

# Gem Stones

By Benjamin Petkof<sup>1</sup>

Estimates of domestic gem stone production indicate that output has increased slightly from \$2.4 million in 1967 to \$2.5 million in 1968. The United States has no

formal gem stone mining industry and the collection of gem materials rests firmly in the hands of individual collectors and rock hobbyists as a recreational activity.

## DOMESTIC PRODUCTION

Thirty-eight States produced gem material during 1968. The following States were the major producers and supplied material valued in excess of \$100,000: Oregon, Cali-

fornia, Idaho, Texas, Arizona, Wyoming, Colorado, and Montana. These States supplied 72 percent of total production.

## CONSUMPTION

Consumption of both rough and cut gem diamond exceeded 4.3 million carats valued at \$475 million, an increase of 10 percent in quantity and 23 percent in value over that of 1967. The value of imported synthetic and imitation gem stones including imitation pearl reached \$12.4 million, an increase of 20 percent over that of the

previous year; natural and cultured pearls declined 24 percent from 1967.

Apparent consumption of gem stones (domestic production plus imports minus exports and reexports) increased 45 percent from \$304 million in 1967 to \$441 million in 1968.

## PRICES

During the year, price ranges for cut and polished, unmounted gem diamond were 0.25 carat, \$75 to \$400; 0.50 carat,

\$200 to \$800; 1 carat, \$650 to \$2,500; 2 carats, \$1,500 to \$9,000; 3 carats, \$3,000 to \$18,000.

## FOREIGN TRADE

Exports of precious and semiprecious gem stone increased over 50 percent to a value of \$99.2 million. Diamond, over one-half carat in weight, cut but unset made up the bulk of the exports.

Imports of gem material increased 22 percent in value over those of 1967 with gem diamond accounting for 88 percent of the total.

Emerald imports almost doubled, with India and Colombia supplying almost 60

percent of the receipts.

Ruby and sapphire imports increased 61 percent and were received from 27 countries with Ceylon, Burma, and India furnishing 68 percent of the total.

Imports of natural and cultured pearl declined with India and Japan supplying the major portions of natural and cultured material, respectively.

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Table 1.—U.S. imports for consumption of precious and semiprecious gem stones  
(Thousand carats and thousand dollars)

Stones	1967		1968	
	Quantity	Value	Quantity	Value
<b>Diamonds:</b>				
Rough or uncut.....carats	2,506	\$212,902	2,514	\$252,653
Cut but unset.....do	1,455	174,570	1,834	222,478
<b>Emeralds:</b> Cut but unset.....do	242	5,518	365	10,644
<b>Rubies and sapphires:</b> Cut but unset.....do	NA	5,685	NA	9,175
<b>Marcasites</b> .....do	NA	3	NA	1
<b>Pearls:</b>				
Natural.....do	NA	576	NA	525
Cultured.....do	NA	17,140	NA	12,865
Imitation.....do	NA	374	NA	403
<b>Other precious and semiprecious stones:</b>				
Rough and uncut.....do	NA	4,900	NA	5,062
Cut but unset.....do	NA	7,745	NA	11,038
Other, n.s.p.f.....do	NA	270	NA	374
Synthetic:				
Cut but unset.....number	3,042	1,382	5,085	2,404
Other.....do	NA	104	NA	166
Imitation gem stones.....do	NA	8,476	NA	9,405
<b>Total</b> .....do	NA	439,645	NA	537,193

\* Revised. NA Not available.

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

(Thousand carats and thousand dollars)

