Gem Stones

By J. W. Pressler[1]

The value of gem stones and mineral specimens produced in the United States during 1981 was estimated to be $7.6 million. During the year, turquoise production decreased while tourmaline and sapphire production increased. Amateur collectors accounted for much of the activity in many States. Commercial operators produced rough jade, jasper, agate, sapphire, turquoise, opal, and tourmaline, which they sold mainly to wholesale or retail outlets and also to jewelry manufacturers.

DOMESTIC PRODUCTION

Mines and collectors in 46 States produced gem materials with an estimated value of $1,000 or more in each State in 1981. Ten States supplied 90% of the total value, as follows: Arizona, $3.3 million; Nevada, $1.0 million; Maine, $700,000; Oregon, $600,000; California, $300,000; Wyoming, $250,000; and Arkansas, New Mexico, Texas, and Washington, $200,000 each. In 1981, estimated production increased 33% in New Mexico and Washington, 25% in Texas, 20% in Oregon, 5% in Nevada, and 3% in Arkansas, but decreased 12% in Maine.

Park authorities at the Crater of Diamonds Park in Pike County, Ark., reported that approximately 97,000 people visited the park in 1981 and found 1,327 diamonds with a total weight of 244 carats. This was an increase of 99% compared with the old record of 668 stones found in 1975. The largest was an 8.3-carat white stone of undetermined value. The next three largest diamonds, one brown and two whites, ranged from 5.90 to 6.25 carats. The principal factor contributing to this new record was the introduction of new concentrating and screening techniques that enable diggers to recover more of the smaller (1- to 24-point) diamonds. The average for all diamonds found was 18 points. Ticket sales and total attendance were up substantially from the 75,000 tickets sold in 1980. The "dig for fee" operations remained popular.

In Pala, San Diego County, Calif., Pala Gem Mines produced tourmaline at their Stewart lithia mine. The other small mines, in the same county, continued to produce fine gem-quality and specimen tourmaline, kunzite, and morganite.

Montana continued to lead the other States in the production of corundum, particularly gem-quality sapphire. Gemco International produced 35,000 carats of sapphires in 1980 from Yogo Gulch, Fergus County, with a high percentage of prize blues. A 500-ton-per-day recovery plant was planned to be onstream by 1982. Three other pay-as-you-dig or fee placer operations were active: Eldorado Bar and Castle's Sapphire Mine near Helena, and Gem Mountain Sapphire Mine near Philipsburg. Gem-quality rubies and sapphires are also found in the Cowee Valley near Franklin, N.C. A 163-carat ruby is believed to be one of the largest rubies ever found in the area.

The largest single emerald ever found in North America was a 1,438-carat crystal from the Rist Mine near Hiddenite, N.C., in 1969. Each year, many small emeralds are found by visitors there, as well as from the Crabtree Mine near New Switzerland, N.C.

CONSUMPTION

Domestic gem stone output went to amateur and commercial rock, mineral, and gem stone collections, objects of art, and jewelry. Apparent consumption (domestic production plus imports minus exports and reexports) in 1981 was $1,812 million, 1% more than that of 1980.

PRICES

Yearend domestic sales of commercial-grade gem diamonds (inexpensive commercial-grade stones up to 1 carat) surged during the Christmas season, but there was a reduced market for better quality certificate stones over 1.0 carat.

The U.S. price of 1.0-carat, D-flawless, investment-grade diamond plummeted during the year, decreasing more than 60% from an alltime high in October 1980 of $54,250 to a $20,000-to-$25,000 range at yearend 1981.

Colored stones languished during the year, with commercial materials being more popular, and expensive stones experienced poor sales. Average prices of some high-quality stones—emerald, black opal, and ruby—decreased 30% to 50%, while others—sapphire, star sapphire, tanzanite, and tourmaline—increased 56% to 80%.

Table 1.—Prices of U.S. cut diamonds, by size and quality

Carat weight	Description, color[1]	Clarity[2] (GIA terms)	Price range per carat 1981	Median price per carat[3]	
				December 1980	Early December 1981
0.04-0.08	G-I	VS_1	$375- $650	$570	$467
.04- .08	G-I	SI_1	325- 550	520	400
.09- .16	G-I	VS_1	475- 750	655	550
.09- .16	G-I	SI_1	400- 615	585	470
.17- .22	G-I	VS_1	600- 1,205	1,080	837
.17- .22	G-I	SI_1	510- 1,045	975	687
.23- .28	G-I	VS_1	750- 1,375	1,385	900
.23- .28	G-I	SI_1	640- 1,215	1,150	800
.29- .35	G-I	VS_1	875- 1,795	1,550	1,200
.29- .35	G-I	SI_1	740- 1,535	1,375	917
.46- .55	G-I	VS_1	1,300- 2,285	2,738	1,800
.46- .55	G-I	SI_1	1,000- 2,000	1,950	1,500
.69- .79	G-I	VS_1	1,600- 3,010	3,556	2,300
.69- .79	G-I	SI_1	1,200- 2,420	2,530	1,850
1.00-1.15	D	FL	(4)	[5]53,000	26,500
1.00-1.15	E	VVS_1	10,000-16,050	[5]23,000	11,250
1.00-1.15	G	VS_1	4,600- 8,480	[5]8,600	5,075
1.00-1.15	H	VS_2	3,500- 5,700	[5]5,650	3,800
1.00-1.15	I	SI_1	2,600- 4,000	[5]3,550	2,750

[1]Gemological Institute of America (GIA) color grades: D—colorless; E—rare white; G-I—traces of color.

