

# Gem Stones

By Staff, Bureau of Mines

The value of gem stones and mineral specimens produced in the United States during 1985 was estimated to be \$7.4 million, virtually the same as that of 1984. Amateur collectors accounted for much of the activity in many States. Small mine operators produced jade, opal, sapphire, tourmaline, and turquoise, which they sold mainly to wholesale and retail outlets, in gem and mineral shops, gem shows, and to jewelry manufacturers.

**Domestic Data Coverage.**—Domestic production data for gem stones are developed by the Bureau of Mines from the "Gem Stones" survey, a voluntary survey of U.S. operations. Of the 43 operations to which a survey request was sent, 33% responded. Production for the 29 nonrespondents was estimated using reported prior year production levels adjusted by trends in employment and other guidelines.

## DOMESTIC PRODUCTION

Mines and collectors in 46 States produced gem materials with an estimated value of \$1,000 or more in each State. Ten States supplied 88% of the total value as follows: Arizona, \$2.7 million; Nevada, \$1.3 million; California, \$550,000; Montana and Maine, \$400,000 each; Oregon, \$350,000; Wyoming, \$225,000; and Arkansas, New Mexico, and Washington, \$200,000 each. Estimated production increased 10% in California, 17% in Idaho, but decreased 11% in Montana and 13% in Oregon.

Lac Minerals Ltd. entered a joint venture with Superior Oil Co. in the continuing exploration of the Wyoming-Colorado border area near Tie Siding, WY, for diamond. The land holdings involve 63 unpatented claims and rights on an additional 2,500 acres leased from a Union Pacific subsidiary. Exploration revealed the existence of kimberlite pipes and dikes. A 3,000-short-ton bulk sample was processed through Superior's pilot plant at Fort Collins, CO, and found to be diamondiferous. A 500-carat sample of gem and industrial-quality diamonds was offered for sale by the parties, as part of the characterization studies, to determine the economic value.

A major new deposit of pink tourmaline (rubellite) associated with purple apatite

was discovered at the Mount Rubellite Quarry near Hebron, ME. Purple and lavender apatite crystals also were found. The discovery could be the most significant gem stone find in Maine since the tourmaline discovery at Newry in 1972.

Exmin Corp. leased some lands in Minnesota's Morrison, Todd, and Wadena Counties to explore for diamonds. Some diamonds and kimberlite have been reported in Michigan and Wisconsin, and exploration continued in these two States in 1985.

A Texas partnership, Hanvey-Boulle Ltd., expressed a willingness to spend up to \$2 million to take a core sample at the Crater of Diamonds State Park, Murfreesboro, AR, to determine if diamond mining is feasible. The State of Arkansas has final right of approval, and the Arkansas State Parks, Recreation, and Travel Commission appointed a special committee to examine any plans for commercial operations. A detailed proposal was requested from the firm by the committee. The firm indicated that the core sampling would involve drilling to a depth of 500 feet to determine the number of diamonds per hundred tons of soil. The firm also leased 3,000 acres of land surrounding the park, including several hundred acres leased from Anaconda Mining Co.<sup>1</sup>

## CONSUMPTION

Domestic gem stone output went to amateur and commercial rock, mineral, and gem stone collections, objects of art, and jewelry. Value of apparent consumption increased slightly to \$3,008 million from that of 1984.

U.S. consumption of colored stones, led by emerald, ruby, and sapphire, decreased. Annual sales of emerald continued to be almost equal to those of ruby and sapphire combined. The value of all imported gem stones, other than diamond, decreased 10%,

with other cut, set and unset, principally cultured pearls, decreasing 12%, followed by emerald with a 10% decrease.

According to data reported by the U.S. Department of Commerce, the sales value of merchandise sold by jewelry stores in 1985 increased 9%, to \$11.1 billion, over that of the previous year. Jewelers of America Inc. data indicated a substantial gain in colored gem stones sales, compared with diamond sales, for the Nation, and even more strongly for the Southwest.

## PRICES

The U.S. price of 1.0-carat, D-flawless, investment-grade diamond fluctuated between \$10,500 and \$13,500 per carat, and at yearend was \$12,750 per carat. However, only a few hundred of these perfect 1-carat

stones have been available each year, and their value may have amounted to less than 0.2% of the total market.

Prices for colored stones experienced little change during the year.

