

25th YEAR

THE MINERAL INDUSTRY

1892-1916

VOLUMES I TO XXV

Complete Sets of this work, uniformly bound, except Volumes I and VI; which are out of print, are available at the following prices:

	Per Copy
VOLUMES I TO XV	\$ 5.00
(Except Volumes I and VI)	
VOLUMES XVI TO XXV.....	\$10.00

McGRAW-HILL BOOK COMPANY, INC.
239 WEST 39TH STREET, - - NEW YORK

THE MINERAL INDUSTRY
=

ITS

STATISTICS, TECHNOLOGY AND TRADE

DURING

1916

FOUNDED BY RICHARD P. ROTHWELL

EDITED BY

G. A. ROUSH, A.B., M.S.

ASSISTANT PROFESSOR, DEPARTMENT OF METALLURGY, LEHIGH UNIVERSITY
ASSISTANT SECRETARY OF THE AMERICAN ELECTROCHEMICAL SOCIETY
MEMBER, AMERICAN INSTITUTE OF MINING ENGINEERS

VOLUME XXV

SUPPLEMENTING VOLUMES I TO XXIV

McGRAW-HILL BOOK COMPANY, INC.
239 WEST 39TH STREET. NEW YORK

LONDON: HILL PUBLISHING CO., LTD.
6 & 8 BOUVERIE ST., E. C.

1917

11

COPYRIGHT, 1917, BY THE
MCGRAW-HILL BOOK COMPANY, INC.

243508

YWAAGL! OROVMATZ

MICROFILM AVAILABLE

THE MAPLE PRESS YORK PA

PRECIOUS STONES

BY GEORGE F. KUNZ

The precious-stone imports for the calendar year 1916 total \$51,117,767, the largest annual importation ever recorded. It should always be borne in mind that the import valuations are much below the actual final cost to the importers, as they take no account of duty, freight, insurance, etc. For such charges it is estimated that 26 per cent. must be added to the invoice price; this would give \$64,408,386 for the 1916 imports. Dealer's profits and incidental expenses would probably double the cost of the stones as purchased by the public, so that the final, or selling price of the precious stones, including settings, now so often of platinum, brought here in this one year would be about \$130,000,000.

The invincible tendency of the precious-stone market to react against all unfavorable circumstances is shown by a comparison of two 5-year periods, that from 1908 to 1912, and that from 1912 to 1916 (1912 being included in both). The first of these periods gave the highest figures for any quinquennial period up to that time, \$184,303,374, and yet despite the serious setback of 1914, when imports declined to less than \$20,000,000, the 5 years 1912-1916 represent another advance to a new record figure, namely \$186,517,412. In the 25 years from 1893 to 1916, inclusive, precious stones worth \$663,163,477 were imported. This figure with 26 per cent. added would give a final cost to the dealers of \$835,000,000, making a selling value of \$1,670,000,000, if computed in the same way as the figures for 1916.

IMPORTS OF DIAMOND AND OTHER PRECIOUS STONES INTO THE UNITED STATES
1913-1916

	1913.	1914.	1915.	1916.
Diamonds, uncut, free.....	\$11,616,286			\$368,211
Diamonds, uncut, dut.....	956,576	\$2,976,227	\$7,047,945	11,264,704
Diamonds, cut but not set, dut.....	24,886,133	12,022,146	13,140,548	24,276,882
Bort, dut.....			26,752	62,901
Pearls and parts of, not strung or set, dut.....	5,004,489	2,142,221	4,309,837	11,972,018
Other precious stones, uncut, free.....	47,716			
Other precious stones, uncut, dut.....	9,459	32,590	76,371	194,804
Other precious and semi-precious stones, cut, but not set, dut.....	2,740,804	1,630,715	1,021,221	2,143,543
Imitation precious stones, dut.....	1,299,145	961,082	898,656	834,704
Totals.....	\$46,560,608	\$19,764,987	\$26,521,330	\$51,117,767

The increase in the precious-stone importations for 1916, bringing the total up to the highest figure ever recorded for a single calendar year, was

due to the exceptionally great value of the pearls brought here. This reached about \$12,000,000, while in former years the five-million mark was only twice exceeded, in 1912 and 1913. Since 1900 it is estimated that pearls to the value of over \$40,000,000 have been imported.

As a demonstration of the essential stability of the precious-stone market in the United States despite the greatest fluctuations, the following figures covering the calendar years of the two quinquennial periods 1907-1911 and 1912-1916 are too significant to require comment:

Imports of precious stones and pearls, 1907-1911.	
1907.....	\$31,866,599
1908.....	13,700,404
1909.....	43,570,556
1910.....	42,315,830
1911.....	42,163,864
Total.....	\$173,617,253
Imports of precious stones and pearls, 1912-1916.	
1912.....	\$42,552,720
1913.....	46,560,608
1914.....	19,764,987
1915.....	26,521,330
1916.....	51,117,767
	\$186,517,412

The former of these periods includes the financial crisis of 1907-1908, and the latter shows the temporary effect of the first years of the great war.

The total imports of precious stones, pearls and imitation stones into the United States from 1867 to 1916, inclusive, were as follows:

Diamonds and other precious stones.....	\$736,703,696
Pearls.....	50,541,170
Imitation stones.....	5,796,314
Total.....	\$793,041,180

In many of the earlier years no distinction was made between diamonds and other precious stones, but it is safe to estimate the value of the diamonds at from \$680,000,000 to \$700,000,000. In a very few years pearls were not separately entered, but this would not greatly change the total for these gems. The figures for imitation and artificial stones cover only the period 1911-1916, before which time not many were imported and they were not separately listed.

DIAMOND TRADE CONDITIONS

Since the early part of 1917, the diamond trade has been almost brought to a standstill by the activity of the German submarines and the consequent rise in insurance rates. On shipments from South Africa to London the rate on Mar. 9, 1917, was 5 per cent., and from London to the United States another 5 per cent. was charged, this rate having since risen to 8 per cent. These high rates would in themselves be discouraging

enough, but could be offset by raising the price of the diamonds. When, however, a valuable shipment is lost, the insurance collected scarcely covers the cost of the stones and the premium paid becomes a dead loss to the importer, as he no longer has any chance to recoup himself from his profits. Still the active financial market that is promised will rebound to the advantage of some, and should benefit trade in general and consequently the business interests of precious-stone dealers and jewelers. An indication of the confidence felt in the future by the London market is the fact that the Diamond Syndicate has recently purchased the South-west Africa diamonds from the South African Union Government, thus centralizing the holdings of diamonds. This step should certainly preclude any decline in prices.

At the beginning of this year another increase of about 5 per cent. in the price of rough diamonds was made by the Diamond Syndicate. In Amsterdam rough material has been so scarce that the manufacturers have had but little to dispose of, since they wished to keep what they had for use in their own cutting establishments to furnish work for the cutters.

The British royal proclamation of Nov. 23, 1916, puts "diamonds suitable for industrial purposes" on the list of absolute contraband. "Emery, corundum, carborundum, and all other abradé materials, whether natural or artificial," are placed in the same category.¹ The extensive use of the diamond drill in engineering operations, as well as the use of carborundum and of corundum for such purposes, explains the special restriction placed upon these materials.

The stability of the gem market in London was tested at the beginning of this year by the forced sale of a London firm, by order of the Board of Trade, under the provisions of the Trading with the Enemy Act. The pearls brought high prices, as might be expected from the present scant supply. A single necklace of exceptionally well-matched pearls sold for £25,600 (about \$125,000 at normal exchange). The first 3 days of the sale realized £100,000. Last December the African Union invited tenders for 31,000 carats of diamonds, so that the former German source of supply is about to be utilized again, at least to a limited extent.

In the early part of last year an import duty of 7½ per cent. was imposed by the Indian Government upon unset precious stones and pearls imported into that country. Pearls were, however, exempted from the provision on Mar. 26, 1916, and on Sept. 2 an exemption was also accorded to importers of uncut precious stones. As to the cut stones, no change was believed to be desirable, since in case of reexportation, arrangements had already been made for the payment of a drawback by the principal Custom Houses. These exemptions had been strongly urged by a Com-

¹ *Min. Jour.*, Nov. 25, 1916.

mittee of the Bengal Chamber of Commerce, because of the fact that, in their opinion, so heavy an impost as $7\frac{1}{2}$ per cent. would work serious injury to the Indian jewelry trade.¹

In order to relieve in some measure the pressure brought to bear upon the jewelry trade in France, the Minister of Commerce issued on Oct. 12, 1916, a notice permitting, with special authorization, the importation of diamonds and precious stones, if cut for jewelry manufacture, up to the value of the exports of similar goods. These exports need not, however, have been made by the individual or firm receiving the imports, the evident object being to avoid any financial drain upon the country, while favoring the success of the special industry, as the money sent out to pay for the imports would be offset by that received for the exports.

