S.R. e/ 6/	XX	XX	XX
Venezuela	220	175	395
Zaire	4,000	13,000	17,000
Total	47,100	52,800	99,900
Other	5,230	5,910	11,200
Grand total	52,300	58,700	111,000

e/ Estimated. r/ Revised. XX Not applicable.

1/ Previously published and 1994 data have been rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

2/ Table includes data available through May 30, 1995. Total natural diamond output (gem plus industrial) for each country actually is reported, except where indicated by a footnote to be estimated. In contrast, the detailed separate production data for gem diamond and industrial diamond are U.S. Bureau of Mines estimates except Brazil (1990) and Central African Republic (1990-93), for which source publications give details on grade as well as totals. The estimated distribution of total output between gem and industrial diamond is conjectural, and for most countries, is based on the best available data at time of publication.

3/ Includes near-gem and cheap-gem qualities.

4/ Figures do not include smuggled artisanal production.

5/ Figures are estimates based on reported exports and do not include smuggled diamonds.

6/ Dissolved in Dec. 1991.

7/ Reported figure.