Gem Stones

By Robert G. Clarke [1]

Gem stone production was estimated to be $2.6 million dollars in 1971, an increase of 8 percent over 1970 figures. Individual collectors reported more finds of gem materials in both quantity and value. Since the United States has no formal gem stone mining industry, activity was principally the result of recreational mining by hobbyists. A few deposits were operated to produce rough material for direct sale to wholesale or retail outlets, or for raw material to manufacture finished jewelry.

DOMESTIC PRODUCTION

Collectors in 38 States produced gem materials estimated at $1,000 or more for each State. Of these, the following States supplied 78 percent of the total, in thousand dollars, as follows: Oregon, $755; California, $205; Arizona, $160; Texas $155; Washington, $155; Wyoming, $135; Colorado, $125; Montana, $114; Nevada, $105; and Idaho, $100.

Emeralds from Hiddenite, N.C. made news in that the largest emerald crystal, 59 carats, ever found in North America was discovered there August 1970. The stone was fashioned, cut to 13.14 carats as a gem, named the Carolina Emerald and displayed by Tiffany's of New York.[2] Reports of emerald recoveries from Hiddenite were published in newspapers and journals.[3] A jade boulder, 8 feet long and weighing over 5 tons, was taken from the Pacific Ocean near Jade Cove, just south of the town of Big Sur, Calif.[4] Similar nephrite boulders, weighing up to 1 ton, were reported to have been found at a site on the Rib River in Marathon County in Wisconsin.[5]

Black opal from Virgin Valley, Nev., has an unfortunate tendency to craze. A process has now been developed which stabilizes the opal and allows it to become one of the most treasured gems of the world.[6]

Descriptions of field trips, events, and reports of mineral and gem stone finds were reported in periodicals.[7]

CONSUMPTION

Domestic gem stone output generally went to rock, mineral, and gem stone collections, objects of art, and jewelry. Apparent consumption of gem stones (domestic production plus imports minus exports and reexports) increased to $311 million, compared with $292 million in 1970, because of greater imports of diamond.

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1 Physical scientist, Division of Nonmetallic Minerals.

2 Crowningshield, R. America's Largest Faceted Emerald. Lapidary J., v. 25, No. 1, April 1971, p. 40.

3 Knoxville (Tenn.) News-Sentinel. Rockhound Finds Gems in N. C. Hole. Aug. 18, 1971, p. 40. The State, Columbia, S. C. Raw Emeralds. Aug. 1, 1971, p. 26A.

4 The Evening Star, Washington, D.C. $180,000 Jade Slab. V. 110, No. 215, Aug. 3, 1971, p. A3.

5 Kraege, H. Another Prospectors Mecca. Rocks and Minerals, v. 46, No. 12, December 1971, p. 737.

6 Zeitner, June C. Precious Opal from Nevada. Lapidary J. v. 24, No. 12, March 1971, pp. 1534–1542.

7 Gems and Minerals. Field Trips, News Notes of Collecting Areas. No. 400, January 1971–No. 411, December 1971.

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The Mineralogical Record. Friends of Mineralogy. V. 2, No. 1, January–February 1971–V. 2, No. 6, November–December 1971.

PRICES

During the year, representative price ranges for first quality, cut and polished, unmounted gem diamond were 0.25 carat, $100 to $450; 0.5 carat, $250 to $950; 1 carat $650 to $3,000; 2 carats, $2,000 to $10,000; and 3 carats, $3,000 to $18,000. The median price for each range was 0.25 carat, $210; 0.5 carat, $525; 1 carat, $1,600; 2 carats, $4,500; and 3 carats, $8,700.

FOREIGN TRADE

Exports of all gem materials amounted to $132.9 million, and reexports, to $85.1 million. Diamond was 94 percent of the value of each, exports and reexports. United States exports of diamond in 1971, on which work was done prior to reexport amounted to 349,136 carats valued at $125.3 million. Of this, diamonds, cut but unset, suitable for gem stones, not classified by weight, were 62,904 carats valued at $4.9 million; cut but unset, not over 0.5 carat, were 109,932 carats valued at $8.6 million; and cut but unset, over 0.5 carat, were 176,300 carats valued at $111.8 million.