Precious stones to be utilized directly for jewelry can only enter Italy by special permission of the Minister of Finance, but those in uncut state—which are to be worked up in Italy for use in watch-making may now be passed through the Italian Customs, although before the latter part of 1916 even these were not admitted.

The difficulties experienced by the Germans in disposing of some of the jewel-heirlooms that the exigencies of the war have made it necessary to sell, received a curious illustration recently, when two men were tried and sentenced for endeavoring to smuggle some diamond jewelry into the port of New York. In the ordinary course of things the smuggled jewelry would have been confiscated by our Government, but as it was proven that the men were only acting as special messengers, there being no other way of sending German jewels to this country, the Custom House officers accepted the explanation that the failure to declare the goods on arrival was due either to negligence, or perhaps to a design of selling the gems for the smugglers' own benefit. In any case, this serves to show how effective have been the measures taken by the rulers of the sea.

THE DIAMOND INDUSTRY IN HOLLAND AND BELGIUM

There have been no regular imports of diamonds from Belgium to Holland for a year or more, although a few may have been smuggled across the frontier. In the early part of the war some diamonds must have been brought in from Belgium, as they were to be had at that time in Amsterdam. Of the Belgian diamond-cutters it is estimated that about 800 have come to the Netherlands, but among these are many born in the latter country, who returned to their native land because they could not find work to do in Belgium.²

¹ *The Watchmaker, Jeweler, Silversmith and Optician*, Nov. 10, 1916.

² Communicated by Consul Frank W. Mahin of Amsterdam, in letter dated May 8, 1917.

As a result of the German occupation of Antwerp, and the consequent departure from that former diamond center of most of the Belgian diamond-cutters, this industry has received a powerful impetus in England. While quite a number of diamond factories have been started in London with Belgian workers, Birmingham, probably the leader in the British jewelry trade, has also come into prominence in the diamond-cutting art. An establishment started there has proved a great success, and toward the end of 1916 there were 80 skilled Belgian operators employed, while a number of British boys were being passed through an apprenticeship. It is said that many of the latter have shown marked aptitude for the work. Although it is expected that most of the Belgian diamond-cutters now in England will return to their native land at the establishment of peace, the industry will have secured too firm a footing on British soil to be removed.¹

The attempt to start a diamond market at Scheveningen, Holland, by Belgian diamond merchants, though promising at the outset, was doomed to failure, as it induced the Union of Dutch diamond dealers in Amsterdam to discourage the new competition. Within a year's time the Amsterdam dealers had secured control of the new market, so that now the Belgians who desire to sell their diamonds in the United States must do this by way of Amsterdam. During its short-lived existence, diamonds to the value of \$1,837,204 were exported to the United States from Scheveningen, as follows: 1914, rough, \$16,349; cut, \$237,088; 1915, rough, \$25,568; cut, \$1,558,199.

To what a great extent Amsterdam has profited by the suppression, or at least the great curtailment of the diamond industry of Antwerp, its successful rival of late years, is shown by the value of the diamond exports invoiced at the American consulate in Amsterdam during the first 3 months of 1916. The amount exceeded that for any preceding first quarter of a year, as appears from the following comparisons for 1911 to 1916:²

1911.....	\$2,620,074
1912.....	2,046,202
1913.....	3,579,081
1914.....	1,935,620
1915.....	1,202,003
1916.....	5,154,990

In 1916 cut diamonds valued at \$20,959,051 and rough stones worth \$185,384, in all a value of \$21,144,435, were exported from Amsterdam to the United States, as declared upon the invoices produced at the United States Consulate. In addition to this, a few stones went from the Rotterdam district. Exports of diamonds to all other countries outside of the

¹ Consul Samuel M. Taylor, of Birmingham, *Comm. Rept.*

² Consul Frank W. Mahin, of Amsterdam, *Comm. Rept.*, Apr. 29, 1916.

United States in 1916 are estimated to have been worth from \$2,000,000 to \$3,000,000.¹ The restrictions on the export and import of diamonds and the high rate of insurance from Holland to American and other ports have operated to curtail the trade in diamonds.

The number of unemployed workmen in the Amsterdam diamond industry at the beginning of 1915 was 8143; in the middle of the year, 6170; at the end of the year, 3752. As the total number of workers is about 9500, some 40 per cent. were still unemployed at the end of 1915, in spite of the notable revival of the diamond industry due to demand from the United States.²

The Amsterdam diamond market in May, 1917, showed improvement over the conditions ruling during the preceding month, and as exports were easier to make there was better employment for the diamond workers. Still, the fact that as many as 5000 are unemployed at present signifies how far conditions are removed from the normal. The larger sizes of diamonds find a strong market, and the advance in price has been notable in those weighing from $\frac{1}{2}$ carat down. Light cape stones of the finer hues are exceedingly scarce and in some demand. The difficulty in obtaining diamonds of a required quality is a handicap to jewelers, as well as the increasing prices, so that in London dealers may often be seen at the weekly auction sales of well-known firms. There is an equal scarcity of fine gems in the pearl trade. In the Paris market prices have risen steadily owing to the curtailment of the export of pearls from India. An increased demand in London for rose-cut diamonds is expected to result from the introduction of jeweled brooches and badges with regimental colors, the manufacture of which has constituted a good share of the business recently done by West End manufacturers.

An intelligent adaptation of the needs of an industry to the stern requirements of war time is reported from Amsterdam, where the shortage of coal had forced the Dutch Government to prescribe a reduction of 25 per cent. of the normal consumption at factories. To avoid the injury to the diamond-cutting industry that might result from this, a committee of the trade has made arrangements to concentrate all the diamond factories into a single organization, and shut down 80 of the smaller factories, while carrying out the work in 22 of the larger ones. Due compensation for eventual losses is to be accorded to the proprietors of the establishments that have been closed.

GOVERNMENT REGULATIONS

The forms of the diamond guarantees required by the British Government before according the privilege of importing diamonds into the

¹ Communicated by Consul Frank W. Mahin, of Amsterdam, in letter dated May 8, 1917.

² *Suppl. Comm. Rept.*, July 20, 1916.

United States have recently been modified to some extent. Especially is this the case with the guarantee given by the importer of industrial diamonds as will appear by comparing the following briefer form with that published in the last report:¹

DIAMOND GUARANTEE

HIS BRITANNIC MAJESTY'S CONSUL GENERAL,

NEW YORK.

Shipper..... In consideration of your consenting to the delivery to us of the industrial diamonds specified in the margin, we

Sender..... hereby give you the following undertaking which shall remain in force so long as Great Britain continues at war with any European Power:

From.....

Marks..... That the diamonds if released will only be sold or disposed of by us for industrial purposes in the United States, and will not be exported, or sold for export, directly or indirectly, to any country at war with Great Britain.

Weight.....

Parcels..... We further undertake not to dispose or sell the diamonds now released or any other industrial diamonds which may now or hereafter be in our possession to any person in the United States other than legitimate American users of such diamonds, whose guarantee to your satisfaction against the re-exportation or re-sale of the same we will produce to you within seven days from the date of sale.

We further agree that all industrial diamonds that are sold to persons outside the City of New York shall be handed in unsealed packages to Mr. R. C. Munro of 452 5th Avenue, New York City, who will be at his office for one hour each week day to receive the same. The packages must be sealed in Mr. Munro's office and sent to their destination by registered mail, Mr. Munro undertaking to deliver to us the official post office receipts.

We further undertake to produce on demand, for the confidential inspection of the British Consul General, the firm's sales records or other documents showing the disposal of the diamonds above referred to.

We further undertake in the event of our importing any diamonds from Holland, or other countries than Great Britain, that we will have the same consigned to the British Consul General at New York to be released under similar conditions.

Here, as will be noted, the importer binds himself not to sell the diamonds delivered "to any person, co-partnership or corporation in the United States or elsewhere," and also engages not to make any transfer of diamonds "now or hereafter" in his possession to any country with which Great Britain is at war "or to any person or firm with whom British subjects are prohibited from trading."

Many gem dealers favor the enactment of a Federal law to control the trade in artificial precious stones and imitations, the legislation

¹ MINERAL INDUSTRY, 24, 594-595.

to be on the lines of the pure-food laws, and to provide for an expert examination of the stones when treated as interstate commerce. As things are now, a purchaser is exclusively dependent upon the word of the firm he trades with, there being no effective legal remedy for misrepresentations in regard to the genuineness of the precious stones that are sold. In France, where the most successful imitations, or "reconstructions," have been made by means of synthetic processes, the laws are very stringent in this matter, and the jeweler or gem dealer who fails to properly designate the true character of the gems he sells is liable to be forced to pay a heavy penalty for his negligence, intentional or unintentional.

