Gem Stones

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The production value of gem stones and mineral specimens in the United States during 1974 was estimated to be $4.6 million, an increase of 70% over that of 1973. Most of the value was contributed by the few companies which operated deposits for emerald, jade, opal, sapphire, and turquoise. Amateur collectors were important even though their total contribution was surpassed by the commercial operators. The commercial operators sold mainly to wholesale or retail outlets and occasionally to jewelry manufacturers.

DOMESTIC PRODUCTION

Gem stone production was estimated to be $1,000 or more for each of 39 States. The following States accounted for 70% of the total production value in thousands: Arizona, $1,500; Oregon, $500; Montana, $400; Nevada, $400; California, $220; and New Mexico, $200.

Gem stones are considered as one of the reliable items of value sought by people as a hedge against inflation. Added to this demand, the recent tremendous increase in American Indian jewelry has stimulated the turquoise mining industry to new records in value of output.

The Fairburn agate received its name from the town in which it was found first, Fairburn, S. Dak. Fairburns are beautiful agates noted for many fine lines in the pattern and brilliant natural colors. Because of the sharp contrasts of red, white, yellow, and black bands, they are often considered the world's most beautiful agates. Good ones sell for $5 to $100 per pound. Two articles described the collecting areas.[2]

Cape May "diamonds" are little quartz pebbles washed onto New Jersey beaches.[3] These are sold in most Cape May souvenir shops. In addition to beachcombing for the "diamond" quartz pebbles, collectors also gather pebbles of citrine, rose quartz, amethyst, smoky quartz, unakite, jasper, basanite, ilmenite, zircon, and various fossils of shellfish.

Several good quality diamonds, up to 2 carats in weight, were found at the Crater of Diamonds State Park in Arkansas, according to reports from park authorities.

Some of the world's finest sparkling quartz crystals are found in northern and western Arkansas where the collecting localities are numbered by the dozens.[4] Amateurs are permitted to collect at the commercial mine described. The record clear crystal from the operation measured 57 inches in length and 37 inches in width.

Descriptions of field trips, events, and mineral and gem stone finds were reported regularly in the following publications: Gems and Minerals, Lapidary Journal, Mineralogical Record, and Rocks and Minerals.

The quantity and value of emerald, jade, sapphire and tourmaline produced

[1] Physical scientist, Division of Nonmetallic Minerals.

[2] Linde, M. Collecting Fairburn Agates. Gems and Minerals, No. 439, May 1974, pp. 22–23.
Josiassen, S. Rockhound Paradise. Gems and Minerals, No. 439, May 1974, p. 23.

[3] Thomas, C. A. Bonus Trips in the Cape May, New Jersey Area. Gems and Minerals, No. 445, pp. 28–29.

[4] Broughton, P. L. Rock Crystal Clusters From Coleman Crystal Mine Near Hot Springs, Arkansas. Lapidary Journal, v. 28, No. 4, July 1974, pp. 724–728.

domestically were withheld to maintain confidentiality. About 9 tons of rough opal was produced and was valued at $68,000. The production of turquoise of all grades and qualities was nearly 160 tons valued at $2.0 million. Producers of gem stones in the United States, by principal gem stone reported, were as follows:

Emerald.—Big Crabtree mine, Mitchell County, N.C., operated by PBH Emerald Co., P.O. Box 163, Little Switzerland, N.C. 28749.

Jade.—Stewart Jewel Jade mine, Kobuk Village, Alaska, operated by Stewart Jewel Jade Co., 531 4th Ave., Anchorage, Alaska 99501.

Opal.—Jeppesen and Wilson mine, Clark County, Idaho, operated by Jeppesen, Wilson, and others, Rt. 2, Box 162, Idaho Falls, Idaho 83401. Operated on a daily fee-digging basis for amateur collectors.

Lorrie Lee mine, Humboldt County, Nev., operated by Charles L. Eddy, 10799 Sherman Grove, Sunland, Calif. 91040.

Royal Peacock mine, Humboldt County, Nev., operated by Harry W. Wilson, Denio, Nev. 89404.

