

GEOLOGICAL SURVEY OF NEW JERSEY

HENRY B. KÜMMEL, STATE GEOLOGIST

BULLETIN 5

The
Mineral Industry of New
Jersey for 1910

BY

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AND

S. PERCY JONES

TRENTON, N. J.

MacCrellish & Quigley, State Printers, Opposite Post Office.

1911.

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Letter of Transmittal.

TRENTON, N. J., September 1st, 1911.

*The State Printing Board,
Trenton, New Jersey.*

GENTLEMEN—I hereby request that the State Printing Board order the publication of 1,800 copies of a Bulletin on the Mineral Industry of New Jersey for 1910, the manuscript of which is now ready. The publication of this report has been approved by the Board of Managers of the Geological Survey, and favorable action by the State Printing Board is requested as provided by Chapter 46, Laws of 1910. The printing contract for 1910-1911 provides for such Bulletins of the Geological Survey as shall be ordered by your board.

Respectfully yours,

HENRY B. KÜMMEL.

State Geologist.

STATE OF NEW JERSEY,
OFFICE OF COMPTROLLER OF THE TREASURY.

TRENTON, September 6th, 1911.

*Henry B. Kümmel, Esq.,
State Geologist,
Trenton, N. J.*

DEAR SIR—At a meeting of the State Printing Board, held September 5th, 1911, the request contained in your communication of the 1st inst., relative to the printing of 1,800 copies of a Bulletin on the Mineral Industry of New Jersey for 1910, was granted.

Very respectfully,

E. J. EDWARDS,

Comptroller, as Secretary, State Printing Board.

(5)

THE MINERAL INDUSTRY OF NEW JERSEY FOR 1910.

BY HENRY B. KÜMMEL AND S. PERCY JONES.

The collection of statistics of the mineral production of New Jersey was made in co-operation with the United States Geological Survey, in order that producers might not be troubled by requests for information from two organizations.

The returns, compared with those of the preceding year, indicate increased activity along most lines. The pottery branch of clay products exhibits the largest increase in any one industry, the sales for 1910 exceeding those in 1909 by \$797,313.

The total value of the mineral industry for 1910 amounted to \$35,184,692, distributed as follows:

VALUE OF THE MINERAL INDUSTRY IN 1910.

| | Value. | Per Cent. of Whole. | Increase or Decrease Compared to 1909. |
|---------------------------------------|---------------|------------------------|---|
| Iron Mining | \$1,582,213 | 4.49 | \$24,796 D |
| Zinc Mining, | 7,417,182 (a) | 21.08 | |
| Clay and Clay-Working Industries, ... | 18,492,102 | 52.05 | 625,452 I |
| Stone, | 1,704,112 | 4.84 | 61,313 I (c) |
| Sand and Gravel, | 1,139,275 | 3.23 | 203,902 I |
| Portland Cement, | 3,057,265 | 8.71 | 254,103 I |
| Lime, | 128,964 | .36 | 17,437 D |
| Mineral Water, | 133,739 | .38 | 6,114 I |
| Sand-lime Brick, | 23,811 | .07 | 1,886 I |
| Mineral Paints, | 1,406,019 (b) | 4.24 | |
| Coke, | | | |
| Greensand Marl, | | | |
| Total, | \$35,184,692 | | |

a. Value of the recoverable output figured as metallic zinc.

b. Combined in order to conceal individual production of coke and mineral paints.

c. This comparison does not apply to slate, talc and soapstone.

IRON MINING.

The iron ores mined in New Jersey in 1910 were magnetite and limonite, or brown hematite. Only a small percentage of limonite was produced, the industry at present being practically confined to the magnetites.

The magnetite ores occur in a belt of pre-Cambrian rocks, traversing the northern part of the State. By far the most important deposits are found as interleaved layers of magmatic origin in gneisses. Workable ore bodies of lesser importance occur in a crystalline limestone associated with the gneisses, and at some points magnetiferous pegmatites have been mined for their ore contents. The occurrence of these ores has recently been fully discussed and all mining operations described by Dr. W. S. Bayley.¹ Those interested in the iron mines of New Jersey are referred to this report for further information.

In view of the opinion sometimes expressed that the end of iron mining in New Jersey and other eastern States was not far distant, attention may well be directed to Dr. Bayley's very conservative estimate of good ore still capable of being mined from all the points already known in New Jersey to be 35,000,000 tons, or nearly twice as much as has already been mined. If, in addition to these deposits of ore which can be mined without concentration, there should be added the vast amount of lean ore which must be concentrated to be of value, the total quantity of ore, available under economic conditions which may fairly be expected some day to prevail, must be estimated in the hundreds of million tons.

