Gem Stones

By Jerry J. Gray [1]

Estimated gem stone production of $2.4 million was 4 percent less than the previous year because output dropped at the Star garnet deposit, Clarkia, Idaho. The decrease would have been larger except for initiation of production from a new commercial jade mine in Washington and increased visitor days at a precious opal fee site in Idaho. Domestic gem stone production continued to be principally the result of recreational mining by private individuals at free or fee sites. Only a few deposits were operated to produce rough material for direct sale to wholesale or retail outlets. The semiprecious gem industry of Oregon was reviewed with reasons given why it developed into a significant activity for the State. [2]

DOMESTIC PRODUCTION

Gem stone production was reported from 38 States. The following States supplied 78 percent of the total: Oregon, $750,000; California, $200,000; Arizona, $153,000; Texas, $150,000; Washington, $150,000; Wyoming, $129,000; Colorado, $122,000; Montana, $109,000; and Nevada, $100,000.

Activities involving all of the precious gem stones (except ruby) were reported. The Murfreesboro, Ark., diamond pipe, 60 years after its discovery, was consolidated under one owner, General Earth Minerals. The Dallas, Tex., firm opened the whole pipe to fee digging; formerly, only a small portion was available to the public. [3] Both the largest emerald crystal (3-1/16 inches by 2½ inches, 1,438 carats) and the longest (6 inches by ½ inch) ever found in North America were collected at the newly opened Rist mine. This fee site and the older Ellis mine fee site are located near Hiddenite, N.C., and were operated by American Gem, Inc. [4] Two Montana sapphire deposits were described. One, a placer deposit, was open to the public for a straight fee,[5] and the other, a dike, 5 miles long with an average width of 8 feet, was to be worked partially commercial and partially by individuals who gained digging rights by buying a lot in a vacation real estate development situated near the dike. [6] The precious opal deposit near Spencer, Idaho, had its first full season as a fee site. The mine had been operated as a commercial mine until late in the 1968 season. [7]

Concerning semiprecious gem stones, jade was in danger of being in oversupply. Two new jade provinces were supplying the market, one in Washington [8] and the other in Alaska, [9] along with continued production from two mines in

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[2] Shaffer, Leslie L. D., and Steve T. Hashimoto. The Semiprecious Gem Industry of Oregon. Oreg. Bus. Rev., v. 28, No. 7, July 1969, pp. 1–4.

[3] Leiper, Hugh. Crater of Diamonds is Reopened to the Public. Lapidary J. v. 23, No. 7, October 1969 pp. 970–974.

[4] Trapp, Francis W. Green Bolts are Found Again Near Hiddenite, N.C. Lapidary J. v. 24, No. 1, April 1970, pp. 116–126.

[5] Williams, Marjorie. Sapphires on the Eldorado Bar. Gems and Minerals, No. 383, August 1969, pp. 28–31.

[6] Leiper, Hugh. "Five Miles of Sapphires" Famous Yogo Montana Sapphire Mine to be Reopened. Lapidary J., v. 22, No. 10, January 1969, pp. 1278–1286.

[7] Cuthbert, Donna L. Precious Opal, Queen of Gems, in Idaho. Lapidary J. v. 23, No. 7, October 1969, pp. 928–930.

[8] McLeod, D. L. Nephrite Jade Has Been Discovered in Washington. Lapidary J. v. 22, No. 8, November 1968, pp. 1034–1037.

[9] Munz, William. Hundreds of Tons of Nephrite Jade. Lapidary J. v. 24, No. 1, April 1970, pp. 18–26.

California[10] and a small output from Wyoming.[11] Jade imported from a new mine in British Columbia added to the oversupply.[12] Demand for jade probably did not keep pace with supply because demand had been a function of population growth and affluence, which did not exhibit a sudden growth surge.

Output of star garnet, from Clarkia, Idaho, dropped sharply after the U.S. Forest Service stopped the free collecting on several square miles of its acquired lands. Collecting was restriced to a 40-acre fee site concession.[13]

CONSUMPTION

The 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) declined to $343 million, compared with $355 million revised in 1968, because of greater exports.

Total consumption was measured primarily by reported import-export data. The reported values contain mainly high-value-per-unit-weight rough and cut stones. The cut stones inflate the total consumption value figure by that amount added by foreign cutting and polishing. Gem diamond consumption, both rough and cut, continuing an upward trend, reached $505 million, a 6-percent increase over that of 1968 and 163 percent over the $192 million of 1962. Value of synthetic and imitation gem stones including imitation pearl was $12.7 million, an increase of 2 percent over that of 1968; value of natural and cultured pearls declined to $12.7 million, a 5-percent decline from that of 1968 and a 43-percent decline from that of 1965.