Spencer Opal mine, Clark County, Idaho, operated by Mark L. Stetler, 1862 Ranier St., Idaho Falls, Idaho 83401. Operated on a daily fee-digging basis for amateur collectors.

Sapphire.—Chaussee Sapphire mine, Granite County, Mont., operated by Chaussee Sapphire Corp., P.O. Box 706, Philipsburg, Mont. 59858. Also sold unscreened material to tourists during the summer months.

Sapphire Village mine (Yogo Gulch), Judith Basin County, Mont., operated by Sapphire International Corp., Box 30, Utica, Mont. 59452.

Tourmaline.—Plumbago Gem mine, Oxford County, Maine, operated by Plumbago Mining Corp., P.O. Box 366, Congress Street, Rumford, Maine 04276.

Turquoise.—Aurora mine, Lander County, Nev., operated by Carico Lake Mining Co., P.O. Box 3426, Albuquerque, New Mexico 87110.

Blue Jim mine, Lander County, Nev., operated by James Elquist, Box 255, Battle Mountain, Nev. 89820.

Cortez Canyon mine, Lander County, Nev., operated by Nevada King Turquoise Co., P.O. Box 21, Searchlight, Nev. 89046.

Duval mine, Mohave County, Ariz., turquoise operations by L. W. Hardy Co., Inc., 3809 E. Highway 66, Kingman, Ariz. 86401.

Pinto Valley mine, Gila County, Ariz., operated by L. W. Hardy Co., Inc., 3809 E. Highway 66, Kingman, Ariz. 86401.

Red Mountain Turquoise mine, Lander County, Nev., operated by Donald B. Potts, Box 629, Tonopah, Nev. 89049.

Shoshone mine, Lander County, Nev., operated by Lombardo Turquoise Milling and Mining Co., Box 148, Austin, Nev. 89310.

Tina Gem mine, Lander County, Nev., operated by Richard G. Bonner, Box 948, Fallon, Nev. 89406.

Villa Grove Turquoise mine, Saguache County, Colo., operated by Clayton C. Musick, Box 101, Villa Grove, Colo. 81155.

CONSUMPTION

Domestic gem stone output went to amateur and commercial rock, mineral, and gem stone collections, objects of art, and jewelry. Apparent consumption of gem stones (domestic production plus imports, minus exports and reexports) was $401 million, about 5% less than that of 1973.

PRICES

Typical costs to a retail jeweler for a 2-week period in December 1974 for representative gem stones, based on a survey of dealers in all parts of the United States, were as follows:[5]

[5] Jewelers' Circular-Keystone. JC-K's Colored Stone Price Index. V. 145, No. 5, February 1975, p. 51.

Gem stone	Carat weight	Median price per carat	Price range per carat
Amethyst	10	$12	$8–$20
Aquamarine	8	95	60–200
Black opal	3	300	200–1,500
Cat's-eye	10	1,000	600–5,000
Citrine	10	6.50	4–20
Emerald	1	1,100	500–7,000
Green garnet	1	275	150–400
Man's sky blue star	10	200	80–1,000
Peridot	15	40	25–60
Ruby	2	800	350–15,000
Sapphire	2	500	250–2,200
Tanzanite	5	220	200–500
Tourmaline	10	35	20–75
White/opal fiery	5	80	35–100

Turquoise prices, wholesale, per pound, Kingman, Ariz., were as follows:

	Low-grade	Medium-grade	High-grade
Natural turquoise			
Kingman mine	$80	$100–125	$200–250
Castle Dome mine	80	100–125	150–200
Treated, cutting-grade turquoise			
Grade 1—Blue			$60
Grade 1—Blue Green			40
Grade 1—Green			30

Treated, tumbled-polished turquoise

¼-inch = small; ¼-inch-½-inch = medium; ½-inch and up = large. The tumbled-polished turquoise is the same price regardless of size.

Grade 1—Blue	$60-$80
Grade 1—Blue Green	20-40
Grade 1—Green	20-40
Stabilized turquoise	
Grade 1	$100
Grade 2	80
Grade 3	60

No survey was made of diamond prices. However, diamond price trends indicated that a 25% increase occurred in the higher range and that the lower range was unchanged.