During 1910, the iron mining industry showed a slight fluctuation from that of 1909, there being a very small falling off in production.

The following mines were operated during all or a portion of the year: Ahles, Shoemaker, Washington, Mount Hope, Richard, Hude, Hurd (at Wharton), Hoff, Wharton, Orchard

¹ Bayley, W. S. Report on Iron Mines and Mining, Vol. VII. Reports of the Geological Survey of New Jersey.

and Peters. The ore produced amounted to 521,832 long tons, all being magnetite except the product of the Ahles mines, which, properly classed, is a manganiferous brown ore, and that of the Shoemaker mine, which is limonite. The value of the ore at the mines was \$1,582,213, the average value per ton being \$3.03. The returns from all the mines but two reported the percentage of metallic iron in the ore as varying from 54.6 per cent. to 59 per cent.

In addition to the production given above, the ore undisposed of at the various mines at the close of the year amounted to 17,567 long tons.

A comparison of the statistics for 1910 with those of 1909 shows a decrease in production of 21,688 tons, a little less than four per cent. The figures indicate, however, an average value per ton in 1910 of \$3.03, as against \$2.94 in the preceding year.

IRON ORE MINED SINCE 1870

| | |
|----------------------------|------------|
| Previously reported, | 18,462,228 |
| Mined in 1910, | 521,832 |

ZINC MINES.

According to statistics obtained by the United States Geological Survey, 308,353 tons of crude ore were sent to the concentrating mills, from which 263,606 tons of concentrates were obtained. In addition 67,324 tons of crude ore were sent to the smelters. Figured as metallic zinc, the total recoverable output was 137,355,219 pounds of spelter valued at \$7,417,182.

Mr. R. M. Catlin, superintendent of the New Jersey Zinc Company mine, at Franklin Furnace, reports 339,434 tons of ore hoisted in 1910. This is a decrease of 88,869 tons from the preceding year. There was, however, an increase of about 8 per cent. in the tonnage of ore separated.

The Palmer shaft has been completed and is now the working shaft for the entire product of the mine. With these new facilities all ore required by the mill is now delivered in the day,

so that the night shift in the mine can be dispensed with. Electric pumps have been installed on the 300-foot level to dispose of the surface water from the open cut. Electric haulage has been in satisfactory operation on the 300, 750, 950 and 1,150-foot levels.

A change house has been constructed at the Palmer shaft, and over half a million feet of timber was placed during the year. A hospital was completed by the company in 1908, and with this and a dispensary the needs of patients are provided for.

ORE MINED SINCE 1880.

| | |
|----------------------------|-----------|
| Previously reported, | 4,165,350 |
| Mined in 1910, | 339,434 |

CLAY AND CLAY-WORKING INDUSTRY.

New Jersey continues to lead in the production and sale of raw clay, and ranks third in the value of its manufactured clay products. The statistics of the clay-working industry of the United States in 1909, compiled by the United States Geological Survey, show that in that year New Jersey ranked first in fire-proofing;¹ second in architectural terra cotta; second in tile, other than drain; third in front brick; fourth in fire brick, and fourth in common brick.

It ranks second in the total value of all classes of pottery ware, being exceeded in this branch of the clay-working industry by Ohio only.

In 1909, it was first in china delft and Belleek ware (about 61 per cent. of the whole); first in sanitary ware (about 72 per cent. of the whole), and second in porcelain electrical supplies.

The total value of clay products, exclusive of raw clay, in 1910 was \$17,834,297 as against \$17,172,094 in 1909, an increase of 2.6 per cent.

Raw Clay.—The most valuable clays of New Jersey, including the fine grades of fire clay, paper clay, ball clay, etc., are con-

¹In these and following comparisons with other States it is necessary to use figures for 1909, as statistics for 1910 from other States are not available.

fined chiefly to the Raritan formation—the lowest member of the Cretaceous. This occurs in a broad belt extending across the state from the Raritan Bay to Trenton and Bordentown, and a much narrower strip along the Delaware River to Salem County. Much of this area, however, is covered by sand and gravel of later deposition, too thick at many localities to permit the exploitation of the underlying clay beds.

Clay suitable for the manufacture of common brick, drain tile and red earthenware, occurs in the other members of the Cretaceous and also in the Tertiary and Pleistocene. At several localities, clays of glacial origin are used for making brick.