If gem stone consumption were viewed from the standpoint of quantity instead of value, it would change from 1 ton of imported diamonds to hundreds of tons of domestically produced semiprecious materials. Consumption, in terms of quantity, equates to domestic production of semiprecious materials; however, there is no good estimate available for domestic quantitative output.

PRICES

During the year, price ranges for cut and polished, unmounted gem diamond were 0.25 carat, $100 to $400; 0.50 carat, $250 to $800; 1 carat, $650 to $2,750; 2 carats, $1,500 to $9,000; and 3 carats, $3,900 to $17,000. The medium price for each range was 0.25 carat, $200; 0.5 carat, $500; 1 carat, $1,600; 2 carats, $4,250; and 3 carats, $8,000.

FOREIGN TRADE

Precious and semiprecious gem stone exports were valued at $128.0 million, compared with $99.2 million in 1968. Diamond, over one-half carat in weight, cut but unset, made up the bulk of the exports. Reexport of all varieties of gem stones was valued at $97.6 million, compared with $85.6 million the previous year. Rough or uncut gem-quality diamond formed the major portion of reexports.

Imports of gem material increased 5 percent in value over those of 1968; gem diamond supplied from 26 countries accounted for 89 percent of the total.

The total value of emeralds imported was 14 percent less than the previous year. Although originating from 33 countries, Brazil, Colombia, and India supplied 86 percent of the total carats and 68 percent

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[10] Davis, Fenelon F. Some Highlights of 1969, California Mining Review. Mineral Information Service, v. 23, No. 4, April 1970, p. 75.

Draper, James W. Botryoidal Jade of the California Coast. Lapidary J. v. 23, No. 5, August 1969, pp. 684–686.

Hemrich, Gerald I. Botryoidal Jade in California. Lapidary J. No. 386, November 1969, pp. 42–47.

[11] Gregory, Gardiner E. Jade Hunting at Jeffrey City, Wyoming. Lapidary J. v. 22, No. 11, February 1969, pp. 1476–1481.

[12] Cavenaile, Rene. Surrey, B.C., Housewife-Prospector Finds British Columbia "Mountain of Jade." Lapidary J. v. 22, No. 12, March 1969, p. 1562.

[13] Gems and Minerals. National Forest Service Announces New Arrangements for Garnet Collecting at Emerald Creek, Idaho. No. 382, July 1969, pp. 11–12.

of the total value. Imports of rubies and sapphires remained at about the same level with Thailand, India, and Ceylon supplying 69 percent of the total value. The value of imported pearls decreased 5 percent from that of 1968 and 40 percent from that of 1965. India was the major source of natural pearl, 69 percent; Japan the major source of cultured pearls, 92 percent.

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

(Thousand carats and thousand dollars)

Stones	1968		1969	
	Quantity	Value	Quantity	Value
Diamonds:				
Rough or uncut---carats	2,514	$252,653	2,932	$287,566
Cut but unset---do	1,834	222,478	1,758	217,081
Emeralds: Cut but unset---do	365	10,644	309	9,175
Rubies and sapphires: Cut but unset	NA	9,175	NA	9,201
Marcasites	NA	1	NA	6
Pearls:				
Natural	NA	525	NA	475
Cultured	NA	12,865	NA	12,238
Imitation	NA	403	NA	672
Other precious and semiprecious stones:				
Rough and uncut	NA	5,062	NA	4,847
Cut but unset	NA	11,038	NA	12,799
Other, n.s.p.f	NA	374	NA	559
Synthetic:				
Cut but unset---number	5,085	2,404	4,886	2,793
Other	NA	166	NA	282
Imitation gem stones	NA	9,405	NA	8,999
Total	NA	537,193	NA	566,693

NA Not available.

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

(Thousand carats and thousand dollars)