[2]Clarity: FL—no blemishes; VVS_1—very, very slightly included; VS_1—very slightly included; VS_2—very slightly included, but more visible; SI_1—slightly included.

[3]Jewelers' Circular-Keystone, v. 152, No. 1, January 1981, p. 124; v. 153, No. 2, February 1982, p. 150. These figures represent a sampling of net prices that diamond dealers in various U.S. cities charged their customers during the month.

[4]Not enough sales reported to quote prices. Last quoted as $36,000-$44,000 in July 1981 Jewelers' Circular-Keystone. Quoted at yearend in The Diamond Registry Bulletin, New York, N.Y., as $20,000-$25,000.

[5]Representative of early November 1980 sales. December sales are nonrepresentative.

Table 2.—Prices of U.S. cut colored gem stones, by size

Gem stone	Carat weight	Price range per carat 1981	Median price per carat[1]	
			December 1980	Early December 1981
Amethyst	10	$10- $25	$15	$18
Aquamarine	5	40- 300	168	187
Cat's eye	2		[2]	[2]
Citrine	10	12- 45	12	16
Emerald:				
Medium to better	1	1,200-4,000	3,500	2,500
Commercial	1	800-2,500	900	1,175
Garnet, green	1	400-1,000	725	625
Opal, black	3	200- 300	500	250
Opal, white	5	45- 125	75	80
Peridot	5	45- 100	55	65
Ruby:				
Medium to better	1	1,200-5,000	2,750	1,650
Commercial	1	600-3,000	850	700
Sapphire:				
Medium to better	1	450-2,500	1,200	1,500
Commercial	1	250- 800	425	750
Star sapphire:				
Sky-blue	5	350- 500	250	450
Gray	5	80- 200	100	102
Tanzanite	5	400-1,000	590	850
Topaz	5	75- 350	245	237
Tourmaline, green	5	45- 150	75	125
Tourmaline, pink	5	65- 200	80	125

[1]Jewelers' Circular-Keystone, v. 152, No. 1, January 1981, p. 126; v. 153, No. 2, February 1982, p. 152. These figures represent a sampling of net prices that colored stone dealers in various U.S. cities charged their cash customers during the month.
[2]Not reported.

FOREIGN TRADE

U.S. imports of rough and polished natural diamonds, excluding industrial diamonds, attained a record $2.2 billion declared custom value in 1981. Total polished diamond imports, principally from Belgium (36%) and Israel (29%), increased 43% to $1.8 billion, a new alltime record. The over-0.5-carat category, mostly from Belgium (42%), Israel (19%), and Switzerland (17%), increased 66% to $760 million, and the less-than-0.5-carat group, mostly from Israel (37%), Belgium (31%), and India (24%), increased 30% to $1.04 billion. However, imports of rough natural diamond, principally from the Republic of South Africa (70%), the United Kingdom (9%), and Sierra Leone (4%), decreased 41% in caratage and 59% in value in 1981 compared with that of 1980. The decrease in carat value from $731 in 1980 to $359 in 1981 for South African imports was an indication that De Beers Consolidated Mines Ltd. was withholding the better quality rough stones from the market.

The total value of emerald imports decreased 7% to $132 million in 1981. The total value of rubies and sapphires imported in 1981 increased 30% to $177 million, compared with the revised figure of $136 million in 1980.

Table 3.—U.S. exports and reexports of diamond (exclusive of industrial diamond), by country

Country	1980		1981	
	Quantity (carats)	Value (millions)	Quantity (carats)	Value (millions)
Exports:				
Belgium-Luxembourg	31,797	$95.9	47,781	$49.4
Canada	7,041	5.1	9,020	7.1
France	5,112	31.0	5,909	23.0
Germany, Federal Republic of	2,452	7.5	3,037	6.8
Hong Kong	69,927	240.5	47,802	134.8
Israel	21,164	16.2	16,253	11.8
Japan	28,039	64.2	31,415	66.8
Netherlands	739	5.7	371	4.3
Singapore	6,836	13.7	6,585	12.3
Switzerland	24,110	127.3	16,930	98.4
United Kingdom	5,068	19.5	5,278	18.3
Other	8,358	16.7	6,729	8.3
Total	210,643	643.3	197,110	441.3
Reexports:				
Belgium-Luxembourg	333,186	119.2	[1]1,973,297	142.0
France	6,922	6.9	4,315	5.2
Hong Kong	36,345	40.6	55,118	44.9
India	199,201	6.7	323,785	7.2
Israel	262,625	93.2	386,840	79.3
Japan	61,579	7.3	79,813	19.5
Netherlands	42,987	6.8	41,324	3.2
Switzerland	18,323	44.6	28,182	58.5
United Kingdom	109,024	18.4	43,719	39.1
Other	43,918	54.2	81,484	13.9
Total	1,114,110	397.9	3,017,877	412.8

[1]Artificially inflated in 1981 by auction of 1,477,365 carats of U.S. Government stockpile industrial diamond stones with subsequent reexport as gem stones to Belgium-Luxembourg.