FOREIGN TRADE

Exports of all gem materials amounted to $320.7 million, and reexports to $165.3 million. Diamond accounted for 95% of the value of exports and 92% of the value of reexports. Exports of diamond in total were 285,136 carats valued at $304.6 million. Of this total, diamond cut but unset, suitable for gem stones, not over 0.5 carat, was 50,340 carats valued at $18.1 million; and cut but unset, over 0.5 carat, was 234,796 carats valued at $286.5 million.

Reexports of diamond amounted to 1,176,132 carats, valued at $151.8 million, in categories as follows: Rough or uncut, suitable for gem stones, not classified by weight, 1,059,089 carats valued at $92.7 million; cut but unset, not over 0.5 carat, 56,686 carats valued at $13.3 million; cut but unset, over 0.5 carat, 60,357 carats, valued at $45.9 million.

The seven leading recipients of diamond exports accounted for 92% of the carats and 95% of the value and were as follows: Hong Kong, 80,627 carats valued at $87.8 million; Switzerland, 75,933 carats, at $63.9 million; the Netherlands, 36,107 carats, at $58.2 million; Japan, 37,247 carats, at $30.6 million; Belgium, 20,170 carats, at $28.6 million; West Germany, 7,822 carats, $10.9 million; and France, 4,968 carats, at $10.2 million. The six leading recipients of diamond reexports accounted for 93% of the carats and 90% of the value and were as follows: Israel, 437,476 carats valued at $41.3 million; Belgium, 383,943 carats, $33.1 million; the Netherlands, 197,919 carats, $31.0 million; Switzerland, 54,924 carats, $20.8 million; Japan, 8,812 carats, $5.3 million; Hong Kong, 12,454 carats, $5.0 million.

Exports of all other gem materials amounted to $16.0 million. Of this total,

pearls, natural and cultured, not set or strung, were valued at $0.8 million. Natural precious and semiprecious stones, unset, were valued at $13.3 million; and synthetic or reconstructed stones, unset, were valued at $2.0 million. Reexports of all other gem materials amounted to $13.5 million. Reexports of pearls amounted to $0.9 million; of natural precious and semiprecious stones, unset, to $12.5 million; and of synthetic or reconstructed stones, unset, to $0.1 million.

Imports of gem materials decreased 6% in value from those of 1973. Diamond accounted for 86% of the total value of gem material imports.

Although rough and uncut diamond imports were reported from 28 countries, over 99% in value were from 10 countries as follows: The United Kingdom, 911,165 carats, $211.8 million; the Republic of South Africa, 389,222 carats, $69.0 million; Sierra Leone, 453,084 carats, $57.6 million; the Netherlands, 51,101 carats, $19.2 million; Belgium-Luxembourg, 43,260 carats, $14.8 million; Liberia, 5,724 carats, $8.7 million; Venezuela, 382,738 carats, $8.2 million; Israel, 36,878 carats, $8.1 million; Central African Republic, 131,912 carats, $6.8 million; and France, 30,501 carats, $5.7 million. Cut but unset diamonds, not over ½ carat were imported from 30 countries; however, the imports of this category from 8 countries amounted to 99% of its total value as follows: Belgium-Luxembourg, 838,552 carats, $119.7 million; Israel, 710,386 carats, $109.3 million; India, 219,250 carats, $26.5 million; the Republic of South Africa, 12,956 carats, $3.8 million; the Netherlands, 28,183 carats, $3.6 million; the U.S.S.R., 13,161 carats, $2.6 million; the United Kingdom, 16,967 carats, $2.3 million; and, France, 19,557 carats, $2.1 million.

For diamond cut and unset, over 0.5 carat, 98% in value came from the following six countries: Belgium-Luxembourg, 114,815 carats, $43.2 million; Israel, 63,234 carats, $19.6 million; the Republic of South Africa, 9,837 carats, $6.0 million; the Netherlands, 3,714 carats, $1.4 million; the U.S.S.R., 1,964 carats, $1.0 million; and, the United Kingdom, 1,742 carats, $0.9 million.