Reexports of diamond, on which no work was done, amounted to 1,226,755 carats valued at $79.8 million in the following categories: Cut, but unset, suitable for gem stones, not classified by weight, 1,173,727 carats valued at $65.2 million; cut but unset, not over 0.5 carat, 20,851 carats valued at $4.4 million; cut but unset, over 0.5 carat, 32,177 carats valued at $10.2 million.

The seven leading countries for diamond exports and reexports combined, accounting for 95 percent of the carats and 93 percent of the value were as follows: Israel, 577,121 carats valued at $32.2 million; Belgium, 335,274 carats valued at $23.7 million; Switzerland, 282,846 carats valued at $27.5 million; Hong Kong, 119,124 carats valued at $59.0 million; The Netherlands, 117,363 carats valued at $23.8 million; Japan, 39,969 carats valued at $21.1 million; and the United Kingdom 23,809 carats valued at $3.1 million.

Exports of all other gem materials amounted to $7.6 million. Of this total, pearls, natural and cultured, not set or strung, were valued at $0.4 million. Natural precious and semiprecious stones, unset, were valued at $5.7 million; and synthetic stones, unset, were valued at $1.6 million. Reexports of all other gem materials amounted to $5.3 million. Reexports of pearls amounted to $0.3 million; of natural precious and semiprecious stones, unset, to $4.9 million; and of synthetic precious and semiprecious stones, to $0.1 million.

Imports of gem material increased 8 percent in value compared with that of 1970. Diamond accounted for 88 percent of the total value of gem stone imports.

The four leading countries from which diamond imports came, in total carats and in total value were as follows: Belgium-Luxembourg, 1,123,193 carats valued at $122.7 million; the United Kingdom, 959,516 carats valued at $120.3 million; the Republic of South Africa, 928,896 carats valued at $89.8 million; and, Israel, 717,470 carats valued at $73.0 million.

Imports of emeralds increased 8 percent in quantity and less than 1 percent in value. Of 33 countries supplying natural emeralds to the United States, India furnished 190,358 carats valued at $3.6 million; Brazil, 67,519 carats valued at $0.7 million; Hong Kong, 34,818 carats valued at $0.4 million; and Colombia, 18,622 carats valued at $1.3 million. These four countries furnished 89 percent of the quantity (in carats) and 78 percent of the value of total emerald imports. The United Kingdom, Switzerland, France, West Germany, Israel, and Italy accounted for most of the remainder, but the country of origin was unknown.

Imports of rubies and sapphires increased 42 percent and came from 27 countries. Seven countries accounted for 92 percent of the value of rubies and sapphires, as follows: Thailand, $4.4 million; India, $0.8 million; Ceylon, $0.7 million; Hong Kong $0.5 million; France, $0.4 million; Switzerland, $0.4 million; and the United Kingdom, $0.3 million.

Synthetic materials, gem stone quality, cut but not set, amounted to $9.6 million in imports. From West Germany, the value of synthetics was $3.5 million; from Japan, $1.4 million; from Switzerland, $1.3 million; from Israel, $1.1 million; and from France, $0.9 million.

Table 1.—U.S. imports for consumption of precious and semiprecious gem stones

(Thousand carats and thousand dollars)

Stones	1970		1971	
	Quantity	Value	Quantity	Value
Diamonds:				
Rough or uncut	2,633	$234,164	2,742	$254,575
Cut but unset	1,642	190,733	1,925	208,667
Emeralds: Cut but unset	326	7,715	351	7,731
Rubies and sapphires: Cut but unset	NA	5,769	NA	8,206
Marcasites	NA	4	NA	1
Pearls:				
Natural	NA	371	NA	364
Cultured	NA	10,184	NA	6,895
Imitation	NA	1,493	NA	5,013
Other precious and semiprecious stones:				
Rough and uncut	NA	10,001	NA	3,532
Cut but unset	NA	12,034	NA	13,456
Other, n.s.p.f.	NA	590	NA	734
Synthetic:				
Cut but unset—number	7,333	4,363	11,040	9,492
Other	NA	526	NA	137
Imitation gem stones	NA	8,096	NA	7,180
Total	NA	486,043	NA	525,983

NA Not available.