Table 4.—U.S. imports of diamond for consumption, by kind and country

Kind and country	1980		1981	
	Quantity (carats)	Value (millions)	Quantity (carats)	Value (millions)
Rough or uncut, natural:[1]				
Belgium-Luxembourg	32,587	$19.5	28,122	$12.2
Central African Republic	66,308	7.1	19,869	2.2
Israel	23,635	12.5	21,609	6.7
Liberia	5,023	10.5	3,717	2.7
Sierra Leone	85,352	49.2	37,872	23.3
South Africa, Republic of	907,749	662.1	656,362	282.5
Switzerland	18,988	11.6	7,943	4.1
United Kingdom	201,138	193.5	80,010	56.9
Venezuela	204,513	16.8	67,351	6.0
Other	48,310	12.4	10,430	6.5
Total	1,593,603	995.2	933,285	403.1
Cut but unset, not over 0.5 carat:				
Belgium-Luxembourg	531,251	223.6	777,054	319.9
Hong Kong	10,128	3.6	19,370	10.0
India	854,526	198.9	1,120,122	246.0
Israel	787,535	322.8	958,153	383.3
South Africa, Republic of	34,751	25.6	45,150	27.9
Switzerland	9,528	4.6	29,660	13.8
United Kingdom	12,192	5.9	17,571	10.8
Other	30,882	13.4	68,851	25.5
Total	2,270,793	798.4	3,035,931	1,037.2
Cut but unset, over 0.5 carat:				
Belgium-Luxembourg	155,280	242.2	206,171	319.3
Hong Kong	1,298	3.4	5,899	26.2
India	5,155	2.7	11,409	6.3
Israel	89,015	117.8	138,107	146.7
Netherlands	2,555	4.9	8,288	16.0
South Africa, Republic of	28,638	43.1	26,463	48.2
Switzerland	3,678	16.6	18,688	125.6
United Kingdom	5,475	15.4	11,112	40.1
Other	5,011	11.5	11,927	31.4
Total	296,105	457.6	438,064	759.8

[1]Includes some natural advanced diamond.

Table 5.—U.S. imports of precious and semiprecious gem stones, by kind and country

Kind and country	1980		1981	
	Quantity (carats)	Value (millions)	Quantity (carats)	Value (millions)
Emerald:				
Belgium-Luxembourg	1,777	$0.7	6,645	$3.2
Brazil	240,198	7.5	48,977	5.8
Canada	2,587	.7	18,788	1.2
Colombia	81,910	55.7	121,708	40.2
France	5,073	1.5	9,759	2.2
Germany, Federal Republic of	38,618	3.0	41,795	4.6
Hong Kong	56,073	8.6	120,313	12.2
India	3,025,578	18.6	1,572,510	15.8
Israel	88,234	21.2	96,870	22.8
Pakistan	793	.4	4,651	1.2
South Africa, Republic of	6,200	1.1	14,787	1.4
Switzerland	27,310	12.0	49,721	1.1
Thailand	6,779	.5	31,940	2.6
United Kingdom	6,032	7.2	7,097	4.6
Other	13,728	2.7	152,098	12.7
Total	3,600,890	141.4	2,297,659	131.6
Ruby:				
Belgium-Luxembourg	NA	.2	NA	1.4
Burma		.8		3.3
Canada		.1		1.2
France		.7		1.4
Germany, Federal Republic of		.9		3.1
Hong Kong		13.5		9.1
India		3.1		4.7
Switzerland		3.3		12.0
Thailand		58.1		47.6
United Kingdom		1.3		4.7
Other		3.0		5.3
Total	NA	85.0	NA	93.8
Sapphire:				
Australia	NA	.4	NA	2.6
France		.3		2.2
Germany, Federal Republic of		.6		2.4
Hong Kong		4.9		8.4
India		1.6		3.3
Sri Lanka		6.8		7.5
Switzerland		1.7		11.1
Thailand		31.8		34.8
United Kingdom		.8		5.1
Other		2.0		5.6
Total	NA	50.9	NA	83.0
Other:				
Rough, uncut:				
Australia	NA	2.0	NA	1.2
Brazil		4.5		3.2
Colombia		1.8		2.2
South Africa, Republic of		3.2		1.6
Switzerland		3.5		.7
Zambia		1.9		2.5
Other		3.4		6.3
Total	NA	20.3	NA	17.7
Cut but unset:				
Australia	NA	2.4	NA	3.5
Brazil		17.4		36.4
Germany, Federal Republic of		7.9		11.0
Hong Kong		17.1		17.6
India		2.7		2.4
Switzerland		.4		1.0
Taiwan		1.0		.9
Thailand		1.5		2.8
Other		6.5		5.4
Total	NA	56.9	NA	81.0

NA Not available.

