Gem Stones

By John W. Hartwell [1] and Betty Ann Brett [2]

PRODUCTION of gem materials and mineral specimens in the United States during 1962 was valued at approximately $1,296,000, a $13,000 decrease from 1961.

Public Law 87–713, passed by Congress in 1962, stated that deposits of petrified wood were excluded from appropriation under the mining laws. Petrified wood was no longer to be considered a mineral that could be used to establish a valid mining claim. It was defined as "agatized, opalized, petrified, or silicified wood, or any material formed by the replacement of wood by silica or other matter."

DOMESTIC PRODUCTION

Production data were collected by the Bureau of Mines by canvassing amateur and professional producers of gem stones, but it was not possible to contact all operators. Therefore, information was based on a partial survey.

Gem material and mineral-specimen production was reported from 45 States, the same as in 1961. During both years California, Oregon, and Texas were the leading producing States. Twelve States, with production valued at $25,000 or over, produced 89 percent of the total value. These States were Arizona, California, Colorado, Maine, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming.

The reported find of a 14-ounce pink sapphire and a 24-ounce ruby in North Carolina during 1961 was discovered to be a hoax.[3]

Gem grade pollucite was reported mined during 1962 at the Walden Gem mine, Portland, Conn. A cut and polished gem of more than 12 carats and a 49 carat uncut stone of gem quality were some of the larger pieces produced. Many 1 to 4 carat pieces were recovered and offered for sale.

Agate.—About 125 tons of agate valued at $92,000 was reported produced in 18 States. The variety and quantity of agate included in the total was classified as: Moss, 4,300 pounds; turritella, 5,100 pounds; and fire agate, 1,400 pounds; the balance were miscellaneous types. Principal States, in decreasing order of production, were Oregon,

[1] Commodity specialist, Division of Minerals.
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[3] The Knoxville News-Sentinel. Rockhounds Go To "Gem Fields." Aug. 13, 1961, p. B–9.

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Arizona, New Mexico, Washington, California, South Dakota, Texas, and Utah.

Diamond.—Diamond production at Crater of Diamonds near Murfreesboro, Ark., was reported at 200 carats valued at $8,850. A frosty-white diamond was reported weighing 4.39 carats and valued at $3,000.

Jade.—Production of jade from Alaska, California, and Wyoming was 45,600 pounds valued at nearly $100,000. California was the leading State with 23,000 pounds valued at nearly 25,000. A 2,250-pound jade rock discovered in 170 feet of water off Catalina Island, Calif., was valued at $75,000.

Mineral Specimens.—About 140,000 pounds of mineral specimens were produced and valued at nearly $50,000. Arizona, Colorado, and New Mexico were the leading States; each produced more than 25,000 pounds. Copper mineral specimens production, not included in the above total, was reported at 21,900 pounds valued at $12,700. Most of the copper minerals came from Arizona.

Obsidian.—Production, totaling 122,000 pounds valued at $24,000, was reported from five States. California was the leading State with nearly 83,000 pounds valued at $17,000.

Petrified Wood.—Production of 174 tons valued at $92,000 was reported from 11 States during 1962. Utah led with nearly 32 tons followed in descending order by Arizona, Wyoming, South Dakota, California, Colorado, New Mexico, and Texas. Petrified palm wood production was only 138 pounds valued at $138, and petrified bone produced was 3,000 pounds valued at $2,000.

Quartz Crystal.—Output from 18 States was reported at 72,100 pounds valued at $30,200. Rose quartz production was estimated at 37,000 pounds with a value of $1,200. Smokey quartz production was 570 pounds valued at about $1 per pound.

Turquoise.—Production in 1962 was reported at 11,500 pounds valued at $44,500. Arizona was the leading turquoise-producing State with 7,400 pounds valued at nearly $17,000. New Mexico followed with 2,250 pounds valued at $6,000. Two other States that also reported production were Nevada and California. Nevada material was rated more valuable with values ranging from $5 to $20 per pound.

Miscellaneous Gem Material.—Jasper production was estimated at nearly 59,000 pounds valued at $15,000. Principal production was reported from Arizona. All grades of opal mined during the year were reported at 104,000 pounds valued at about $13,000. Only 10 pounds of fire opal valued at $150 was declared. Nevada was the leading-producing State with an estimated 101,000 pounds valued at $8,000. Most of this material was produced in Virgin Valley. Garnet production was 2,400 pounds valued at $1,200. Sales of 196 carats of cut and polished stones valued at nearly $500 were reported from a garnet mine at North Creek, N.Y. Black coral obtained by divers off the island of Maui was valued at $6,000 with a production of 1,200 pounds. No production was reported from the ocean near the other islands. Peridot gems from Arizona and New Mexico were reported to be valued at $14,000 with a production of 22,300 pounds.