Country	1967				1968				1969			
	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	47	$6,111	775	$96,676	46	$7,455	954	$119,396	59	$6,729	916	$113,114
Brazil	21	1,009	2	169	10	594	(1)	8	29	1,033	1	58
Canada	5	847	(1)	64	9	1,256	5	205	8	1,307	(1)	54
Central African Republic	183	9,002	---	---	218	11,818	1	61	232	9,806	---	---
France	1	101	17	2,085	22	1,004	22	2,514	10	379	20	2,484
Germany, West	2	227	11	1,039	(1)	2	5	556	1	13	5	507
Ghana	5	68	---	---	---	---	(1)	46	(1)	9	---	---
Guyana	31	1,370	---	---	14	830	(1)	5	20	1,020	---	---
India	---	---	14	1,239	---	---	30	2,714	---	---	30	2,663
Ireland	132	571	3	240	---	---	3	305	---	---	2	220
Israel	46	4,079	533	55,033	50	5,245	666	70,217	36	4,155	658	73,777
Japan	(1)	14	2	150	(1)	52	1	100	(1)	5	1	71
Liberia	26	3,946	---	---	7	1,898	---	---	13	2,976	---	---
Netherlands	39	8,566	14	2,065	46	9,953	19	3,073	48	12,810	27	3,561
Sierra Leone	180	5,921	3	307	61	1,892	9	1,310	224	8,331	10	1,447
South Africa, Republic of	333	39,852	32	7,766	434	46,380	35	9,076	361	41,585	28	8,713
Switzerland	7	1,524	(1)	174	20	2,039	4	785	6	1,043	3	919
U.S.S.R.	(1)	17	39	5,918	---	---	63	9,588	---	---	43	6,629
United Kingdom	1,339	122,000	10	1,395	1,439	152,881	17	2,239	1,697	185,278	9	1,496
Venezuela	64	2,347	---	---	95	3,468	---	---	157	5,439	---	---
Western Africa, n.e.c.	35	4,260	(1)	6	36	5,614	(1)	5	27	5,210	---	---
Other countries	10	1,070	(1)	244	7	272	(1)	275	4	438	5	1,368
Total	2,506	212,902	1,455	174,570	2,514	252,653	1,834	222,478	2,932	287,566	1,758	217,081

[1] Less than ½ unit.

WORLD REVIEW

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

(Thousand carats)

Country	1967	1968	1969 p
Africa: [1]			
Angola	983	1,316	e 1,536
Central African Republic	e 260	e 305	e 330
Congo, (Kinshasa)	r 263	551	491
Ghana	254	e 245	e 238
Ivory Coast	e 105	e 110	e 121
Liberia [2]	r 262	537	e 550
Sierra Leone e	560	560	600
South-West Africa e [3]	1,531	1,636	1,700
Tanzania	r 433	356	e 380
South Africa, Republic of: e			
Premier	594	580	NA
De Beers Group [4]	2,128	2,170	NA
Other	334	446	NA
Total, South Africa, Republic of	3,056	3,196	3,380
Total Africa	r 7,707	8,812	9,326
Other areas:			
Brazil e	160	160	160
Guyana e	41	28	31
India	5	7	e 7
Indonesia e	14	14	14
U.S.S.R. e	1,400	1,400	1,500
Venezuela	38	60	118
Total [5]	r 9,365	10,481	11,156

e Estimate. p Preliminary. r Revised. NA Not available.
[1] Gem diamond is also produced in Guinea but data are not available.
[2] Exports, fiscal year ending August 31.
[3] Output of Consolidated Diamond Mines of South-West Africa Ltd.
[4] Includes some alluvial from De Beers properties.
[5] Totals are of listed figures only.

Angola.—Exports of gem and industrial diamonds, totaling 2 million carats valued at $70 million, continued to provide a major portion of the country's total export value. Only one company, Companhia de Diamantes Angola (DIAMANG), mined for diamond; however, two new companies were granted concessions for the exploration and exploitation of diamond and other precious stones. [14]

Australia.—A 220-ounce opal found at Andamooka sold for a world record price of $188,000. [15]

Botswana.—De Beers Consolidated Mines Ltd. established that one of the diamondiferous kimberlite pipes discovered during 1968 at Orapa, in the central part of the country, could become a major source of diamonds. Initial ore production of 8,000 tons per day is scheduled for 1971 with a doubling of production by 1974–75. Output to date indicated a ratio of 70 percent industrial stones to 30 percent gem-quality stones. The National Assembly of Botswana passed the "Precious Stone Industry (Protection) Act, 1969" to regulate and control the new industry. A mineral resource and mining activities review of the Republic was published. [16]

Burma.—The Burmese Government held its fifth annual Gem, Jade, and Pearl Emporium March 5–13, 1969, and sold $2.4 million worth of material. Cultured pearls accounted for 44 percent of total sales. All gem stone prospecting, mining, and marketing was nationalized March 12, and all private gem-mining operations and equipment were appropriated without promise of compensation. The justification for the action was that it would provide greater benefits to the gem workers and to the people of Burma generally, and that it

[14] Bureau of Mines. Mineral Trade Notes. Diamond. V. 66, No. 8, August 1969, pp. 8–10.
———. Gem Stones. V. 66, No. 12, December 1969, pp. 13–14.
[15] The Mining Journal. The Industry in Action: World Record-Priced Opal. V. 273, No. 7008, Dec. 12, 1969, p. 541.
[16] Boocock, C. Review of Mineral Resources and Mining Activities in the Republic of Botswana. Geological Survey—Botswana, Jan. 15, 1969, 12 pp.