Country	1966				1967				1968			
	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.....	72	\$9,520	787	\$94,353	47	\$6,111	775	\$96,676	46	\$7,455	954	\$119,396
Brazil.....	4	425	-----	-----	21	1,009	2	169	10	594	(1)	8
Canada.....	10	1,663	(1)	16	5	847	(1)	64	9	1,256	5	205
Central African Republic.....	187	9,835	-----	-----	183	9,002	-----	-----	218	11,818	1	61
France.....	3	211	18	1,902	1	101	17	2,085	22	1,004	22	2,514
Germany, West.....	(1)	1	17	1,441	2	227	11	1,039	(1)	2	5	556
Ghana.....	20	464	-----	-----	5	68	-----	-----	-----	-----	(1)	46
Guyana.....	25	995	(1)	8	31	1,370	-----	-----	14	830	(1)	5
India.....	-----	-----	8	720	-----	-----	14	1,239	-----	-----	30	2,714
Ireland.....	56	2,248	2	101	132	571	3	240	-----	-----	3	305
Israel.....	36	8,096	525	51,446	46	4,079	533	55,033	50	5,245	666	70,217
Japan.....	(1)	6	1	78	(1)	14	2	150	(1)	52	1	100
Liberia.....	16	1,831	-----	-----	26	8,946	-----	-----	7	1,898	-----	-----
Netherlands.....	49	8,825	21	3,013	39	8,566	14	2,065	46	9,953	19	3,073
Sierra Leone.....	161	7,705	(1)	53	130	5,921	3	307	61	1,892	9	1,310
South Africa, Republic of.....	121	13,023	23	7,001	333	39,352	32	7,766	434	46,330	35	9,076
Switzerland.....	69	8,504	1	422	7	1,524	(1)	174	20	2,039	4	785
U.S.S.R.....	-----	-----	29	3,391	(1)	17	39	5,918	-----	-----	63	9,583
United Kingdom.....	1,106	131,809	10	1,354	1,339	122,000	10	1,395	1,439	152,881	17	2,239
Venezuela.....	66	2,525	-----	-----	64	2,347	-----	-----	95	3,468	-----	-----
Western Africa, n.e.c.....	21	3,446	-----	-----	35	4,260	(1)	6	36	5,614	(1)	5
Other countries.....	10	1,907	5	438	10	1,070	(1)	244	7	272	(1)	275
Total.....	2,082	208,039	1,452	165,737	2,506	212,902	1,455	174,570	2,514	252,653	1,334	222,473

<sup>1</sup> Less than 1/2 unit.

## WORLD REVIEW

**Canada.**—Kimberlite dikes were discovered underground at the Upper Canada Mines, Limited, by the Geological Survey of Canada. Upper Canada and neighboring Queenston Gold Mines Limited, entered into an exploration agreement with Canadian Rock Company Limited, a wholly owned subsidiary of De Beers Consolidated Mines Ltd. of South Africa. During the latter part of the year an announcement was made that work progress had not been encouraging.

The Kimberlite Mining Corporation Limited began a drilling and geophysical program in the Coral Rapids area of northern Ontario. Reportedly a 250-foot width of kimberlite material was found during drilling.<sup>2</sup>

**Ceylon.**—Export duties on precious and semiprecious stones were abolished effective November 16, 1968. The abolition of duties

was expected to provide incentive for gem exporters to accept foreign exchange controls.<sup>3</sup>

**Colombia.**—The Government has established a group called the Empresa Colombiana de Esmeraldas to develop and administer deposits of emeralds and other precious stones in the national reserve region of Colombia. The directorate of this organization will consist of the Minister of Mines and four other members appointed by the Government. The issuance of permits to others for the purposes of exploration and development of emerald deposits has been suspended.<sup>4</sup>

<sup>2</sup> Canadian Mining Journal. Diamonds. V. 90, No. 2, February 1969, p. 124.

<sup>3</sup> U.S. Embassy, Ceylon. State Department Airgram A-544, Nov. 27, 1968, p. 1.

<sup>4</sup> Mining Journal (London). Columbia Emerald Exploitation. V. 271, No. 6942, Sept. 6, 1968, p. 168.

Table 3.—World production of gem diamond, by countries

(Thousand carats)