The Treasury Department has ruled that unset diamonds and other precious stones sent to this country "to have blurs polished therefrom, or to have defects removed by recutting or repolishing or similar work in the nature of repairs which does not destroy their identity," can be accorded free entry under bond. As, however, the certain identification of such stones offers considerable difficulty, the port collectors are required to satisfy themselves as far as may be of the bona fides of each importation. Full details as to weight, size and color, and as to any characteristic peculiarities must be furnished when the stones are received, and before allowing them to pass out again the appraiser must examine them as to their identity. The exportation must be made from the same port at which the stones entered.

A notice was received from the office of the Second Assistant Postmaster General, Oct. 3, 1916, to the effect that sealed or unsealed, registered or unregistered, packages of precious stones would be received in the regular mails from foreign countries. The acceptance of such matter for mailing, was, however, subject to determination by the country in which it was offered, but when received in the United States, in the regular mails, the packages were to be subject "to all customs regulations," in the same manner as though imported by parcel post, freight or express. The packages must be plainly marked abroad with the words "Dutiable" and "Subject to examination by United States Customs Officers," and they may also be marked "Precious Stones." Each package must contain an invoice giving an accurate statement of the value of its contents.¹

PRECIOUS STONES OF MADAGASCAR

In Madagascar only 224 lb. of precious and semi-precious stones were produced in 1915, against 2834 lb. in 1914. The data for 1915 show in that year 95 lb. of garnet and other stones for industrial purposes and 129

¹ Communicated in letter dated Oct. 18, 1916, from F. M. Halsten, Chief, Division of Customs.

lb. of gem-stones, beryls, tourmalines, spessartite (garnets), opals, topazes, amethysts, etc. There has been considerable demand in the United States during recent years for the gems of this great island, several kilograms of beryls having been brought thence to our country in 1915.¹

DIAMONDS

South Africa.—The total value of all the diamonds found in the territory of the Union of South Africa, from the earliest date of existing records down to Dec. 31, 1915, is stated in an official report as follows:²

Province.	Value.	
	Pounds Sterling.	Dollars.
Transvaal.....	£18,392,609	\$89,385,164
Cape.....	138,024,967	670,801,340
Orange Free State.....	13,325,702	64,762,912
	£169,742,678	\$824,949,416

In 1916 the total production of diamonds in the Union of South Africa was as follows in the different diamond-producing States:

	Carats.	Value.
Transvaal.....	615,209	£933,643
Cape Colony.....	1,510,756	4,057,928
Orange Free State.....	220,365	736,820
	2,346,330	£5,728,391
Totals for 1912.....	5,071,882	£10,061,489
Totals for 1913.....	5,163,547	£11,389,807

This shows a return in some slight measure to normal conditions, the prices being relatively higher than before the war. Figured at £1 = \$4.865, the value for 1916 would be \$27,868,623, or \$11.88 per carat. For 1912 the value would be \$48,949,144, or \$9.65 per carat, and for 1913 we would have \$55,411,411 as the value of the total product, making a price of \$10.73 per carat, more than a dollar less than in 1916.

The export tax on diamonds passed by the Parliament of the Union of South Africa is graduated in accordance with the average percentage of profit realized by each exporting company during the 3 years preceding Aug. 4, 1914. Should the percentage of profit not exceed 35 per cent. no export tax is imposed, but when it is greater an export duty of $\frac{1}{2}$ per cent. is levied for every $\frac{3}{4}$ per cent. of profit until the profit reaches $42\frac{1}{2}$ per cent., when the maximum duty, 5 per cent., is imposed. At the last annual meeting of the shareholders of the Jagersfontein Co., Chairman

¹ Consul James G. Carter of Tamatvac, *Suppl. Comm. Rept.*, Dec. 15, 1916.

² Union of South Africa, Department of Mines and Industries. *Annual Report of the Government Mining Engineer*, Pretoria, 1916.

Harris announced that no duty could be charged against this company, as the average profits during the 3 years mentioned were only 32.94 per cent.

The refusal of the British Government to allow the mining companies to secure dynamite under what is known as "Report A," which allows as much as may be required, has contributed to check operations to a considerable extent, so that the mines toward the end of 1916 were only producing about 27 per cent. of the average output. Of course, the intentional limitation of the mining on the part of some of the companies is another important cause of lessened production.

The pooling of all the South African diamonds recently arranged by S. B. Joel, and the arrangement by which the product of the Premier mine is in future to be sold by the London Diamond Syndicate, give a firm basis to the policy of coöperation that was initiated some time since between the two great diamond companies of South Africa.

The alluvial diggings of the southwestern Transvaal produced more diamonds in 1916 than in 1915, the value of the stones showing a larger increase than the number of carats found, as appears from the following table giving the returns for 1911-1916, as well as the value per carat in each year, in United States currency at \$4.865 = £1.

Year.	Carats.	Value.	Value per Carat.
1911.....	37,861	\$967,327	\$25.55
1912.....	79,079	1,881,140	23.79
1913.....	81,943	2,055,927	25.09
1914.....	35,644	686,675	19.26
1915.....	29,920	573,180	19.22
1916.....	43,170½	1,151,720	26.68
Totals.....	307,617¾	\$7,315,969	\$23.80

The low average prices for 1914 and 1915 reflect the temporary depression of values to which most of the diggers were forced to submit, as they could not well afford to hold their diamonds until a recovery of the market.

Work in the alluvial deposits of the South African Union has been very active in the past year, five or six mines in the Orange Free State having produced a total value of £723,453 in diamonds, or \$3,519,600, the average per carat being \$16.05. The Vaal River diggings furnished 167,620 carats with a worth of £948,571, or \$4,592,788; this amount has been exceeded in only two of the previous years, and gives a carat value of £5 13s. 2d. or \$27.53, while at the prices ruling in 1914 or 1915 the carat was worth only about £4 or \$19.46. Another productive district in this field was Barkeley West, where 82,968 carats of diamonds were produced, the value being £554,896 (\$2,699,569), the single carat being therefore worth £6 13s. 9d. or \$32.54. Lastly from the new fields of

Klerksdorf came a quarter of a million carats valued at £5 6s. a carat or \$25.78.¹

One of the late developments in South African diamond mining has been the opening up of fields in the Theumissen district by the Compound Mining Syndicate, Ltd. As a result of prospecting operations here a parcel of diamonds weighing 250 carats has been shown. A new company, named New Compound Diamonds, Ltd., is to be formed to acquire the assets of the company named above, and carry on its work.² Another new exploitation is that of the Aliwal Diamond Prospecting Syndicate, Ltd., which owns rights on two farms situated south of the Orange River. The prospects here are said to be very promising. The company is registered as a limited liability corporation with a capitalization of £5000, and active operations are likely to be soon begun.³

A new diamond corporation, the Monteleo Diamonds, Ltd., has recently been registered in South Africa, in the Orange Free State, with a nominal capital of £45,000. The issued capital is £22,078 and the working capital £6328, leaving a reserve capital of £22,922. The company's property consists of an option to buy 200 morgan (about 422 acres) of the freehold farm Erfbloem No. 712, District Winburg, Orange Free State. The sum of £15,000 in cash for the right and option to purchase, was to be provided by the issue of 15,000 shares, 750 shares serving as part consideration for an extension of the option for one year.

Although as yet only 12 claims of the Monteleo diamond property have been stripped of overburden, the chairman of the company believes that the diamantiferous area equals at least 40 claims. A test washing of 2000 loads yielded the high average of 20 carats to the load, the stones bringing over 70s. per carat. The installation of adequate machinery for speedily stripping the mine will soon be accomplished. The discovery of a single gem of unusual brilliance and purity has been announced, without, however, any information regarding its exact weight.⁴

In the Twenty-eighth Report of the De Beers Consolidated Mines Ltd., for the year ending June 30, 1916, clear evidence is given of the bettering conditions that now obtain in this great South African diamond field. While in the year ending June 30, 1915, the receipts from diamonds sold, less the decrease in stocks taken at cost of production, amounted to but £574,398, the figures for 1916 are £2,142,092, nearly four times as much. Since the decrease for the year in diamonds unsold, at cost, amounts to £502,255, the amount actually received from the diamond sales was £2,644,347. Adding to this "interest and dividends on invest-

¹ *Eng. Min. Jour.*, June 9, 1917.

² *So. Afr. Min. Jour.*, July 8, 1916.

³ *Idem.*, Oct. 28, 1916.