Imports of emeralds increased 16% in quantity and 4% in value. Imports of rubies and sapphires increased 8% in value. Natural pearls and parts increased 20% in value but cultured pearls decreased 4% in value. Imitation pearls decreased 19% in value. Other precious and semiprecious stones, rough and uncut, decreased 21% in value. Other precious and semiprecious stones, cut but unset, increased 16% in value and others, not in these categories, increased 21% in value. Synthetic gem stones, cut but unset, decreased 37% in value and imitation gem stones increased 29% in value.

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

Stones	1973		1974	
	Quantity	Value	Quantity	Value
Diamonds:				
Rough or uncut	[1] 2,821	[1] 460,198	2,450	412,678
Cut but unset	2,360	[r] 360,987	2,083	347,362
Emeralds: Cut but unset	[r] 750	[r] 32,865	871	34,046
Coral, cut but not set, and cameos suitable for use in jewelry	NA	2,103	NA	3,082
Rubies and sapphires: Cut but unset	NA	19,336	NA	20,960
Marcasites	NA	28	NA	249
Pearls:				
Natural	NA	368	NA	440
Cultured	NA	9,232	NA	8,874
Imitation	NA	1,257	NA	1,019
Other precious and semiprecious stones:				
Rough and uncut	NA	5,859	NA	4,646
Cut but unset	NA	25,043	NA	29,083
Other n.s.p.f	NA	1,532	NA	1,851
Synthetic:				
Cut but unset number	16,365	10,066	9,271	6,316
Other	NA	341	NA	362
Imitation gem stones	NA	[r] 8,803	NA	11,352
Total	NA	[r] 938,018	NA	882,320

[r] Revised. NA Not available.
[1] Adjusted by the Bureau of Mines.

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

(Thousand carats and thousand dollars)

Country	1972				1973				1974			
	Rough or uncut		Cut but unset		Rough or uncut		Cut but unset		Rough or uncut		Cut but unset	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Belgium-Luxembourg	64	10,706	1,211	147,392	68	16,836	1,159	r 177,317	43	14,804	953	162,926
Brazil	(1)	26	3	321	(1)	6	2	409	1	535	4	642
Canada	--	--	1	82	1	276	1	91	(1)	(1)	(1)	52
Central African Republic	207	6,587	--	--	191	7,668	--	--	132	6,766	--	--
France	33	1,564	23	1,895	6	169	24	2,441	31	5,668	20	2,150
Germany, West	(1)	31	3	324	1	301	1	94	1	72	2	207
Guyana	2	96	(1)	6	(1)	37	(1)	3	--	--	(1)	15
India	--	--	186	16,507	(1)	21	213	23,099	--	--	221	26,709
Israel	38	5,120	852	98,316	34	7,838	852	128,204	37	8,052	774	128,856
Japan	--	--	1	129	1	36	2	286	1	77	4	854
Liberia	3	1,611	(1)	67	7	5,192	(1)	406	6	8,683	(1)	5
Netherlands	37	10,948	15	2,266	55	22,209	18	4,143	51	19,193	32	4,948
Sierra Leone	164	15,593	3	324	2 747	2 78,919	(1)	40	453	57,577	1	82
South Africa, Republic of	953	100,059	27	8,286	427	83,707	24	12,833	389	68,948	23	9,786
Switzerland	47	2,269	8	1,188	1	181	5	1,429	2	251	8	1,587
U.S.S.R	--	--	35	5,802	--	--	30	5,931	--	--	15	3,609
United Kingdom	1,302	178,659	32	3,586	979	225,802	20	2,415	911	211,799	19	3,209
Venezuela	244	5,118	--	--	296	9,339	(1)	12	383	8,215	(1)	20
Other	2	237	10	1,564	7	1,161	9	1,834	9	2,038	7	1,705
Total	3,096	338,624	2,410	288,055	2 2,821	2 460,198	2,360	r 360,987	2,450	412,678	2,083	347,362

r Revised.
1 Less than ½ unit.
2 Adjusted by the Bureau of Mines.

