Gem Stones

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GEM stones and mineral specimens produced in the United States during 1959 had an estimated value of $1,185,000, nearly 18 percent more than in 1958. This increase was primarily due to a 235-percent gain from Utah and increases from 28 other States.

New gem stone deposits continue to be found in all sections of the United States. A few old deposits, thought depleted, were reestablished as producing localities with the introduction of new mining methods.

DOMESTIC PRODUCTION

Because of the many scattered, part-time, and amateur producers of gem stones it was not possible for the Bureau to canvass all operations. Therefore, the information is based on a partial survey, and the domestic production figures given in this chapter are estimates based on available data.

Production was reported for the first time from the 50th State, Hawaii. Oregon was the leading producing State, with an estimated $200,000, the same as in 1958. Eleven States—Oregon, California, Utah, Nevada, Texas, Arizona, Wyoming, Washington, Colorado, New Mexico, and Montana—produced 88 percent of the total value.

During the year petrified wood, turquoise, jade, agate, quartz crystal, and mineral specimens, in that order, comprised about 27 percent of the value of all gem materials and mineral specimens collected. Principal varieties produced, in decreasing order by weight, were petrified wood, agate, rose quartz, unclassified mineral specimens, quartz crystals, and jasper. These materials comprised about 10 percent of the total weight collected.

Agate.—Producers in 27 States reported recovering 35 tons of agate valued at $30,000, a 10-percent decrease in weight, and a 40-percent decrease in value from 1958. Principal producing States, in decreasing order of production, were Oregon, Utah, Wyoming, California, and Texas. Gem-stone industry representatives estimated that agate production from Oregon, Washington, Idaho, and Montana ranged from 50 to 200 tons.

Jade.—Over 11,000 pounds of jade valued at $35,000 was produced during 1959. Wyoming was the leading State in value ($17,000); Alaska led in quantity (5,625 pounds). Some processed jade, mined at Dahl Creek near Kobuk, Alaska, was sold at auction at the Anchorage Fur Rendezvous, Anchorage, at prices ranging from $3 to $22

[1] Commodity specialist.
[2] Statistical clerk.

per pound. The average price paid for Alaskan jade, rough and uncut, was more than $2 per pound. Quantities of jade continued to be sent to West Germany for cutting and polishing.

Petrified Wood.—An estimated 350 tons of petrified wood valued at more than $100,000 was produced by 16 States during 1959—greater than three times the estimated 110 tons reported in 1958. Utah was the leading State, with nearly 200 tons valued at $60,000, followed by Arizona, Oregon, and Wyoming.

Quartz Crystal.—About 16 tons of quartz crystal valued at $10,000 was produced in 12 States. Arkansas led with over 13 tons valued at $5,000. About 11,000 carats of smoky quartz crystal valued at $1,000 was reported recovered in New Hampshire.

Turquoise.—Total U.S. production was estimated at 16,000 pounds with a value of $63,000. Arizona remained the leading producing State with 9,000 pounds valued at $18,200. The area around Globe and Miami yielded about 6,000 pounds valued at nearly $12,000. An additional 1,000 pounds valued at $2,000 was reported produced in the Cerbat Mountains in Mohave County.

In Nevada Lone Mountain Turquoise Mine, Esmeralda County, reported production of 550 pounds valued at $11,000. Total State production was nearly 1,500 pounds valued at $22,600.

The Villa Grove Lode Mine, Saguache County, Colo., reported production of 340 pounds valued at $16,000.

Miscellaneous Gem Material.—The quantity of mineral specimens produced in the United States was estimated at over 125,000 pounds valued at nearly $90,000. The principal producing States were Arizona and Colorado.

Tourmaline production at a Mesa Grande location in San Diego County, Calif., was 80 pounds valued at $7,200.

Production of 1.25 pounds of fire opal valued at $1,500 was reported from the Rainbow Ridge and Bonanza mines in Humboldt County, Nev. A new opal discovery near Yerington, Nev., was reported. One opal recovered in this deposit weighed 55 pounds.

Diamond production in Arkansas was reported at 110 carats valued at $825. During the year a 6.42 carat stone reportedly was found.

Sapphire production in North Carolina was estimated at $2,500. Montana production was reported by a mine owner to average about $6,000 per day; annual production was not given.

Rose quartz production at the Scott Mine, S. Dak., was 134,000 pounds valued at $5,000. Total U.S. production was estimated at 140,000 pounds with a value of $6,000.

The quantity and value of some other gem stones produced were: Amazonite, 2,000 pounds, $2,000; beryl specimens, 750 pounds, $1,300; fluorite, 7,000 pounds, $2,500; garnet, 500 pounds, $2,100; jasper, 23,000 pounds, $7,000; obsidian, 10,000 pounds, $6,500; peridot, 680 pounds, $1,600; and rhodonite, 9,000 pounds, $2,200.

