Gem Stones

By Benjamin Petkof[1]

ESTIMATE of 1964 production of gem materials and mineral specimens reached $1.5 million, an increase of 7 percent over 1963. Individual collectors continued to account for the bulk of domestic production.

Regulations controlling the collection of petrified wood on public lands were issued by the Bureau of Land Management of the Department of the Interior.[2]

DOMESTIC PRODUCTION

The Bureau of Mines discontinued its collection of data by direct canvass of known amateur and professional gem stone producers. Estimates of production indicated that 38 States produced gem stone. Of these, California, Oregon, Texas, Arizona, and Wyoming were the leading producers.

A deposit of black jade was discovered 62 miles southwest of Douglas, Wyo., by a rock hobbyist who leased his claim to the Eloxite Corp. Similar jade is known only in Siberia. The domestic stone is claimed to be of a better quality because it polishes to a more lustrous sheen. The mining company was selling the material for $8,000 per ton. Material has been shipped to Japan for cutting and carving and to the Federal Republic of Germany for jewelry.

The California Division of Mines and Geology announced the discovery of nephrite jade in 1962 by its personnel in the Bagby district 2½ N.-N.E. of Bagby, Calif. The jade occurs in veins along the east contact of the serpentine belt and ranges up to 5 feet thick and 150 feet long. The best quality jade occurs in various shades of green without any flaws and changes into rock of less desirable color perfection and hardness. The jade is generally within a thick shell of partially nephritized serpentine.[3]

The Himalaya Mine of San Diego County, Calif., which won its fame as a producer of gem tourmaline between 1903 and 1913, was sold to new owners who plan to open it for organized groups to hunt for tourmaline and other minerals that can be found on the mine dump.

A ruby weighing almost 87 carats was found at the old Shuler corundum mine in Cowee Valley near Franklin, N.C. The stone was valued in excess of $4,000.

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[1] Commodity specialist, Division of Minerals.

[2] Bureau of Land Management, U.S. Department of the Interior. Subchapter C—Minerals Management. Circ. 2147, July 1, 1964, pp. 5–6.

[3] California Mineral Information Service, Division of Mines and Geology. New Jade Deposit Found by Division . . . . V. 17, No. 2, February 1964, p. 21.

CONSUMPTION

Consumption of gem diamond reached $259 million, an increase of almost 16 percent over 1963; imported imitation and synthetic gem stones including imitation pearl was $6.1 million, an increase of 20 percent over 1963; and natural and cultured pearls were $19.7 million, an increase of 10 percent over 1963.

Apparent consumption (domestic production plus imports minus exports and reexports) of gem material in the United States was $189 million, up 11 percent over 1963.

PRICES

Prices quoted during the year for cut and polished, unmounted gem diamonds were 0.25 carat, $70 to $275; 0.50 carat, $185 to $600; 1 carat, $500 to $1,800; 2 carat, $1,200 to $5,600.

FOREIGN TRADE

Over 90 percent of the cut but unset emerald was imported from India. Nineteen other countries supplied the remaining quantity. The average value of emerald imports from India was $11.50 per carat.

Japan supplied the bulk of the pearl imports. Cut but unset rubies and sapphires, valued at $4.1 million, were imported. In addition, about $6.9 million of other precious and semiprecious stones were imported. However, no classification information on the latter was available.

TABLE 1.—U.S. imports for consumption of precious and semiprecious stones, exclusive of industrial diamonds

Stones	1963		1964	
	Quantity	Value (thousands)	Quantity	Value (thousands)
Diamonds:				
Rough or uncut, suitable for cutting into gem stones, duty-free—carats	1,749,641	$129,870	1,547,955	$149,729
Cut but unset, suitable for jewelry, dutiable—carats	1,071,620	93,977	1,096,795	108,805
Emeralds: Cut but not set, dutiable—do	190,933	2,081	180,069	3,218
Pearls and parts, not strung or set, dutiable:				
Natural	(1)	479	(1)	474
Cultured or cultivated	(1)	17,427	(1)	19,204
Other precious and semiprecious stones:				
Rough or uncut, duty-free	(1)	1,708	(1)	2,514
Cut but not set, dutiable	(1)	5,183	(1)	7,657
Imitation, except opaque, dutiable:				
Not cut or faceted	(1)	28	(1)	(2)
Cut or faceted:				
Synthetic—number	r 1,054,236	398	1,218,326	623
Other	(1)	4,487	(1)	5,825
Imitation, opaque, including imitation pearls, dutiable	(1)	154	(1)	337
Marcasites: Real and imitation, dutiable	(1)	(3)		
Total	(1)	255,792	(1)	298,386

r Revised.
1 Quantity not recorded.
2 No longer separately classified.
3 Less than ½ unit.