WORLD REVIEW

Australia.—Descriptions of the two areas in Australia, where most of the world's sapphires are produced, was provided in a recent issue of the Lapidary Journal.[6] The Swanbrook mine, near Inverel, several hundred miles north of Sydney, New South Wales, is a strip mining operation of Dominion Mining N.L. and is one of the largest of about 50 mines in the area. Each truckload of gravel mined contains about 100 grams (2 ounces) of sapphire of which about 10% is gem quality and sold by the carat. The rest of the sapphires are sold by the kilogram to collectors. Mechanical separation by screens and sieves is done first, followed by hand-sorting to pick out the materials which cannot be separated mechanically. The mine is in a cultivated area and all land is restored to its original condition. The Queensland sapphire fields are in the vicinity of the settlement of Anakie, about 200 miles west of Rockhampton. Individual miners are allotted mining areas 66 by 66 feet. The sapphire-bearing gravel is generally not more than 3 feet deep and mining is done by hand. If water is available, the gravel is washed over a screen, but dry sorting is also practiced in this arid area of Australia.

Production of opal in Australia probably accounts for 98% of the world's supply. Several well-illustrated articles described the localities in Australia where opals are found and also the methods used to mine them.[7] At Coober Pedy, the largest field in South Australia, heavy equipment such as bulldozers, is used to supplement the pick and shovel common to other areas. Two other major areas are Ankamooka, also in South Australia, and Lightning Ridge in New South Wales. Opal prices varied, depending on quality, from about $1 per ounce for the lowest grade of crude to $1,200 per ounce for excellent quality. Top grade opal in larger pieces up to 1 ounce in size sold for nearly $3,000 per ounce.

Botswana.—The Orapa mine of the De Beers Botswana Mining Co., (Pty.) Ltd., produced an estimated 2,718,000 carats of diamond from 2,954,000 tons of ore treated or 92 carats per ton treated.[8] Gem stones were about 15% of the yield. Sampling of kimberlite pipes, DK 1 and DK 2, by De Beers was completed but negotiations on further development were still in progress. The Government of Botswana has requested a review of terms for the Orapa mine.[9] Drilling was continued in several kimberlite pipes in southern Botswana.

Brazil.—The only large mechanical operation, Mineração Tejucana, S. A., reported production of 65,861 carats of diamond from 8.6 million cubic yards of gravel dredged and treated during 1973. Average sales price was $33.81 per carat. Production was about equally divided between gem and industrial stones.

The Brazil National Department of Mineral Production published its first bulletin on prices of minerals and metallurgical products for the period of January to March 1974. For precious and semiprecious stones the price list gave a range for the various qualities and median price f.o.b. Rio de Janeiro for diamond, aquamarine, emerald, chrysoberyl, citrine, amethyst, topaz, morganite, kunzite, garnet, opal, alexandrite, and tourmaline.

Central African Republic.—The 1974 diamond production attained a level about one-fifth higher than that of 1973. About two-thirds of the output was gem stone diamond by weight; and by value, gem stone diamond was more than 90%. Diamond exports accounted for about 35% of the foreign exchange receipts. Société Centrafricaine d'Exploitation Diamantifére was formed as a joint enterprise in 1973 by Diamond Distributors International, Inc., of New York, Cominco, Ltd., of Canada, and the Government to mechanize mining operations as well as to aid diggers. The joint enterprise was credited with the gains for 1974.

Ghana.—The Ghana Department of Mines reported diamond production of 2.3 million carats in 1973, a decline from

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[6] Curtis, R. Sapphire Treasure Won From Australian Open-Cut Mine. Lapidary Journal, v. 28, No. 8, November 1974, pp. 1280–1282.
Kovac, C. Queensland's Sapphires. Lapidary Journal, v. 28, No. 8, November 1974, pp. 1318–1321.

[7] Wright, D. The Craze for Opal. Lapidary Journal, v. 27, No. 11, February 1974, pp. 1726–1732.
Ross, R. Lightning Ridge Block Opal Knobby. Lapidary Journal, v. 27, No. 12, March 1974, pp. 1796–1802.
Oakley, P. An Opal Prospecting Tour Through Australia. Lapidary Journal, v. 28, No. 5, August 1974, pp. 778–789.

[8] De Beers Consolidated Mines Limited. Annual Report 1974, p. 22.

[9] Page 5 of work cited in footnote 8.