CONSUMPTION

Consumption of diamond ($180 million) was about 28 percent higher; sales of cultured pearl ($13 million) were 25 percent higher; and sales of synthetic and imitation stones ($10 million) about 10 percent higher than 1958.

TABLE 1.—Estimated production of gem stones in the United States
(In thousand dollars)

	1958	1959		1958	1959
Alaska	(1)	$18	New Mexico	$28	$39
Arizona	$86	88	New York	8	8
Arkansas	23	18	North Carolina	1	9
California	150	150	North Dakota	1	1
Colorado	38	43	Ohio	(1)	2
Connecticut	3	5	Oklahoma	----	(1)
Florida	----	3	Oregon	200	200
Hawaii	----	(1)	Pennsylvania	2	3
Idaho	5	5	South Dakota	16	20
Illinois	1	1	Tennessee	1	----
Kansas	----	1	Texas	100	100
Maine	5	10	Utah	40	134
Maryland	2	2	Vermont	1	1
Massachusetts	----	(1)	Virginia	3	4
Michigan	----	1	Washington	75	75
Minnesota	1	----	West Virginia	1	1
Missouri	----	3	Wyoming	52	76
Montana	35	35	Other States	17	9
Nebraska	2	3			
Nevada	100	100	Total	1,006	1,184
New Hampshire	5	10			
New Jersey	4	6			

[1] Included with "Other States."

Apparent consumption (domestic production plus imports minus exports) of gem stones in the United States in 1959 was about $189 million.

PRICES

A booklet published early in 1960 listed retail replacement prices (for insurance purposes) for excellent and good quality, 1- to 40-carat, cut and polished gem stones.[3] The gem stones included agate, aquamarine, alexandrite, amazonite, amethyst, bloodstone, chrysoprase, cairngorm, citrine, diamond, emerald, garnet, hematite, jade, kunzite, labradorite, lapis lazuli, moonstone, morganite, onyx, opal, pearl, peridot, ruby, sardonyx, sapphire, synthetic gems, topaz, tourmaline, turquoise, and zircon. Prices ranged from $1 for a good quality 1-carat agate gem to $16,000 for an excellent quality 8-carat Siberian emerald, or ruby. Diamond prices were quoted for stones up to and including 3 carats.

FOREIGN TRADE[4]

Value of gem-stone imports into the United States in 1959 increased 28 percent over that of 1958. Gem diamond accounted for 85 percent of the total imports, about the same as had been reported since 1954.

Import value of natural pearls remained the same as in 1958, but cultivated pearls showed a 26-percent increase, primarily due to an increase of imports from Japan.

Emerald imports, cut but not set, showed an increase of $1.4 million, primarily because of imports from Switzerland of $1.1 million, compared with $170,300 in 1958. The average value per carat of emeralds imported from Switzerland in 1959 was $725.

[3] Guffey, Neal, Gem Appraisers' Guide: Lapidary Jewelers, Inc. (Georgetown), Washington, D.C., 1960, 56 pp.

[4] 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.

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Exports of gem stones, precious and semiprecious, from the United States was $5.6 million in 1959, compared with $3.6 million in 1958; and reexports were $19.6 million, compared with $11.5 million in 1958.

TABLE 2.—Precious and semiprecious stones (exclusive of industrial diamonds) imported for consumption in the United States

[Bureau of the Census]

Item	1958		1959	
	Carats	Value (thousands)	Carats	Value (thousands)
Diamonds:				
Rough or uncut (suitable for cutting into gem stones), duty free	[1] 1,129,808	[1] $72,563	1,599,720	$94,299
Cut, but unset, suitable for jewelry, dutiable	718,422	[1] 68,068	928,699	86,366
Emeralds: Cut but not set, dutiable	38,848	1,100	88,875	2,450
Pearls and parts, not strung or set, dutiable:				
Natural		597		595
Cultured or cultivated		10,347		13,083
Other precious and semiprecious stones:				
Rough or uncut, duty free		717		678
Cut but not set, dutiable		2,904		3,990
Imitation, except opaque, dutiable:				
Not cut or faceted		65		64
Cut or faceted:				
Synthetic		228		243
Other		9,311		10,746
Imitation, opaque, including imitation pearls, dutiable		17		14
Marcasites: Real and imitation, dutiable		26		8
Total		[1] 165,943		212,536

[1] Revised figure.

WORLD REVIEW

World diamond production decreased 1.2 million carats below that of 1958—the first annual decrease in 13 years. Decreases from Sierra Leone (200,000 carats) and the Belgian Congo (1.8 million carats) were the principal causes of lower production. Increases in other countries reduced the difference, bringing total production to 26.8 million carats.

Sales of gem diamonds (reported by the Central Selling Organization, London, which sold about 90 percent of the world total) were $177 million, compared with sales of $138 million in 1958.