Table 6.—Value of U.S. imports of synthetic and imitation gem stones, by country

(Million dollars)

Country	1980	1981
Synthetic, cut but unset:		
Austria	0.9	1.7
France	.8	1.2
Germany, Federal Republic of	7.5	5.8
Korea, Republic of	5.3	8.2
Switzerland	2.1	2.6
Other	3.1	3.1
Total	19.7	22.6
Imitation:		
Austria	8.5	7.7
Czechoslovakia	.8	.8
Germany, Federal Republic of	3.1	3.8
Other	1.3	1.0
Total	13.7	13.3

Table 7.—U.S. imports for consumption of precious and semiprecious gem stones

(Thousand carats and thousand dollars)

Stone	1980		1981	
	Quantity	Value	Quantity	Value
Diamonds:				
Rough or uncut[1]	1,594	995,212	935	404,354
Cut but unset	2,567	1,255,983	3,474	1,796,908
Emeralds: Cut but unset	3,601	141,413	2,298	131,560
Coral: Cut but unset, and cameos suitable for use in jewelry	NA	3,544	NA	3,630
Rubies and sapphires: Cut but unset	NA	r135,914	NA	176,758
Marcasites	NA	136	NA	498
Pearls:				
Natural	NA	3,829	NA	2,008
Cultured	NA	77,375	NA	105,942
Imitation	NA	1,965	NA	1,966
Other precious and semiprecious stones:				
Rough and uncut	NA	20,323	NA	17,697
Cut but unset	NA	56,927	NA	87,325
Other n.s.p.f	NA	7,430	NA	665
Synthetic:				
Cut but unset[2]	17,848	19,714	28,846	22,646
Other	NA	1,277	NA	961
Imitation gem stones	NA	13,689	NA	13,332
Total	XX	r2,734,731	XX	2,766,250

rRevised. NA Not available. XX Not applicable.

[1]Includes 16,544 carats of other natural diamond, advanced, valued at $1.15 million in 1980, and 1,823 carats valued at $1.26 million in 1981.

[2]Quantity in thousands of stones.

WORLD REVIEW

Angola.—Prior to Angola's independence in 1974, annual diamond production was 2.4 million carats, and by 1979, production had fallen to 840,000 carats. A revitalization of this country's important diamond mining industry, spearheaded by Companhia de Diamantes de Angola (Diamang), bolstered by increasing prices, caused annual production of diamonds to climb to 1.5 million carats, with export earnings of $400 million in 1980. Diamang was 77.1% owned by the Government, with the remainder held by British, South African, United States, Belgian, and Swiss interests, with marketing handled by De Beers.[2]

Australia.—Exploration and evaluation of the Argyle prospect by the CRA-Ashton Joint Venture continued during the year with drilling and bulk sampling of the kimberlite pipe AK-1, and bulk sampling of the Upper Smoke Creek, Lower Smoke Creek, and the Limestone Creek alluvial

deposits. Cumulative totals for all work performed (including 1980), indicate that 152,000 carats have been recovered from 37,800 short tons of the AK-1 pipe, and 102,000 carats have been recovered from 52,100 tons of the alluvials. Composite sorting of these diamonds showed a quality of 10% gem, 30% near-gem, and some high-quality industrials, and the balance industrials. A representative sampling has been evaluated by the Central Selling Organization at $8.00 per carat, depending on the bort value assumed.

The final feasibility study commenced at yearend for the design and construction of a large-scale commercial plant with an initial capacity of 2.5 million short tons per year. Large-diameter core drilling for kimberlite sampling and geological continuity of the pipe progressed to depths of 145 meters. With these assumptions, diamond production should start in 1985 at a level of 10 to 15 million carats per year, slightly better in the initial years until the alluvials are processed, and with a project life of 20 to 30 years. This mine alone would easily surpass Zaire as the world's largest producer of industrials and would have a strong impact upon the world market. At yearend, an agreement was made by the Central Selling Organization with the Ashton Joint Venture and the Australian Government to market most of the production, with some concessions to allow domestic sales, and the development of a cutting and polishing center in Perth.[3]

Australia produces five types of precious gem stones—black, gray, and white fire opal, sapphires, diamonds, chrysoprase, and rubies. The Aga emerald mine in Western Australia is a recent development. Although it has been an intermittent producer since 1909 with exports to India, recent exploration revealed an increased potential for emerald production. Recovery of gem-quality was about 11%, and the largest crystal found so far was 9.6 carats. The lower grade emeralds were being sold to the United States.[4]

Belgium.—Total imports of diamonds by Belgium reached 54 million carats in 1981, a 17% increase compared with that of the previous year; however, total value decreased 3.4% compared with that of 1980. Total exports were 48 million carats valued at $3.1 billion, a caratage increase of 8.5% and value increase of 7.4% compared with that of 1980. The major market for Belgium diamonds continued to be the United States, which received 1 million carats in 1981. The Central Selling Organization's share of Belgium's rough stone imports had gradually fallen from 89% in 1977 to 68% in 1981.[5] Price setting of investment-grade diamonds was being done twice daily by an important Antwerp-based diamond dealer.[6]

Botswana.—At yearend 1981, De Beers asked Botswana to stockpile diamonds because of the world slump in prices. De Beers had a 50% interest in De Beers Botswana Mining Co. in the operation of the Orapa and Letlhakane Mines, and the new Jwaneng Mine near Gabarone in the southern part of the state. The Jwaneng Mine, scheduled to have a rated capacity of 5.3 million short tons per year, was to be onstream in the second half of 1982. It is expected to have a higher recovery grade than that of any other mine in the Group, and to produce diamonds of medium quality. De Beers reported it to be probably the most important kimberlite pipe discovered anywhere in the world since Kimberley more than a century ago.[7]

Brazil.—Most of the gem diamond production in Brazil has come from independent prospectors called "garimpeiros" who produce about 120,000 carats per year. A conservative estimate for 1981 indicated total state production of 228,000 carats of gem and 372,000 carats of industrial diamond, mostly from Minas Gerais and Mato Grosso Provinces.[8]