Table 3.—Diamond (natural): World production by country [1]

(Thousand carats)

Country	1972			1973			1974 [p]		
	Gem	Industrial	Total	Gem	Industrial	Total	Gem	Industrial	Total
Africa:									
Angola	1,616	539	2,155	1,594	531	2,125	1,600	500	[e] 2,100
Botswana	360	2,043	2,403	362	2,054	2,416	408	2,310	2,718
Central African Republic	346	178	524	251	129	380	300	150	[e] 450
Ghana	266	2,393	2,659	232	2,085	2,317	257	2,316	[e] 2,573
Guinea [e]	25	55	80	25	55	80	25	55	80
Ivory Coast	134	200	334	120	180	300	130	190	[e] 320
Lesotho [2]	1	8	9	1	[r] 8	9	2	9	11
Liberia [3]	[4] 481	[4] 409	[4] 890	[r] 509	[r] 308	[r] 817	377	259	636
Sierra Leone [3]	720	1,080	1,800	646	758	1,404	670	1,000	[e] 1,670
South Africa, Republic of:									
Premier mine	613	1,841	2,454	625	1,876	2,501	605	1,817	2,422
Other de Beers Co.[5]	2,291	[r] 1,874	[r] 4,165	2,368	1,938	4,306	2,897	1,961	4,358
Other	466	[r] 310	[r] 776	455	303	758	433	289	722
Total	3,370	4,025	7,395	3,448	4,117	7,565	3,435	4,067	7,502
South West Africa, Territory of	1,516	80	1,596	1,520	80	1,600	1,491	79	1,570
Tanzania	326	[r] 326	[r] 652	[r] 251	[r] 250	[r] 501	275	275	[e] 550
Zaire	[r] 1,332	[r] 12,058	13,390	[r] 1,082	[r] 11,858	12,940	1,100	11,900	[e] 13,000
Other areas:									
Brazil [e]	155	155	310	160	160	320	160	160	320
Guyana	20	29	49	[r] 31	[r] 21	52	30	20	50
India	17	3	20	18	3	21	17	3	[e] 20
Indonesia [e]	12	3	15	12	3	15	12	3	15
U.S.S.R.[e]	1,850	7,350	9,200	1,900	7,600	9,500	1,950	7,850	9,800
Venezuela	141	315	456	[r] 315	[r] 463	[r] 778	280	420	700
World total	12,688	31,249	43,937	12,477	30,663	43,140	12,519	31,566	44,085

[e] Estimate. [p] Preliminary. [r] Revised.

[1] Total (gem plus industrial) diamond output for each country is actually reported except where indicated by footnote to be an estimate. In contrast, the detailed separate reporting of gem diamond and industrial diamond represents Bureau of Mines estimates in the case of every country except Central African Republic (1972 and 1973), Lesotho (1972 and 1973), Liberia (all years), Guyana (1972 and 1973), and Venezuela (1972 and 1973), where sources give both total output and detail. The estimated distribution of total output between gem and industrial diamond is conjectural in the case of a number of countries, based on unofficial information of varying reliability.

[2] Exports of diamond originating in Lesotho; excludes stones imported for cutting and subsequently reexported.

[3] Exports.

[4] Revised from data in previous edition, which were for years ending August 31 of year stated, to normal calendar year basis.

[5] All company output from the Republic of South Africa except for that from the Premier mine; also excludes company output from the Territory of South West Africa and Botswana.

the 2.7 carats produced in 1972.[10] Since 1968, the average annual production from Ghana's two diamondiferous areas, the Birim River Basin (Eastern Region) and the Bonsa Region (Western), has averaged 2.47 million carats. Three companies, Ghana Consolidated Diamonds, Ltd., Cayco (Ghana) Ltd., and the Amalgamated Diamond Corp., are actively engaged in mining diamonds in the Birim River Basin. First International Natura Corp. of the United States completed exploration in the Birim and Pra River areas, and it was reported the firm would be issued a license for a project in which the Government will own a 55% share. Since the liquidation in 1969 of Takrowase Diamond Field, the Government has preferred participation rather than outright ownership in diamond mining operations. Effective from October 1, 1972, the Government acquired by decree a 55% interest in Consolidated African Trust's Ghana diamond operations by forming Ghana Consolidated Diamonds Ltd., in which Consolidated African Selection Trust Ltd. has a 45% share. Ghana Consolidated Diamonds Ltd. production in the 5-year period, 1968–73, was 2.39 million carats, or about 96% of the country's production, according to Ghana's Mines Department. The output averages about 10% gem stones of high quality.