Source: Bureau of the Census.

Precious and semiprecious gem stone exports were valued at $46.8 million compared with $40.5 million in 1963. Diamonds, both rough and uncut, accounted for almost 89 percent of total exports.

Reexports of all varieties of gem stone were valued at $64.3 million compared with $46.7 million in 1963. Diamond in the rough but uncut category accounted for 85 percent of total reexports.

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

Country	1963				1964			
	Rough or uncut		Cut but unset		Rough or uncut		Cut but unset	
	Carats	Value (thousands)	Carats	Value (thousands)	Carats	Value (thousands)	Carats	Value (thousands)
Austria							584	$35
Belgium-Luxembourg	33,537	$3,282	522,383	$50,555	77,728	$9,264	583,207	60,155
Brazil	1,911	191			1,329	196	5	3
British Guiana	1,011	43	84	6	10,156	383		
Canada	9,110	918	847	66	7,753	1,200	227	28
Central African Republic					102,919	5,451		
Columbia	124	6						
Congo (Léopoldville)	8,811	368			236	71		
France	7,169	633	16,746	1,775	6,066	435	15,781	1,678
Germany, West	7	(1)	46,015	3,502			18,040	1,335
Ghana	1,993	49			858	53		
Guinea					2,774	418		
Hong Kong			227	50			329	41
India			207	16			535	111
Ireland					3,616	464		
Israel	69,671	3,404	374,199	29,719	49,011	3,800	426,052	36,800
Italy			152	103			84	17
Japan	283	5	4,381	321			1,541	95
Liberia	19,051	1,395			8,417	806		
Malta and Gozo	519	14	660	56			205	16
Netherlands	26,539	1,583	19,299	2,124	39,265	4,179	14,358	1,896
Nigeria	4,329	135						
Sierra Leone	320,845	8,725			72,153	2,867		
Republic of South Africa	112,448	11,558	27,089	4,736	138,015	12,162	23,721	4,918
Switzerland	37,402	1,549	501	205	33,748	2,192	783	364
U.S.S.R.			411	23			5,590	503
United Kingdom	906,340	86,977	4,280	699	894,260	100,928	5,387	754
Venezuela	55,905	1,971			78,486	2,960		
Western Africa, n.e.c.[2]	71,096	4,148			20,995	1,868		
Western Equatorial Africa	61,537	2,916						
Total[3]	1,749,641	129,870	1,017,620	93,977	1,547,955	149,729	1,096,795	108,805

[1] Less than ½ unit.
[2] Not elsewhere classified.
[3] Includes imports valued at less than $25,000 for following countries: Barbados, 1964; Jamaica, 1964; Mexico, 1963; Netherlands Antilles, 1964; Trinidad and Tobago, 1964; Gibraltar, 1963; Portugal, 1963–64; South Korea, 1964; Lebanon, 1963; Thailand, 1963; Senegal, 1964; Australia, 1964; New Zealand, 1964.

Source: Bureau of the Census.

WORLD REVIEW

Brazil.—Mineração Tejucana S.A. has been given the right to develop previously uneconomic alluvial diamond deposits along the Jequitinhonha River in the area of Diamantina and Bocaiuba, Minas Gerais. Economic exploitation is expected by dredging with equipment that

can treat 3 million cubic meters per year for the recovery of about 30,000 carats, valued at about $600,000.[4]

A large crystal of gem beryl weighing about 15 pounds was found near Padre Paraiso, Municipality of Caraí, Minas Gerais and was valued at $143,000.[5]

Cameroon.—The Ivory Coast Diamond Corp. has been awarded diamond prospecting rights by the Ministry of Transportation, Mines, and Post and Communication.[6]

TABLE 3.—World production of gem diamond by countries

(Thousand carats)

Country	1963	1964
Africa:		
Angola	759	804
Central African Republic	121	221
Congo, (Brazzaville) Republic of [1] [2]	341	316
Congo, (Léopoldville) Republic of the	296	295
Ghana	536	267
Guinea [1]	22	22
Ivory Coast	63	120
Liberia [1]	240	298
Sierra Leone	555	516
Republic of South Africa:		
Pipe mines:		
Premier	522	556
DeBeers group [3]	921	928
Others	r 15	18
Alluvial	r 338	288
South-West Africa	1,076	1,373
Tanzania	276	12
Other Countries:		
Brazil	175	175
British Guiana	60	60
India	1	2
U.S.S.R.	240	240
Venezuela	38	58
World total	r 6,594	6,570

e Estimated. r Revised.
[1] Exports.
[2] Probable origin, Republic of the Congo.
[3] Includes some alluvial from DeBeers properties.