⁴ *So. Afr. Min. Jour.*, Jan. 27, 1917.

ments," £130,078, "net revenues from rents," £2941, "revenue from other sources," £22,671, and the previous balance of £289,264, we have a total revenue amounting to £3,089,301. Against this must be set the following expenditures: Mining expenditure during period of production, £395,850; expenditure on farms, Kimberley-Alexandersfontein tramway and charges, including donations, £145,932; interest on company's 4½ per cent. South African Exploration debentures, and on capital of leased companies, £169,890; sinking fund for repayment of debentures, £72,893; mining profit tax, estimated, £150,000; British income tax, £9136; expenditure consequent upon the war, £316,660; total, £1,260,461. This leaves a balance of £1,828,840. Preference shareholders received out of the balance the dividend of 10s. per share due for the half year ending Dec. 31, 1914, and a dividend of 20s. per share for 1915, representing £400,000 and £800,000, together £1,200,000; the balance, £628,840, was carried to the next year.

The first dividend declared on the deferred (common) shares of the De Beers Consolidated Mines, since the beginning of the war, has been announced for the year ending June 30, 1917. It will be 40 per cent., a dividend as large as has ever been declared at one time. The directors have also voted the sum of \$125,000 for the British Red Cross funds and the same sum for those of the French Red Cross. That the company is now able to disburse so large a dividend, amounting to \$5,000,000, forcibly illustrates the recovery of the diamond industry, mainly due to buying for the United States.

The following figures give the stocks of blue ground and lumps on the floors of the respective mines, on June 30, 1916:

	Loads.
De Beers.....	48,396
Wesselton.....	2,607,097
Bultfontein.....	2,379,211
Dutoitspan.....	4,594,272
Total.....	9,628,976

To the prospective yield of this diamond-bearing material must be added the stock of unsold diamonds on hand, worth at cost of production, £648,734, and marketable at a much higher figure.

The gradual resumption of operations at the De Beers mines is reflected in the following figures for the years 1913-1914, 1914-1915, and 1915-1916. In 1914-1915 work was done only from July 1 to Aug. 8, 1914:

MINERAL INDUSTRY

DE BEERS AND KIMBERLEY MINES

	Loads of Blue Ground Hoisted.	Loads of Blue, Ground Washed.	Carats of Diamonds Found.	Selling Value per Carat.
1913-1914	None	75,815	27,346½	80s. 10. 21d.
1914-1915	None	None	None	None
1915-1916	None	None	None	None

WESELTON MINE

1913-1914	2,373,522	2,083,352	593,305	45s. 7. 62d.
1914-1915	217,483	219,276	56,359¼	37s. 7. 13d.
1915-1916	43,586	885,334	227,914¼	44s. 2. 31d.

BULTFONTEIN MINE

1913-1914	2,279,838	2,069,552	785,510¾	40s. 10. 47d.
1914-1915	256,950	214,522	76,084	33s. 6. 86d.
1915-1916	60,997	864,052	342,676¼	39s. 11. 09d.

DUTOITSPAN MINE

1913-1914	2,513,469	2,412,679	497,459	84s. 0. 9d.
1914-1915	264,039	260,024	55,609¾	68s. 6. 25d.
1915-1916	None	108,597	20,740¼	91s. 0. 26d.

GRAND TOTALS FOR ALL MINES

1913-1914	7,166,829	6,641,398	1,903,621¼	
1914-1915	738,472	893,822	188,053	
1915-1916	104,583	1,857,983	591,331	

It will be noted that while but little additional blue ground was hoisted, nearly three times as much was washed in the year 1915-1916 as in the short working period of the previous year. Thus the diamonds recovered came almost entirely from ground already on the floors. This is shown in the number of loads, excluding lumps, on the floor at the close of the 3 years. The number of carats found in the loads washed, and the value per load, are also given, the latter figures depending of course not only upon the quantity of diamonds recovered, but also upon their value in each year:

DE BEERS MINE

	Carats per 100 Loads.	Value per Load.	Loads of Blue Ground on the Floor at Close of Year.
1913-1914	36	29s. 1.28d.	48,396
1914-1915			48,396
1915-1916			48,396

WESSELTON MINE

	Carats per 100 Loads.	Value per Load.	Loads of Blue Ground on the Floor at Close of Year.
1913-1914	28	12s. 9.33d.	3,450,638
1914-1915	26	9s. 9.29d.	3,448,845
1915-1916	26	11s. 5.8d.	2,607,097

BULTFONTEIN MINE

	Carats per 100 Loads.	Value per Load.	Loads of Blue Ground on the Floor at Close of Year.
1913-1914	38	15s. 6.38d.	3,095,893
1914-1915	35	11s. 9d.	3,138,321
1915-1916	40	15s. 11.6d.	2,335,266

DUTOITSPAN MINE

	Carats per 100 Loads.	Value per Load.	Loads of Blue Ground on the Floor at Close of Year.
1913-1914	21	17s. 7.87d.	4,358,185
1914-1915	20	13s. 8.45d.	4,341,900
1915-1916	19	17s. 3.48d.	4,233,303

These figures show the quick recovery of the diamond market from the temporary depression in the first months of the war.

The depths of the various shafts remain unchanged, as follows:

De Beers:	Feet.
Rock shaft.....	2,640
No. 1 shaft.....	1,728
Kimberley:	
Main rock shaft.....	3,601
Atkins shaft.....	1,009
Wesselton:	
No. 1 main rock shaft.....	1,119
No. 2 main rock shaft.....	1,667
Bultfontein:	
No. 1 main rock shaft.....	708
No. 2 main rock shaft.....	1,715
Dutoitspan:	
No. 1 main rock shaft.....	1,424
No. 2 main rock shaft.....	768

The only development work for the year 1915-1916 was at the Dutoitspan mine, where 931 ft. of tunnels were driven in the rock, and 44 ft. of passes sunk in the rock. The number of natives employed on July 1, 1915, was 1249, and on June 30, 1916, 6656, an increase of 5407 for the year. The white employees numbered 726 men and 42 lads, July 1, 1915, and on June 30, 1916, 1306 men and 97 lads, an increase of 580 men and 55 lads. This excludes the 526 white employees who were on active military service. From July 1, 1916, all employees have been in receipt of full pay.

The blue ground in sight at the different mines of the De Beers Consolidated Co. on June 30, 1916, was as follows:

Mine.	No. of Loads.
De Beers, above 2,040-ft. level.....	2,750,000
Kimberley, above 3,520-ft. level.....	2,000,000
Wesselton, above 980-ft. level.....	15,738,000
Bultfontein, above 1,000-ft. level.....	10,182,000
Dutoitspan, above 750-ft. level.....	13,245,000
Total.....	43,915,000

Additional, estimated, quantities of blue ground were:

Mine.	No. of Loads.
Wesselton between 980-ft. and 1,550-ft. levels.....	22,000,000
Bultfontein between 1,000-ft. and 1,600-ft. levels.....	22,000,000
Dutoitspan between 750-ft. and 1,300-ft. levels.....	25,000,000
Total.....	69,000,000

This makes a grand total of 112,915,000 loads in sight and estimated, the diamond content being, on the basis of the latest results, about 32,000,000 carats, worth in the neighborhood of \$400,000,000.

The New Jagersfontein Co. sold, in the 3 years immediately preceding the war, diamonds to the value of £3,538,076, making a yearly average of £1,179,359. On the other hand, the total sales for nearly 2 years, up to July, 1916, totaled only £179,900, or less than £90,000 per annum, no diamonds having been sold from the war's outbreak until the end of May, 1915. However, this restriction of sales has served eventually to sustain prices, while the river diggers, being obliged to realize on their product, had to be satisfied with prices often 50 per cent. lower than in 1913 on their forced sales. The Jagersfontein Co. received substantial support in tiding over the difficult period from the National Bank, as well as from Barnato Bros., and the directors were thus enabled to care for their employees during the suspension of work. The recovery, or rather the increase in diamond values over those prevailing just before the war, will soon relieve the situation entirely. From the blue ground already on the Jagersfontein floors, a yield of diamonds worth £1,100,000 is expected, giving probably £500,000 profits for the company's surplus, and making it possible to indemnify the stockholders for the more than 2 years' suspension of dividends.¹ The company resumed dividend paying toward the end of 1916, when a distribution of 3s. per share, 15 per cent., was made to shareholders. The last dividend previous to this was one of 12½ per cent. in April, 1914, none having been paid in the interval.