would curb smuggling. The claim was made that the gem trade had enriched only a few individuals, largely persons of foreign origin, and had brought only poor revenue to the Government.[17]

Canada.—A new type opal gem stone with prismatic reflective colors was discovered in the Province of Alberta. The stone, suitable for doublets, was the opalized conchiolin of the fossil ammonite.[18] Two lode deposits of jade were reported to have been discovered in British Columbia.[19]

Colombia.—An emerald weighing 7,025 carats (almost 3 pounds) was reported to have been found at the Las Cruces mine in Cundinamarca. It was the largest ever found in Colombia.[20]

Southern Rhodesia.—A portion of an emerald crystal weighing 1,160 carats was found at the Chikwanda mine near Fort Victoria. The area may have possibilities as a new emerald source.[21]

Tanzania.—Tanzania exported 780,210 carats of diamond (gem and industrial combined) valued at $24.9 million and 514 kilograms of other gem stones valued at $200,000. Gem-corundum, ruby, and sapphire exports totaled 296 kilograms valued at $140,000. A new source of ruby and sapphire was reported to have been located and was being mined.[22]

Exports of gem zoisite totaled 20 kilograms valued at $30,000. During 1967, a deposit of gem-quality violet-blue zoisite crystals (given the varietal name tanzanite) was discovered. The crystals, because of a striking red, blue, yellow-green pleochroism, quickly gained popularity in the gem market. A 122.7 carat faceted tanzanite was placed on display by the Smithsonian Institute,[23] and several reports were published describing the gem mineral and its location.[24]

TECHNOLOGY

A colorless synthetic yttrium-aluminum garnet developed for use in microwave, laser, and ultrasonic devices was marketed as a diamond substitute. Faceted stones were sold for $50 per carat under the trade name "Diamonair".[25] A general review of diamond mining and recovery was published.[26] A study of diamonds recovered from the Witwatersrand gold mines suggested that the stones were subject to charged-particle radiation and subsequent annealing.[27] Single crystal sapphire filaments were grown to lengths of 100 feet with tensile strength of 300,000 pounds per square inch and a modulus of elasticity 65 to 75 million pounds per square inch.[28] A molten salt solution method of growing gem-grade rubies was discussed. Controlled defects can be introduced similar to those found in natural stones.[29]

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[17] Bureau of Mines. Mineral Trade Notes. Gem Stones. V. 66, No. 6. August 1969, pp. 13–14.

[18] Leiper, Hugh. A New Fossil Gem is Found in Alberta, Canada. Lapidary J. v. 23, No. 7, October 1969, pp. 932–937.

[19] The Northern Miner. B.C. Companies Join in Consortium To Exploit Mountainside Jade Find. Sept. 25, 1969, p. 20.

Western Mining News. Second Jade Discovery. Mar. 6, 1970, p. 4.

[20] Bureau of Mines. Mineral Trade Notes. Gem Stones. V. 66, No. 7, July 1969, p. 15.

[21] Bureau of Mines. Mineral Trade Notes. Gem Stones. V. 67, No. 4, April 1970, p. 12.

[22] Lapidary Journal. New Ruby, Sapphire Sources in Africa. V. 23, No. 9, December 1969, p. 1296.

[23] Trapp, Francis W. "The Midnight Blue." A New Tanzanite is Added to the Smithsonian's Collection. Lapidary J. v. 23, No. 5, August 1969, p. 680.

[24] Brayman, Harold H. "Really Beautiful Stuff" Tanzanite. Science Digest, May 1969, pp. 70–72.

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Thompson, Thomas. Tanzania to Tiffany's. Life, v. 66, No. 18, May 9, 1969, pp. 70–76.

[25] Business Week. Marketing—Why the Fake Diamoind Market Glitters. No. 2111, Feb. 14, 1970, p. 116.

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[26] Linholm, A. A. L. Diamond Recovery is Big Business. Eng. & Min. J. v. 170, No. 11, November 1969, pp. 67–80.

[27] Raal, F. A. A Study of Some Gold Mine Diamonds. The Am. Miner., v. 54, No. 1–2, January–February, 1969, pp. 292–301.

[28] Chemistry. Hundred-Foot-Long Sapphires. V. 42, No. 1, January 1969, p. 23.

[29] Chemical Engineering. Growing Gem-Grade Rubies. V. 76, No. 5, Mar. 10, 1969, p. 64.