NORTH AMERICA

Dominican Republic.—Production and sales of amber in 1959 were about 161 pounds valued at $520.[5]

SOUTH AMERICA

Brazil.—Possibilities of exploiting the Brazilian diamond deposits by large companies were discussed. Brazil produced only 3 percent of the world's diamonds, but deposits were known in 12 States. These deposits were worked by large numbers of individuals who used

[5] U.S. Embassy, Ciudad Trujillo, Dominican Republic, State Department Dispatch 354: Apr. 22, 1960, p. 1.

TABLE 3.—Diamonds (exclusive of industrial diamonds) imported for consumption in the United States, by countries

[Bureau of the Census]

Country	1958				1959			
	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	8,085	$885	1,318	$103	13,322	$1,259	817	$61
Mexico							15	1
Total	8,085	885	1,318	103	13,322	1,259	832	62
South America:								
Argentina	290	7	10	12	508	11		
Brazil	5,631	295	287	17	22,032	725	213	18
British Guiana	6,739	210	40	6	7,461	241	67	8
Colombia					216	5		
Surinam	27	1					25	3
Venezuela	39,405	1,114	40	4	47,518	1,411	19	2
Total	52,092	1,627	377	39	77,735	2,393	324	31
Europe:								
Austria			62	9			220	28
Belgium-Luxembourg	192,980	12,831	455,267	40,740	398,790	20,003	538,811	50,786
France	[1] 11,581	[1] 463	7,386	898	24,373	1,257	13,981	1,461
Germany, West	784	19	35,323	2,442	2,418	57	49,400	3,438
Italy			119	60	1,152	28	58	14
Netherlands	8,252	983	24,046	2,927	6,900	546	35,782	3,987
Switzerland			279	100	3,134	91	918	433
United Kingdom	[1] 646,274	[1] 50,542	6,543	1,447	877,236	63,669	7,398	1,016
Total	[1] 859,871	[1] 64,838	529,025	48,623	1,314,003	85,651	646,568	61,163
Asia:								
Ceylon			142	21				
Hong Kong			207	15				
India			57	4			1,970	331
Israel	7,088	146	150,438	12,769	6,625	158	240,552	17,497
Japan			308	22			1,828	159
Lebanon	1,250	60					3	1
Singapore, Colony of	290	42					32	13
Total	8,628	248	151,152	12,831	6,625	158	244,385	18,001
Africa:								
Belgian Congo	5,025	30						
British East Africa	479	15						
French Equatorial Africa	6,521	224			1,796	85		
French West Africa and Togo, Republic of	3,686	92			5,546	224		
Ghana	72,951	553			43,508	404		
Liberia	22,989	805	4	(2)	30,384	905		
Union of South Africa	88,815	3,191	36,546	[1] 6,472	106,801	3,220	36,590	7,109
Western Portuguese Africa	666	55						
Total	201,132	4,965	36,550	[1] 6,472	188,035	4,838	36,590	7,109
Grand total	[1] 1,129,808	[1] 72,563	718,422	[1] 68,068	1,599,720	94,299	928,699	86,366

[1] Revised figure.
[2] Less than $1,000.

TABLE 4.—World production of diamond, by countries

[In thousand carats]

Country	1958		1959	
	Gem	Industrial	Gem	Industrial
Africa:				
Angola	601	400	516	500
Belgian Congo:				
Bakwanga	304	15,700	396	13,800
Kasai	469	200	259	400
French Equitorial Africa [1]	45	60	40	60
French West Africa [1]	195	260	200	400
Ghana	1,232	2,200	876	2,200
Liberia [2]	323	500	470	500
Sierra Leone	590	900	644	650
South-West Africa	844	60	841	90
Tanganyika	231	290	274	350
Union of South Africa:				
Premier	316	960	323	950
De Beers Group	488	480	562	500
Other "pipe" mines [1]	40	70	30	70
Alluvial [1 3]	100	100	250	150
Other regions:				
Brazil [1]	150	150	180	170
British Guiana	13	20	22	40
Venezuela	15	75	15	80
India, Borneo, Australia, U.S.S.R., and Others [1]	5	5	5	10
World total	5,961	22,430	5,903	20,920

[1] Estimate.
[2] Exports only.
[3] Including State-owned mines.

primitive recovery methods. Over 90 percent of the diamond recovered was gem stone, because little effort was made to save the small and industrial stones. Recovery of diamond by large companies may be difficult because of the low ratio of payable diamond material to worthless rock.[6]

The variety and approximate quantity of uncut gem stones exported from Brazil in 1959 are given in table 5.[7]

British Guiana.—Production of diamond in 1959 was more than 430,000 stones weighing about 62,330 carats, compared with more than 280,000 stones weighing about 33,000 carats in 1958.[8]

Colombia.—During 1958 the Banco de la Republica decided to reorganize the Muzo and Cosquez emerald mines. In mid-1959 a proposal was made by the Minister of Mines to establish the emerald mining industry as a "public utility," with exploitation rights