The quantity and value of some other gem and ornamental stone reported produced were: Amethyst, 3 pounds, $180; beryl specimens, 1,300 pounds, $3,200; feldspar gems, 3,900 pounds, $1,500; fluorite,

23,100 pounds, $8,200; fossils, 1,600 pounds, $800; geodes, 1,100 pounds, $560; gold nuggets, 20 ounces, $700; idocrase, 4,500 pounds, $1,400; marcasite, 1,000 pounds, $700; onyx, 32,000 pounds, $8,000; ornamental stone, 73,100 pounds, $4,400; rhodonite, 6,300 pounds, $3,400; rhyolite, 42,000 pounds, $4,900; sapphire, 14 pounds, $2,100; topaz, 600 pounds, $1,500; and vesuvianite, 1,400 pounds, $280.

CONSUMPTION

Gem diamond consumption, $192 million, was nearly the same as in 1961; sales of imported imitation and synthetic gem stones, $4.3 million, were 20 percent lower; and sales of natural and cultured pearls, $18.9 million, were 12 percent higher.

Apparent consumption (production plus imports minus exports and reexports) of gem stones in the United States was $167 million, compared with $181 million in 1961.

PRICES

Prices quoted during January for cut and polished unmounted gem diamonds were: 0.25 carat, $65 to $318; 0.5 carat, $200 to $550; 1 carat, $525 to $1,500; 2 carats, $1,200 to $4,364; and 3 carats, $2,400 to $8,162. The price range of each size depended upon quality (cut, clarity, and color).

A report on the diamond industry contained information on diamond marketing and world prices of gem and industrial diamonds during 1961.[4]

FOREIGN TRADE[5]

Imports.—Gem stone imports increased less than 1 percent in value, compared with 1961. Gem diamonds accounted for 85 percent of total imports but decreased 711,352 carats in quantity and $1.6 million in value, compared with 1961.

Diamonds, rough or uncut, were principally imported, by quantity, from the United Kingdom (53 percent), followed by Venezuela (9 percent), British West Africa (9 percent), and the Republic of South Africa (8 percent). Diamonds, cut but unset, were principally imported from Belgium-Luxembourg (49 percent) and Israel (36 percent). The average values per carat of cut but unset diamond imports were Belgium-Luxembourg, $95.49; Israel, $79.36; the Netherlands, $103.58; Republic of South Africa, $182.43; the United Kingdom, $129.64; and West Germany, $71.63.

Imports of emeralds, cut but unset, decreased 30,600 carats under 1961; 93 percent came from India, 2 percent each from Colombia and Switzerland, 1 percent from West Germany, and the balance from 18 other countries. The average value per carat of emerald imports

[4] Switzer, George. Thirty-Seventh Annual Report on the Diamond Industry—1961. Jewelers' Circ.-Keystone, 1962. 48 pp.

[5] Figures on imports and exports compiled by Mae B. Price and Elsie D. Jackson, Division of Foreign Activities, Bureau of Mines, from records of the U.S. Department of Commerce, Bureau of the Census.

from the principal exporting countries were Colombia, $124,28; India, $10.95; Switzerland, $45.64; and West Germany, $10.87.

Rubies and sapphires, cut but unset, valued at $1,207,700 were imported from 15 countries, principally from Colombia (86 percent), the United Kingdom (4 percent), India (3 percent), and Republic of South Africa (3 percent). Imports from Colombia, the principal source, were valued at $1,033,000—more than a 100-percent increase, compared with 1961.

Cultured pearl imports were about $1.8 million more than 1961, and imports of natural pearls were $237,000 more. The principal countries from which natural pearls were imported were Japan (49 percent) and India (41 percent).

The largest quantity of rough or uncut and cut but unset gem stones imported into the United States came from Hong Kong ($658,000) and Brazil ($285,000).

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

Stones	1961		1962	
	Quantity	Value (thousands)	Quantity	Value (thousands)
Diamonds:				
Rough or uncut, suitable for cutting into gem stones, duty free—carats	2,274,923	$114,670	1,420,443	$102,446
Cut, but unset, suitable for jewelry, dutiable—carats	839,150	78,605	982,278	89,188
Emeralds: Cut but not set, dutiable—do	227,284	2,090	196,649	2,798
Pearls and parts, not strung or set, dutiable:				
Natural	(1)	500	(1)	737
Cultured or cultivated	(1)	16,425	(1)	18,198
Other precious and semiprecious stones:				
Rough or uncut, duty free	(1)	1,169	(1)	1,765
Cut but not set, dutiable	(1)	[2] 3,900	(1)	5,098
Imitation, except opaque, dutiable:				
Not cut or faceted	(1)	54	(1)	61
Cut or faceted:				
Synthetic—number	664,932	[2] 345	1,176,058	457
Other	(1)	4,907	(1)	3,740
Imitation, opaque, including imitation pearls, dutiable	(1)	14	(1)	18
Marcasites: Real and imitation, dutiable	(1)	36	(1)	(3)
Total	(1)	222,715	(1)	224,506

[1] Quantity not recorded.
[2] Revised figure.
[3] Less than $1,000.

Source: Bureau of the Census.

