

GEM STONES

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SUMMARY OUTLINE

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JEWELRY INDUSTRY IN 1941

Retail sales by jewelry stores in the United States totaled about \$526,000,000 in 1941, a 30-percent increase over 1940 (when sales totaled about \$405,000,000) and within 2 percent of those in 1929. An additional 18 to 24 percent was sold by department stores.

Arkansas, Connecticut, and Indiana showed notable advances over 1940 in retail sales. Again, as in 1940, gains were due mainly to larger turn-over of relatively inexpensive items, and sales of high-priced articles were the exception. This can be explained, in New York at least, by the colorless stock market.

The jewelry trade had two "Christmases"—the first late in September, when taxwise buyers bought heavily to avoid the 10-percent excise tax, and the real Christmas. During both periods the buying rate was higher than at any corresponding time since 1929. Some expensive articles were sold during both buying seasons, and certain of these, strangely enough, were purchased by European refugees. In 1941 the gain in sales may have been in part a hedge against inflation, that is, investment buying; but furthermore, compared with 1940 the Nation's income had risen from about \$72,000,000,000 to about \$92,000,000,000. Sales were also increased by an all-time record number of marriages (1,565,000), over 16 percent above those in 1940, which had been the banner year.

From year to year in the larger cities, a few of the better department stores are cutting into sales of retail jewelers, and it may be added that, on the average, they are handling stock of finer grade year after year.

Wholesale jewelry sales in 1941 were somewhat greater even than those of the retailers, and stocks in retail jewelry shops increased 14 percent. Manufacturers' personnel was employed full time. During the year, exports to South America, which normally obtains its jewelry supplies from Germany, were large.

The national income of Canada is also rising (\$5,180,000,000 in 1940—\$6,200,000,000 in 1941), and retail jewelry sales in 1941 topped those of 1940. Canadian prices have as their ceiling those of the basic

period September 15–October 11, 1941. Luckily, the more important shops had fairly extensive stocks when the price order went into effect; but as the war progresses, the transfer of machinery and artisans to war work and the lack of certain materials may cause a shortage of articles, resulting in smaller retail sales.

FASHIONS IN JEWELS

Large, flamboyant jewelry characterized the mode in 1941, a year in which it was used even with sport clothes. Gold continued to be worn more than platinum, although the latter was used in the finer diamond mountings. For the first time, however, industrial consumption of platinum exceeded that of the jewelry trade. Regimental and other military insignia and the "V for Victory" pins and clips were popular, but floral decorations, grotesque animals, geometric designs, and Victorian and South American motifs were also seen. Ensembles set with similar stones and large jewelry pieces divisible into several ornaments continued in favor. Clips and lapel pins were especially popular; watches, bracelets, earrings, and necklaces were less so. Double wedding rings are gaining popularity.

The shortage of melee is decreasing the use of pavé mountings, and more and more fine gems are being set "sec." Stones, such as citrine and aquamarine, weighing up to 400 carats (over 2 ounces), were used in bracelets and pins. Diamond (including some brown stones for men), sapphire (largely blue, but also yellow and pink), and ruby were the most popular gems, followed by topaz, moonstone, emerald, aquamarine, and amethyst. Due to the insistent demand for diamonds, colorless stones were dominant, followed by blue, red, yellow, and green. For the first time in many years, yellow stones were more popular than green and were used almost as commonly as blue and red stones. Owing to wider knowledge of gem stones in the United States, some 40 varieties were used in jewelry in 1941, in contrast to the few kinds once worn.

DOMESTIC PRODUCTION

From the 1909 peak output of gem stones valued at \$534,280, domestic production dwindled to only \$3,000 in 1934; but since that year production has increased progressively and markedly and in 1941 was valued at \$240,000 to \$770,000. The first figure is a rough estimate of the value of uncut stones used in jewelry and the second an estimate of the total value after cutting, including stones added to mineralogists' collections or sold to tourists, collectors, and rock gardeners. Of the total value, 70 percent represents members of the quartz family, 18 percent sapphires (largely used industrially), and 12 percent turquoise. The principal producing States (in approximate order of output) were Oregon, Montana, Washington, Nevada, Wyoming, and Colorado.