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

Carat weight	Description, color <sup>1</sup>	Clarity <sup>2</sup> (GIA terms)	Price range per carat <sup>3</sup> in 1985	Median price per carat <sup>3</sup>	
				November 1984	August 1985
0.04-0.08	G-I	VS <sub>1</sub>	\$400- 590	\$490	\$482
.04-.08	G-I	SI <sub>1</sub>	400- 500	450	440
.09-.16	G-I	VS <sub>1</sub>	440- 750	560	550
.09-.16	G-I	SI <sub>1</sub>	410- 600	475	460
.17-.22	G-I	VS <sub>1</sub>	670- 1,200	835	810
.17-.22	G-I	SI <sub>1</sub>	490- 1,150	690	675
.23-.28	G-I	VS <sub>1</sub>	720- 1,400	965	950
.23-.28	G-I	SI <sub>1</sub>	650- 1,300	770	755
.29-.35	G-I	VS <sub>1</sub>	860- 1,300	1,260	1,235
.29-.35	G-I	SI <sub>1</sub>	720- 1,500	1,050	1,010
.46-.55	G-I	VS <sub>1</sub>	1,400- 2,300	2,000	1,950
.46-.55	G-I	SI <sub>1</sub>	850- 1,845	1,545	1,500
.69-.79	G-I	VS <sub>1</sub>	1,700- 2,900	2,500	2,460
.69-.79	G-I	SI <sub>1</sub>	1,400- 2,450	1,950	1,910
1.00-1.15 <sup>4</sup>	D	FL	10,500-13,500	12,750	12,750
1.00-1.15	E	VVS <sub>1</sub>	6,600- 7,900	7,500	7,200
1.00-1.15	G	VS <sub>1</sub>	3,400- 5,200	4,200	4,120
1.00-1.15	H	VS <sub>2</sub>	2,400- 4,800	3,300	3,300
1.00-1.15	I	SI <sub>1</sub>	2,000- 3,800	2,600	2,600

<sup>1</sup>Gemological Institute of America (GIA) color grades: D—colorless; E—rare white; and G-I—traces of color.

<sup>2</sup>Clarity: FL—no blemishes; VVS<sub>1</sub>—very, very slightly included; VS<sub>1</sub>—very slightly included; VS<sub>2</sub>—very slightly included, but more visible; and SI<sub>1</sub>—slightly included.

<sup>3</sup>Jewelers' Circular-Keystone. V. 156, No. 14, Dec. 1985, p. 42; and v. 156, No. 12, Oct. 1985, p. 276. These figures represent a sampling of net prices that diamond dealers in various U.S. cities charged their customers during the month.

<sup>4</sup>The Diamond Registry Bulletin. V. 15, No. 1, Jan. 1985.

Table 2.—Prices of U.S. cut colored gem stones, by size<sup>1</sup>

Gem stone	Carat weight	Price range per carat in 1985 <sup>2</sup>	Median price per carat, <sup>1 2</sup> November 1984
Amethyst -----	10	\$6.50- \$25	\$17
Aquamarine -----	5	50 - 200	150
Citrine -----	10	5 - 20	10
Emerald:			
Colombian -----	1	250 - 5,000	1,500
Zambian -----	1	250 - 4,000	1,400
Commercial, 2d quality <sup>3</sup> -----		300 - 1,600	550
Garnet, tsavorite -----	1	175 - 500	725
Ruby:			
Medium to better -----	1	460 - 2,000	1,200
Commercial, 2d quality <sup>2</sup> -----	1	220 - 700	330
Sapphire:			
Medium to better -----	1	50 - 1,500	700
Commercial, 2d quality <sup>3</sup> -----	1	165 - 480	220
Tanzanite -----	5	50 - 750	762
Topaz -----	5	10 - 500	210
Tourmaline, green <sup>4</sup> -----	5	50 - 250	132
Tourmaline, pink <sup>4</sup> -----	5	40 - 200	137

<sup>1</sup>Medium to better quality.

<sup>2</sup>Jewelers' Circular-Keystone. V. 155, No. 12, Dec. 1984, p. 44; and v. 156, No. 1, Jan. 1985, p. 52. These figures represent a sampling of net prices that colored stone dealers in various U.S. cities charged their cash customers during the month.

<sup>3</sup>The Gemstone Registry Bulletin. V. 2, No. 2, Jan. 1984, and v. 3, No. 1, Jan. 1985, p. 8.

<sup>4</sup>The Gemstone Registry Bulletin. V. 17, No. 3, Feb. 28, 1986, p. 8.