Canada.—Rock blasted from a quarry on Ile Ronde, Montreal, showed a similarity to South African kimberlite. This indicated a possibility that diamonds are embedded in the rock far below the surface.

Ceylon.—The Government formed the State Gem Mining Corporation to control internal and external trade in precious stones within the country. The corporation was expected to eliminate smuggling, thereby improving the Government's revenue and foreign exchange position in addition to insuring a reasonable return to the miner. The corporation shall have the authority to set license fees on all gem pits and impose taxes on all sections of the industry. The industry reforms caused a large number of gem dealers in Ratnapura to close their businesses.[7]

Chile.—Compañía Minera Caren continued to operate the only active lapis lazuli mine near the Argentine border in Coquimbo Province.

[4] Mining Journal (London). V. 263, No. 6729, Aug. 7, 1964, p. 93.
[5] Bureau of Mines. Mineral Trade Notes. V. 59, No. 5, November 1964, pp. 4–5.
[6] Bureau of Mines. Mineral Trade Notes. V. 59, No. 4, October 1964, p. 17.
[7] Mining Journal (London). V. 263, No. 6731, Aug. 21, 1964, p. 137.

About 8,800 pounds, valued at $12,000, was produced during 1963. The bulk of this material was exported to Italy, France, United States, Germany, and Switzerland. Greater production was planned during 1964 to meet the increasing market created by hobbyists who are cutting and polishing lapis lazuli.[8]

Colombia.—During 1963 the Muzo, Coscuez, and Chivor emerald mines produced 50,560 carats of gem quality emerald. In addition, these mines produced 140,556 carats of low-grade emerald (morralla.)[9]

Czechoslovakia.—A northern area of the country where gem quality pyrope was formerly found has shown a similarity to the Siberian kimberlites. Studies of the pyrope rock have been made and it was concluded that further exploration for diamond was warranted.[10]

India.—The National Mineral Development Corporation of India undertook development of two new diamond mines at Majgawar and Ramkhiria. The yield of these mines was estimated at 30,000 and 12,500 carats per year respectively.[11]

Ivory Coast.—Three companies, Société Anonyme de Recherches et d'Exploitations Minière en Côte d'Ivoire, Société Diamantifere de Côte d'Ivoire, and Société Minière de Bandama produced diamonds during 1963. The Société Waston and the Diamond Corporation of the Ivory Coast prospected but did not begin operation in 1963. Government enforcement of its ban on clandestine operations eliminated the production of native prospectors.[12]

Sierra Leone.—The Government and Templesman and Bros., an American firm, have signed an agreement to set up a factory to cut and polish rough and uncut diamonds within the country. Operation of the facility is anticipated by the end of 1965.[13] A detailed article describing licensed diamond mining in the country was published.[14]

South Africa, Republic of.—Mining began at the Finsch Mine, the first new diamond mine in 50 years, in December. The mine, at Potmasburg on a claim discovered by A. T. Fincham was purchased by DeBeers Consolidated Mines for over $6 million in 1963. The area was being stripped of overburden to reach the diamond-bearing "blue ground." Treatment of the "yellow ground" in the overburden for the recovery of diamond has begun. Pilot plant experience will determine the design of the treatment and recovery plant to be built. The area will be mined by open pit methods to a depth of 300 feet. Operating results will then determine whether to continue open pit methods or begin underground mining.[15]

A special court in Pretoria opened hearings on the General Electric Co.'s application to patent the process for manufacturing diamond. The Transvaal and Orange Free State Chamber of Mines opposed the application by claiming that the synthesis of diamond is an obvious

[8] Bureau of Mines. Mineral Trade Notes. V. 59, No. 2, August 1964, p. 34.
[9] Bureau of Mines. Mineral Trade Notes. V. 60, No. 1, January 1965, pp. 12–13.
[10] Mine and Quarry Engineering (London). Czech Diamond Prospects. V. 30, No. 2, February 1964, p. 96.
[11] Mining Journal (London). V. 262, No. 6709, Mar. 20, 1964, p. 216.
[12] Bureau of Mines. Mineral Trade Notes. V. 59, No. 1, July 1964, p. 13.
[13] Mining Journal (London). Sierra Leone Diamond Factory. V. 264, No. 6752, Jan. 15, 1965, pp. 43, 45.
[14] Fairbairn, W. C. Licensed Diamond Mining in Sierra Leone. Min. Mag. (London), v. 112, No. 3, March 1965, pp. 166–167, 169, 171, 173, 175, 177.
[15] Mines Magazine. New Diamond Mine. V. 55, No. 3, March 1965, pp. 23–24.