The interest in beautiful minerals continues to grow; the number of professional and amateur lapidaries is increasing, particularly in Oregon (largely Portland and Newport) and Washington. Dr. H. C. Dake says that in those States the shops are operating at capacity and there is a shortage of skilled labor; cabochon-cut gems are being sold to American makers of costume jewelry; and agate balance knives and

mortars and pestles are being produced. Local machine shops manufacture cutting equipment, including diamond saws.

Professional gem cutters operate also in New York, Rhode Island (Providence), Maine, North Carolina, Montana, and South Dakota. Gem cutting is carried on as a hobby in many States, notably in Idaho, Wyoming, Utah, and North Carolina. Owners of precious-stone claims complain that amateur mineralogists "high-grade" the deposits in the absence of a resident watchman.

Agate and jasper are collected in quantity in Oregon and Washington, particularly on the beaches of Lincoln County, Oreg. Most of this is cut by local lapidaries, although some rough is shipped to other States. Montana continues to produce a considerable quantity of fine moss agate from the gravels of Yellowstone River in the southeastern part of the State. Wyoming also furnishes good material. Alfred M. Buranek states that Utah produced about \$10,000 worth of agate in 1941. Arthur L. Crawford describes the principal varieties as jasper from the east bank of the Colorado River in Grand County; agate from 6 miles east of Cisco, Grand County; and red jasper geodes from Tidwell, Emery County. Arkansas produces considerable rock crystal from the vicinity of Hot Springs. Farmers dig most of it in the winter, but mineral dealers also mine some. Most of it is sold to tourists as curios, but some is used in jewelry. Scott's Rose Quartz Co. produced considerable rose quartz from its mine near Custer, S. Dak., and sold some for jewelry use.

In 1941, Montana produced about 3,720 troy pounds of sapphire (of which perhaps 50 percent was first-grade material), valued at some \$43,000. The principal producers are American Gem Mines at Philipsburg, owned by Charles H. Carp and J. S. and R. M. Kaiser, and the Perry-Schroeder Mining Co., dredge operator of Helena. The former company operates on the West Fork of Rock Creek in Granite County, and the latter obtains its stones as a byproduct of gold-dredging Missouri River bars in Lewis and Clark County. Most of the stones are sold for industrial use; if for any reason the supply of synthetic sapphire should be inadequate to satisfy war demands for instrument jewels, Montana sapphire would have prime importance. Carl J. Trauerman (Butte Daily Post, June 3, 1941) believes that, if necessary, Montana could produce 150,000 to 200,000 ounces yearly. Besides the two localities mentioned above, production could be obtained from Brown's Gulch in Silver Bow County, Dry Cottonwood Creek in Powell County, and lode mines of Yogo Gulch.

Turquoise ranks after the quartz family and sapphire in value of production, with a total of about \$28,000. Nevada ranks first in output and Colorado second. The principal producer in Nevada was the Smith mine at Cortez, operated by A. Guisti, which produced over 7,550 pounds; the material is shipped to E. C. Smith, Santa Barbara, Calif. The King mine at Manassa, Colo., had an unusually successful year, as one "pocket" alone produced almost 700 pounds of good material. Richard M. Pearl reports that W. S. Kettering of Pueblo opened up a deposit in Pueblo County, Colo., in 1941, some of the product being good gem material. Imitation turquoise is cutting somewhat into western turquoise sales.

Further data furnished by B. F. Couch, Reno, Nev., suggests that Nevada alone produced turquoise worth at least \$20,000 in 1940, so that the author's estimate of \$20,000 as the country's production in

1940 (Gem Stones, p. 1401, Minerals Yearbook, Review of 1940) is probably somewhat low. The chief production centers are Royston and southern Death Valley (Nye County), Battle Mountain, Cortez, and Austin (Lander County), and one deposit in Mineral County. Couch says also that in 1941 Nevada produced over 2,175 pounds of good material worth \$13,775, with two producers not reporting. The Smith mine in the Bullion district, Lander County, was the chief producer, followed by mines in northern Lander County and the Royston and Beatty districts, both in Nye County.