TABLE 5.—Gem stone exports from Brazil, uncut, 1959

Variety	Quantity (pounds)	Variety	Quantity (pounds)
Agate	357,300	Topaz	400
Amethyst	33,100	Tourmaline	600
Aquamarine	1,000	Other, n.e.s.	352,800
Cat's eye	10	Diamond (carats)	25,000
Citrine	1,800		

[6] Mieritz, R. E., Brazil, An Untapped Diamond Source: Min. World, vol. 21, No. 1, January 1959, pp. 41–43.
[7] U.S. Embassy, Rio de Janeiro, Brazil, State Department Dispatch 1044: Apr. 28, 1960, pp. 2–3.
[8] Industrial Diamond Review (London), News in Brief: Vol. 20, No. 231, February 1960, p. 38.

reserved for the Government. Renewable 5-year contracts could be granted to private companies under government supervision.[9]

Early in 1960 it was announced that these emerald mines would be worked by a new company, The Colombia Emerald Co. This company was organized with government and private capital. (Private capital came from foreign and domestic sources.)[10]

Production of emeralds in 1958 was over 93,000 carats of third-, fourth-, fifth-, and sixth-class material; 68,000 carats was classed as Morrallas (semicrystallized product having the appearance of turquoise matrix, but green in color). Emerald production in 1957 was estimated at 12,500 carats.[11]

Venezuela.—Production of gem diamond in 1959 was 15,103 carats.[12]

EUROPE

Belgium.—A decline in recent years in the number of apprentices for some parts of the Belgium diamond industry was due to lower wages, increased production demand, and inadequate training facilities. The industry, in recognition of the importance for a number of skilled workers, was considering establishing technical schools.[13]

Imports of cuttable gem diamonds in 1959 were about 4.4 million carats valued at $102 million, compared with 4.4 million carats worth more than $90 million in 1958. Exports of cuttable and polished diamond in 1959 were about 1.1 million carats valued at $115 million. Nearly 50 percent of the polished diamond, valued at $50 million, was exported to the United States.[14]

Finland.—Gem materials found in Finland include chrome diopside, which usually occurs as nontransparent material suitable for cabochons. (Transparent crystals of this diopside are rare.) Other gem materials reportedly found were almandine, blue cordierite, staurolite, quartz crystals, and garnet.[15]

Germany, East.—Russian authorities reported opening an amber mine at Palmniken, East Germany. Production was reported at 25 to 30 tons annually.[16]

Netherlands.—The Netherland Institute of Scientific Research of Precious Stones and Pearls installed X-ray equipment to distinguish natural and cultivated pearls. Examinations were available to private individuals for a fee.[17]

U.S.S.R.—A new diamond discovery in the northern Ural Mountains was reported. These diamonds were of gem quality.[18]

The quality of diamond produced from the Yakutian area was unknown, but 80 percent of the stones were small, ranging from 0.5 to 32.5 carats. The largest found was a 54.14-carat stone. Stones

[9] Bureau of Mines, Mineral Trade Notes: Vol. 50, No. 1, January 1960, p. 18.
[10] Mining World, vol. 22, No. 3, March 1960, pp. 81–82.
[11] Bureau of Mines, Mineral Trade Notes: Vol. 49, No. 2, August 1959, p. 45.
[12] U.S. Embassy, Caracas, Venezuela, State Department Dispatch 942: Apr. 26, 1960, p. 1.
[13] U.S. Consulate, Antwerp, Belgium, State Department Dispatch 125: Dec. 23, 1959, 4 pp.
[14] Bureau of Mines, Mineral Trade Notes: Vol. 50, No. 6, June 1960, pp. 8–9.
[15] Laitakari, Aarne, Some Unusual Stones in Finland: Rocks and Minerals, vol. 34, No. 7–8, July-August 1959, p. 297.
[16] Mining Journal (London), vol. 253, No. 6477, Oct. 9, 1959, p. 340.
[17] Bureau of Mines, Mineral Trade Notes: Vol. 49, No. 4, October 1959, p. 40.
[18] Mining Journal (London), Russian Diamonds: Vol. 254, No. 6490, Jan. 8, 1960, p. 46.

of gem quality were rare, although enough were found to start a small-scale jewelry-making industry.[19]

United Kingdom.—The Central Selling Organization in London reported that sales of gem diamond in 1959 rose to $176,492,923 from $138,377,948 in 1958. Sales of diamond in the United States (about three-fourths of world sales) benefited from increased business activity and restocking of inventories depleted during 1958.[20]

Cairngorms, amethysts, topaz, royal blue beryl, sapphires, garnets, sard, and agates from Scotland were described.[21]

ASIA

Afghanistan.—Lapis lazuli production in 1959 was about 2 tons, compared with 1.5 tons in 1958. Unit value of cut and uncut material ranged from $41 to $136, the same as in 1958.[22]