process and not an invention. The legal dispute was expected to be lengthy because of the affidavits entered by affected parties and the legal efforts by the Chamber of Mines to require deponents to give evidence in person.[16]

South-West Africa.—Diamond dredging activities continued in the offshore marine sediments. Offshore prospecting was underway by several mining companies. Notable among these was the *Rockeater*, a ship specifically designed for underwater mineral sampling, whose sampling operations were supported by the DeBeers Consolidated Mines, Ltd.

Marine Diamond Corp., Ltd., continued to recover diamonds from its offshore concession. During the period of January 1 to May 31, 1964, the company mined almost 102,000 carats of diamonds.

Mining activities continued along the territory's coastal belt. Consolidated Diamond Mines' Vacu-Veyor, essentially a large vacuum cleaner, proved successful for removing sand and gravel from bed rock.[17] An article provided a description of Consolidated Diamond Mines diamond mining practices.[18]

South-West Africa continued to produce and export semiprecious gem materials such as agate, amazonite, quartz (amethyst, green and rose), chalcedony, jasper, and tourmaline.

Thailand.—During 1963 about 13 million carats of precious and semiprecious materials was imported and over 11 million carats was exported. The bulk of the material imported consisted of synthetic or reconstructed precious or semiprecious stones.[19]

Upper Volta.—Diamond exploration rights were awarded to the West African Selection Trust, Ltd., for 1 year commencing at the beginning of 1964 and to be renewable for 2 years. The organization agreed to spend $62,000 per year for exploration. Geological surveys had been completed for only 20 percent of the territory involved, and traces of diamond were found near the Ghanaian border.[20]

U.S.S.R.—Both industrial and gem diamonds were mined at Mirny in Yakutia, Eastern Siberia, by opencast methods. A new concentrating plant capable of operating the entire year was being built. Finds of new kimberlite pipes were reported north of Mirny on the Olenck River.[21]

Zambia.—Rio Tinto, Ltd., discontinued exports of higher grade emerald from the Sandawana mine near Belingwe in order to form a domestic cutting industry that will export cut emerald. Rio Tinto planned to continue to export lower grade uncut emerald.[22]

TECHNOLOGY

Detection by loupe or Gemolite that a diamond was coated to enhance its color was reported. The coating, a foreign substance, is applied to

[16] Bureau of Mines. Mineral Trade Notes. V. 58, No. 5, May 1964, p. 18.
[17] South African Mining & Engineering Journal (Johannesburg). Mining Activities in S.W.A. V. 75, Pt. 2, No. 3725, June 26, 1964, pp. 187–188, 191.
[18] South African Mining & Engineering Journal (Johannesburg). 26-million to 1 Concentration Operation at Cons. Diamonds. V. 76, Pt. 1, No. 3759, Feb. 19, 1965, pp. 410–416.
[19] Bureau of Mines. Mineral Trade Notes. V. 59, No. 6, December 1964, pp. 18–19.
[20] Bureau of Mines. Mineral Trade Notes. V. 58, No. 5, May 1964, p. 23.
[21] Mining & Minerals Engineering (London). Diamond Mining in Yakutia. V. 1, No. 7, March 1965, p. 277.
[22] Bureau of Mines. Mineral Trade Notes. V. 60, No. 3, March 1965, p. 7.

the surface of certain diamonds to raise their color by neutralizing their true yellow color. Recent application of the phase microscope has brought the nature of coated surfaces of diamond into critical focus and photographic records were made under 500 to 1,000 magnification. The pictures reveal clearly where coatings were applied. They confirm earlier findings of characteristic markings that were seen with use of 10X loupe or a Gemolite.[23]

The development of an ultramodern automatic diamond sorting machine was reported. The machine was based on techniques in various scientific fields that electronics coordinated effectively, as X-rays, precision mechanics, vacuum, and compressed air.[24]

Steps taken to improve gem diamond production at the operations of the leading gem diamond producer was briefly described. The installation of two Wedag medium scoop wheel separators by Consolidated Diamond Mines of South-West Africa Ltd., should contribute considerably in increasing production.[25]