Exports.—Precious and semiprecious gem stones exported were $18.8 million, compared with $14.8 million in 1961. Diamonds, cut but unset, accounted for 74 percent of the total. The value of gem stones exported, except diamonds, was over $3 million.

Reexports of gem stones, precious and semiprecious, were $40 million, compared with $28 million in 1961. Diamonds, rough, uncut, and suitable for cutting into gem stones, accounted for 86 percent of the total.

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

Country	1961				1962			
	Rough or uncut		Cut but unset		Rough or uncut		Cut but unset	
	Carats	Value (thousands)	Carats	Value (thousands)	Carats	Value (thousands)	Carats	Value (thousands)
North America:								
Canada	7,772	$833	79	$10	5,128	$655	217	$16
Mexico	257	3	160	14			198	22
Panama			23	3				
Total	8,029	836	262	27	5,128	655	415	38
South America:								
Brazil	42,962	759	706	36	996	39	1,469	121
British Guiana	26,150	686	93	8	9,852	346	133	10
Venezuela	111,700	3,151			128,264	4,025		
Total	180,812	4,596	799	44	139,112	4,410	1,602	131
Europe:								
Austria							130	13
Belgium-Luxembourg	210,419	15,391	428,054	41,957	39,877	2,381	478,795	45,721
France	47,857	1,522	10,573	1,018	4,902	413	14,291	1,459
Germany, West	896	28	52,154	3,480	2,144	59	75,301	5,394
Ireland							1	(1)
Italy			541	59			201	66
Malta and Gozo							169	16
Netherlands	50,563	2,360	28,756	3,234	22,367	1,652	23,786	2,463
Portugal							12	1
Spain							7	5
Switzerland	6,526	269	349	205	503	95	526	66
U.S.S.R.			1,023	85			2,640	262
United Kingdom	1,561,423	81,702	5,238	680	752,905	67,087	5,901	765
Total	1,877,684	101,272	526,693	50,718	822,698	71,687	601,760	56,231
Asia:								
Hong Kong			1	(1)			46	12
India			9	3			38	50
Iran			56	4			74	6
Israel	50,744	1,938	278,229	21,971	20,001	949	351,306	27,881
Japan	244	26	942	91			831	70
Malaya, Federation of							7	10
Singapore, Colony of			38	11				
Thailand			83	1				
Total	50,988	1,964	279,358	22,081	20,001	949	352,302	28,029
Africa:								
British West Africa and Sierra Leone					125,407	4,622		
Cameroon, Federal Republic of					2,218	28	321	38
Congo, Republic of the and Ruanda-Urundi	10,860	228	10	1	34,945	1,309		
Ghana					23,962	253		
Liberia	8,113	280			10,456	1,211		
Nigeria					778	190		
South Africa, Republic of [2]	54,331	3,346	31,951	5,725	120,213	12,255	25,878	4,721
Western Africa, n.e.c.[3]	80,243	2,097			57,030	2,772		
Western Equatorial Africa, n.e.c.[3]	3,863	51			58,495	2,105		
Total	157,410	6,002	31,961	5,726	433,504	24,745	26,199	4,759
Oceania: Australia			77	9				
Grand total	2,274,923	114,670	839,150	78,605	1,420,443	102,446	982,278	89,188

[1] Less than $1,000.
[2] Effective Jan. 1, 1962; formerly Union of South Africa.
[3] Not elsewhere classified.

Source: Bureau of the Census.

WORLD REVIEW [6]

NORTH AMERICA

Canada.—De Beers Consolidated Mines, Ltd., an associate of Anglo-American Corporation of South Africa, Ltd., acquired the exploration license that was granted to W. G. Wahl, Ltd., to explore for diamonds in Ontario.[7] Mineral sources in eastern Ontario that could be easily reached by collectors were reported.[8] Boulders of jade were reported discovered in Vital Creek, near Takla Landing, British Columbia. Two stones weighing 5,000 and 3,000 pounds each were shipped to Vancouver for display. Vancouver dealers in jade were reported to be exporting about 40 tons a year, the greater portion being destined for West Germany.[9]

TABLE 3.—World production of diamonds, by countries

(Thousand carats)

Country	1961		1962	
	Gem	Industrial	Gem	Industrial
Africa:				
Angola	688	460	701	380
Central African Republic	41	70	80	185
Congo, Republic of the	405	17,738	[1] [2] 456	[1] [2] 17,700
Ghana	[3] 654	[3] 1,560	628	2,580
Guinea [3] [4]	490	730	140	210
Ivory Coast	219	330	102	182
Liberia [4]	[3] 596	500	225	680
Sierra Leone [3] [4]	[3] 799	[3] 1,497	707	1,200
South Africa, Republic of:				
Pipe mines:				
Premier	360	1,200	425	1,260
De Beers Group	953	760	883	750
Other pipe mines [3]	35	80	36	84
Alluvial mines [3]	240	160	290	190
South-West Africa	816	90	800	227
Tanganyika	340	345	323	324
Other regions:				
Brazil	175	175	175	175
British Guiana	68	45	60	40
Venezuela	60	74	94	83
U.S.S.R., India, and others [3]	80	420	75	425
World total	[3] 7,019	[3] 26,234	6,200	26,675

[1] Including exports reported from Congo (excluding French).
[2] Estimate.
[3] Revised figure.
[4] Exports.