Richard M. Pearl (see Bibliography) states that Colorado has for several years ranked second among the States as a turquoise producer, the gem stone occurring at four localities in the southwestern part of the State. The principal mines are the Hall near Villagrove and the King near Manassa; both of these deposits occur in felsite porphyry. The deposit near Leadville occurs in Silver Plume (Algonkian) granite, and turquoise near Creede occurs as stream pebbles. The turquoise of the lode deposits is believed to have been deposited by cold meteoric waters in fractures and shear zones.

Alfred M. Buranek states that about \$2,000 worth of variscite was produced from the Clay Canyon deposit near Fairview, Utah. Jewelers, museums, and mineral collectors were the purchasers.

Vergil E. Barnes (North American Tektites, University of Texas Publication 3945, Austin, June 1940, pp. 477-582) describes the only tektites yet found in North America. The first of these, which have been dubbed "bediastites," was found in Grimes County in 1936, and in all 482 have been recovered. To the local residents they are known as "black diamonds," and some have been cut for jewelry. They are found in an area 10 miles long and 5 miles wide. The tektites are black and have an average specific gravity of 2.37; the largest weighed 59.4 grams. Most of them are ellipsoidal, and a few are spherical or tabular with their exterior deeply furrowed. The tektites consist dominantly of silica (73.52 to 77.76 percent) and alumina (13.3 to 15.88 percent), with low lime. Barnes considers them fulgurites.

Several hundred carats of colorless and yellowish topaz was obtained from the Tarryall Mountains, Park County, Colo. Gems up to 5 carats in weight have been cut from this material (according to a letter from R. M. Pearl). Topaz Mountain in the Thomas Range, Juab County, Utah, also produced a little topaz. Dr. H. C. Dake reports that some nephrite of gem quality was obtained from the two Wyoming localities (Fremont County and 48 miles southwest of Lander); at the first locality the material is mined from a dike, and at the second it occurs as boulders. One mass weighed 119 pounds. He states that in 1941 about 1 ton of this variety of jade was produced, the best rough material selling for \$5 a pound. Alfred M. Buranek states that a little fine pyrope garnet was mined near Mexican Hat in southeastern Utah. Some was sold to prominent jewelers. Only three or four Indians worked the catlinite deposit at Pipestone, Minn., in 1941.

Other gem stones produced in the United States in 1941 included agate (Arizona, Colorado, Georgia, Montana, Oregon, South Dakota, and Utah); agatized wood (Arizona (private lands surrounding Petrified Forest National Monument) and Wyoming); alabaster (South Dakota); amazonstone (central Colorado); amethyst (Colorado, Georgia, South Carolina, LaSal Mountains and San Rafael Swell in

Utah, and near Liberty, Wash.); apatite (South Dakota); aquamarine (Colorado, Georgia, North Carolina, South Dakota, and Wyoming); azurite (northern Colorado); carnelian (Bastrop and Colorado Counties, Tex.); chalcedony (Colorado); chrysoprase (North Carolina); emerald matrix (North Carolina); epidote (Milford, Utah); garnet (Georgia; rhodolite from Mason County, N. C.; and a variety from the Oregon coast known locally as "Oregon jade"); hematite (Platte County, Wyo.); jasper (Socorro County, N. Mex.); jet (Mesa County, Colo.); lapis lazuli (Gunnison County, Colo.); opal (Georgia and Wyoming); moonstone (North Carolina); opalized wood (central Washington); rhodonite (North Carolina); rock crystal (Colorado, Georgia, and Idaho); rose quartz (Maine and North Carolina); rutilated quartz (North Carolina); smoky quartz (Colorado, North Carolina, and Utah); sapphire and pink sapphire (Macon County, N. C.); and tourmaline (Milford, Utah).

A little pale emerald occurs in the beryl-bearing pegmatites northeast of Winnipeg, Manitoba, Canada.