Bahrein, State of.—Reports indicated that the value of pearl production would reach $210,000 in 1959. The pearling industry had been declining for several years owing to consumer preference for Japanese cultured pearls.[23]

Burma.—The quantity and value of gem stones produced in 1959 were: Jadeite, 47,700 pounds valued at $72,800; ruby, 15,200 carats valued at $415,800; sapphire, 438,500 carats valued at $214,600; and spinel, 73,900 carats valued at $119,100.[24]

China.—Geologists reportedly discovered a diamond deposit in the Yuan River, Province of Hunan.[25]

India.—Production of emeralds totaled 249,000 carats, compared with 80,000 in 1958, and 338,000 in 1957. Diamond production was 682 carats in 1959, 1,535 in 1958, and 790 in 1957. Other precious and semiprecious stones also were produced during these years.[26]

A directory of mines, firms, and mineral commodities of India, giving the name and address of each company owning or operating mines, was published.[27]

Israel.—Israel was able to compete in world gem-diamond trade because of a low-wage level, high rate of raw material usage, and technical improvements in its production processes. Therefore, during 1959, new workers were trained, and additional diamond-cutting and -polishing enterprises were established. The raw materials and financial assistance were supplied by the Government.[28]

Exports of polished diamond were about 470,000 carats. This was a 37-percent increase over the 1958 production of 341,000 carats.[29]

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[19] Katkoff, V. Russia's Diamond Strike, How Potent?: Jewelers' Circ.-Keystone, vol. 129, No. 7, April 1959, pp. 85–91.
[20] Wall Street Journal, vol. 155, No. 5, Jan. 8, 1960, p. 15.
[21] Rhodesian Mining Journal, Gem Stones of Scotland: Vol. 30, No. 378, November 1958, p. 312.
[22] U.S. Embassy, Kabul, Afghanistan, State Department Dispatch 199: Apr. 9, 1960, p. 1.
[23] Bureau of Mines, Mineral Trade Notes: Vol. 50, No. 1, January 1960, p. 18.
[24] U.S. Embassy, Rangoon, Burma, State Department Dispatch 520: Apr. 27, 1960, Encl. 1, p. 1.
[25] Jewelers' Circular-Keystone, Briefly: Vol. 129, No. 12, September 1959, p. 144.
[26] U.S. Embassy, New Delhi, India, State Department Dispatch 1431; June 4, 1959, p. 35; Dispatch 1006: Apr. 25, 1960, Encl. 1, p. 1.
[27] Mine and Quarry Engineering (London), List of Indian Mines: Vol. 25, No. 6, June 1959, p. 281.
[28] Gemmologist, Report From Israel; Vol. 28, No. 338, September 1959, pp. 177–178.
[29] South African Mining and Engineering Journal (Johannesburg), Israeli Diamond Exports: Vol. 71, No. 3500, Mar. 4, 1960, p. 551.

Japan.—Pearl exports in 1959 were valued at nearly $29 million, an increase of $6 million over 1958.[30] Higher prices were expected because a typhoon in September 1959 caused about $15 million damage to the pearl industry. A shortage of quality cultured pearls might result for 2 to 5 years.[31]

A short history of the cultured-pearl industry of Japan, and recent techniques introduced by the industry, was reported.[32]

Thailand.—About 1 million carats of gem stones was imported in 1959, compared with 6.9 million in 1958. Of the 1959 imports, 99 percent were "precious and semiprecious stones, including synthetics, cut but not set, n.e.c." Exports, 1.1 million carats in 1958, rose to 3.4 million carats in 1959. Exports in 1959 included uncut sapphires (163,000 carats), cut sapphires (314,000 carats), and cut zircons (217,000 carats).[33]

AFRICA

French West Africa.—Upper Guinea has many alluvial diamond deposits, about which production data are not available. However, two mining companies, Soginex, a De Beers subsidiary, and Compagnie Miniere de Beyla, a French company, exported about 52,000 carats of gem diamond in 1959.[34]

Rhodesia and Nyasaland, Federation of.—Vulcan Minerals (Pvt.), Ltd., sold its emerald deposit in the Belingwe district of Southern Rhodesia to Rio Tinto Ltd. The new owner planned to make a geological and mining survey of the area.[35]

Amethyst production in 1958 was about 3,800 pounds valued at $462, reported by the Northern Rodesian Department of Mines.[36]

South-West Africa.—Gem-diamond exports in 1959 were 819,351 carats valued at $42,530,000. Other gem materials produced were rose quartz (4.25 tons), tourmaline (41.3 pounds), chalcedony (670 pounds), topaz (20,300 pounds), and amethyst. Almost 3 tons of amethyst valued at $1,176 was exported.[37]

Tanganyika.—The Tanganyika Corundum Corp. produced a few small specimens from its ruby-corundum claim acquired in 1958.[38]

A three-part historical and operational account of the Williamson Diamond mine was given. Part one described the property and the services rendered to the community. Part two discussed geology and mining operations. Part three gave information on the process of concentrating diamond.[39]

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[30] Foreign Commerce Weekly, Japanese Pearl Exports Set Record in 1959: Vol. 63, No. 5, Feb. 1, 1960, p. 29.