SOUTH AMERICA

Brazil.—New diamond deposits were reported discovered near Grao Mogol, Minas Gerais,[10] and at Chapada dos Guimarees, Mato Grosso.[11]

[6] Values in this section are U.S. dollars, based on the average rate of exchange by the Federal Reserve Board unless otherwise specified.
[7] Northern Miner (Toronto). De Beers Comes to Canada Looking for Diamonds. V. 48, No. 11, June 7, 1962, p. 16, sec. 1.
[8] Marshall, John W., Jr. Mineral Collecting in Eastern Ontario, Canada. Rocks and Minerals, v. 37, Nos. 5–6, May–June 1962, pp. 229–232, 328.
[9] Western Miner and Oil Review (Vancouver). Jade Boulders in Omineca. V. 35, No. 12, December 1962, p. 52.
[10] Engineering and Mining Journal. V. 163, No. 10, October 1962, p. 154.
[11] Mining Journal (London). Diamond Find in Brazil. V. 259, No. 6624, Aug. 3, 1962, p. 110.

A large-scale diamond-prospecting program by the Pacific Tin Co. near Diamantina, Minas Gerais, on the Rio São Francisco was in progress, and about 65 to 70 men were employed. An amethyst discovery was reported. Production was estimated at 3 tons, 10 percent of which was faceting grade. The available varieties of colors and sizes were described.[12]

British Guiana.—Diamond production decreased 12 percent from 1961. Bad weather at midyear, hampering the individual prospectors, was blamed for the reduced production.[13]

Venezuela.—Three gem-mining concessions were granted by the Government: One for rubies, another for precious stones in the State of Merida, and the third was for diamonds in the State of Bolivar.[14]

EUROPE

Belgium.—Imports of cuttable diamonds were reported to be about 3.4 million carats valued at $95 million in 1961. Nearly 192,000 carats of this quantity came from the United States. Polished diamond imports were 221,000 carats valued at $36 million. Polished diamond exports were 916,000 carats valued at $102 million.[15]

Switzerland.—Data on gem stone and jewelry imports for 1960 and 1961 were reported. Statistics on output of manufactured and semimanufactured precious and semiprecious stones were not available. Tariff rates and import duties were given.[16]

ASIA

Burma.—The Kachin State Supreme Council announced plans to develop and nationalize the jade industry, which was centralized about 65 miles west of Mogaung, Myitkyina District, where the mining and trading was monopolized by the Chinese. Plans included development of abandoned mines and establishment of plants to manufacture household articles of low-grade jade.[17]

Ceylon.—Gem stone mining followed the same pattern as in previous years. Value of exports which was the only figure published was $420,000. The principal varieties produced were ruby, sapphire, cat's eye, topaz, zircon, aquamarine, and moonstone.[18]

Hong Kong.—Jewelry and gem stones available, prices, methods of manufacturing and processing, and items for sale that should be avoided by U.S. buyers were described. Nearly 700 jewelry stores and lapidaries flourished in this British island colony. Jewelry manufacture was limited to small, simple articles of jade and ivory; no figure carving was attempted. Every carved stone object originated

[12] Bookstone, Harry. New Brazilian Amethyst Find. Jewelers' Circ.-Keystone, v. 132, No. 11, July 1962, pp. 66, 68, 78.
[13] U.S.Consulate, Georgetown, British Guiana. State Department Dispatch A–231. Feb. 17, 1963, p. 14.
[14] Mining World. World Wide Mining Activities. V. 25, No. 5, Apr. 25, 1963, p. 124.
[15] U.S. Consulate, Antwerp, Belgium. State Department Airgram 37. Nov. 2, 1962, encl. 8, p. 1; encl. 10, pp. 1, 2.
[16] Nelson, John H. What's Current in Commodities? Jewellery, Switzerland. Foreign Trade, v. 118, No. 3, Aug. 11, 1962, pp. 8, 9.
[17] Bureau of Mines. Mineral Trade Notes. V. 55, No. 4, October 1962, p. 18.
[18] Mining World. World Wide Mining Activities. V. 25, No. 5, Apr. 25, 1963, p. 107.

in China and could not be purchased for import into the United States.[19]

India.—Crude emerald production in 1960 and 1961 was 321,000 and 304,000 carats, respectively, and no value was given. In 1960 trimmed or processed emeralds, weighing 59,000 carats, were valued at $12,200, and in 1961, 14,000 carats were processed valued at $2,700.[20] The diamond mines in the Ramkherya and Majhgawan areas in the Panna District, Madhya Pradesh, were expected to start producing in 1963. Recovered during the prospecting of these areas in 1960–62 were 540 gems and 284 industrial diamonds. Surveys of other diamond deposits in the Kurnool, Anantpur, Mahboobnagar, and Krishna Districts were planned.[21]