Table 2.—U.S. imports for consumption of diamond (exclusive of industrial diamond), by country

(Thousand carats and thousand dollars)

Country	1969				1970				1971			
	Rough or uncut		Cut but unset		Rough or uncut		Cut but unset		Rough or uncut		Cut but unset	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Belgium-Luxembourg	59	$6,729	916	$113,114	64	$6,572	863	$103,705	88	$9,092	1,036	$113,626
Brazil	29	1,033	1	58	31	1,184	1	80	3	129	2	232
Canada	8	1,307	(1)	54	2	462	1	60	--	--	1	69
Central African Republic	232	9,806	--	--	165	5,826	--	--	208	6,785	--	--
France	10	379	20	2,484	4	195	27	2,550	21	634	31	2,514
Germany, West	1	13	5	507	2	117	4	516	1	121	2	210
Guyana	20	1,020	--	--	26	1,074	(1)	19	1	49	(1)	19
India	--	--	30	2,663	--	--	40	3,475	--	--	80	6,429
Israel	36	4,155	658	73,777	52	6,723	604	61,753	47	3,425	671	69,569
Japan	(1)	5	1	71	(1)	20	(1)	18	(1)	33	2	203
Liberia	13	2,976	--	--	6	1,893	--	--	17	3,797	(1)	66
Netherlands	48	12,810	27	3,561	23	7,886	13	1,899	31	6,190	20	2,440
Sierra Leone	224	8,331	10	1,447	--	--	6	814	281	14,331	4	527
South Africa, Republic of	361	41,585	28	8,713	593	54,571	26	6,868	904	83,389	25	6,388
Switzerland	6	1,043	3	919	4	354	1	262	16	3,149	11	1,156
U.S.S.R.	--	--	43	6,629	--	--	44	6,826	--	--	24	3,324
United Kingdom	1,697	185,278	9	1,496	1,432	140,243	6	970	947	118,913	12	1,366
Venezuela	157	5,439	--	--	223	6,333	--	--	177	4,283	--	--
Western Africa, n.e.c.	27	5,210	--	--	1	366	--	--	--	--	--	--
Other countries	4	447	7	1,588	5	345	6	918	--	255	4	529
Total	2,932	287,566	1,758	217,081	2,633	234,164	1,642	190,733	2,742	254,575	1,925	208,667

[1] Less than ½ unit.

WORLD REVIEW

Angola.—A new firm, Consorcio Mineiro de Diamantes (CONDIAMA), formed by Companhia de Diamantes de Angola (DIAMANG) of Lisbon, and De Beers Consolidated Mines Ltd. of Kimberley, Republic of South Africa, was granted exclusive rights to concession areas relinquished by DIAMANG whose rights originally granted in 1921 expired May 14, 1971.[8] The Angolan Government will gain financially from the new contracts.

Australia.—A major emerald deposit was opened near Poona, 430 miles northeast of Perth. One emerald from the deposit weighed 138 carats and measured 1.8 inches by 0.8 inch.[9] At Glengarry, an oval shaped black opal, valued at $168,000, measuring 2.25 inches by 1.5 inches was found and named the Orient Queen.[10]

Botswana.—The Orapa diamond mine began operations in July 1971 on a scheduled treating of 8,000 tons of diamond-bearing ore per day.[11] Gem diamond recovery was indicated to be only 10 percent of the estimated annual yield of 2 million carats.[12]

Burma.—The Mineral Development Corp., the Burmese state-owned mining concern, sent an exploration team to the Shan State following reported diamond finds in Mongmit township.[13] Jade was predominant in sales at Burma's Seventh Annual Gem, Jade, and Pearl Emporium accounting for $1.96 million of the total of $2.60 million. Pearl sales amounted to $480,000. All other gem sales amounted to $154,000. Jade sales, accounting for 76 percent of the total sales, set a new record owing to strong demand from Hong Kong. No single large stones were sold.[14]