Kenya.—A pink corundum deposit was claimed to be possibly the largest ruby mine in the world and was also the subject of dispute between Government administrators and geologists from the United States who made the original discovery.[11] According to the reports, about 300 kilograms of corundum were exported in the first 9 months of 1974 and were worth between $30,000 and $40,000 or over $100 per kilogram. The mine is located in the Tsavo National Game Park in southeastern Kenya.

Lesotho.—On March 1, 1974, an announcement was made that De Beers Diamond Corp. and the Government of Lesotho (GOL) reached an agreement in principle on opening the Letseng-la-terai diamond mine in the Maluti mountains at an estimated cost of over $30 million.[12] The agreement was to be signed early in 1975.[13] GOL will have a 25% equity in the corporation and will receive 62.5% of profits after recovery of invested capital. If the mine were to prove substantially more profitable than anticipated, the GOL percentage of profits could rise on a sliding scale to a maximum of 72%. Production is expected to start in 1977 at a rate of 4,000 tons of ore per day. A diamond sales company registered in Lesotho will be established and, throughout the life of the mine, the production will be marketed through the Central Selling Organization.

South Africa, Republic of.—In April 1974 a miner found a 616-carat gem diamond in the crusher at the Dutoitspan mine in the Kimberley area.[14] The diamond is the ninth largest gem diamond ever found and is the largest found in the Kimberley area. The announcement by De Beers said that the diamond was a yellow octahedron of good shape but not of the best quality.

Diamond sales by the Central Selling Organization decreased from R921 million ($1,289.4 million) in 1973 to R849 million ($1,288.6 million) in 1974, or 7.8%. Production of the larger and more valuable stones from all mines, old and new, declined. Generally, the increased demand for small diamonds was insufficient to offset the drop in value due to lower sales of large diamonds.

Sri Lanka.—The State Gem Corporation established a gem export incentive program under which exporters could reserve 25% of their gem value in unrestricted external accounts. The program created a boom in gem stone mining because all other segments of the business population, in addition to those already in the gem stone industry, joined in the export market to have access to the trade privileges. Gem stones in 1973 ranked fourth after tea, rubber, and coconut products in value of exports and were expected to rank second in 1974, exceeded only by the value of tea. Prior to 1973, gem stones contributed little to the total export value of Sri Lanka, but the 20-fold increase of the value in 1973 compared with that of 1972 raised the value of gem stones into the top rankings. Gem stones of interest to collectors include sapphire, ruby, garnet,

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[10] U.S. Bureau of Mines. Diamond: Ghana. Mineral Trade Notes, v. 71, No. 7, July 1974, pp. 3–4.
[11] Arkansas Gazette. Americans, Kenya Seeking Ruby Mine. Oct. 7, 1974, sec. A, p. 8.
[12] U.S. Bureau of Mines. Diamond: Lesotho. Mineral Trade Notes, v. 71, No. 5, May 1974, p. 3.
[13] Pages 5 and 6 of work cited in footnote 8.
[14] World Mining. Republic of South Africa. Diamonds Sparkle Again for DeBeers. V. 27, No. 6, June 1974, p. 52.

catseye, spinel, moonstone, alexandrite, tourmaline, and varieties of quartz.

Thailand.—Major gem stones mines in Thailand are located in the provinces of Chantaburi, Kanchanburi, Phrae, Si Saket, and Trat.[15] The following types of gem stones are found: Ruby, sapphire, spinel, peridot, garnet, zircon, beryl, tourmaline, jadeite, quartz, and occasionally diamond. A high-volume of jade and rough sapphire stones are imported and reexported as cut stones because of the lower labor costs in Thailand. The majority, about 85%, of Thai gems are sold as cut stones. In Bangkok, the average prices for cut stones late in 1973 were $500 per carat for ruby, $380 per carat for blue sapphire, and $70 per carat for yellow sapphire. In 1957 gem stone exports amounted to about $380,000 but in 1973 the total value was about $31.0 million.