IMPORTS

On January 2, 1942, the United States Department of Commerce announced that "in the interest of national and hemisphere war effort, no further detailed statistics concerning the foreign trade of the United States" would be published. Imports of precious and imitation stones (exclusive of industrial diamonds) into the United States for the first 9 months of 1941 totaled \$22,802,940, a 19-percent decrease compared with the corresponding period of 1940. Details for 1941 are shown in the following table.

*Precious and semiprecious stones (exclusive of industrial diamonds) imported for consumption in the United States in 1941 (January–September, inclusive)*¹

	Carats	Value
Diamonds:		
Rough or uncut (suitable for cutting into gem stones), duty free.....	124, 202	\$5, 967, 938
Cut but unset, suitable for jewelry, dutiable.....	182, 652	13, 570, 481
Emeralds:		
Rough or uncut, free.....		247, 730
Cut but not set, dutiable.....	18, 497	
Pearls and parts, not strung or set, dutiable:		
Natural.....		145, 897
Cultured or cultivated.....		423, 918
Other precious and semiprecious stones:		
Rough or uncut, free.....		75, 111
Cut but not set, dutiable.....		2, 074, 363
Imitation, except opaque, dutiable:		
Not cut or faceted.....		9, 703
Cut or faceted:		
Synthetic.....		217, 988
Other.....		18, 806
Imitation, opaque, including imitation pearls, dutiable.....		26, 957
Marcasites, dutiable:		
Real ¹		22, 208
Imitation.....		1, 840
		<hr/> 22, 802, 940

¹ Figures for 1940 in Minerals Yearbook, Review of 1940, p. 1403, should read—Marcasites, real, \$8,220; grand total, \$37,769,135.

Imports of pearls and cut precious stones and imitation stones increased notably, while all other subdivisions decreased. Imports of uncut diamonds decreased sharply, suggesting that American cutters overbought in 1940. The decrease in cut imported was somewhat less drastic. The number of watch jewels imported in the first 9 months of 1941 totaled 79,875,751 valued at \$1,769,689, compared with 98,771,042 valued at \$1,831,007 in the 12 months of 1940.

Synthetic rubies and sapphires imported in the first 9 months of 1941 totaled 440,491 pieces worth \$217,988, or 71.8 percent of the quantity and 75.3 percent of the value imported in the corresponding period of 1940. Imports of synthetics were small in the third quarter of 1941 and are believed to have been negligible in the fourth quarter.

GOVERNMENT REGULATIONS

Again, due to the war, Government regulations covering the jewelry trade were legion in 1941. Great Britain, Germany, Italy, and France made strong efforts to divert funds normally spent on jewelry to Government securities.

EFFECT OF WAR ON SOURCES OF GEMS

The prices of colored stones, like those for diamonds, have increased since the Second World War started. For instance, fine rubies and emeralds are 15 to 20 percent higher and some of the less noble gems and all synthetics even more.

War in the Pacific has removed Thailand and Indochina from the list of countries from which the United States obtains precious stones. The principal sources of zircons (rough, Indochina; cut in Thailand) therefore can no longer trade with us. Thailand also supplied a few sapphires and rubies. Japan provided most of our cultured pearls. Furthermore, as a result of the war, imports of gems from India will have to be rerouted, and receipt of precious stones from Burma may be temporarily interrupted.

With the declaration of war imports from Germany (largely imitation stones) and Italy ceased, and the difficulty of importing watches and watch parts—notably jewels—from Switzerland increased.