## FOREIGN TRADE

The declared customs value of U.S. imports of rough and polished natural diamond, excluding industrial diamond, was up slightly to \$3.0 billion. Total polished diamond imports, principally from Israel, 29%; India, 19%; and Belgium, 13%; were valued at \$2.7 billion. Imports in the over-0.5-carat category, mostly from Israel, 30%; Belgium, 28%; and Switzerland, 13%; increased 7% in value to \$1.1 billion. The value of imports in the less-than-0.5-carat group, mostly from India, 31%; Belgium, 29%; and Israel, 29%; increased slightly to \$1.6 billion. Imports of rough natural diamond, 53% from the Republic of South Africa, decreased 4% in caratage and slightly in value. A 5% increase in South African carat value, from \$325 to \$341, was indicated.

The total value of emerald imports decreased 10% to \$139 million. The total

value of ruby imports decreased 13% to \$70 million, and sapphire imports decreased 15% to \$71 million. Average carat values increased 45% for emerald to \$51. Average carat values increased 15% for ruby to \$19 and decreased 18% for sapphire to \$19.

Export value of all gem materials other than diamond increased 12% to \$60.1 million. Of this total, other precious and semiprecious stones, cut but unset, were valued at \$35.4 million; other natural precious and semiprecious stones, not set or cut, \$12.2 million; synthetic gem stones and materials for jewelry, cut, \$4.1 million; pearls, natural, cultured, and imitation, not strung or set, \$3.6 million; and other, \$4.2 million. Reexports of all gem materials, other than diamond, decreased 24% to \$39.9 million. Reexport categories were precious and semiprecious stones, cut but unset, \$22.9 million; and other, \$16.9 million.

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

Country	1984		1985	
	Quantity (carats)	Value (millions)	Quantity (carats)	Value (millions)
<b>Exports:</b>				
Belgium-Luxembourg	128,521	\$65.0	179,829	\$82.3
Canada	19,043	11.0	23,012	12.2
France	2,153	7.1	1,763	8.3
Germany, Federal Republic of	3,677	3.7	2,937	2.5
Hong Kong	63,320	64.8	42,302	61.7
Israel	101,532	53.0	109,842	56.7
Japan	29,043	54.2	31,218	46.5
Singapore	3,734	9.2	2,039	4.4
Sweden	9	( <sup>1</sup> )	21	( <sup>1</sup> )
Switzerland	20,113	73.9	29,025	95.6
Thailand	3,813	2.4	5,226	2.8
United Arab Emirates	29	( <sup>1</sup> )	—	—
United Kingdom	5,707	14.2	3,966	4.0
Other	4,468	4.4	6,865	8.3
<b>Total</b>	<b>385,162</b>	<b>362.9</b>	<b>438,045</b>	<b>385.3</b>
<b>Reexports:</b>				
Belgium-Luxembourg	<sup>2</sup> 1,072,640	57.4	839,257	56.7
Canada	7,834	.6	4,243	.3
China	17,784	.7	8,120	.4
Germany, Federal Republic of	32,530	1.5	53,318	1.6
Hong Kong	27,244	17.6	42,021	14.0
India	228,205	6.5	153,323	3.9
Israel	126,400	26.3	196,743	31.4
Japan	98,398	8.5	114,713	8.5
Netherlands	21,793	3.4	106,819	5.2
Switzerland	110,486	46.3	41,953	41.2
United Kingdom	93,442	32.6	297,044	12.2
Other	50,592	10.3	82,324	10.6
<b>Total</b>	<b>1,887,348</b>	<b>211.7</b>	<b>1,939,878</b>	<b>186.0</b>

<sup>1</sup>Less than 1/10 unit.

<sup>2</sup>Artificially inflated in 1984 by auction of approximately 1 million carats of U.S. Government stockpile industrial diamond stones with subsequent reexports as gem stones to Belgium-Luxembourg and India.

Source: Bureau of the Census.