Japan.—During 1962 exports of pearls from the extensive pearl-forming area in Mie Prefecture was reported to be 62,850 kilograms valued at $41,850,000. The quantity exported was 2,000 kilograms more than during 1961. The United States was still the leading customer, followed by Switzerland.[22] Cultured pearl exports in 1961, reported by the All Japan Pearl Culture Cooperative, reached a record of 27,350 pounds valued at $35.8 million, an increase of 20 percent over 1960.[23] The Japanese jewelry industry was reviewed. Pearls, opal, and coral ranked high in gem stone sales. Quantities of jade were sold at prices higher than in the United States. Carved ivory was also offered for sale. Prices for pearls, opals, coral, and jade were quoted.[24]

AFRICA

Angola.—Diamond production was normal in the Lunda District. Following several years of exploration, a new diamond field in the Guango Basin was expected to start producing in 1963. Diamond output in 1962 was 1,081,100 carats, of which 65 percent was gem quality.[25]

British East Africa.—Tanganyika Corundum Corp., Ltd., continued to work the ruby-corundum deposit near Longido during 1961. Exports to Germany of green zoisite matrix and rough ruby were reported for the first time. Federal Ventures, Ltd., completed a preliminary examination of the ruby and sapphire deposits of the Umba River in the Lushoto District and applied for a mining lease. Negotiations were underway for the sale of these gem materials. One prospecting license for zircon in the Lushoto District was granted. The zircons found were described as suitable for use as gem stones. An important development for the semiprecious stone industry was the establishment of a lapidary by Tanganyika Crystals, Ltd., at Arusha.[26] Owners of the Williamson Diamond mines made an agreement with the Tan-

[19] Pough Frederick H. A Glance at Jewelry Scene in Hong Kong, Jeweler's Circ.-Keystone, v. 133, No. 1, October 1962, pp. 88, 90, 103–105; Hong Kong Hokus Pokus, No. 2, November 1962, pp. 66, 68, 85–86.
[20] Bureau of Mines. Mineral Trade Notes. V. 55, No. 6, December 1962, p. 10.
[21] Journal of Mines, Metals and Fuels (Calcutta). V. 10, No. 8, August 1962, p. 30.
[22] U.S. Consulate, Nagoya, Japan. State Department Airgram A–92. Mar. 12, 1963, pp. 1, 2.
[23] Bureau of Mines. Mineral Trade Notes. V. 55, No. 3, September 1962, p. 29.
[24] Pough, Frederick H. The Japanese Jewelry Scene. Jeweler's Circ.-Keystone, v. 133, No. 3, December 1962, pp. 48, 50, 56.
[25] Mining World. World Wide Mining Activities. V. 25, No. 5, Apr. 25, 1963, p. 114.
[26] Mining Magazine (London). Tanganyika Mining Industry, 1961. V. 106, No. 6, June 1962, pp. 337–340.

ganyikan Government to examine new ruby and sapphire deposits found near the Umba River.[27]

Ivory Coast.—Two government corporations were formed to prospect for diamonds in the vicinity of Seguela. Other organizations to which the government considered granting concessions were consolidated African Selection Trust, Diamond Distributors, Inc., and Harry Winston, Inc. The Israeli Government was granted exclusive diamond prospecting rights for 1 year in two large areas.[28]

Mozambique.—Tourmaline was produced in 1961 by Empresa Mineira do Alto Ligonha, Lda., from the pegmatite area of the Zambezia District. Production in 1961 was estimated at 500,000 carats, compared with 70,000 carats in 1960. Most of the production was exported to West Germany.[29]

Rhodesia and Nyasaland, Federation of.—Progress continued in the development of the Sandawana emerald deposit. Drilling indicated that emeralds may be found in some areas at deeper levels than was expected.[30] Four exclusive precious stone prospecting licenses were granted by the Southern Rhodesian Government to Sandawana Mines (Pvt.), Ltd., in July 1962.[31] Amethyst veins discovered southeast of Kalomo, Northern Rhodesia, were described. Mining was done by manual selection of gem quality stones from weathered vein material. Reserves of quality material were estimated at over 2 million pounds.[32] According to the Central Statistical Office, Salisbury, amethyst production in Northern Rhodesia was nearly 10,000 pound valued at $22,400. Agate output in Southern Rhodesia in 1961 was 3,700 pounds valued at $1,500.[33] A report on Rhodesian gem-stone production and problems in marketing was published.[34]