China.—OCTHA, a South African diamond mining, cutting, and marketing group, is investing $3 million in China to establish the first diamond cutting and polishing operation in China.[9]

Colombia.—Econominas, the Colombian state mining organization, reported that legal exports of emeralds in 1980 were valued at $196 million, principally to Japan, the United States, and Taiwan. Emerald exports accounted for almost 50% of the total mineral exports from Colombia. However, it was estimated that this was only 40% of the real amount exported, the remainder being smuggled out of the country illegally.[10]

Ghana.—The Akwatia diamond mine, 65 miles from the Ghanaian capital of Accra, was facing several financial difficulties. The mine, which started operations in 1924, was no longer profitable, and its closing was a possibility. In 1973, the mine had produced 2.4 million carats annually and only produced about 1.0 million carats in 1981. However, at yearend the Government

underwrote a $15 million loan to Ghana Consolidated Diamond Co. to modernize its plant and improve its economic viability. Also at yearend, the Government of India announced an agreement to purchase rough diamonds from the Diamond Marketing Corp. of Ghana, and it was estimated that this would result in additional margins for Ghana, compared with the previous sales through the Diamond Trading Co. of London.[11]

Guinea.—A $70 million alluvial diamond venture was being developed in the Kissidougou Banankor area close to the border of Sierra Leone, an area noted for high-quality diamonds. Initial production was expected to begin in August 1983 at an annual production level of 200,000 carats and increase to 500,000 carats per year by 1985. The project was a joint venture between Bridge Oil of Australia (45%) and the Republic of Guinea (50%). The remaining 5% was to be shared by Simonius Vischer and Industrial Diamond Co. of Switzerland, with marketing performed by Aredor Sales managed by Industrial Diamond Co.[12]

A diamond of 800 carats was discovered in Guinea in 1981. The diamond, the largest found in the country since 1958, was of industrial quality.[13]

India.—The discovery of three large diamonds in the Vajrakarur area of Andhra Pradesh has led the Geological Survey of India to embark on a 3-year program of intensive diamond exploration. The Majhagawan diamond mines of the Panna district have yielded a total of 233,000 carats of diamonds worth $20 million since 1960. The Panna area has also produced about 3,200 carats of crude emerald per year.[14]

The Gem and Jewellery Export Promotion Council in India reported that exports of gem stones and jewelry rose by 8% to $700 million in 1980-81. The council fixed a new target of $860 million for 1981-82, with most of the revenue from cut and polished gem diamonds, which ranks as India's top foreign exchange earning commodity. India already led the world in quantity of diamond exports and was ranked third after Israel and Belgium in terms of value.[15]

Israel.—The Israeli diamond cutting, polishing, and trading industry, one of the most important in the world, was severely affected by the recent decline in world gem sales. The industry has been the nation's largest industrial export business, with exports totaling $1.4 billion at its peak. At its peak in 1979, 700 companies employed 12,000 people, compared with about 600 companies employing 8,000 people in 1981. Exports in 1981 were about $950 million, 68% lower than the peak year of 1979.[16]

Israel accounts for about 50% of world production of cut emeralds, and exports have grown in value from $2.6 million in 1971 to $10 million in 1977. It is expected that exports exceeded $50 million in 1981.[17]

Ivory Coast.—Diamond mining of both gem and industrial quality in the Ivory Coast has been centered in the Tortiya and Seguela regions. Société Anonyme de Recherches et d'Exploitations Minières en Côte d'Ivoire's operation at Tortiya began in 1948 and continued until 1975, when it closed because of high costs. The Seguela Mine was successfully operated by the Watson Society from 1971 to 1977. The Ivory Coast has not produced any diamonds in the past 2 years.[18]

Lesotho.—At the Letseng-la-Terai Mine of De Beers Lesotho Mining Co., Ltd., the tonnage treated was down slightly to about 2.1 million short tons, and the grade was practically the same at 2.80 carats per 110 short tons. The percentage of gem diamonds remained high at 93%, and the diamonds larger than 10 carats in size represented 12% of the production.[19] Commercial operations at other diamond-bearing kimberlites in this small, landlocked country surrounded by the Republic of South Africa had been organized into two labor-intensive cooperatives with portable washing plants, which provided profitable work for over 1,100 employees.[20]

The Lesotho Government's Bureau of Statistics reported that 1980 production, 105,245 carats of diamonds, was valued at $274.88 per carat.[21]

Namibia.—Responding to poor market conditions, curtailment of the mining and treatment operations of Consolidated Diamond Mines (Pty.) Ltd., a subsidiary of De Beers, resulted in a 25% reduction in total tonnage treated, and a reduction of 20% in diamond production from 1.6 million carats in 1980 to 1.25 million carats in 1981. These beach placers near Oranjemund yield diamonds of 95% gem-quality, and contributed as much as 18% of De Beers pretax profits in 1979.[22]

The T.O.N.M. Oil and Gas Exploration Corp. has acquired a 50% interest in African Coast Diamond and Minerals (Pty.) Ltd. (ACDM). ACDM has mining rights to 90 square miles along the Atlantic coast of Namibia. A large-scale pilot plant with

Sortex equipment is located between the Hoarusib and Hoanib Rivers. Reserves have been estimated to be 2 to 6 million carats.[23]