Brazil.—A new diamond rush started in Minas Gerais State when diamond stones were found weighing 75, 44, and 24 carats.[15]

Ceylon.—The Government set up the State Gem Corporation which sponsored a gem auction. To protect consumers, the State Gem Corporation initiated a procedure to issue a certificate of authenticity for each gem stone giving its specific gravity, refractive index, hardness, weight, volume, color, and luster, together with a true-to-scale contact print.[16]

India.—The National Mineral Development Corporation (NMDC) started operations in the Majhgawan diamond pipe of 21 surface acres at Panna.[17] Ore reserves down to 1,000 feet was estimated to be 55 million tons. Although the grade is low, 10 carats per 100 tons, the venture is profitable because of the high ratio of gem diamond to industrial diamond, about 4 to 1. Other areas investigated by NMDC were at Golconda and Kurnool in Andhra Pradesh. NMDC imports gem diamond from Ghana for cutting and reexport.[18]

Ivory Coast.—Société Anonyme de Recherches et d'Exploitation Minières en Côte d'Ivoire (SAREMCI) at Tortiya south of Korogho, accounted for 91 percent and Société Diamantifere de Côte d'Ivoire (SODIAMCI) accounted for 8 percent of diamond production reported in 1970. New equipment installed by each was expected to maintain the ratio in 1971.[19]

Malagasy Republic.—Garnets were the most important gem stones produced and were marketed for jewelry, bearings, and abrasives.[20] De Beers Consolidated Mines Ltd. of South Africa concluded an agreement with the Government for prospecting for diamond. Under the agreement De Beers would analyze 20,000 samples of ore concentrate from the Malagasy Republic. The contract included Government sharing in any subsequent corporation.[21]

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[8] Bureau of Mines. Mineral Trade Notes. Diamond, Angola. V. 68, No. 12, December 1971, pp. 11–12.
[9] Journal of Mines, Metals & Fuels (India). Notes and News, Emerald Mine in Western Australia. V. 19, No. 12, December 1971, p. 372.
[10] The Evening Star, Washington, D.C. $168,000 Opal Found. V. 119, No. 190, July 9, 1971, p. D6.
[11] Holz P. Other African Countries. Botswana. Canadian Mining J., v. 93, No. 3, March 1972, p. 71.
[12] World Mining. De Beers Orapa Diamond Mine Starts Production in June 1971. V. 6, No. 13, December 1970, p. 50.
[13] Industrial Minerals (London). No. 46, July 1971, p. 45.
[14] Bureau of Mines. Mineral Trade Notes. Gem Stones, Burma. V. 68, No. 6, June 1971, p. 5.
[15] Jewelers' Circular-Keystone. Briefly. V. 142, No. 3, December 1971, p. 74.
[16] Staff, Modern Asia: Hong Kong. Gem Country. V. 5, No. 8, October 1971, pp. 24–27. Ceylon Government Gazette, No. 14, 989/8, Dec. 23, 1971, pp. 11A–16A.
[17] Staff, World Mining. Diamond Mining in India Today. V. 24, No. 6, June 1971, pp. 34–35.
[18] Journal of Mines, Metals & Fuels (India). Import of African Diamonds. V. 19, No. 1, January 1971, p. 25.
[19] Bureau of Mines. Mineral Trade Notes. Ivory Coast. V. 68, No. 8, August 1971, p. 11.
[20] Mining Annual Review. Malagasy. June 1971, p. 352.
[21] Bureau of Mines. Mineral Trade Notes. Malagasy Republic. V. 68, No. 7, July 1971, p. 17.