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

Kind, weight, and country of origin	1984		1985	
	Quantity (carats)	Value <sup>1</sup> (millions)	Quantity (carats)	Value <sup>1</sup> (millions)
<b>Rough or uncut, natural:<sup>2</sup></b>				
Belgium-Luxembourg	160,100	\$32.8	130,996	\$32.9
Brazil	1,431	.3	90,280	6.6
Cape Verde	—	—	21	( <sup>3</sup> )
Colombia	216	.2	—	—
Congo	12,977	4.4	80	.2
Guyana	2,475	.1	636	( <sup>3</sup> )
Israel	14,880	4.7	27,198	8.3
Netherlands	4,675	4.1	9,643	8.0
South Africa, Republic of	794,912	258.3	555,907	189.4
Switzerland	7,748	7.2	15,106	10.4
United Kingdom	22,125	4.6	116,601	52.0
Venezuela	34,811	2.3	21,036	.8
Other	28,163	6.9	75,309	8.9
<b>Total</b>	<b>1,084,513</b>	<b>325.9</b>	<b>1,042,813</b>	<b>317.5</b>
<b>Cut but unset, not over 0.5 carat:</b>				
Belgium-Luxembourg	1,424,655	433.6	1,466,325	444.8
Brazil	20,567	6.0	22,790	2.5
Canada	38,567	5.2	19,607	6.6
Hong Kong	100,017	20.3	146,416	39.4
India	3,107,794	544.8	2,667,906	486.8
Israel	1,113,127	399.5	1,237,123	448.2
Malaysia	21,949	7.8	17,772	6.0
Netherlands	56,924	23.5	85,811	26.9
South Africa, Republic of	38,301	23.8	48,074	16.9
Switzerland	56,670	23.8	153,329	38.7
United Kingdom	33,332	15.3	35,138	13.4

See footnotes at end of table.

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

Kind, weight, and country of origin	1984		1985	
	Quantity (carats)	Value <sup>1</sup> (millions)	Quantity (carats)	Value <sup>1</sup> (millions)
Cut but unset, not over 0.5 carat—Continued				
Other .....	44,030	\$16.0	68,754	\$22.2
Total .....	6,055,933	1,519.6	5,969,045	1,552.4
Cut but unset, over 0.5 carat:				
Belgium-Luxembourg .....	410,638	379.8	369,838	314.7
Hong Kong .....	13,697	22.5	24,259	37.0
India .....	33,415	23.2	47,709	16.1
Israel .....	342,221	259.5	439,036	340.9
Netherlands .....	32,846	33.6	34,951	35.5
South Africa, Republic of .....	61,595	39.8	76,025	77.4
Switzerland .....	56,618	134.0	46,098	148.5
United Kingdom .....	34,643	68.9	46,832	75.1
Other .....	51,200	48.6	54,397	91.5
Total .....	1,086,873	1,059.9	1,139,147	1,136.7

<sup>1</sup>Customs value.<sup>2</sup>Includes some natural advanced diamond.<sup>3</sup>Less than 1/2 unit.

Source: Bureau of the Census.

Table 5.—U.S. imports for consumption of natural precious and semiprecious gem stones, other than diamond, by kind and country

Kind and country	1984		1985	
	Quantity (carats)	Value (millions)	Quantity (carats)	Value (millions)
Emerald:				
Argentina .....	12,474	\$1.3	122	( <sup>1</sup> )
Belgium-Luxembourg .....	10,092	2.8	106,895	\$3.4
Brazil .....	197,367	13.8	219,068	6.0
Colombia .....	271,559	48.9	197,249	56.1
France .....	11,456	2.5	20,928	3.8
Germany, Federal Republic of .....	52,883	2.4	26,176	1.7
Hong Kong .....	114,630	11.3	317,142	10.8
India .....	3,220,565	16.7	1,413,167	11.0
Israel .....	162,559	19.6	101,683	11.5
Japan .....	28,516	1.4	12,661	1.4
Paraguay .....	25,790	( <sup>1</sup> )	--	--
South Africa, Republic of .....	3,118	.1	2,436	.4
Switzerland .....	103,859	20.8	163,048	23.9
Taiwan .....	2,758	( <sup>1</sup> )	1	( <sup>2</sup> )
Thailand .....	116,812	4.5	74,418	1.1
United Kingdom .....	20,008	4.6	20,403	2.8
Other .....	55,709	3.9	65,916	5.1
Total .....	4,410,155	154.6	2,741,313	139.0
Ruby:				
Austria .....	75,977	.1	99	( <sup>1</sup> )
Belgium-Luxembourg .....	14,246	1.9	11,381	1.7
Brazil .....	10,712	.1	18,993	( <sup>1</sup> )
Colombia .....	948	.2	4,701	.1
France .....	11,277	1.4	9,712	1.9
Germany, Federal Republic of .....	65,703	1.6	35,204	1.6
Hong Kong .....	71,857	5.5	110,033	3.7
India .....	226,782	1.8	221,923	1.3
Israel .....	99,663	2.1	42,921	1.2
Japan .....	33,146	.6	21,242	.5
Switzerland .....	81,943	12.6	296,877	15.6
Thailand .....	4,107,406	43.0	2,770,136	31.2
United Kingdom .....	21,208	6.1	33,713	6.4
Other .....	32,977	2.7	103,762	4.5
Total .....	4,853,845	79.7	3,680,697	69.7

See footnotes at end of table.