Country	1964	1965	1966	1967	1968 <sup>p</sup>
<b>Africa:</b>					
Angola.....	r 874	r 887	r 968	983	1,316
Central African Republic.....	221	263	270	• 260	• 305
Congo (Kinshasa).....	295	14	r 12	1	551
Congo (Brazzaville) • 1 2.....	316	318	300	NA	NA
Ghana.....	378	25	282	254	• 245
Guinea •.....	21	21	21	NA	NA
Ivory Coast.....	120	119	110	• 105	• 110
Liberia 1.....	298	277	343	362	537
Sierra Leone.....	585	658	629	560	• 560
South-West Africa.....	1,387	1,491	1,583	r 3 1,531	r 1,552
Tanzania.....	338	• 414	• 474	864	356
<b>South Africa, Republic of:•</b>					
Premier.....	556	610	625	594	608
De Beers Group 1.....	928	985	1,429	2,128	2,307
Other pipe mines.....	13	123	131	334	484
Alluvial.....	288	230	300		
Total, South Africa, Republic of.....	1,790	1,948	2,485	r 3,056	3,399
Total Africa.....	r 6,623	r 6,440	r 7,477	r 7,976	8,931
<b>Other Areas:</b>					
Brazil •.....	175	175	150	160	160
Guyana.....	60	45	37	41	28
India.....	2	r 4	2	5	7
Indonesia.....	14	r 14	r 14	14	14
U.S.S.R. •.....	800	1,000	1,200	1,400	1,400
Venezuela.....	57	52	42	38	60
Total 5.....	r 7,731	r 7,730	r 8,922	r 9,634	10,600

• Estimate. <sup>p</sup> Preliminary. <sup>r</sup> Revised. NA Not available.

<sup>1</sup> Exports, fiscal year ending August 31.

<sup>2</sup> Probable origin Congo (Kinshasa).

<sup>3</sup> Output of Consolidated Diamond Mines of South-West Africa Ltd.

<sup>4</sup> Includes some alluvial from De Beers properties.

<sup>5</sup> Totals are of listed figures only.

**Guyana.**—The diamond production potential was discussed and reviewed in a recent paper. Production was primarily industrial with a small quantity of gem grade and was from alluvial deposits.<sup>5</sup>

**India.**—The Geological Survey of India has begun work to determine the feasibility of commercially extracting diamond from the pipe rock, conglomerates, and river gravels in Andhra Pradesh.<sup>6</sup>

**Sierra Leone.**—In November 1968, a mining agreement was reached between the Diamond Corporation West Africa Ltd. and the Sierra Leone Government wherein

the corporation would be the sole marketer and exporter of diamond produced under the Alluvial Diamond Mining Scheme. The terms of the agreement require that the corporation pay an annual fee to the Government for these rights and forego the service fee paid for its operation of the Government Diamond Office. The agreement became effective at the beginning of 1969.<sup>7</sup>

**Thailand.**—Imports and exports of precious and semiprecious stones for 1967 were published.<sup>8</sup>

## TECHNOLOGY

Several papers were published concerning the development of kimberlite deposits. These papers presented theories and supporting data on the occurrence of diamond and other materials in kimberlite.<sup>9</sup>

The refractive index of type I diamond has been shown to vary indirectly with pressure. A direct measurement technique, with the application of hydrostatic pressure, was used to make direct measurements to a pressure of 7 kilobars.<sup>10</sup>

<sup>5</sup> Norwood, V. G. C. Guyana—an Expanding Source of Industrial Diamonds. *Min. Mag.*, v. 118, No. 3, March 1968, pp. 169-171.

<sup>6</sup> Journal of Mines, Metals & Fuels. Exploration for Diamonds in Andhra Pradesh. V. 14, No. 8, August 1968, p. 285.

<sup>7</sup> Bureau of Mines. Mineral Trade Notes. Diamond (Sierra Leone). V. 66, No. 3, March 1969, p. 7.

<sup>8</sup> Bureau of Mines. Mineral Trade Notes. Gem stones. V. 65, No. 12, December 1968, pp. 18-19.

<sup>9</sup> Crockett, Richard N., and Robert Mason. Foci of Mantle Disturbance in Southern Africa

and Their Economic Significance. *Econ. Geol.*, v. 63, No. 5, August 1968, p. 532-540.

Dawson, J. B. Recent Researches on Kimberlite and Diamond Geology. *Econ. Geol.*, v. 63, No. 5, August 1968, p. 504-511.

Kennedy, George C., and Bert E. Nordlie. The Genesis of Diamond Deposits (Abstract). *Econ. Geol.*, v. 63, No. 5, August 1968, p. 495-503.

<sup>10</sup> Schmidt, E. D. D., J. L. Kirk, and K. Vedam. Variation of the Refractive Index of Diamond With Hydrostatic Pressure to 7 Kilobars. *Am. Miner.*, v. 53, Nos. 7-8, July-August 1968, pp. 1,404-1,406.