Table 3.—Diamond (natural): World production by country [1]

(Thousand carats)

Country	1969			1970			1971 [p]		
	Gem	Industrial	Total	Gem	Industrial	Total	Gem	Industrial	Total
Africa:									
Angola	[r] 1,516	[r] 506	2,022	1,797	599	2,396	[e] 1,625	[e] 542	[e] 2,167
Botswana	NA	NA	NA	54	490	544	87	785	[2] 872
Central African Republic	[r] 348	[r] 187	535	[r] 313	[r] 169	482	304	163	467
Ghana	239	2,152	2,391	255	2,295	2,550	256	2,306	2,562
Guinea	22	50	72	22	52	[3] 74	[e] 22	[e] 52	[e] 74
Ivory Coast	81	121	202	85	128	213	[e] 88	[e] 132	[e] 220
Lesotho [4]	5	25	30	4	13	17	1	6	7
Liberia	[5] 562	[5] 184	[5] 746	[5] 577	[5] 235	[5] 812	525	214	739
Sierra Leone	736	1,253	1,989	723	1,232	1,955	715	1,220	1,935
South Africa:									
Premier	631	1,891	2,522	623	1,867	2,490	[6] 652	[6] 1,955	[6] 2,607
Other DeBeers Company [7]	2,457	2,010	4,467	2,615	2,140	4,755	2,267	1,855	[e] 4,122
Other	524	350	874	520	347	867	181	121	[e] 302
Total	3,612	4,251	7,863	3,758	4,354	8,112	3,100	3,931	7,031
South-West Africa, Territory of	1,923	101	2,024	1,772	93	1,865	[e] 1,800	[e] 100	[e] 1,900
Tanzania	394	383	777	359	349	708	404	404	[2] 808
Zaire (formerly Congo-Kinshasa)	[r] 1,802	[r] 11,621	[r] 13,423	1,649	12,438	14,087	[e] 1,700	[e] 12,000	[e] 13,700
Other Areas:									
Brazil [e]	160	160	320	160	160	320	160	160	320
Guyana	21	31	52	24	37	61	19	29	48
India	10	2	12	17	3	20	16	3	19
Indonesia [e]	14	6	20	14	6	20	14	6	20
U.S.S.R. [e]	1,500	6,000	7,500	1,600	6,250	7,850	1,800	7,000	8,800
Venezuela	118	76	194	129	371	500	[e] 130	[e] 370	[e] 500
World total	13,063	27,109	40,172	13,312	29,274	42,586	12,766	29,423	42,189

[e] Estimate. [p] Preliminary. [r] Revised. NA Not available.

[1] Total (gem plus industrial) diamond output of each country is actually reported except where indicated to be an estimate by footnote. In contrast, the detailed separate reporting of gem diamond and industrial diamond represents Bureau of Mines estimates in all cases except Angola (1969 only), Lesotho (all years), Liberia (1969 and 1970), Zaire (1969 only), and Venezuela (1969 and 1970), where sources give both total output and detail. The estimated distribution of the total in the case of a number of countries is conjectural, based on unofficial information of varying reliability.

[2] Exports.

[3] Official estimate by Government of Guinea.

[4] Exports of diamond originating in Lesotho; excludes stones imported for cutting and subsequently reexported.

[5] Exports for year ended August 31 of that stated.

[6] Total non-alluvial output of Transvaal, presumably includes a small share of total originating from non-De Beers-owned properties other than the Premier mine.

[7] All company output from the Republic of South Africa except for that from the Premier mine; excludes company output from the Territory of South-West Africa and from Botswana.

Nigeria.—The Government published Decree No. 55, Diamond Trading Decree 1971, in the Official Gazette No. 64, V. 58, Dec. 31, 1971.[22] The Federal Military Government issued the decree which contained 15 sections. Mining, selling, buying, importing, exporting, and cutting of diamond was to be licensed or authorized, and violators subject to arrest, forfeitures, and penalties.

Scotland.—A short paper described areas for collectors of minerals, precious stones, and semiprecious stones in Scotland.[23] A location map of the country was included.

Sierra Leone.—The third largest diamond ever found, 969.8 carats and valued at $11.7 million, was reported.[24] Sierra Leone diamond production has a high ratio of gem diamond. The Government and the economy are tied to diamond production to a remarkable degree as trade data for the last three years showed. Diamond exports were about two-thirds of the country's exports in value and were the source of 15 to 20 percent of the Government's revenue.