It was reported that three kimberlite pipes had been discovered near the western border of the Republic of South Africa with Namibia, and De Beers inaugurated an extensive prospecting program across the frontier in the northeastern corner of Namibia.[24]

Sierra Leone.—During 1981, the National Diamond Mining Co., Ltd. (DIMINCO) of Sierra Leone mined principally alluvial deposits to produce about 595,000 carats of diamonds. Over 50% of the diamonds were of gem-quality, including some very large stones, which has resulted in illicit operations and theft. DIMINCO estimates that as much as 50% of the diamonds mined have been smuggled out. DIMINCO initiated an Alluvial Diamond Mining Scheme to have frequent sights in Freetown with payment in hard currency to detract from the smuggling. In the July sights, DIMINCO sold almost 45,000 carats for $188 per carat, not including a special sale of a 119-carat diamond for $1.1 million. A new joint venture of the Sierra Leone Government (60%), the Kuwait Foreign Trading, Contracting and Investment Co. (30%), and Sierra Leone Selection Trust (10%) was formed to mine the diamond-bearing kimberlites in the Kono area, to be initiated in 1981 and fully operational by 1985.[25]

South Africa, Republic of.—De Beers continued its widespread reconnaissance and prospecting program in the Republic of South Africa without the discovery of any new important kimberlite provinces. Shaft sampling of a kimberlite cluster on the Venetia farm, with bulk sample treatment by a heavy media separation plant, progressed during the year. Sampling for reserve extension of existing mines in Namaqualand continued.

The Namaqualand Div. of De Beers suspended operations in the Tweepad area for the last 7 months of 1981, and production at Annexe Kleinzee and the Koingnaas complex was reduced by 10% for the remainder of the year. Diamond recovery declined 15% to a level of 1.2 million carats with an average grade of 18.6 carats per 110 short tons.

At the Finsch Mine, operation of the new treatment plant for the full year at a high throughput and improved diamond recovery efficiency resulted in a 50% increase of diamond production in 1981 compared with 1980. The open pit mine, presently producing from the 160- to 220-meter levels, was scheduled to change over to underground production in 1988. Vertical shaft sinking to 763 meters was completed in August 1981.[26]

Leichardt Exploration of Australia discovered more diamonds on Farm "C" at the Reads Drift prospect, confirming expectations that higher grades exist at depth.[27]

The Octha diamond group was expanding its investment program to $160 million in South Africa, to create an integrated diamond mining, cutting, marketing, and retailing operation. Included in its operations was a Namaqualand Mine and four mines in the Kimberley area. Production in 1981, about 100,000 carats of 85% gem-quality, was expected to be increased to 1 million carats per year 50% gem-quality, by 1986.[28]

Sweden.—Two diamonds, each about 0.3 millimeter, were found in an area of kimberlite on the Baltic island of Alnon, just off the east coast of Sweden near Sundsvall. Washing of 12 short tons of ore yielded one diamond. This was the first confirmed diamond find ever made in western Europe.[29]

Thailand.—Thailand continued to be one of the most important centers of gem stone cutting and polishing in the world, principally diamonds, rubies, and sapphires. Export value of all precious stones in 1980 was approximately $2.5 billion.[30]

U.S.S.R.—The Siberian platform of the Soviet Union in north-central Asia has emerged as one of the most remarkable kimberlite and diamond areas on earth. Since the pioneering days 25 years ago, over 400 kimberlite pipes have been discovered within an oval belt 300 miles long and 250 miles wide southwest of the Lena River, a kimberlite province comparable with the Diamond Belt of southern Africa. Twelve principal kimberlite and/or diamond regions have been delineated, and the state has concentrated on these for maximum production development. The famous Mir diamond mine is in the Malo Botuoba region and was one of the richest pipes. However, it is questionable whether the full potential of this remote area will ever be realized, because at least 5 of the 12 principal regions are well within the Arctic Circle, where deep permafrost prevails along with long winters and extremely sub-Arctic temperatures. In one case at Mirnyy, construction engineers were fortunate in finding a dolerite sill upon which to build a milling and recovery plant.[31]

A new diamond mine was under develop-

Table 8.—Diamond (natural): World production, by country and type[1]

(Thousand carats)