Bombay (Bureau of Mines Mineral Trade Notes, August 20, 1941, pp. 27-30) has long been one of the more important precious stone markets of the world. However, before the war started, Bombay had virtually no direct trade with the United States; its stones were exported to London or Paris—then the center of the trade in colored stones—where American gem merchants purchased their requirements. Bombay does not control the output of any important gem-stone deposits but has always been only a junction point in the world circulation of precious stones. However, conditions have changed since the war. In 1938 Bombay exported \$35,169 worth of gem stones and pearls; in 1940, \$443,020. The increase of its exports to the United States has been even more remarkable, because American importers now look to Bombay instead of Paris for their colored stones. The quantity of stones exported is controlled by the Reserve Bank of India. Rubies from Mogak, Burma, are the principal exports. Although star rubies are cut in Burma, other Burmese rubies are cut largely in Cambay, India, and a few in Bombay itself. The price of

rough rubies has increased 15 to 20 percent since the war began, although the price of cut stones has changed little. Star rubies and sapphires sell for four or five times their pre-war price. Sapphires are imported from Burma, Ceylon, and Kashmir and emeralds from Ceylon and U. S. S. R.; diamonds, formerly imported from Europe, usually are sold locally. Since March 1940, an export certificate, obtained at an accredited bank, is required before gems can be exported to the "hard-currency" countries. Precious stones cannot be imported from "hard-currency" countries. An ad valorem duty of 5 percent is paid on most stones imported, although gems from Burma are exempt from duty.

China is sending us tiger-eye and quartz cameos, which formerly were purchased in Germany.

Although there seems to be no deficiency in the supply of fine rubies, sapphires, and emeralds, there is a distinct shortage of the less expensive grades of these gems, of some of the lesser gems, and of synthetics. Brazil, however, is supplying the United States with sufficient aquamarine, topaz, citrine, amethyst, and tourmaline, and our imports (both cut and rough) from that country are increasing. In view of the unusually good demand for colored stones, the lack of adequate cutting facilities in the United States is unfortunate. American lapidaries are working overtime cutting South American rough and recutting into modern shapes stones recovered from old jewelry. Some South American chalcedony is being stained into black onyx.

DIAMOND

A layman would have expected the diamond industry, which produces a luxury, to be one of the first adversely affected by the war. In reality, in 1941 it enjoyed relative prosperity, notwithstanding the fact that its processing branch—the cutting of gem stones—is about one-eighth as large as normally since the invasion of the Low Countries.

Production was appreciably smaller than in 1940 and, indeed, less than in any year since 1937. Sales of rough, on the other hand, were large, due partly to a slight increase in sales of gem stones in America but largely to huge sales of industrials. Prices of rough and fine large cut advanced; prices of small cut held at two to four times those of early 1940. "Investment" buying increased in 1941—in Europe in "black markets," in the United States in a free market.

Share dealings.—The shares of diamond-mining companies, virtually all of which are listed on the London Stock Exchange, gained over 75 percent during the year and in the fall were market leaders. Until Russia showed its strength, the market was uninteresting, but by mid-September a gain of 50 percent had been made. Prices sagged in October, rose sharply in November, weakened on the entrance of the United States (the chief market for cut) into the war, and at the year end strengthened on good dividend declarations. The market rise was in contradistinction to a 14-percent rise in English industrials and a loss of 18 percent during 1941 on the New York Stock Exchange. At the year end, diamond-mining stocks were 39 percent of their high (1927) and 445 percent of their low (1932). Of the 12 leading diamond-mining companies, 11 paid dividends; the twelfth, Cape Coast Exploration, is soon to make a handsome liquidation payment.

Market.—In 1941, the Diamond Trading Co., which in normal times controls the sale of about 95 percent of world production, sold

rough valued at about £7,500,000 (£6,144,314 in 1940). The United States bought such "American qualities" (fine, relatively large stones) as were available and some fine small rough, but the increase in sales was due principally to large purchases of industrial diamonds by the Governments of the United States and Russia and by American brokers. In addition to its London and Kimberley offices, the Diamond Trading Co. in the fall opened an office at Hamilton, Bermuda, to deal with cutters and brokers residing in the United States.

In 1941 the American market for cut was featured by an increasing demand, a reasonable supply of large cut, and a wholly inadequate supply of small cut. There was a fair turn-over in polished stones in Great Britain, notwithstanding Government attempts to restrict it. The finer stones were sold for "investment" purposes in a thriving "black market." South America, Canada, and India were relatively large buyers of cut. Citizens of Nazi-occupied Europe desired to "invest" in diamonds, but opportunities were few.