TECHNOLOGY

The world's third largest rough diamond—the 968.9-carat Star of Sierra Leone—was cut into 11 fine white gem stones ranging from 143.2 carats to 1.85 carats.[16] The total weight of the cut stones was 328.14 carats, a recovery of 33.9% comparing favorably with previously cut large stones.

Two color-illustrated articles described in detail the effects of either gamma radiation or heat treatment on the resulting gem stone colors.[17]

Colorless to pale-yellow topaz turned to a sherry color (imperial topaz) or to brown; however, an occasional topaz turned blue when irradiation was followed by heating. When colorless quartz was gamma-irradiated, it had a smoky or amethyst color, depending on the iron and aluminum content as well as the growth direction. Some natural colorless or pale-color beryl turned a deep-blue color after radiation, but the color was unstable on exposure to light. Similar dosages of gamma irradiation induced major color changes in tourmaline, but the stability of these colors was unpredictable on exposure to light or heat. An unstable new color in some Brazilian crystalline quartz was produced by gamma irradiation followed by gentle heating techniques. Pearls, a gem stone material, turned gray, bluish-gray, or blue by gamma irradiation and were stable. Kunzite turned a deep green after gamma irradiation but bleached on exposure to light or after heating. Minor color changes apparently were produced in jade and no changes appeared in opal after irradiation.

Technological progress in the use and application of lasers and grasers (X-ray laser) in gem stone analyses was reported.[18] Items of significant progress were as follows:

1. High-output laser systems have processed a variety of materials including plastic, metal, stone, and minerals.

2. Laser interferometry, holography, and acoustical holography have been used for the nondestructive testing of materials.

3. The X-ray laser or graser has been used in research and may lead to knowledge of the molecular structure of matter but it is extremely dangerous to use.

The first International Kimberlite Conference was held in the Republic of South Africa and Lesotho September 17 through October 8, 1973.[19] The conference of about 200 delegates from 20 countries brought together geologists who have an interest

[15] Bangkok Bank Monthly Review. Other Aspects of the Economy. Gem Stones—A Promising Industry. V. 16, No. 3, March 1975, pp. 172–176.

[16] Jewelers' Circular-Keystone. The Diamond Scene. Winston Cuts Sierra Leone Star, Largest Gem Is 143.2 Carats. V. 154, No. 4, January 1975, p. 138.

[17] Nassau, K. The Effects of Gamma Rays on the Color of Beryl, Smoky Quartz, Amethyst and Topaz. Lapidary Journal, v. 28, No. 1, April 1974, pp. 20–26, 30, 36–40.

Nassau, K. The Effect of Gamma Rays on Tourmaline, Greenish-Yellow Quartz, Pearls, Kunzite, and Jade. Lapidary Journal, v. 28, No. 7, October 1974, pp. 1064–1074, 1084.

[18] Goldman, L. Progress in Laser Technology and Art. Lapidary Journal, v. 28, No. 4, July 1974, pp. 636–639.

[19] Boyd, F. R. Kimberlite Conference in Africa. Geotimes, v. 19, No. 5, May 1974, pp. 24–25.

in the discovery of kimberlites, which can be the source rock for diamond.

The eruption of kimberlites in various parts of the world has brought an unusual variety of rock to the surface from the upper mantle and crustal basement. Southern Africa is rich in kimberlites, and the kimberlite occurrences in the small country of Lesotho alone amount to 17 pipes, 21 dike enlargements, and more than 200 dikes.[20]

A guide to collecting in working and abandoned mines was published and strongly emphasized attention to safety.[21] The publication was directed towards the experienced mineral collector who occasionally has the opportunity to go underground.

[20] Lesotho National Development Corp. Lesotho Kimberlites, ed. by P. H. Nixon. Printed by Cape & Transvaal Printers, Ltd., Capetown, Republic of South Africa, 1973, 336 pp., 69 plates.

[21] Wilson, W. E. A Guide to Underground Collecting. The Mineralogical Record, v. 5, No. 3, May–June 1974, pp. 128–137.