Advanced equipment used in diamond prospecting on the sea-floor sampling program conducted on behalf of the DeBeers group off the coast of South-West Africa was described.[26]

Method and equipment used in the production of diamonds in the U.S.S.R. were described.[27]

Tests for identifying artificial and improved turquoise were reported. Many substitutes are offered in place of genuine turquoise. The offerings are of three types: Compacted poor quality turquoise, colored and soaked with plastic; other natural substances similarly treated; and wholly artificial aggregates.[28]

An article was written on the misleading use of names on maps indicating turquoise locations in the Turquoise Mountains east of Baker, Calif.[29]

The use of synthetic sapphire jewel bearings in gas flow meters was discussed. Synthetic sapphires are nonmagnetic, corrosion-resistant, easily obtainable, and have miniature dimensions within critical tolerances.[30]

The occurrence of needle-like structures and some color phases in quartz are described.[31]

A guide on gems, minerals, crystals, and ores was written for professional mineralogists, gem cutters, collectors, and hobbyists. The

[23] Miles, Eunice R. First Close-Up Shots of Coated Diamonds. Jewelers' Circular-Keystone, v. 75, No. 1, October 1964, pp. 70–73, 104–108.
[24] Mining Journal (London). Automatic Rough Diamond Sorter. V. 263, No. 6743, November 1964, p. 355. Mining Magazine (London). Automatic Rough Sorter. V. III, No. 6, December 1964, p. 391.
[25] Mining Magazine (London). Dense Medium Separators for Diamonds. V. III, No. 6, December 1964, pp. 381–383.
[26] Mining Magazine (London). Sea-Floor Sampling. V. III, No. 6, December 1964, pp. 403, 405. South African Mining & Engineering Journal (Johannesburg). Prospecting For Diamonds Off South-West Africa. V. 75, Pt. 2, No. 3743, October 1964, pp. 1208–1209.
[27] World Mining. How Russia Mines More Diamonds. V. 17, No. 13, December 1964, p. 34.
[28] Pough, F. H. Turquoise and Its Substitutes. Jewelers' Circular-Keystone, v. 84, No. 4, January 1964, pp. 78, 80 and 81.
[29] Pemberton, H. E. Place Names in the Turquoise Mountains. The Mineralogist, v. 32, No. 5, October 1964, pp. 10–13.
[30] Chemical Engineering. Synthetic Jewel Bearings Make Accurate Gas Flow Meter. V. 71, No. 22, October 1964, p. 146.
[31] Pough, F. H. Quartz Jewelry Stones. Jewelers' Circular-Keystone, v. 75, No. 1, October 1964, pp. 86–90, 98–100.

book describes where to find them, methods of identification, cutting, and displaying.[32]

The cultivation of high-quality pearls in fresh-water mussels was described. The fresh-water mussel often is larger and has a thicker shell than the Japanese salt-water oyster. Fresh-water mussels yield two crops of non-nucleated pearls.[33]

The surface structures of crystal faces of natural and synthetic emeralds were reported. By using a reflection and phase contrast microscope, a clear distinction can be made between natural and synthetic emeralds.[34]

The geologic occurrence, variations, color zoning, and inclusions were discussed in an article on tourmaline.[35]

Goldmanite, a new garnet, has been identified as a constituent of a metamorphosed uranium-vanadium deposit in the Sandy (or South Laguna) mine area, about 4 miles southeast of Laguna, N. Mex. Occurrence, separation, properties, composition, and analytical procedures are described.[36]

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[32] Pearl, R. M. Gems, Minerals, Crystals and Ores. The Odyssey Press, New York, 1964, pp. 320.
[33] Pough, F. H. Cultured Pearls—Shape and Luster Distinguish Fresh-Water Cultured Pearls. Jewelers' Circular-Keystone, v. 84, No. 11, July 1964, pp. 72–76, 92.
[34] Sunagawa, I. A Distinction Between Natural and Synthetic Emeralds. The American Mineralogist, v. 49, Nos. 5 and 6, May–June 1964, pp. 785–792.
[35] Ransom, J. E. Tourmaline—The Geological Saga of a Crystal. The Mineralogist, v. 32, No. 4, August 1964, pp. 2–9.
[36] Moench, R. H. and R. Meyrowitz. Goldmanite, a Vanadium Garnet from Laguna, New Mexico. The American Mineralogist, v. 49, Nos. 5 and 6, May–June 1964, pp. 644–655.