At the annual meeting of the shareholders, held on Friday, June 30, 1916, the chairman, Sir David Harris, called attention to the unfavor-

¹ The New Jagersfontein Mining and Exploration Co., Ltd., *Twenty-eighth Annual Report for the year ended 31st March, 1916*, Kimberley, 1916.

able result of the forced sale of alluvial diamonds by the diggers as indicating clearly what would have been the effect if the large diamond producers had insisted upon unloading their stocks upon an unwilling market. In his opinion "the policy of the three large producers to stop production, and the action of the Diamond Syndicate in not offering any of its large stock, saved the situation, with the result that prices for the better qualities are as high to-day as in 1913, when they reached high-water mark." He recognized that the production of the Jagersfontein Co., as well as that of the other large concerns, would be strictly limited to the lessened demand. The erection of a new direct-treatment plant was projected, together with a power station, the cost being approximately £300,000. When this plant shall have been installed, it is expected that a saving of at least 6d. will be realized on the working cost of each load of 16 cu. ft. of diamantiferous soil, a saving that will serve to offset the added expense entailed by the increased depth of the working levels.

The number of loads of blue ground deposited on the floors of the Jagersfontein mine in the years 1909-1916 (each year ending Mar. 31), the number of loads washed, the number of carats of diamonds produced, the average yield per load and the total value of the diamonds, were as follows:

Year.	Loads of Blue Ground Deposited.	Loads Washed Including Lumps.	No. of Carats of Diamonds Produced.	Average Yield per 100 Loads (of Blue).	Total Value of Diamonds.
1909	1,526,018	2,270,651	224,204½	12.39	£140,346
1910	2,431,089	3,236,590	338,581½	13.08	1,023,187
1911	2,479,715	3,436,283	333,831½	11.47	993,779
1912	3,479,648	3,798,831	344,635½	10.62	1,116,432
1913	4,558,383	4,173,753	363,397½	9.99	1,259,983
1914	3,316,628	4,403,383	330,523½	8.90	1,161,660
1915	1,173,927	1,655,337	116,251½	8.24	270,175
1916	325,366	24,587½	8.57	75,101
Totals	18,965,388	23,300,194	2,076,012¾		£6,310,663

The diamonds of the recently operated Kameelfontein digging averaged 0.83 carat in weight during last June, and had an average worth of £3 6s. 9d. per carat. One diamond weighing 37 carats was found, its value being £300. A few fine stones of 7 and 9 carats, and one of 12½ carats have been reported, but in general the diamonds are not of good quality, many broken stones and cleavage fragments appearing. Occasionally heart-shaped twin crystals are found here. The prevailing tint is brownish or yellowish; a few pale green stones have also been recovered. The peculiar opalescence characteristic of the Premier mine diamonds is present in the case of many of those from Kameelfontein. This would seem to indicate that the deposits have resulted mainly from denudation of the Premier pipe, this source being perhaps supplemented

from other primary deposits. It is stated that nothing indicates the proximity of a kimberlite occurrence.¹

At the great Premier mine, washing operations which had been discontinued from August, 1914, were resumed on a small scale in January, 1916, and were continued without interruption throughout the year. Hauling and washing of mine ground were started late in July, 1916.² The larger part of the diamonds recovered came from an old heap of tailings and cylinder lumps dumped in the early history of the company; this furnished 266,945½ carats, while from the mine ground 153,001½ were secured. These diamonds, except those carried over in the Suspense Account, and the whole of the stock on hand on Oct. 31, 1915, were so carefully and conservatively marketed that better prices were obtained than those ruling just before the outbreak of the war.

The total number of natives admitted to the compound was 9157, a large number (5775) having applied for work on their own account, a successful result of the company's efforts to encourage voluntary labor. The agents in the various labor districts furnished the balance of the workers, to the number of 3382. The close of the financial year found 6500 natives employed. The death rate among them was low, being but 13.55 per thousand per annum.

The average depth of the mine is now 235 ft. The ground still available above the 360-ft. level is sufficient to supply material at the normal rate of working for 3 years.

The total number of loads of blue ground taken from the mine during the few months of actual mining from July 29 to Oct. 31, came from the following levels:

From the 210-ft. level.....	149,058
From the 260-ft. level.....	222,713
From the 310-ft. level.....	363,462
From the 360-ft. level.....	119,552
	<hr/>
Add to this tailings and cylinder lumps.....	854,785
	717,736
	<hr/>
Total washed.....	1,572,521

The average yield per load of the mine ground washed was 0.179 carat per load, showing that the slow diminution of the yield continues, the average for 1914 having been 0.185 carat per load. The better showing for the whole of the material washed (0.267 carat per load) resulted from the greater yield of the old tailings.

The profits derived from the sale of diamonds, £475,856, served to defray mine expenses of £185,827, administrative expenses of £13,572, directors' and auditors' fees of £5325, as well as to provide £2500 for

¹ *So. Afr. Min. Jour.*, July 15, 1916.

² *Fourteenth Annual Report of the Premier (Transvaal) Diamond Mining Co., Ltd.* Directors' report and statement of accounts for the 12 months ended 31st October, 1916.

depreciation on investments, leaving a balance of £268,632. Adding to this profit suspense as of Oct. 31, 1915, to the amount of £234,298, and deducting diamond stock on hand, Oct. 31, 1916, valued at £160,330, there remained £342,600 for transfer to Expenditure and Revenue Account No. 2. Deducting here £5289 for general equipment, and setting aside 60 per cent. of the balance as the share due to the Government of the Union of South Africa, there was left for the shareholders £134,924. From this the two preference dividends of £50,000 each, still due from 1915, were paid, as well as £12,110 for British and South African income tax, and there remained enough to show a balance of £77,440 as against a balance of £54,626 at the close of the previous financial year.

Full details of the total diamond production of the Premier from the outset to Oct. 31, 1916, are given as follows in the 14th Annual Report:

Year Ended Oct. 31.	No. of Loads Washed.	No. of Carats Found.	Value of Diamonds.	Yield Per Load in Carats.	Value Per Carat.		Value Per Load.		Cost of Production Per Load.		Profit Per Load.	
					s.	d.	s.	d.	s.	d.	s.	d.
1903	76,931	99,208½	£ 137,435	1.290	27	8.50	35	6.70	4	7.20	30	11.50
1904	939,265	749,653½	866,030	0.798	23	1.20	18	5.30	2	7.62	15	9.68
1905	1,388,071	845,652	994,687	0.609	23	6.29	14	3.98	3	3.44	11	0.55
1906	2,988,471	899,746	1,277,740	0.301	28	4.82	8	6.61	3	5.71	5	0.90
1907	6,538,669	1,889,986¾	1,702,631	0.290	18	0.20	5	2.49	2	4.14	2	10.35
1908	8,058,844	2,078,825½	1,536,720	0.258	14	9.40	3	9.75	1	10.24	1	11.51
1909	7,517,793	1,872,136½	1,172,379	0.249	12	6.29	3	1.43	1	11.42	1	2.01
1910	9,331,882	2,145,832¾	1,496,641	0.230	13	11.39	3	2.49	2	0.56	1	1.93
1911	8,325,272	1,774,206	1,433,971	0.213	16	1.97	3	5.34	2	2.02	1	3.32
1912	9,707,098	1,992,474	2,004,943	0.205	20	1.50	4	1.57	2	4.79	1	8.78
1913	10,434,680	2,107,983	2,336,828	0.202	22	2.05	4	5.74	2	6.67	1	11.07
1914	7,683,943	1,417,755	1,259,643	0.185	17	9.23	3	3.34	2	5.89		9.45
1915	Mining operations suspended.											
1916	1,572,521	419,947	475,856	0.267	22	7.95	6	0.63	2	7.62	3	5.01

This gives the following totals for the fourteen years:

Number of loads washed.....	74,563,440
Carats of diamonds found.....	18,293,406
Value of diamonds.....	£16,695,504

It is stated that in line with the general policy to restrict and control the diamond market, the washings of the Premier mine are to be confined to the capacity of the No. 4 Gear, and also that the customary annual increase in the depth of the open-cut workings, which has been 34 ft., will be reduced one-half to 17 ft. As a result of this the duration of the mine would be double what it would be if the old rate were maintained.¹

The third report of the South African Diamond Corporation, Ltd., for the year ending June 30, 1916, was submitted at the general meeting held Dec. 19, 1916. There has been no change in the capital of the company, which remains at £1,000,000, of which £100,000 has been issued, that is, two directors' shares of £1000, and 98,000 common shares of £1 each. Washing had been resumed in March, 1916, and as the results

¹ *Eng. Min. Jour.*, June 9, 1917.

were satisfactory and profits equalled those realized before the war, the company has begun again the payment of dividends. Digging has been carried on to some extent, but has been hampered by the absence of many diggers who are serving in the army. The diamond trade has been very active during 1916, the demand coming largely from the United States, but being also notable in Russia, India, and the Far East. At the Blaauwbosch mine, in which this corporation is interested, washing has been in progress since March. The rise of about 20 per cent. in diamond prices as compared with the period before the war has operated to enhance the value of diamond-mining shares in the market.¹