Prices of rough diamonds advanced 10 to 15 percent, and a further rise is likely early in 1942. Prices of fine, large cut are 10 to 20 percent higher than in pre-war days, and prices of small cut have doubled or quadrupled. In America, a fine 1-carat stone costs what it did before the 1929 crash; in Nazi-occupied lands and in the British "black market," prices are much higher.

Stocks of rough increased somewhat in 1941 but will decrease in 1942. Those in the hands of American cutters are adequate, as are those of fine, large cut; however, the supply of small cut is pitifully low.

Imports.—On September 30, 1941, the Department of Commerce ceased to publish import figures. Imports from January 1 to September 30, 1941, were as follows:

Diamonds imported into the United States in 1941 (January–September, inclusive), by countries

[Exclusive of industrial diamonds]

Country	Rough or uncut			Cut but unset		
	Carats	Value		Carats	Value	
		Total	Average		Total	Average
Argentina.....				146	\$8,607	\$58.95
Belgium.....				123,052	6,722,113	54.63
Brazil.....	35,825	\$1,261,715	\$35.22	2,470	276,702	112.03
British Malaya.....				73	6,872	94.14
Cuba.....				191	16,947	88.73
France.....				3,867	474,752	122.77
Germany.....				539	42,337	78.55
Mexico.....				432	35,314	81.75
Netherlands.....				1,123	42,384	37.74
Netherlands Indies.....				104	5,339	51.34
Palestine.....				3,409	398,123	116.79
Switzerland.....				630	108,796	172.69
Union of South Africa.....	88,377	4,706,223	53.25	31,043	3,776,182	121.64
U. S. S. R.....				30	2,250	75.00
United Kingdom.....				15,543	1,653,763	106.40
	124,202	5,967,938	48.05	182,652	13,570,481	74.30

Cutting.—In May 1940 the world cutting industry was completely disorganized, having lost 90 percent of its operatives as a result of German invasion of the Low Countries. A few cutters escaped and

reestablished their trade in far corners of the earth, others were marooned in France, but most were caught in the Low Countries. The United States and South Africa and, to a smaller extent, Great Britain and Palestine furnish an adequate supply of "American qualities" (fine, large cut), but there is a woeful shortage of small cut. Germany has attempted without success to reestablish the industry in Belgium and the Netherlands.

By a fluke, New York is now the leading diamond-cutting center of the world, with some 650 cutters and a large number of apprentices. Several firms are attempting to cut melee. Some of the more experienced cutters make over \$235 a week. South Africa has 300 to 400 cutters, Great Britain 200 to 250, Palestine perhaps 200, Puerto Rico 75, and Java a few. Borneo and Brazil cut some diamonds for the local trade, but their product is not cut well enough for the American market.

World production.—For the second year, due to the war, actual diamond-production figures are not available, but the estimates in the following table are believed to be fairly accurate. World production (gems and industrials) in 1941 is estimated to have been 9,088,000 carats (1.817 metric tons) valued at about \$27,000,000. Compared with 1940, the total weight decreased 36 percent and the value 19 percent. The average quality of the stones produced was better than in 1940, bort representing perhaps 78 percent of the caratage and gem stones 22 percent. Belgian Congo was the leading world producer, both in weight (over 67 percent of the total) and in value (27 percent). The British Empire produced 19 percent of the total by weight and 31 percent by value. The South African pipe mines were not operated; consequently, all production was from alluvial mines.

The following table shows, as accurately as available statistics permit, world production for the past 5 years.