Country	1977			1978			1979			1980[p]			1981[e]		
	Gem	Industrial	Total	Gem	Industrial	Total	Gem	Industrial	Total	Gem	Industrial	Total	Gem	Industrial	Total
Africa:															
Angola	265	88	353	r488	r162	r650	630	211	841	1,125	375	1,500	1,050	350	1,400
Botswana	404	2,287	2,691	r420	r2,379	r2,799	659	3,735	4,394	765	4,336	5,101	744	4,217	24,961
Central African Republic	178	119	297	199	85	284	205	110	315	227	123	350	200	100	300
Ghana	230	1,717	1,947	142	1,281	1,423	125	1,128	1,253	126	1,132	1,258	100	900	1,000
Guinea[e]	25	55	80	25	55	80	27	58	85	12	26	38	12	26	38
Ivory Coast	r20	r19	239	r22	r23	r45	24	24	48	--	--	--	--	--	--
Lesotho	39	3	42	62	5	67	48	4	52	50	4	54	49	4	253
Liberia[3]	163	163	326	128	180	308	170	132	302	123	175	298	117	169	2286
Namibia	1,901	100	2,001	1,803	95	1,898	1,570	83	1,653	1,482	78	1,560	1,186	62	21,248
Sierra Leone	423	538	961	353	426	779	419	436	855	317	275	592	320	275	595
South Africa, Republic of:															
Finsch Mine	r365	r2,061	2,426	r403	r2,227	2,630	465	2,120	2,585	465	2,442	2,907	1,002	3,463	24,465
Premier Mine	r378	r1,632	2,010	r380	r1,603	1,983	468	1,613	2,081	407	1,632	2,039	510	1,530	22,040
Other De Beers properties[4]	r1,216	r1,441	2,657	r1,254	r1,395	2,649	1,850	1,370	3,220	1,550	1,489	3,039	1,603	1,069	22,672
Other	r372	r178	550	r320	r145	465	403	95	498	391	44	435	314	35	349
Total	r2,331	r5,312	7,643	r2,357	r5,370	7,727	3,186	5,198	8,384	2,813	5,607	8,420	3,429	6,097	29,526
Tanzania	204	204	408	r141	r141	r282	157	157	314	137	137	274	140	140	280
Zaire	533	10,681	11,214	640	10,603	11,243	294	8,440	8,734	345	9,890	10,235	260	7,240	7,500
Other areas:															
Australia	--	--	--	--	--	--	--	--	--	--	48	48	221	2184	2205
Brazil	r236	r384	r620	r236	r384	r620	236	384	620	253	414	667	228	372	600
Guyana	7	10	17	7	10	17	6	10	16	4	6	10	4	6	10
India	15	3	18	14	2	16	14	2	16	e12	e2	e14	12	2	14
Indonesia[e]	3	12	15	3	12	15	3	12	15	3	12	15	3	12	15
U.S.S.R.[e]	2,100	8,200	10,300	2,150	8,400	10,550	2,200	8,500	10,700	2,250	8,600	10,850	2,120	8,480	10,600
Venezuela	204	483	687	r271	r549	r820	247	556	803	238	483	721	2102	2388	2490
Total	r9,281	r30,378	r39,659	r9,461	r30,162	r39,623	10,220	29,180	39,400	10,282	31,723	42,005	10,097	29,024	39,121

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

[1]Table includes data available through May 7, 1982. Total diamond output (gem plus industrial) for each country is actually reported except where indicated by a footnote to be estimated. In contrast, the detailed separate production data for gem diamond and industrial diamond are Bureau of Mines estimates in the case of every country except Australia (1980-81), Central African Republic (1977-78), Liberia (1977-78), Sierra Leone (1977-78), and Venezuela (1978-81), for which source publications give details on grade as well as totals. The estimated distribution of total output between gem and industrial diamond is conjectural, and for most countries is based on the best available data at time of publication. China also produces some natural diamond, but output is not reported.

[2]Reported figure.

[3]Total exports.

[4]All company output from the Republic of South Africa, except for that credited to the Finsch and Premier Mines for the years indicated; excludes De Beers Group output from Botswana, Lesotho, and Namibia.

ment near Mirnyy in the Yakutsk Autonomous Soviet Socialist Republic . The mine, which was the first Soviet underground diamond mine, was to go into operation during the period 1983-85. Twin 21-foot shafts will be sunk by freezing techniques in the unconsolidated formation below permafrost—one for ore removal and the other for ventilation. Both shafts will be approximately 3,300 feet deep.[32]

Zaire.—Zaire is the largest producer of industrial diamonds in the world. Production by Société Minière de Bakwanga (Miba) progressively dropped from a record 18 million carats in 1961 to an estimated 7.5 million carats in 1981. Illegal mining and smuggling have been reported to represent 50% of official production by Miba.

Faced with higher operating costs and declining grades, Miba was seeking financing for a new mine, as well as modernization and expansion of current alluvial operations. The plant was to treat primary kimberlite and to purchase two dredges to work deposits in riverbeds and adjoining areas. The Miba deposits at Mbuji-Mayi are about 1,400 kilometers east of Kinshasa in Kasai Oriental Province. The deposits were first worked over 60 years ago; recent exploitation has been equally divided between alluvial deposits and primary kimberlite deposits to depths of 60 meters.[33]

In 1981, Sozacom, the Zairean state marketing agency, announced a break with De Beers' Central Selling Organization, which had exclusive marketing rights for the last 14 years. At yearend, Sozacom announced that they had marketed 10 millions carats for 1981, as demand for industrials and low-grade gems had held up better in a recession year compared with the demand for larger gems.[34]

At yearend, three companies—International Diamond Co. of London, and Caddi Sprl and Glasol NV of Belgium—who had agreed to market Zaire's diamonds in cooperation with Sozacom, also agreed to assist a local diamond cutting and polishing industry by constructing a $2 million plant.