South Africa, Republic of.—Exports of emerald crystals decreased to 353 pounds valued at $311,500, compared with 1,200 pounds valued at $145,000 in 1961 and 2,880 pounds at $113,000 in 1960. The crystals exported in 1961 and 1962 went principally to the United Kingdom. Tiger's eye production was 206,000 pounds in 1962 and 34,000 pounds in 1961. Exports were 126,000 pounds valued at $37,500 in 1962 and 12,000 pounds valued at $760 in 1961. The only producer of tiger's eye was P. C. Beukes, Niekerkshope, Cape Province.[35] A 32-carat gem diamond and several 10-carat stones were found by miners at Windsorton.[36] The Treasure Trove Diamond mine on the West Rand near Postmasburg was expected to resume production. This mine, which was closed in 1930, produced principally gem quality stones.[37]

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[27] Mining Journal (London). Ruby Deposits in Tanganyika. V. 259, No. 6627, Aug. 24, 1962, p. 175.
[28] Mining Journal (London). Diamond Prospecting in the Ivory Coast. V. 258, No. 6618, June 22, 1962, p. 652.
[29] Bureau of Mines. Mineral Trade Notes. V. 55, No. 3, September 1962, p. 29.
[30] South African Mining & Engineering Journal (Johannesburg). V. 73, pt. 1, No. 3616. May 25, 1962, pp. 1145.
[31] Mining Journal (London). V. 259, No. 6624, Aug. 3, 1962, p. 110.
[32] Brown, A. G. The Amethyst Deposits of Mwakambiko. Rhodesian Min. and Eng. (Salisbury, Southern Rhodesia), v. 27, No. 12, November 1962, p. 28.
[33] Bureau of Mines. Mineral Trade Notes. V. 55, No. 3, September 1962, p. 29.
[34] Broeksma, J. B. A. Rhodesia May Be on the Way to "Gem Country" Status. Rhodesian Min. and Eng. (Salisbury, Southern Rhodesia), v. 27, No. 10, October 1962, pp. 19–20, 30.
[35] U.S. Consulate, Johannesburg. State Department Airgram A–362. Mar. 28, 1963. 5 pp.
Bureau of Mines. Mineral Trade Notes. V. 55, No. 2, August 1962, pp. 28, 29.
[36] Engineering and Mining Journal. V. 163, No. 10, October 1962, p. 161.
[37] Mining Journal (London). V. 259, No. 6633, Oct. 5, 1962, p. 321.

South-West Africa.—Marine Diamond Corp., Ltd., dredged for diamonds off the South-West African coast. By July, 9,000 carats were produced and 250 carats per day were expected to be recovered during the balance of the year. Southern Diamonds Corporation, Ltd., was formed to operate off the Atlantic coast near the Cape of Good Hope. Fifty percent of the operating expenses were being furnished by the owner of Marine Diamond Corp., and the balance, from two other companies.[38] Ocean diamond mining was still considered to be in the experimental stage, and no official estimate of the payable reserves of diamondiferous gravel was made. Diamond and mineral deposits were discovered along the Skeleton coast between the dry beds of the Ugab and Unjab Rivers. Over 800 diamonds, 90 percent being of gem quality, were reported recovered in this area.[39] Semiprecious stone production in 1961 was reported to be about 38,000 pounds; principally amethyst, chalcedony, rose quartz, and tourmaline. Exports were 14,000 pounds valued at $10,300, almost all of which was shipped to West Germany. Producers of semiprecious stones were listed.[40]

TABLE 4.—South-West Africa: Production and exports of gem stones in 1962

Gem	Production	Exports	
	Quantity	Quantity	Value
Diamonds—carats	[1] 1,027,233	800,497	$40,000,000
Amethyst—pounds	312,000	9,560	9,800
Chalcedony—do	8,000	4,740	2,150
Rose quartz—do	500	----	----
Tourmaline—do	11	----	----
Aragonite—do	98,000	8,000	1,120

[1] Industrial and gem diamonds combined.

Source: U.S. Consulate, Johannesburg, Republic of South Africa. State Department Airgram A-334. Mar. 13, 1963, pp. 1-2.

OCEANIA

Australia.—Opal exports were about $900,000 per year from the producing areas of Coober Pedy and Andamooka, South Australia, and Lightning Ridge, New South Wales. The Australian Government considered the industry to be of sufficient importance to station officials full time at the fields and to incur expenditures to provide water for the areas.[41] Rise in prices of sapphire caused an increased interest in mining this gem. The sapphire mining district of Inverell in New South Wales and the Anakie District of Queensland reported increased activity.[42] The potential of sapphire and opal mining was discussed in a report by the Queensland Government.[43]

[38] Mining Magazine (London). Diamonds Mined Off the Seabed. V. 107, No. 1, July 1962. p. 40.
[39] Mining Journal (London). Diamonds and Salt in South West Africa. V. 258, No. 6610, Apr. 27, 1962, p. 419.
[40] Bureau of Mines. Mineral Trade Notes. V. 55, No. 2, August 1962, pp. 29, 30.
[41] Mining Magazine (London). Opals. V. 107, No. 3. September 1962, p. 167.
[42] Mining Magazine (London). Gems. V. 106, No. 3, March 1962, p. 158.
[43] Queensland Government Mining Journal (Australia). Gemstones. V. 63, No. 729, July 1962, p. 334.