Australia.—Some diamonds have been found from time to time in the course of mining operations in the Beechworth district, Victoria, Australia. Quite recently a prospector came across a number of them, while sluicing in Blacksand Creek, four miles from Beechworth, and the principal of the Beechworth Technical School has pronounced one of them to be a first-water diamond of 5 carats. In the district from Wooragee down to Eldorado diamonds have also been met with, but as the stones were very small, the product was trifling. Some time ago a 5-carat stone was found in the Beechworth district, so that two such diamonds may now be credited to this locality. It is supposed that the matrix of the original deposit is to be sought at some point not far distant from Beechworth. Of other diamond finds in Australia in recent years there may be noted the finding of 11 small diamonds in the sluice boxes at the Great Southern Alluvial mine, Chiltern, in 1912. Still another diamond-producing locality is the granite country at Kongbool, in the Western district, and also Bunyip and Benalla. In New South Wales there are diamantiferous deposits at Cudegong, Bingara, Tingha, Mount Oberon, and in the Inverall district. The largest diamond of which Australia can boast was found on Mount Werong, near Oberon, New South Wales; this weighed $28\frac{5}{16}$ carats (29.32 metric carats). The finest stone, however, came from the Echunga field, South Australia, and is called "Glover's Diamond"; it brought £70. A few diamonds have also been furnished by the Pilbara district of Western Australia. The official statistics estimate the diamond yield of 1914 at 1580 carats, with a value of £1440, and place the total production of Australia up to the end of 1914, at 186,124 carats, worth £126,989.² This gives about \$617,800 as Australia's share of the diamond production of the world.

A few diamonds have been found in the sapphire-bearing gravels of the Anakie district, Queensland, Australia. Some years ago a colorless, flawless diamond crystal weighing $1\frac{1}{4}$ carats was found in Policeman

¹ *So. Afr. Min. Jour.*, Dec. 30, 1916.

² *The Watchmaker, Jeweler, Silversmith and Optician*, May, 1917, p. 519.

Creek, and two straw-colored diamonds weighing about 1 carat each are reported to have been found in Retreat Creek, the locality where sapphire was first discovered in this region.¹

Brazil.—Of the most favored regions for diamond mining in Brazil at the present time, Consul General Gottschalk reports as follows:²

“In the State of São Paulo diamonds have been found in the Rio Verde and Sapucahy-Mirim. In the State of Parana, the Tibagy, Japão, Pitanguy Rivers, and their affluents have shown some results in diamond working. The interior of the State of Bahia seems to have been, with Minas Geraes, the most favored region. It was in the Sincora and Chapa Mountains, in the Paraguassu River and its tributaries, in the mountain chain called Lavras Diamantinas, at Andarahy, Morro do Chapeu, Salombro, Cannaveiras, and Itapicuru that diamond fields were found which, since 1844, have been yielding the precious stones in great quantities. It is said that during the decade between 1844 and 1854 the customs at the port of Bahia registered 876,250 carats of diamonds.

“In the district mentioned the famous Brazilian carbonados, or black diamonds, have been found. They are also present in the north of the State of Minas Geraes, at Grão-Mogol and Terra Branca, but most have come from Bahia. Lençoes in that State produced in 1895 the great carbonado which is said to have been sold successively for \$6000 and \$25,000.

“The diamonds of the State of Goyaz, Brazil, found in the beds of the Claro, Piloes, Fortuna, Tres Barras, Desengano, and Caiaposinho Rivers, are stated to be distinguished by amber or clear green tints. They are present in but limited quantity.

“The native diamond miners in Brazil are said to exhibit an unusual degree of trustfulness in sending the rough stones to the coast. To certain business men, with whose good repute the sender is, however, probably acquainted, packets of uncut stones are intrusted, without the exaction of any receipt. This brings it about that many Brazilian diamonds reach the coast without being included in official statistics. It is said that before the war, when Germans were the principal diamond traders, they frequently employed Syrians, settled in the interior, as brokers and intermediaries; some of the German travelers, however, made their purchases directly at the mines. Now American firms are sending representatives, and it is not unlikely that they will keep the trade in their hands even after the conclusion of peace has again opened up trade relations between Brazil and Germany. However, there are apparently no American diamond miners in the country as yet.

“Diamond buying in Brazil in the period before the beginning of the world war was principally in the hands of Germans, their intermediaries with the miners being usually certain Syrians who had settled in the interior of the country. However, in some cases German traveling buyers dealt directly with the buyers. Since the outbreak of the war several American firms have sent agents to Brazil, and in view of the great demand for diamonds in the United States and the high prices, it is deemed probable that the Americans are likely to drive competitors out of this market.”

British Guiana.—The diamond production of British Guiana for the year ending June 30, 1915, was 78,533 stones weighing 10,980 carats, against 94,871 stones weighing 12,506 carats in 1913–1914.³ The average

¹ *Bulletin of the Imperial Institute*, April-June, 1916, p. 258.

² *Comm. Rept.*, Sept. 9, 1916.

³ From *Report of the Institute of Mines and Forests of British Guiana*, for 1915.

weight for 1914-1915 was thus 0.14 carat against 0.132 carat for 1913-1914, a slight increase. At a price of \$10 per carat which has been given as the estimated value there were recovered in 1913-1914 diamonds worth \$125,060, while for 1914-1915 the value was but \$109,800, or \$15,260 less. The progressive changes in average weight since 1910 were as follows:

	Carat.
1910-1911.....	0.130
1911-1912.....	0.085
1912-1913.....	0.100
1913-1914.....	0.132
1914-1915.....	0.140

India.—What an infinitesimal contribution to the diamond supply is now made by India, once the sole source of the world's diamonds, is strikingly brought out in the annual report for 1915 on the Mineral Production of India. The figures there given for 1914 and 1915 are as follows, and seem to indicate that the output is dwindling away to the vanishing point.

	1914.		1915.	
	Carats.	Value.	Carats.	Value.
Central India.....	54.65	£791 (\$3,848)	35.99	£603 (\$2,933)

The opinion prevails that the deep-lying Indian diamond deposits were never reached by the diamond miners of former times, and that a systematic exploitation of some of the old fields would give good results. The Geological Survey of India has for some time past carried on investigations to this end, and considerable interest has already been aroused in the matter. Whether the diamond material would prove to be present in sufficient quantity to warrant the expenditure necessary for equipment and working on a large scale must, however, be regarded as rather doubtful, in view of the powerful competition of the South African companies.

California.—Diamonds have been found at several localities in the State of California, as follows:¹

In El Dorado County, at Placerville, on the south side of Webber hill, in White Rock canyon, at Dirty Flat, and at Smith's Flat; in Amador County, at Rancheria, 3 miles south of Volcano, and at Loafer Hill, near Oleta; in Nevada County, at French Cowal; in Butte County, at Cherokee Flat and at Yankee Hill; in Plumas County, at Gopher Hill, and on Upper Spanish Creek. From three other counties, Del Norte, Trinity, and Tulare, reports of diamond finds have come.

The writer has suggested the advisability of equipping the washings on the California districts where diamonds have occurred with tallowed boards such as are used for the concentrates of the South African mines.²

¹ H. W. Turner in *American Geologist*, 23, (1899).

² *Min. Sci. Press*, Feb. 24, 1917, noted in paper by W. H. Storms on Diamonds in California.

EMERALD

In the Budget for 1917-1918 of the Republic of Colombia there appears among the items of expected revenue, one of \$200,000 for receipts on account of the emerald mines of Muzo and Coscuez. This appears in an executive decree published in the issue of the *Diario Oficial* for Feb. 15, 1917.¹

A rare and interesting type of emerald crystal of the kind locally known as "emerald twins," was brought from the Muzo district by Dr. Pogue. The specimen he secured measured about $1\frac{1}{2}$ cm. in length and about 7 mm. in diameter. He describes it as a crystal with a tapering core of carbonaceous emerald, with six rays of carbonaceous material extending from the edges of the core to the corners of the crystals.

The common emerald is found in several parts of German Southwest Africa, and occurs, associated with tantalite, in pegmatite veins at Tonkerkoek. Near Rossing there is found in pegmatites golden beryl, or "heliodore," accompanied by tourmaline and tungsten.²

GARNET

A remarkable crystal of almandine garnet was found while grading a property between Broadway and Fort Washington Avenue, 166th to 168th Streets, during the summer of 1915. The crystal shows about eight of the twenty-four faces of a trapezohedron; the balance is imperfect, with slight rock adhering. It weighs 10 lb. 8 oz. avoirdupois, 13 lb. 12 oz. troy, or 4.763 kg.