TECHNOLOGY

The labeling of the so-called reconstructed or reconstituted Geneva ruby, produced in the early development of synthetic ruby in 1903-04, has been convincingly proven incorrect. The most popular production technique explanation—that of fusing small pieces of genuine ruby together by flame fusion such as with Verneuil torch—has been discounted by scientific experiments. Genuine reconstructed products from these experiments do not resemble in any way the boules or cut stones of the original reconstructed ruby. The originals can now be attributed to multiple-step boule production under less than ideal conditions.[35]

The quality of synthetic ruby has now so improved that the new synthetic Kashan ruby is so similar to the natural that only professional laboratories can distinguish the difference. Heretofore, a professional with a 10-power hand lens could distinguish between natural rubies with crystal and Saturn-like inclusions, coarse twinning, and wispy fingerprints, and synthetic ruby with bubble inclusions and curved striae, but 45-power microscopic observation by a professional is now necessary.[36]

Zircon-based age-dating of six different Siberian kimberlite pipes have indicated a geological age ranging from 148 to 450 million years. Diamond-bearing eclogite examination presented definite conclusions that the diamonds were formed in a medium close to normal basalt in chemical composition, the only difference being that the formation of diamonds took place at a depth of about 200 kilometers. Isolation and separate examination of diamond-bearing inclusions such as red garnet and chrome diopside indicated that the morphology of the enclosed mineral is a perfect copy of the morphology of the diamond itself, and confirm the age of the diamond.[37]

---

[1]Physical scientist, Division of Industrial Minerals.
[2]World Mining. Southern Africa. V. 35, No. 2, p. 68.
Mining Annual Review (London). 1981, p. 490.
[3]Industrial Minerals (London). Ashton's Cut? Comment. No. 172, January 1982, p. 7.
Ashton Joint Venture. Fourth Quarter 1981 Progress Report. Melbourne, Australia, Jan. 8, 1982, pp. 1-4.
World Mining. Australia. Argyle Could Be Largest Diamond Deposit in the World. V. 34, No. 13, December 1981, p. 66.
[4]Mining Magazine (London). The Aga Khan—an Australian Emerald Mine. V. 145, No. 2, August 1981, p. 77.
[5]Industrial Minerals (London). World of Minerals. No. 173, February 1982, p. 11.
[6]———. Company News & Mineral Notes. No. 174, March 1982, p. 76.
[7]De Beers Consolidated Mines Ltd. Annual Report 1981. Kimberley, Republic of South Africa, Apr. 28, 1982.
[8]Minerais Não. Balanco Mineral Brazileiro. V. 2, 1980, p. 98.
U.S. Embassy, Rio De Janeiro, Brazil. State Department Airgram A-13, 1980, p. 29.
[9]Industrial Minerals (London). Company News & Mineral Notes. No. 172, January 1982, p. 48.
[10]Mining Journal (London). V. 297, No. 7613, July 17, 1981, p. 48.
[11]World Mining Yearbook, 1981 (London). V. 34, No. 9, Aug. 25, 1981, pp. 112, 115.

Work cited in footnote 5.
Industrial Minerals (London). No. 172, January 1982, p. 11.
[12]World Mining. What's Going on in World Mining. V. 34, No. 11, October 1981, p. 801.
[13]Industrial Minerals (London). Company News & Mineral Notes. No. 164, May 1981, p. 72.
[14]World Mining. V. 34, No. 7, July 1981, p. 64.
[15]Industrial Minerals (London). No. 166, August 1981, pp. 11-12.
[16]———.Dull Times for Diamonds. No. 170, November 1981, p. 13.
[17]Page 50 of work cited in footnote 9.
[18]U. S. Embassy, Abidjan, Ivory Coast. State Department Airgram A-07, Apr. 30, 1982, p. 3.
[19]Page 22-23 of work cited in footnote 7.
[20]World Mining. V. 34, No. 6, June 1981, p. 158.
[21]U.S. Embassy, Maseru, Lesotho. State Department Telegram 1606, June 23, 1981.
[22]Page 20 of work cited in footnote 7.
[23]Skillings' Mining Review. T.O.N.M. Buys Interest in African Coast Diamond & Minerals. V. 70, No. 48, Nov. 28, 1981, p. 4.
[24]Mining Journal (London). Mining Annual Review—1981. South Africa Section. June 1981, p. 475.
[25]Pages 126-128 of work cited in footnote 11.
Industrial Minerals (London). No. 162, March 1981, p. 48.
U.S. Embassy, Freetown, Sierra Leone. State Department Telegram 3572, Nov. 20, 1981.
[26]Page 19 of work cited in footnote 7.
[27]Work cited in footnote 13.
[28]World Mining. V. 35, No. 3, March 1982, pp. 85-86.
[29]Mining Magazine (London). Diamond Find in Sweden. V. 143, No. 3, September 1981, p. 158.
[30]Work cited in footnote 6.
[31]Wilson, A. N. Diamonds: From Birth to Eternity. Gemological Institute of America, Santa Monica, Calif., 1981.
Jeweler's Circular-Keystone. Gemstones. V. 153, No. 2, February 1982, pp. 126-128, 130, 132.
[32]Mining Journal (London). Industry in Action. V. 296, No. 7606, May 29, 1981, p. 410.
[33]Engineering and Mining Journal. V. 183, No. 3, March 1982, p. 210.
[34]Industrial Minerals (London). No. 165, June 1981, p. 18.
[35]Nassau, K. Gems Made by Man. Chilton Book Co., 1980, pp. 42-53.
[36]Huffer, H. Jewelers' Circular-Keystone. V. 152, No. 1, January 1981, pp. 118-120.
[37]Sobelev, N. V. What the Siberian Diamonds Tell Us. Indiaqua Ind. Diamond Quarterly (London), No. 30, 1981/III, pp. 11-13.