TECHNOLOGY

Nineteen gem and mineral localities in Kern County, Calif., were described. The names and locations of the deposits and the materials found were published.[44]

Opal occurrences in New Mexico were described and identification and infrared absorption data were given.[45]

A world-wide review of emerald deposits was published.[46]

A report on the diamond industry contained information on diamond marketing, and the prices of gem and industrial diamonds throughout the world during 1961.[47]

Each monthly issue of The Mineralogist Magazine, beginning with November–December 1960, described methods of mineral identification. In the 1960 through 1962 issues the titles of the articles in chronological order were Introduction, Physical Characteristics of Minerals, Chemistry and the Blowpipe, Heat Tests for Elements, The Native Elements, The Sulfides and Sulfosalts, The Halides and Oxides, The Carbonates, The Anhydrous Silicates, The Hydrous Silicates, The Oxygen Salts Part I, The Oxygen Salts Part II, and Evaluation and Tests for Unknowns.

A series of articles on quartz minerals starting in October 1961 was concluded. The gem variety of quartz minerals described were formed by hot and cold solutions and included rock crystal, smoky and rose quartz, cairngorm, and amethyst.[48]

Analyses and physical properties were given for three types of garnets found in a mine near Gabbs, Nev.[49]

Each monthly issue of Mine and Quarry Engineer (London) beginning with October 1953 described a mineral, giving the synonyms, nomenclature, varieties, compositions, crystallography, physical and optical properties, tests, occurrences, and uses. Each mineral was illustrated in color. In the 1962 issues the minerals in chronological order were spheene, rosasite, petalite, silver, marcasite, descloizite, cobaltite, anhydrite, willemite, zircon, pyrolusite, and covellite.

Black coral found in Hawaii was softer than red coral, took a good polish, could be cut with a wood saw or a knife before drying, was soft and pliable in warm water, shrank when it dried and hardened, and developed concentric separation cracks in sections through the trunk and limbs on shrinkage.[50]

Orange (natural and synthetic) gem stones were described. Yellow and golden natural gems are common but orange gems, which include diamond, opal, scapolite, and sapphire, were considered the rarest of all colors in the gem world. The makers of synthetic orange sapphires

[44] Troxel, Bennie W., and Paul K. Morton. Mines and Mineral Resources of Kern County, Calif. California Div. of Mines, County Rept. No. 1, 1962, pp. 90–92.
[45] Sun, Ming-Shan. Tridymite (Low Form) in Some Opal of New Mexico. Am. Miner., v. 47, No. 11–12, November–December 1962, pp. 1453–1455.
[46] Rhodesian Mining and Engineering (Salisbury, Southern Rhodesia). Emeralds: Where and How They Occur. V. 27, No. 1, January 1962, pp. 23–24.
[47] Switzer, George. Thirty-Seventh Annual Report on the Diamond Industry—1961. Jewelers' Circ.-Keystone, 1962, 48 pp.
[48] Pough, Frederick H. The Many Faces of Quartz. Jewelers' Circ.-Keystone, v. 132, No. 4, January 1962, pp. 60, 62, 64.
[49] Lee, Donald E. Grossularite-Spessartite Garnet From the Victory Mine, Gabbs, Nevada. Am. Miner., v. 47, No. 1–2, January–February 1962, pp. 147–151.
[50] Pough, Frederick H. Black Beauty in Hawaii. Jewelers' Circ.-Keystone, v. 132, No. 13, September 1962, pp. 100, 102, 129.

produced the change in color by adding nickel oxide to the formula.[51]

Methods and devices used in prospecting for gem stones were described. To facilitate the recognition of water-worn gems in gravel deposits, 12 gem stones were described and data on what to look for when prospecting given.[52]

A system of prospecting for kimberlite pipes from the air was described. Prepared and coordinated supplemental data from an aeromagnetic survey provided a basis for final ground operation.[53]

A method of cleaning bedrock for the recovery of diamonds was described.[54]

The Diamond Research Laboratory in Johannesburg, Republic of South Africa, discovered a method whereby diamonds can be separated optically from waste rock or gravel.[55]

Methods of cutting and polishing semiprecious gems in cabochon form were described.[56]

Methods employed in Hong Kong for cutting and polishing jade were described.[57]

A brilliant silicon carbide gem of about 0.5 carat required special techniques for cutting and polishing.[58]

Calcium titanate boules approximately 1 inch long and 0.5 inch in diameter were grown by the flame fusion technique then heat-treated to produce untwinned crystals. This colorless crystal had an index of refraction of 2.40, slightly less than diamond; a hardness of 6.5 to 7, slightly less than quartz; conchoidal fracture, melting point of 1,960° C, and a specific gravity of 4.10, about as heavy as zircon—one of the heaviest gem stones.[59]

A process of producing large emerald crystals synthetically by Bell Laboratories was described. Even though the temperature during crystallization was about 1,000° C, the crystals could be removed quickly from the furnace for cooling, because of their high resistance to thermal shock.[60]

The artificial growth of oxide crystals was described as a method of providing insight into the forces that hold solids together and of furthering understanding of how to use solids in technology.[61]

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[51] Jewelers' Circ.-Keystone. The Padparadschah: A Color for Collectors. V. 132, No. 12, August 1962, pp. 140, 160–161.