Table 5.—U.S. imports for consumption of natural precious and semiprecious gem stones, other than diamond, by kind and country —Continued

Kind and country	1984		1985	
	Quantity (carats)	Value (millions)	Quantity (carats)	Value (millions)
<b>Sapphire:</b>				
Australia	13,415	\$0.4	1,070	<sup>1)</sup>
Austria	1,186	( <sup>1)</sup> )	122	( <sup>1)</sup> )
Belgium-Luxembourg	20,436	1.8	32,047	\$0.9
Brazil	13,209	.1	1,424	( <sup>1)</sup> )
Canada	9,260	.6	2,717	.5
Colombia	1,647	( <sup>1)</sup> )	2,057	.1
France	11,185	2.5	18,973	1.9
Germany, Federal Republic of	67,298	1.8	32,028	1.2
Hong Kong	93,130	3.8	166,329	4.8
India	175,855	1.7	92,456	1.0
Israel	71,286	1.6	56,909	1.2
Japan	45,737	1.3	50,770	.8
Korea, Republic of	22,478	.1	2,664	( <sup>1)</sup> )
Singapore	22,955	.8	5,910	.4
Sri Lanka	28,999	2.7	32,464	1.5
Switzerland	87,879	15.7	431,909	17.0
Thailand	2,917,584	39.2	2,765,371	32.4
United Kingdom	36,973	6.6	60,549	6.1
Other	32,516	2.3	72,000	1.0
<b>Total</b>	<b>3,678,378</b>	<b>83.0</b>	<b>3,827,769</b>	<b>70.8</b>
<b>Other:</b>				
<b>Rough, uncut:</b>				
Australia		1.9		1.5
Belgium-Luxembourg		.4		( <sup>1)</sup> )
Brazil		14.0		14.0
Canada		.1		( <sup>1)</sup> )
Colombia		10.3		9.8
Hong Kong		.6		.9
Nigeria		2.6		.3
Pakistan		.5		.4
South Africa, Republic of		1.6		.2
Switzerland		.5		.1
United Kingdom		.6		.8
Zambia		.4		.3
Other		2.3		4.8
<b>Total</b>	<b>NA</b>	<b>35.8</b>	<b>NA</b>	<b>33.1</b>
<b>Cut, set and unset:</b>				
Australia		2.8		4.1
Brazil		32.7		10.5
Canada		1.3		1.0
China		5.0		4.5
Germany, Federal Republic of		12.0		12.3
Hong Kong		20.4		29.5
India		6.1		5.2
Japan		240.7		200.9
Switzerland		.7		4.7
Taiwan		5.4		6.2
Thailand		2.8		3.4
United Kingdom		1.5		1.7
Other		5.6		12.6
<b>Total</b>	<b>NA</b>	<b>337.0</b>	<b>NA</b>	<b>296.6</b>

NA Not available.

<sup>1</sup>Less than 1/10 unit.

Source: Bureau of the Census.

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

(Million dollars)

Country	1984	1985
<b>Synthetic, cut but unset:</b>		
Austria	0.8	0.4
France	1.4	.9
Germany, Federal Republic of	5.5	5.5
Japan	1.4	.1
Korea, Republic of	9.4	7.1
Switzerland	3.6	2.2
Other	1.7	1.4
<b>Total</b>	<b>23.8</b>	<b>17.6</b>
<b>Imitation:</b>		
Austria	17.4	23.0
Czechoslovakia	1.8	1.7
Germany, Federal Republic of	6.0	8.9
Japan	4.5	6.3
Other	2.7	3.6
<b>Total</b>	<b>32.4</b>	<b>43.5</b>

Source: Bureau of the Census.

**Table 7.—U.S. imports for consumption of precious and semiprecious gem stones**  
(Thousand carats and thousand dollars)

Stones	1984		1985	
	Quantity	Value	Quantity	Value
<b>Diamonds:</b>				
Rough or uncut <sup>1</sup>	1,085	325,851	1,043	317,584
Cut but unset	7,143	2,579,466	7,108	2,689,178
Emeralds: Cut but unset	4,410	154,644	2,741	139,045
Coral: Cut but unset, and cameos suitable for use in jewelry	NA	3,120	NA	2,224
Rubies and sapphires: Cut but unset	8,532	162,677	7,509	140,618
Marcasites	NA	152	NA	256
<b>Pearls:</b>				
Natural	NA	2,823	NA	2,997
Cultured	NA	240,439	NA	225,004
Imitation	NA	6,171	NA	8,396
<b>Other precious and semiprecious stones:</b>				
Rough, uncut	NA	35,792	NA	33,168
Cut, set and unset	NA	90,421	NA	63,070
<b>Synthetic:</b>				
Cut but unset <sup>2</sup>	52,484	21,368	52,164	17,590
Other	NA	2,410	NA	2,457
Imitation gem stones	NA	26,182	NA	35,333
<b>Total</b>	<b>XX</b>	<b>3,651,516</b>	<b>XX</b>	<b>3,679,920</b>

NA Not available. XX Not applicable.