South Africa, Republic of.—Production of diamond decreased but value of sales increased. De Beers announced a 5 percent general increase in prices in terms of U.S. dollars on November 1, 1971; also, the South African exchange rate varied between August and December 1971.[25]

South West Africa.—Consolidated Diamond Mines of South-West Africa, Ltd. (CDM), a subsidiary of De Beers, closed the sea and foreshore operations in the areas leased to the Marine Diamond Corporation Ltd., a subsidiary of CDM.[26]

Tanzania.—Diamond was the most important mineral mined and exported. Diamond exports in 1971 were 808,000 carats. Gem zoisite (tanzanite) exports amounted to 79,000 carats and were 36 percent of the total value of exports of gem stones excluding the value of diamond. Ruby, sapphire, garnet, amethyst, and tourmaline were other gem stone types exported.

Venezuela.—A significant diamond discovery of gem quality on a 15,000 acre concession in the State of Bolivar was reported.[27] Diamond production increased 6 times in quantity and 4 times in value from 1965 to 1970 according to Government data in an article which also described mining methods and laws.[28]

TECHNOLOGY

A detailed description of synthetic gem stones and other synthetic materials was published.[29] Diamond imitations, their pretensions, and some trade names were also described.[30]

Personnel of the Hawaii Institute of Marine Biology tested a miniature submarine at Makapuu Point, Oahu, in a series of dives to harvest precious coral of which the varieties included gold, pink, bamboo, gold bamboo, and black. The submersible was equipped with an arm and claw and a large basket.[31] Union Carbide Corp.'s Crystal Products Department reported production of a giant synthetic white sapphire, 28,000 carats, 3.5 inches in diameter and 8 inches long, the largest manufactured sapphire crystal on record, using the Czochralski process.[32]

The damage caused by mechanically polishing sapphire and spinel wafers was minimized by chemical polishing.[33] Topaz was described in terms of geometrical and electrostatic interactions.[34] Tiny laser beams were used to burn out unsightly dark inclusions in diamond, a development for jewelers to be aware of.[35]

[22] Bureau of Mines. Mineral Trade Notes. Diamond, Nigeria. V. 69, No. 4, April 1972, pp. 5–12.

[23] Adamson, G. F. S. The Gemstones of Scotland. Mining and Minerals Engineering, v. 7, No. 6, June 1971, pp. 21–24.

[24] The Sunday Star, Washington, D.C. Third Largest Diamond Found on Conveyor in Mine Plant. V. 120, No. 107, Apr. 16, 1972, p. D7.

[25] Staff, Mining Journal, (London). Diamond Sales Improve. V. 278, No. 7117, Jan. 14, 1972, p. 33.

[26] Mining and Minerals Engineering (London). Marine Diamonds. V. 7, No. 6, June 1971, p. 25.

[27] The Wall Street Journal. Fairway Explorations Ltd. Reports Making Significant Diamond Find. V. 178, No. 8, July 13, 1971, p. 33.

[28] Fairbairn, W.C. Diamonds in Venezuela. Mining Magazine, v. 125, No. 4, October 1971, pp. 349–353.

[29] Webster, R. A. Comprehensive Compendium on Modern Synthetic Gem Stones, Part I. Lapidary J., v. 25, No. 1, April 1971, pp. 275–280; Part II, Lapidary J., v. 25, No. 2, May 1971, pp. 304–317.

[30] Sarett, M. R. The Facts About Diamond Imitations. Lapidary J. v. 25, No. 5, August 1971, pp. 714–715.

[31] Reported by Bureau of Mines State Liaison Officer for Hawaii.

[32] Iron Age. Gem of a Giant and Giant of a Gem, Techfront. V. 208, No. 15, Oct. 7, 1971, p. 31.

[33] Reisman, A., M. Berkenblit, J. Cuomo, and S. A. Chan. The Chemical Polishing of Sapphire and MgAl Spinel. J. Electrochemical Soc., v. 118, No. 10, October 1971, pp. 1653–1657.

[34] Ribbe, P. H., and G. V. Gibbs. The Crystal Structure of Topaz and Its Relation to Physical Properties. The American Mineralogist, v. 56, January–February 1971, pp. 24–30.

[35] Jewelers' Circular-Keystone. Something New to Look For in a Diamond. V. 61, No. 6, p. 114.