World production of diamonds, 1937-41, by countries, in metric carats

(Including industrial diamonds)

Country	1937	1938	1939	1940	1941
Africa:					
Angola.....	626, 424	651, 265	690, 353	784, 270	787, 000
Belgian Congo.....	4, 925, 228	7, 205, 620	8, 344, 765	10, 900, 000	6, 106, 000
French Equatorial Africa.....	5, 588	16, 013	16, 000	16, 000	20, 000
French West Africa.....	54, 687	61, 928	56, 314	175, 000	35, 000
Gold Coast (exports).....	1, 577, 661	1, 296, 763	1, 087, 652	1, 825, 000	745, 000
Sierra Leone.....	913, 401	689, 621	1, 600, 006	750, 000	850, 000
South-West Africa.....	196, 803	154, 856	35, 470	30, 017	46, 614
Tanganyika (exports).....	3, 234	3, 576	3, 445	2, 250	1, 750
Union of South Africa:					
Mines.....	820, 284	979, 460	1, 089, 144	1, 351, 447	-----
Alluvial.....	207, 359	259, 147	160, 684	1, 172, 027	112, 300
Total Union of South Africa.....	1, 030, 434	1, 238, 607	1, 249, 828	1, 523, 474	112, 300
Brazil.....	238, 606	235, 000	1, 350, 000	1, 325, 000	325, 000
British Guiana.....	35, 958	32, 522	32, 491	1, 26, 764	27, 000
Other countries ¹	6, 000	34, 200	19, 000	31, 750	34, 350
Grand total.....	9, 614, 024	11, 619, 971	12, 485, 318	14, 289, 525	9, 088, 014

¹ Estimated.

² Includes small quantity of diamonds derived from re-treatment of tallings.

³ 1937: Includes Netherlands Indies (Borneo), India, Australia (New South Wales), Liberia, Venezuela, and Rhodesia; 1938: U. S. S. R., India, Borneo, New South Wales, and Venezuela; 1939: Venezuela, India, Borneo, New South Wales, and U. S. S. R.; 1940 and 1941: Borneo, India, New South Wales, U. S. S. R., and Venezuela.

Most countries showed decreased production as compared with 1940, although Sierra Leone and South-West Africa made minor increases.

During the year, DeBeers Consolidated Mines, Ltd., absorbed Cape Coast Exploration, Ltd., and now owns or controls all important diamond mines in the Union of South Africa and South-West Africa except the State mines of Namaqualand.

In 1942 some of the companies are to attempt to increase production of the industrial stones so necessary today and may succeed. If the war continues, however, the long-term outlook is for a drying up of production as certain essential supplies will be lacking owing to the isolated position of the mines now producing.

Industrial diamonds.—The use of industrial diamonds continues to increase amazingly. The expansion, of course, is due largely to the national defense and war programs, but even without a war the increase would have been marked. World consumption in 1942 is expected to approach 7,500,000 carats, or more than the world production of industrial grades. For several years, stocks of certain types of fine industrial diamonds have been small; however, users will find that the grades substituted are satisfactory.

With signing of the United States-Brazil Trade Agreement (May 15, 1941), the Axis Powers lost their last primary source of industrial diamonds. It is reported that Germany is now using gem stones industrially.

On March 18, 1941, industrial diamonds were classified among the critical war materials, and after April 15 they could not be exported from the United States without an affidavit, except to the British Empire. Since October 31, 1941, American dealers and users have had to report quarterly stocks on hand and transactions completed. The United States Government began to stock-pile diamonds in June 1940.

The percentages, by value, of the chief uses for industrial diamonds follow:

	<i>Percent</i>
Diamond drilling.....	45-40
Diamond-set tools.....	30-35
Diamond dies.....	10- 7
Crushing bort (bonded wheels and tools).....	10- 7
Miscellaneous.....	5-11

In 1940, for the first time in 3 years, diamond drilling in Canada by contractors increased (1939: 391 miles; 1940: 459 miles). The use of diamond drills in stope blast-hole drilling also increased in Canada, and it is reported in the copper mines of Rhodesia and Belgian Congo. The use of diamond-impregnated bits in drilling is increasing.

The demand for diamond dies is large. Formerly the specialty of France, they are now being produced in America, and mechanical methods successfully replace meticulous hand methods.

The Diamond Trading Co. announced that it would not raise the price of industrial stones during the war. Indeed, the price of Congo (Beceka) crushing bort was reduced in the summer of 1941. Whether the price differential between this grade and those of South Africa and Gold Coast is warranted seems questionable.