<sup>1</sup>Includes 2,084 carats of other natural diamond, advanced, valued at \$700,100 in 1984, and 630 carats valued at \$1,062,100 in 1985.<sup>2</sup>Quantity in thousands of stones.

Source: Bureau of the Census.

## WORLD REVIEW

De Beers Consolidated Mines Ltd.'s sales in 1985 through the Central Selling Organization were estimated to be \$1.8 billion compared with \$1.61 billion in 1984. Second half 1985 sales were unusually strong. Sales of colored gems also did very well.

Emeralds were produced in Australia, Colombia, Mozambique, Pakistan, the Republic of South Africa, the U.S.S.R., Zambia, and Zimbabwe. Sapphires were produc-

ed in Australia and Sri Lanka. Aquamarines were produced in Brazil and in very minor amounts in several other countries.

**Australia.**—Argyle Diamond Mines Joint Venture produced a total of about 17 million carats from its alluvial operation before the operation was closed in October. The second phase, production from the AK-1 kimberlite pipe, commenced on schedule in December. The firm estimated that the

AK-1 deposit would produce about 25 million carats per year for about 20 years.<sup>2</sup>

**Botswana.**—The new Jwaneng Mine expanded its diamond production. While mining was centered in the middle lobe, stripping proceeded on the northeastern lobe. The ore grade increased by 23% at the Jwaneng Mine, by 30% at the Letlhakane Mine, and by 8% at the Orapa Mine.

**Burma.**—The Ministry of Mines carried out exploration for diamonds by test pitting and drilling. It discovered 68 diamonds with a total weight of 65.81 carats in the period April 1, 1984, to December 31, 1984. Most of these were industrial diamonds.

Demand for Burmese rubies, particularly the bright red, continued to be strong. Very little material of comparable quality was available from other producers, such as Kenya, Tanzania, and Pakistan, in 1985. Rubies from Afghanistan were comparable but their availability was limited.

**Guinea.**—Diamonds from the Aredor project reached the New York market in midyear after some delay caused by adverse mining conditions. Société Mixte Aredor-Guinea was granted the sole right to explore and mine within its concession. Prior to this, private Guinean citizens could also mine in the concession. The private sector partners will market all the diamonds until the loans are paid off, after which the Government of Guinea will have the right to sell 30% of the rough gem diamonds and 50% of the rough industrial diamonds. The project was scheduled to produce from 250,000 to 500,000 carats per year.<sup>3</sup>

**India.**—The Indian diamond industry was almost exclusively dependent on imports of rough diamonds because domestic production usually totals under 15,000 carats. Imports of rough diamonds for Indian fiscal year 1983-84 totaled 28.4 million carats, the bulk of which came from De Beers. India's efforts to import diamonds directly from producers was of limited success. Some direct imports from Botswana, Ghana, and Sierra Leone were arranged. Indian exports of cut and polished diamonds for Indian fiscal year 1983-84 totaled 5.65 million carats, making India the world's leading diamond exporter, and diamonds India's largest single export item. Nearly 45% of the diamonds was exported to the United States. Japan was the second largest buyer, accounting for 11%, much less than that of the United States.

In response to foreign competition, the Indian industry announced plans to introduce foreign technology and machinery into

what had been a cottage industry and was considering the production of sawn diamonds. The Government of India reduced duties on diamond cutting machinery and tools. Plans for a public-private joint venture to build a 1,300-acre self-contained diamond industrial park in Surat were announced.

India opened its first diamond exchange in Bombay on February 25. Titled the Bharat Diamond Bourse, it enrolled 150 members and provided them with customs clearance facilities and a vault for storing consignments.

The Government of India staged a series of income tax raids on diamond traders to seize records and diamond stocks as a part of its overall campaign against Government corruption and the underground economy. The industry responded by stopping all rough diamond imports and closing down operations. After a month of negotiations between the Government and the industry, activity resumed.<sup>4</sup>

**Israel.**—Imports of rough diamonds in the period January-October 1985 were \$919 million, up 28.4% over the same period in 1984. Exports of cut and polished diamonds in the period January-October 1985 were \$1,034 million, up 20.4% over the same period in 1984.