[31] Wall Street Journal, Cultured Pearl Sales Expected to Rise in '60 Despite Higher Prices: Vol. 155, No. 9, Jan. 14, 1960, p. 19.
Jewelers' Circular Keystone, Japan Typhoon Will Cause Pearl Shortage: Vol. 130, No. 4, January 1960, p. 116.

[32] Bureau of Mines, Mineral Trade Notes: Vol. 50, No. 1, January 1960, pp. 18–24.

[33] U.S. Embassy, Bangkok, Thailand, State Department Dispatch 552: Mar. 30, 1960, Encl. 10, p. 1; Dispatch 673: May 27, 1959, Encl. 10, p. 1.

[34] U.S. Embassy, Canakry, Republic of Guinea, State Department Dispatch 242: Mar. 30, 1960, p. 10.

[35] South African Mining and Engineering Journal (Johannesburg), Rio Tinto and Emeralds: Vol. 70, No. 3482, Nov. 6, 1959, p. 1153.

[36] U.S. Consulate, Johannesburg, Union of South Africa, State Department Dispatch 78: Sept. 29, 1959, Encl. 1, p. 1.

[37] U.S. Consulate, Johannesburg, Union of South Africa, State Department Dispatch 252: Mar. 31, 1960, p. 1.

[38] Mining Magazine (London), Tanganyika Mining Industry, 1959: Vol. 102, No. 3, March 1960, p. 161.

[39] Du Toit, G. J., The Williamson Diamond Mine: Mine and Quarry Eng. (London), vol. 25, No. 3, March 1959, pp. 98–103; No. 4, April 1959, pp. 146–153; No. 5, May 1959, pp. 194–200.

Union of South Africa.—Production of emerald crystals totaled 145 pounds in 1958, compared with 13 pounds in 1957. The leading producer in 1958 was the African Emerald Mining Co. (Pty.), Ltd., Pretoria. Tigers-eye production in 1958 and 1957 was 20 and 40 short tons, respectively.[40]

OCEANIA

Australia.—All important gem stones except ruby and jade have been found in Australia. However, only opal and to a lesser extent sapphire, diamond, and emerald have been recovered commercially.

The principal opal- producing areas were Coober Pedy and Andamooka in South Australia, Lightning Ridge and White Cliffs in New South Wales, and the Hayrick mine near Quilpie, Queensland.

TABLE 6.—Exports of opal from Australia [1] by destination

Country	1954	1955	1956	1957	1958
Ceylon	$20,906	$48,010	$22,340	$19,889	$17,703
Germany, West	55,662	64,180	76,715	143,777	156,507
Hong Kong	511	17,284	24,201	23,598	6,982
Japan	645	12,947	115,752	244,966	369,531
New Zealand	1,485	4,382	710	3,689	2,437
United Kingdom	5,103	7,397	2,860	27,554	12,611
Other British countries	3,519	7,775	981	18,543	5,519
United States	114,406	109,912	127,725	130,442	166,640
Other	1,861	3,559	18,106	34,769	49,076
Total	204,098	275,446	389,390	647,227	787,006

[1] Converted from Australian Mineral Industry, Quarterly Review: Vol. 12, No. 2, pt. 1, November 1959, p. 24.

Sapphire has been produced from the Anakie field, Queensland, and the Inverell district of northeastern New South Wales. In 1920 gems valued at $125,000 were produced in the Anakie field; however, by 1958 the annual production value had fallen to about $1,800. The sapphire was found in the form of water-worn fragments, presumably liberated from basalt deposits. Other gem stones found in these alluvial deposits were green, yellow, and orange-yellow transparent to translucent corundum.

In 1959 Tungsten Consolidated Ltd., bought 40 percent interest in an Inverell sapphire deposit. While developing the property, more than 100 ounces of gem-quality corundum was produced per week; about 30 ounces was cuttable.

Diamond was small, off color, and not of gem quality. The principal producing areas were Copeton, Bingara, and Cudgegong fields of New South Wales.

Emerald production also was small. The principal producing area was near Poona, Western Australia.