Imports of industrial diamonds into the United States during the past 5 years were as follows:

Industrial diamonds (glaziers', engravers', and miners') imported into the United States, 1937-41

Year	Carats	Value		Year	Carats	Value	
		Total	Average			Total	Average
1937.....	1, 885, 970	\$6, 542, 365	\$3. 47	1940.....	3, 809, 071	\$11, 026, 563	\$2. 89
1938.....	1, 396, 247	4, 213, 412	3. 02	1941 (Jan.-			
1939.....	3, 568, 730	9, 725, 683	2. 73	Sept.).....	2, 911, 117	7, 415, 133	2. 55

RUBY, SAPPHIRE, AND EMERALD

Production of precious stones in Burma seems fairly well stabilized. The 1939 production was 211,570 carats of rubies and 10,532 carats of sapphires. A few spinels and other gem stones are byproducts.

Sapphires continued to be produced in 1941 in the Anakie field, Central Queensland. Prices reached perhaps an all-time peak; £85 an ounce was refused for high-quality gems, blue stones brought £45 an ounce, and second-grade stones realized 15 to 30s. an ounce.

Ceylon is changing its mining laws. The Revenue Office now determines gem-mining royalties, the land (both Crown land and that alienated by the Crown) to be exploited, and the location of the workings. Natives are to be trained, after the European method, to cut gems for beauty and not for weight. As Ceylon is a tourist center from which every globetrotter desires to bring a precious stone, prices are higher on the average than they are in Europe. A fine star ruby weighing 310 carats was found in Ceylon by Dr. D. P. E. de Silva late in 1941. Some 15 years ago one weighing 215 carats was found and sold for Rs. 85,000.

LESSER GEMS

Australia is the world's principal source of opals, and its output from 1936 to 1939 ranged in value from \$40,000 to \$75,000 a year. Since 1936 South Australia (1938, £4,750; 1939, £6,020) has been the principal producer, followed by New South Wales. Queensland's production is small (1938, £80; 1939, £50). In 1941 the fields were reported to be doing well and the diggers busy. The market for opals was said to be good.

The ancient turquoise mines of Madan are about 30 miles west of Nishapur, Iran (Bureau of Mines Mineral Trade Notes, January 20, 1942, pp. 26-28). The Iranian Government farms out the mines to operators for about \$2,000 a year. When India, the principal market, is buying in quantity 150 men are employed; at present the demand is poor, and only 20 men are employed. As for most gem mines other than those producing diamonds, profits are small. Turquoise occurs as seams and nodules in brecciated trachyte porphyry. Mining consists of open pits, shafts, and tunnels. To minimize shattering, powder is used instead of dynamite. If the color of the gem does not change within 2 weeks of mining, it is likely to be relatively stable.

The stones are cut at Meshed, 75 miles from the mines. The Iranian market absorbs 10 percent of the product; of the remainder, the best goes to India, and the poorer qualities go to Mecca for the pilgrim

trade. From June 21, 1936, to March 20, 1940, yearly exports have averaged about 822 kilos of cut and 825 kilos of uncut, worth, respectively, 884 rials and 19 rials per kilo (at 50 rials to the dollar, \$17.68 and \$0.38, respectively.)

Brazil produces a number of gem stones, notably aquamarine, pale emerald, tourmaline, amethyst, yellow and blue topaz, and citrine. The value of aquamarine exported is normally 10 times that of tourmaline. Exports are considerably larger than the declared value, recently estimated as \$10,000. Minas Gerais is the principal producer. The war apparently reduced 1941 exports somewhat.

Chile exports considerable tonnages of green "onyx" to the United States through the port of Antofagasta.

Despite Government restrictions, zircon continued for a time to pass the Indochinese border into Thailand for cutting at Bangkok. As already stated, upon the outbreak of the war in the Pacific, Thailand ceased to be a source of zircon for the United States.

South-West Africa, normally a large producer of aquamarine, tourmaline, and other lesser gems, produced 4,075.031 kilos of gems in 1939. As Germany had been the chief buyer, trade languished after the war started.

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