**Namibia.**—The Government-established Thirion commission of inquiry that had been investigating allegations of corruption and misappropriation of funds in the diamond industry for several years obtained evidence that the Diamond Board had not been exercising its regulatory powers over diamond mining as was originally intended. Interest centered on the alleged serious undervaluation of taxable diamond exports and on the excessive depletion of reserves in the diamond deposits. The Thirion commission's major purpose was to recommend ways of obtaining a greater degree of governmental control over the mining industry.

**Pakistan.**—The Pakistani Federal Bureau of Statistics reported that \$1.5 million worth of gem stones was exported in the latest period, the fiscal year 1983-84, mainly to Hong Kong, the Federal Republic of Germany, the United States, and the United Kingdom. The exports, by type, included 130,282 kilograms of rough emeralds and 326 kilograms of cut emeralds, 6,062 kilograms of rough rubies and 3,912 kilograms of cut rubies, and 430 kilograms of rough sapphires and 865 kilograms of cut sapphires.



Table 8.—Diamond (natural): World production, by country<sup>1</sup>  
(Thousand carats)

Country	1981			1982			1983			1984 <sup>2</sup>			1985 <sup>3</sup>		
	Gem	Indus- trial	Total	Gem	Indus- trial	Total	Gem <sup>2</sup>	Indus- trial	Total	Gem <sup>2</sup>	Indus- trial	Total	Gem <sup>2</sup>	Indus- trial	Total
Angola	1,050	850	1,400	915	310	1,225	775	259	1,034	750	250	1,000	375	250	625
Australia	21	184	205	183	183	457	3,720	2,480	6,200	3,414	2,276	5,690	4,235	2,824	7,059
Botswana	744	4,217	4,961	1,165	6,604	7,769	4,829	5,922	10,751	5,810	7,104	12,914	5,800	7,100	12,900
Brazil	163	926	1,089	80	460	530	80	460	530	200	550	750	200	800	1,000
Central African Republic	209	103	312	186	91	277	230	65	295	236	101	337	236	101	337
China	190	760	950	200	800	1,000	200	800	1,000	200	800	1,000	200	800	1,000
Ghana	85	751	836	68	616	684	34	306	340	35	315	350	65	585	650
Guinea <sup>4</sup>	12	26	38	13	27	40	23	17	40	34	14	48	105	7	111
Guyana <sup>5</sup>	4	6	10	4	7	11	5	5	10	6	8	14	4	7	11
India	14	2	16	11	2	13	12	2	14	13	2	15	14	2	16
Indonesia <sup>6</sup>	3	12	15	3	12	15	5	22	27	5	22	27	5	22	27
Lesotho	49	4	53	39	3	42	132	198	330	108	132	240	108	132	240
Liberia	132	204	336	170	263	433	132	198	330	108	132	240	108	132	240
Namibia	1,186	62	1,248	963	51	1,014	915	48	963	884	46	930	894	47	941
Sierra Leone	208	97	305	203	87	290	242	103	345	240	105	345	240	105	345
South Africa, Republic of:															
Finsch Mine	1,002	3,463	4,465	847	3,003	3,850	1,765	3,278	5,043	1,714	3,184	4,898	1,770	3,184	4,954
Premier Mine	510	1,530	2,040	615	1,845	2,460	800	1,844	2,644	765	1,785	2,550	820	1,864	2,684
Other De Beers' properties <sup>4</sup>	1,603	1,069	2,672	1,359	906	2,265	1,400	569	1,969	1,452	593	2,045	1,500	569	2,069
Other	314	35	349	521	58	579	559	66	625	585	65	650	460	35	495
Total	3,429	6,097	9,526	3,342	5,812	9,154	4,554	5,757	10,311	4,516	5,627	10,143	4,550	5,652	10,202
Swaziland	110	107	217	100	120	220	183	78	261	7	10	17	10	15	25
Tanzania	2,100	8,500	10,600	2,100	8,500	10,600	3,700	7,000	10,700	4,300	6,400	10,700	4,400	6,400	10,800
U.S.S.R.	102	388	490	99	394	493	45	234	279	40	232	272	35	163	198
Venezuela	186	1,026	1,212	186	1,026	1,212	186	1,026	1,212	186	1,026	1,212	186	1,026	1,212
Zaire	186	1,026	1,212	186	1,026	1,212	186	1,026	1,212	186	1,026	1,212	186	1,026	1,212
World total	10,171	29,597	39,768	10,243	29,188	40,431	23,039	32,353	55,392	26,153	37,364	63,517	27,155	39,216	66,371

<sup>2</sup>Estimated. <sup>3</sup>Preliminary. <sup>4</sup>Revised.