The crystal has been lent to the New York Mineralogical Club to be placed with the Collection of Minerals of New York City in the Museum of Natural History, by Charles W. McDonald, the contractor who found it. This brings to mind the great almandine garnet found at 35th Street, Manhattan, and which weighed $9\frac{2}{3}$ lb.³ It is now deposited in the New York Mineralogical Club collection.

Many fine gem garnets of the rich pyrope variety have been found in the Navajo Reservation in Arizona and Utah. In this region more or less extensive garnet deposits occur at three localities, two of which have been named Mule Ear, and Moses Rock, in Utah, and the third, called Garnet Ridge, in Arizona. From time to time brilliant examples have been picked up by Navajo Indians and sold to traders, who took them to the trading posts where they were offered for sale as "Arizona rubies." Of the three principal localities above mentioned, the Mule Ear deposits

¹ *Comm. Rept.*, May 3, 1917.

² *L'Echo des Mines*, Sept. 24, 1916, in article on the resources of German Southwest Africa.

³ See "Gems and Precious Stones of North America," by George F. Kuns, pl. opp. p. 82.

do not yield much good material. In the Moses Rock district the strong southwest winds help the garnet-seekers by shifting the sands covering the garnet-bearing drift and exposing the precious material to view. At Garnet Ridge the garnet material is exposed by the strong winds and is found strewn over the surface or accumulated in pockets and riffles; this is the most promising field for the garnet-seekers. It often happens that within 5 min. a quart measure can be filled with material gathered from a natural riffle, fully one-half of the contents being garnet. Masses of solid garnet measuring sometimes as much as 4 in. in diameter have been found. The garnetiferous drift of a high central area has been spread by running water over the surrounding slopes.¹

JADEITE

The official figures on Burmese jadeite are somewhat puzzling. The production for 1914 and 1915 and its value appear as follows:

	1914.		1915.	
	Carats.	Value.	Carats.	Value.
Myitkyina.....	3,764.75	£13,643	3,692.75	£12,678

On the other hand, the exports from Burma for these 2 years are thus reported:

	1914.		1915.	
	Carats.	Value.	Carats.	Value.
	2,959	£40,092	5,001	£52,070

These figures regarding exports are believed to be more likely to indicate the true condition of the jadeite industry than those relating to production or the mining value and the dealers' selling export price.²

OPAL

The precious opal of Hōsaka is briefly noted by *Yōnosuke Otsuki* (pp. 274, 275). The locality lies in the upper course of the rivulet Kikōzuga, which flows between the village of Hōkawa and the mountain-pass Kurumatōge. The opals are found within nodules (silicified spherulites) enclosed in a greenback pearlite which turns gray in weathering. The nodules are usually from 3 to 5 cm. in diameter, although some measure as much as 18 cm. across; they are brownish or black, resembling potatoes in shape, good opals coming more frequently from the brown than from the black nodules. The opal-material is here present in great variety: milk opal, opal-agate, precious opal, glass opal, as well as the smoky, obsidian-like variety, the yellowish-green, the waxy and others. Im-

¹ Herbert E. Gregory, Garnet Deposits on the Navajo Reservation, Arizona and Utah. Reprint from *Econ. Geol.*, April-May, 1916.

² H. H. Hayden, The Mineral Production of India During 1915. Geological Survey of India.

portant is the granulated appearance of some specimens when viewed in a particular direction, the granules offering one interference color by incident light, while the cement assumes a different color. The specific gravity of the precious opal is 2.22, its hardness 5.5 and its aqueous content 8.49 per cent.

A recent discovery of precious opal at Stuarts' Range in Southern Australia has been pronounced to be perhaps the most important mineral discovery in that province made for many years. The area over which opal has already been found in this new field has a maximum length of about ten miles and a minimum width of about two miles, indicating a district of at least twenty square miles in extent. Further exploration here, when rendered practicable by better local supplies of water, is expected to considerably extend this field, which is accessible either by the northern or the transcontinental railway.¹

PEARLS

Australia.—A Federal Royal Commission has been charged, for the past 6 years, with the investigation of the pearling industry on the north-western and northeastern coasts of Australia. It is conjectured that the disposition heretofore prevailing to confine the exploitation entirely to white labor, may find itself modified by the war conditions when the Commission finally presents its report to the Federal Parliament. At the time of its appointment in 1912 the following subjects were defined for inquiry:

1. The classes of labor now engaged in the industry.
2. The reason why white labor has not been generally employed heretofore.
3. The practicability of the introduction of white labor.
4. The employment of machinery in connection with diving pumps.
5. The cultivation of the pearl-shell oyster.
6. The means to be adopted to encourage white labor either wholly or partially.

In attempting to decide the important question as to the desirability of a rigid exclusion of black labor, the Commission carefully studied the conditions obtaining at Broome and Thursday Island, localities where many black workers are used, and Japanese also. The conclusion arrived at is believed to favor the maintenance of existing arrangements in this respect, with slight modifications and restrictions.

The physical capability of Europeans for diving was found to compare favorably with that of other races, but the same could not be said

¹ *The Watchmaker, Jeweler, Silversmith and Optician*, June, 1917, p. 597.

of their ability to utilize the necessarily restricted period of their immersion in locating the pearl-mussels. In this respect the Asiatic pearl-diver possesses an inherited, and almost instinctive ability. So earnest, however, is the desire of the Australians to dispense with other than white labor, that it has been proposed to raise the scale of wages, so as to make pearling an especially attractive employment; it has also been proposed to give a bonus per ton on shell raised by European divers and crews, in the belief that the desired end would be attained by this added expense. The commissioners did not, however, favor the carrying out of such plans.¹

The artificial production of pearls by special shell cultivation has been the subject of experiment at Montebello Island, but it was given up for lack of capital. The work was to be pursued upon the same lines as in Japanese and Indian waters where a certain measure of success has been attained. The Australian commissioners, however, believed that fuller information should be secured as to the methods employed in Japan and India, before undertaking work in Australia on a considerable scale, but they did not advise that any appropriation for this purpose should be made by the Commonwealth Government, not regarding Australian pearling as an industry of sufficient importance to warrant this.

Canada.—Of late years some fresh-water pearls of good quality have been brought from the rivers of Labrador, an exceptionally fine specimen having been sold for over \$1000. An attractive pair of pink pearls are also reported to have been found in this region, each pearl weighing about 12 grains, the value of the pair being estimated at from \$120 to \$140. They were found by chance in a single shell by a man who was opening a clump of shells at haphazard with his pocket knife. As a rule, the pearl-seekers lay out the mussels on flat rocks or on sand banks, leaving them there until the flesh decomposes so that the shells open and the interior can be examined without trouble. The Labrador Indians are said to have long known that pearls were to be found in their rivers, and for generations pearl-seeking was carried on by them. The older pearls in their possession have, however, practically lost their value, having been unskillfully pierced for attachment to wampum belts or for stringing as necklaces. At the present time the Indians find ready sale for any pearls they may find to the Hudson Bay traders. The pearl industry here is important enough to induce the sending of buying agents from several of the Montreal gem-dealing houses.²

India.—Pearls constituting the greater part of the produce of the Indian pearl-fisheries for 1916 are said to have been restored to their

¹ *The Christian Science Monitor's* special Australian correspondent.

² *Jewelers' Circular Weekly*, Dec. 20, 1916.

native element at the destruction by a submarine of the British Steamship "Arabic" in the Mediterranean last November. The pearl market is now and has been for some time past largely dependent upon the supply of pearls derived from necklaces and other ornaments that can be bought from their present owners. The ebb and flow of wealth characterizing the present world conflict has in many cases forced the owners of fine pearls to seek a purchaser for them, and little difficulty has been experienced in making good terms, as the gem-dealers' stocks are constantly being exhausted by the increasing demand for these beautiful natural products.

It has been stated that the consignment of Indian pearls on the "Arabic" was worth \$1,250,000, and the report goes that it was fully insured, the insurance being promptly paid when the fact was established that there was no chance for salvage, on account of the great depth of water in which the ship was sunk.

Persia.—The pearl export trade in the Persian seaport of Lingah has almost come to a standstill. It has been adversely affected for several years by the diversion of a great part of this trade to Bahrain, to which many of the English and Indian pearl-merchants resort annually to make their purchases, and now the general discouragement of commerce and trade in Persia, due to the fact that a considerable part of that land has been the scene of military operations, has accelerated the decline of Lingah. For the Persian official year ending Mar. 20, 1915, the pearl exports were worth only \$22,750, against the sum of \$112,950 in 1913-1914, at that time regarded as an exceptionally bad showing; in 1912-1913 pearls to the value of \$330,225 were exported. Another unfavorable condition for this port is that Debai has been made a regular port of call for the boats of the British India Steam Navigation Co., as goods from Oman are now taken directly to that port.¹

United States.—The pearl yield from American rivers, such as the Mississippi, Illinois, Wabash, etc., in 1916, was only about one-third of that reported in normal years. Disadvantageous circumstances were the late advent of Spring, and the prevalence of high water, which impeded the operations of the pearl-seekers. This curtailment of the American supply coupled with the greatly diminished Indian output has resulted in an advance of fully 25 per cent. in the price of American pearls. The total value of those secured in the past year has been put at from \$200,000 to \$250,000.