Complete statistical information on Australian and Japanese pearl-fishing operations in areas off the Australian coast were compiled by the Australian Fisheries Division, Department of Primary Industry. These statistics, published in two volumes, covered the

[40] Bureau of Mines, Mineral Trade Notes: Vol. 49, No. 6, December 1959, pp. 41–42.

industry from mid-19th century through 1957. Annual supplements were planned for succeeding years.[41]

Pearl production values from 1954 to 1957 were $8,192, $7,493, $16,173, and $28,067, respectively. Ornamental shell (mother-of-pearl, trochus, and green snail) production for fiscal year 1957–58 was 2,809 short tons, about $2.9 million in value.[42]

French Oceania.—Mother-of-pearl shell exports totaled 535 short tons at $795,000 in 1957, and 693 tons at $1,132,000 in 1956. About 85 percent of the exports were to France and West Germany.[43]

TECHNOLOGY

A guide to the minerals and rocks of Minnesota was published.[44]

The quartz family minerals, including the phanero and cryptocrystalline varieties found in California, were described. General references also were included.[45]

The geographical, geological, morphological, and economic conditions of the important mineral deposits of the Burmese Union were discussed. These minerals included precious gem stones and jade.[46]

An occurrence of jadeite in Kotaki, Niigata Prefecture, Japan, and its association with albite and a calciferous rock was studied. It was stated that albite placed under high pressure was transformed into jadeite with liberation of SiO_2.[47]

Studies were made on rocks from the west slope of the Urals containing genetic accessory minerals which accompany diamond in Ordovician gravels.[48]

A pale green, fine-grained, ornamental rock from the Transvaal, Union of South Africa, known as South African jade, and another type of garnet, uvarovite, were described.[49]

The Jewelers' Circular-Keystone magazine, beginning with the January 1959 issue, gave facts and legends about birthstones for each month of the year. These gem stones in chronological order were garnet, amethyst, aquamarine, diamond, emerald, pearl, ruby, sardonyx, sapphire, opal, topaz, and turquoise.

Each monthly issue of the Mine and Quarry Engineering (London) journal beginning with October 1953 described a mineral, giving the synonyms, nomenclature, varieties, composition, crystallography, physical and optical properties, tests, diagnoses, occurrences, and uses. Each mineral was illustrated in color. In the 1959 issues the minerals in chronological order were: Ilmenite, aragonite, tourmaline, adamite,

[41] U.S. Embassy, Canberra, Australia, State Department Dispatch 509: June 22, 1959, 2 pp.
[42] Bureau of Mines, Mineral Trade Notes: Vol. 50, No. 1, January 1960, pp. 16–17.
[43] Bureau of Mines, Mineral Trade Notes: Vol. 49, No. 4, October 1959, p. 40.
[44] Schwartz, G. M., and Thiel, G. A., Guide to the Minerals and Rocks of Minnesota: Univ. of Minnesota, 1958, pp. 1–26.
[45] California Division of Mines, Quartz Family Minerals: Min. Inf. Service, vol. 12, No. 4, April 1959, pp. 1–5.
[46] Jungwirth, Josef, Mining in Burmese Union—Present Status and Development Possibilities: Berg-u hüttenmänn. Monatsh. montan. Hochschule Leoben, vol. 104, 1959, pp. 143–151; Chem. Abs., vol. 53, No. 21, Nov. 10, 1959, col. 19721b.
[47] Shido, Fumiko, Calciferous Amphibole Rich in Sodium From Jadeite Bearing Albite of Kotaki, Niigata Prefecture: Chishitsugaku Zasshi (Tokyo), No. 64, 1958, pp. 595–600; Chem. Abs., vol. 53, No. 11, June 10, 1959, col. 9914c.
[48] Verbitskaya, N. P., and Gapeeva, G. M., Possible Sources of Diamonds in Alluvial Deposits of the West Slope of the Urals: Razvedka i Okhrana Nebr., vol. 25, No. 3, 1959, pp. 8–12; Chem. Abs., vol. 53, No. 18, Sept. 25, 1959, col. 16840e.
[49] Frankel, J. J., Uvarovite Garnet and South African Jade (Hydrogrossular) From the Bushveld Complex, Transvaal: Am. Mineral., vol. 44, No. 5–6, May–June 1959, pp. 565–591.

campylite, asbestos, autunite, analcime, epidote, anglesite, prehnite, and niccolite.

An inexpensive cardboard-mounted dichroscope was offered for sale in the latter part of 1959. This simple instrument helps in identifying colored stones and in distinguishing many synthetic from natural gems.[50]

An article on the atomic structure of diamond crystal presented new knowledge and led to a better understanding of the properties of diamonds. Also, current theories concerning the hardness of diamond were given.[51]

Sizable diamonds have been sold that were coated in such a way that some of the objectionable color was absorbed or neutralized. The coating made the stones appear whiter and therefore more valuable. Methods of restoring the original color and the efforts of the Jewelers Vigilance Committee to discover some simple optical test to detect the coatings was reported.[52]

Four types of facets may be made when recutting diamonds with old-fashioned designs. This recutting is said to give better refraction but causes a weight loss of 10 to 50 percent.[53]