<sup>1</sup>Table includes data available through June 3, 1986. 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 and industrial diamond are Bureau of Mines estimates in the case of every country except Australia (1981-85), Central African Republic (1961, 1963-65), Guinea (1984), Liberia (1981, 1984), Sierra Leone (1981), and Venezuela (1981), 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.

<sup>2</sup>Includes near-gem and cheap-gem qualities.

<sup>3</sup>Reported figure.

<sup>4</sup>Other De Beers Group output from the Republic of South Africa includes Kimberley Pool, Koffiefontein Mine, and the Namaqualand Mines.

**South Africa, Republic of.**—The Minister of Finance announced a special temporary surcharge of 5% over and above the 20% surcharge already in effect on taxes paid by all domestic diamond and gold mines. The new surcharge was added in view of mining profits obtained owing to the favorable rand-dollar exchange rate in 1984. The Chamber of Mines, a mining trade association, responded by saying that any additional profits had been absorbed by increased capital expenditure.

De Beers reported about 95% of 1985 South African diamond production, or about 9.7 million carats. Its Finsch Mine, the largest diamond mine in the Republic of South Africa, produced 4.9 million carats, and its Premier Mine produced 2.7 million carats. Other sources indicate that in 1984, 73% of South African production was from Cape Province, 26% from Transvaal, and the balance from the Orange Free State.

The Finsch Mine worked slightly lower grade ore, in accordance with management's plan. The Premier Mine experienced no further collapse of the gabbro sill. Investigations indicated that retreatment of the mine's tailings pile appeared to be feasible, and the work was scheduled to begin during 1985.

**Swaziland.**—Trans Hex Co. was involved

with its joint venture partner, the Swaziland Government, in a \$5 million expansion of mining activity at its kimberlite pipe. The open pit extraction of industrial and low-quality gem diamonds, plus smaller amounts of good-quality gems, was expected to last at least 8 years. The expansion in capacity was expected to go on-stream in October 1985.

**Zaire.**—Société Minière de Bakwanga (MIBA) produced 6,896,000 carats in 1984 and exported 6,902,000 carats worth \$57.9 million. MIBA invested \$9.7 million in a new hydroelectric power station plus substantial sums on geological exploration and research, modernization of workers' housing, and improving the security of the operations.

**Zambia.**—The Government instituted new regulations on emerald mining in 1984, which were implemented in 1985. Prospecting and mining licenses must be obtained from the Ministry of Mines. Any company seeking a license must form a joint venture with the Government-owned Reserved Mineral Corp. holding a 55% majority of the shares. Several dozen local cooperatives have obtained licenses. The army and police have removed and will continue to remove illegal diggers from the emerald area until Reserved Mineral's new security service can take over completely.

## TECHNOLOGY

Sumitomo Electric Co. perfected a technique for the mass production of large industrial diamonds from graphite. The graphite was subjected to ultrahigh pressure in the range of 50,000 to 60,000 atmospheres at a temperature of 1,400° C to 1,600° C for 100 hours. Attaining this critical temperature and pressure on a consistent basis was difficult, but was achieved. Heretofore, only small-sized diamonds could be mass produced. The firm planned to underprice natural diamond slightly and make its sales mainly to the semiconductor and precision toolmaking industries. Al-

though the firm had no immediate plans for the production of gem diamonds, this breakthrough could clearly result in the production of gem diamonds in the near future.<sup>5</sup>

<sup>1</sup>Arkansas Gazette. Texas Firm Willing To Spend \$2 Million on Tests at Crater of Diamonds. Oct. 12, 1985, p. 2.

<sup>2</sup>Industrial Minerals (London). World of Minerals. No. 220, Jan. 1986, p. 8.

<sup>3</sup>Jewelers' Circular-Keystone. Upfront. V. 156, No. 6, Apr. 1985, p. G.

<sup>4</sup>Shor, R. What if India Offers Quality Diamonds at Bargain Rates? Jewelers' Circ.-Keystone, v. 155, No. 8, June 1985, pp. 187-201.

<sup>5</sup>Industrial Minerals (London). Synthetic Diamond Breakthrough. No. 213, June 1985, p. 10.