RUBELLITE

Rubellite has recently been found in two localities in Lower California, one in the Valley of San Pedro, between Calamahí and San Borja, the other

¹ *Indian (Government) Trade Journal*, Apr. 28, 1916.

at San Juan, near San Borja. Heretofore only black tourmaline crystals, some of very large dimensions, had been discovered in the pegmatites of this region. The rose-colored, lithium tourmalines (rubellites) occur in metamorphosed slates, and have been found in considerable quantity, some of the crystals measuring 10 cm. in length. The tourmalines appear in these biotite slates in crystal aggregates. The color is light pink, the lower part very occasionally green; crystals not affected by weathering are transparent.¹

RUBIES

While according to the Report submitted at the Twenty-Eighth General Meeting, depressing economic conditions continued to affect the business of the Burma Ruby Mines, Ltd., during the year ended Feb. 29, 1916, there was still a notable recovery from the bad showing of the previous year, when the Income and Expenditure Account offered a deficit of £8433 14s. Last year, although there was still a deficit upon the year's operations, this amounted to but £511 3s. 4d., making the total deficiency for both years £8944 17s. 4d.

The sales of rubies amounted to £37,646 13s. against £38,858 14s. 7d. in 1914-1915. The chief element of strength was the good demand both in Burma and India. Conditions and prospects are encouraging enough to warrant the erection of a second washing machine at the Kathi mine, on account of the value of the ruby earth found there. Of course no dividend could be declared during the year and the amount due for royalties to the Government of India, £8799 12s., still remains unsettled. However £500 on a security loan of £3500 was paid, and the entire balance has been liquidated since the close of the year. The stock of rubies on hand, £57,001, is about the same as at the end of the previous year. Because of the French moratorium acceptances of £3500 negotiated on drafts for rubies sold have, for the present, to be regarded as a contingent liability.

The fact that under such favorable circumstances but little further deficit was incurred indicates that with the return of a normal state of affairs this company will be able to resume dividend payments.

The production of precious corundum (ruby, sapphire) and spinel in Burma showed a marked decrease in 1915 as compared with 1914, although perhaps less than might have been expected. Of course rubies represented the major part of the output, but there was also a fair quantity of sapphire, and a considerable amount of the less valuable spinel. The returns from the Mogok mines are here given.

¹ Ernst-Wittich, Über Edelsteinfunde auf der Halbinsel Nieder-Kalifornien; reprint from *Centralblatt für Min., Geol., und Paläont.*, 1914, 15, 449-456. See also Sectaría del Fomento, Colonización, de Industria: *Memoria de la Comisión del Instituto Geológico de México que exploró la región norte de la Baja California, Mexico*, 1913, p. 327.

	1914.		1915.	
	Weight in Carats.	Value.	Weight in Carats.	Value.
Rubies.....	193,333	£40,781 (\$198,400)	167,904	£34,881 (\$169,696)
Sapphires.....	56,709	2,052 (\$9,983)	39,718	1,276 (\$6,208)
Spinel.....	54,830	300 (\$1,480)	43,827	141 (\$686)
Total.....	304,875	£43,133 (\$209,843)	251,449	£36,298 (\$176,590)

SAPPHIRES

Sapphires continue to be very much in demand. However, owing to the shortage of lapidaries in France, the mobilization of many Swiss gem-cutters of the Jura regions, and the increasing demand for labor, and also owing to the isolation of the great German gem-cutting establishments of the Idar and Oberstein regions, only a small number of sapphires were cut during the past year. A considerable amount of Australian material was used for caliber-cut work and flag ornaments, especially the American flag made from rubies, diamonds and sapphires.

The output of the New Mine Sapphire Syndicate, of Utica, Fergus County, Mont., for the year 1916 is given as follows:

Cuttable stones.....	73,322 carats.
Industrial stones.....	2,070 oz.

In the Anakie district in Queensland, the chief alluvial sapphire deposits are in the Central, Tomahawk, Boot and Kettle, Policeman, and Retreat Creeks. The first discovery of Australian sapphire was made in the last-named creek. The sapphire-bearing alluvium, sometimes but a few inches thick, has in other places a depth of several feet. The yield varies in the different localities. The Scrub working on Policeman Creek shows a yield per load of $\frac{1}{2}$ oz. of "parcel blues," $\frac{1}{4}$ oz. of "small blues" (less than 1 carat in weight) and $1\frac{1}{2}$ oz. of "machine stone." Simple methods of recovery are in general use, and the methods of digging consist of "surfacing," the simple removal and treating of the soil, "deep surfacing," which requires the removal of several feet of overburden, and a third method in which shafts are opened through the overburden into the sapphire-bearing gravel. For securing the sapphires hand-raking suffices when the gravel is coarse and the sapphires large enough to be picked out; otherwise the gravel is screened through sieves. Before the outbreak of the war there were more than 300 miners working in the Anakie sapphire deposits.¹

Recent experiments at the Imperial Institute in Queensland have demonstrated that the transparency of sapphires can be greatly increased

¹ *Bulletin of the Imperial Institute*, April-June, 1916, pp. 259, 260.

by subjecting them to high temperatures. This is held to confirm a suspicion that the former German demand for Anakie sapphires of a deep violet hue, appearing black by artificial light, was due to the employment in Germany of some process for modifying the color.¹

The cessation of dealings in gems in Australia, due to the war, made 1915 one of the dullest years on record for the sapphire fields of Anakie, Queensland. However, although there was little encouragement for mining operations at this point, the resident lapidary was kept fully occupied with gem-cutting and a considerable quantity of cut gems was sold. Toward the close of the year conditions improved somewhat, with the announcement of a Sydney firm that a market had been secured for sapphires in London; this firm was able to declare that it had no dealings with any enemy country, and was thus privileged to purchase all classes of stones. The Commonwealth of Australia has prohibited the export of gem-stones to any other country than Great Britain.

But little digging was done in the Anakie field during 1915, and the washing machines have not been in operation since August, 1914, such work as has been done in this direction being accomplished by dry-sieving, or hand-washing. Considerable difficulty has been experienced in making even an approximate estimate of the year's sapphire output.

The following figures as to the known sales of sapphires from the Anakie district since 1902 have been supplied from the Queensland Report.

1902	£ 5,000	
1903	6,500	
1904	10,575	
1905	5,255	
1906	18,110	
1907	39,000	Sapphire
	1,500	Corundum
	11,800	Sapphire
1908	2,500	Native stones
	900	Corundum
1909	23,116	
1910	21,116	
	16,823	Gem stones
	5,820	Industrial corundum
1911	500	Sold by individual miners
	1,650	Cut by Lapidaries
1912	40,016	
1913	43,292	(£3,927 recognized as gems and cut in Australia)
1914	15,000	(Six or seven months before the war)
1915	(Industry interrupted by the war)
1916	8,000	Up to July 31st.

This gives a total of sapphire and corundum material from the Anakie field in the 15 years from 1902 to 1916 inclusive of £264, 273 or \$1,285,688. The returns for 1912 and 1913 when unusual conditions prevailed indicate an average sapphire production of about \$200,000 yearly.

These figures offer an eloquent testimony to the loss in this industry entailed by the war. There was toward the end of the year a good

¹ *Queens. Govt. Min. Jour.*, Feb. 15, 1917.

demand for clean machine stones, sufficient to warrant the belief that the stock now on hand can be satisfactorily marketed. The present population of the fields is put at but 275 persons, a large falling off from the average population in recent years.¹

STAUROLITE

A number of staurolites, stones which have enjoyed considerable vogue because of their supposed luck-bringing qualities, are reported to have been secured a short distance from the MacGregor copper mine at Cloncurry, Queensland. The figure of a cross which gives its name to this mineral results from the interpenetration of two crystals at right angles with each other. As the specimens from Cloncurry are said to be of a dull brownish hue, they are hardly of gem-stone quality, those cut for this use being transparent and of a reddish-brown, and occasionally claret-colored.²

¹ *Annual Report of the Under Secretary for Mines, Queensland, Australia, for the year 1915, Brisbane 1916, p. 23, 34.*

² *Queens. Govt. Min. Jour.*, Sept. 15, 1916.