The refractive indices, absorption coefficients, and biabsorption were determined for two synthetic ruby samples, one colored pink by 0.11 percent Cr_2O_3 (chromic oxide) and the other colored deep red by 1.40 percent Cr_2O_3.[54]

A method for making rubies, similar to the hydrothermal growth technique used to make emeralds, was announced. About 2 years was required to produce these rubies, and they were made in batches of 3,000 to 4,000 carats. Emeralds could be manufactured in about a year.[55]

White sapphires reported to be more perfect than natural stones were produced by the Bell Telephone Laboratories.[56]

Studies were made on unusual star-beryl, which contained a multitude of crystal inclusions.[57]

A study was made of the directional variation of grinding hardness in strontium titanate.[58]

Chrysoberyl and its special optical properties were described.[59]

Care and restoration of pearl luster were explained. Scratch hardness of pearls, tested with a sceleroscope, is 58 to 64 compared with 178 for quartz, 304 for spinel, and 667 for ruby.[60]

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[50] Pough, F. H., New Low-Cost Dichroscope on Market—Or You Can Make Your Own: Jewelers' Circ.-Keystone, vol. 129, No. 11, August 1959, pp. 172, 174.

[51] Wedepohl, P. T., Why Diamonds Are So Hard: Jewelers' Circ.-Keystone, vol. 129, No. 11, August 1959, pp. 132–133, 188, 190, 192, 195.

[52] Jewelers' Circular-Keystone, More Gyps Now "Coat" Diamonds, JVC Warns: Vol. 129, No. 12, September 1959, p. 159.

[53] Deutcher Goldschmiede Zeitung (Stuttgart), [Re-cutting Diamonds]: Vol. 57, No. 9, September 1959, p. 499; Ind. Diamond Abs., vol. 16, November 1959, p. A212.

[54] Mandarino, J. A., Refraction, Absorption, and Biabsorption in Synthetic Ruby: Am. Mineral., vol. 44, No. 9–10, September–October 1959, pp. 961–973.

[55] Jewelers' Circular-Keystone, "Cultured" Rubies Shown to Jewelers by Chatham: Vol. 129, No. 12, September 1959, p. 158.

[56] Science Newsletter, Sapphires Brewed in "Pressure Cooker": Vol. 76, No. 10, Sept. 5, 1959, p. 152.

[57] Eppler, W. F., An Unusual Star-Beryl: Jour. Gemmology (London), vol. 7, No. 5, January 1960, pp. 183–191; Ind. Diamond Abs., vol. 17, March 1960, p. A61.

[58] Giardini, A. A., and Conrad, M. A., Directional Hardness of Strontium Titanate by Peripheral Grinding: Ceram. Abs., vol. 42, No. 4, April 1959, pp. 165–168.

[59] Webster, R., The Prized Chrysoberyl: Gemmologist (London), vol. 28, No. 339, October 1958, pp. 190–194.

[60] Jewelers' Circular-Keystone, Why Pearls Deserve Loving Care: Vol. 129, No. 9, June 1959, p. 68.

A conference on crystal growth was held at the Institute of Crystallography, Academy of Sciences, U.S.S.R., during 1959. Talks were given on hydrothermal synthesis of quartz and methods for crystallization at ultrahigh pressures.[61]

An apparatus for extracting diamond from concentrates was patented in the U.S.S.R.[62]

A method was patented for examining and classifying gem diamond, which also produced a record by means of which the diamond could be positively identified.[63]

A patent was issued on a process for manufacturing synthetic gems.[64]

Artificial gem stones were made by pulverizing colored ceramics, porcelain, and glass, pressing the powder into briquets with or without binders, and firing the briquets at 950° to 1,300° C. The fired material was then worked into finished gem stones by cutting, grinding, engraving, polishing, and boring.[65]

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[61] Central Intelligence Agency, A. U.S.S.R. Conference on the Growth of Crystals: Sci. Inf. Rept. PB131891 T–30, Sept. 18, 1959, pp. 37–39.

[62] Dubinskii, S. A., Shvetsov, G. F., and Khaidarov, A. A., Apparatus for Extraction of Diamonds from Concentrates: U.S.S.R. Patent 113,055, Aug. 15, 1958; Chem. Abs., vol. 53, No. 3, Feb. 10, 1959, col. 2511d.

[63] Samuels, A. S., Sr., Method of Examining and Classifying Diamonds: U.S. Patent 2,909,961, Oct. 27, 1959.

[64] Kato, Ichiro, Ultrahigh-Pressure Furnace for Manufacture of Synthetic Gems: Japanese Patent 9960, Nov. 19, 1958; Chem. Abs., vol. 53, No. 5, Mar. 10, 1959, col. 4619b.

[65] Weichel, Fritz, and Maurer, Karl, Gem Stones From Ceramics, Porcelain, and (or) Glass: German Patent 936,739, Dec. 22, 1955; Chem. Abs., vol. 53, No. 3, Feb. 10, 1959, col. 2511e.