[52] Goldberg, I. Hints for Prospectors on Recognition of Gemstones. Rhodesian Min. and Eng. (Salisburg, Southern Rhodesia), v. 27, No. 10, October 1962, pp. 26–27, 30.

[53] Barygin, V. M. Poiski kimberlitovykh trubok aèrometodami (Prospecting for Kimberlite Pipes from the Air). Trud. yakutskogo filiala sibirskogo otdel. Akad. Nauk U.S.S.R., No. 6, 1961, pp. 172–179; trans. by N. W. Wilson, Min. Mag. (London), v. 107, No. 2, August 1962, pp. 73–78

[54] Mining Magazine (London). Cleaning Bedrock by Vacuum. V. 107, No. 1, July 1962, p. 28.

[55] Mining Magazine (London). Optical Sorting of Diamonds. V. 106, No. 4, April 1962, pp. 246–248.

[56] Rhodesian Mining and Engineering (Salisbury, Southern Rhodesia). Give 'Cabochon Charm' to our Semi-Precious Stones. V. 27, No. 10, October 1962, pp. 20–21.

[57] Shreve, R. N. How Jade Is Cut Today. Gemmologist (London), v. 31, No. 369, April 1962, p. 63.

[58] Mitchell, R. K. A Rare Synthetic. J. Gemmology (London), v. 8, No. 6, April 1962, pp. 218–220.

[59] Merker, Leon. Synthesis of Calcium Titanate Single Crystals by Flame Fusion Technique. J. Am. Ceram. Soc.: Ceram. Abs., v. 45, No. 8, Aug. 1, 1962, pp. 366–369.

[60] Chemistry. Growing Emeralds. V. 36, No. 2, October 1962, pp. 23, 26.

[61] Laudise, R. A. Growing Oxide Crystals. Bell Laboratories Record, v. 40, No. 7, July–August 1962, pp. 244–250.

A method of growing crystals, similar to the Verneuil method but adding supplementary heat to all portions of the crystalline mass before shutting off the burner, was patented.[62]

A process of growing a pegmatitic crystal by thermally inducing a circulation of nutrient solution in the seed-growing region was described.[63]

Several patents were granted for methods of producing diamonds synthetically.[64]

The changes of coloration, transparency, and origin of beryls during heating to 1,200° C were studied. Coloration usually increased during heating. At temperatures above 600° C, transparency and glassy luster disappeared, and refractive indicies and birefringence decreased.[65]

A series of articles on the Brazilian gem market described the discovery of kunzite, tourmaline, and aquamarine deposits, what the tourist or jeweler can see in Brazil, and the difficulties of the Brazilian miners in producing gem stones.[66]

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[62] Merker, Leon (assigned to National Lead Co., New York). Method for Growing Crystals. U.S. Pat. 2,012,374, Dec. 12, 1961.

[63] Sawyer, Charles B. (assigned to Sawyer Research Products, Inc., Eastlake, Ohio). Production of Artificial Crystals. U.S. Pat. 3,013,867, Dec. 19, 1961.

[64] Bovenkerk, Harold P. (assigned to General Electric Co.). Method for Producing Improved Diamond Crystals. U.S. Pat. 2,992,900, July 18, 1961; Method of Diamond Growth and Apparatus Therefor, U.S. Pat. 3,031,269, Apr. 24, 1962.

Custers, J. F. H., H. B. Dyer, B. W. Senior, and P. T. Wedepohl, Canadian Pat. 643,290, June 19, 1962.

Eversole, William G. (assigned to Union Carbide Corp., Kenmore, N.Y.). Synthesis of Diamond. U.S. Pat. 3,030,187, Apr. 17, 1962; U.S. Pat. 3,030,188, Apr. 17, 1962.

[65] Gavrusevich, B. S., and F. Ya. Sarapulov. (Concerning the Change of Color and Optical Properties of Beryls on Heating.) Trans. Akad. Nauk S.S.S.R., Doklady, v. 31, No. 8, 1941, pp. 771–774; Tech. Trans. (Dept. of Commerce), v. 7, No. 9, May 15, 1962, p. 637.

[66] Pough, Frederick H. Brazilian Gem Market, 1962. Jewelers' Circ.-Keystone, v. 132, No. 5, February 1962, pp. 70, 75, 93–94; No. 6, March 1962, pp. 74, 76, 91–92; No. 7, April 1962, pp. 76, 78, 80, 144; No. 8, May 1962, pp. 78, 80, 82, 90–91; No. 9, June 1962, pp. 50, 52 60–61.