The most extensive development of the clay-mining industry has taken place in the northeastern portion of Middlesex County, in the Woodbridge-South Amboy district.

The largest percentage of the more valuable clays are dug at this locality, while lesser quantities are mined in Burlington, Mercer and Camden counties. Common-brick clay is dug at numerous localities throughout the state, and clay for high-grade pressed brick is mined at a number of points in Monmouth, Ocean and Burlington counties.

By far the largest amount of clay mined in New Jersey is manufactured by the miner, and the figures under the head of "raw clay" show only that sold in the raw state. This is chiefly fire clay. A very large production of clay appears only in the statistics of manufactured products, principally as brick and tile.

Of the raw clay mined a large percentage is exported to various other states, where it is used in the manufacture of a variety of clay products.

In 1909, New Jersey reported 18.99 per cent. of the quantity of clay produced and sold in a raw state and 20.13 per cent. of its total value. The production for that year was 410,103 short tons, valued at \$694,566. Of this 78.14 per cent. was fire clay, the value of which was 79.85 per cent. of the total value.¹

During 1910, the clay mined and sold raw amounted to 405,591 short tons, valued at \$657,805.

The various kinds of clay mined, the number of producers, the tonnage and value are shown in the following table.

¹ Figures from Mineral Resources of the United States, U. S. Geol. Sur.

MINERAL INDUSTRY.

KINDS OF CLAY MINED AND SOLD IN 1910.

| | No. of Producers. | Amount in Short Tons. | Value. | Average Per Ton. |
|--|----------------------|--------------------------|-----------|---------------------|
| Ball Clay, | 3 | 2,896 | \$17,376 | \$6.00 |
| Fire clay, including sagger clay, | 30 | 286,854 | 468,890 | 1.63 |
| Stoneware clay, | 8 | 21,099 | 45,171 | 2.14 |
| Brick clay, | 8 | 30,645 | 28,683 | .93 |
| Miscellaneous clay, ¹ | 14 | 64,097 | 97,685 | 1.52 |
| | | <hr/> | <hr/> | <hr/> |
| | | 405,591 | \$657,805 | \$1.62 |

Pottery Industry.—The statistics of the pottery industry show a gratifying increase in the production over that for the preceding year. The total production of all classes of pottery ware in 1910 amounted to \$8,588,455, as against \$7,791,136 in 1909, an increase of 10.23 per cent. Fifty-nine firms reported production.

The following table gives the value of the different classes of ware manufactured and sold in 1910, together with the statistics for 1909, for comparison.

| | 1909. ² | 1910. |
|---|--------------------|-------------|
| Red earthenware, | \$36,573 | \$26,529 |
| Stoneware, yellow and Rockingham ware, | 66,293 | 55,734 |
| White ware, including C. C. ware, white granite, semi-porcelain ware and semi-vitrous porcelain ware, | 1,242,361 | 1,345,156 |
| China, bone china, delft and belleek ware, | 1,082,398 | 1,131,412 |
| Sanitary ware, | 4,341,040 | 4,955,066 |
| Porcelain electrical supplies, | 823,056 | 874,013 |
| Miscellaneous, | 199,415 | 200,545 |
| | <hr/> | <hr/> |
| Total value, | \$7,791,136 | \$8,588,455 |

Trenton, which is the first in rank of the pottery centers of the United States, showed several new firms reporting production in 1910. Here is manufactured about ninety-three per cent. of the pottery products of the State.

¹ Includes Rockingham clay, pipe clay, terra-cotta clay, so-called Kaolin, &c.

² Figures from Mineral Resources of the United States, U. S. Geol. Survey.

All the white-ware, including C C ware, white granite, semi-porcelain and semi-vitreous porcelain ware; all the china, bone china, delft and belleek ware; all the porcelain electrical supplies, and also nearly all of the sanitary ware made in the State are reported from Trenton.

The value of its production in 1909 was 23.11 per cent. of that of the whole country.

So far as New Jersey clay is used for pottery manufacture, excepting that used for common red earthenware and saggars, it is obtained from the lower beds of the Cretaceous, though deposits occur in the Tertiary and Pleistocene formations that might possibly be utilized as stoneware clay. The clay for potteries comes principally from the Woodbridge-South Amboy district of Middlesex County.

The method of mining is usually surface working, pits of convenient size being sunk through the good clay in the bed. Shaft mining has been employed at a few points where the overburden is very heavy.

The lower-grade clays are mined on a more extensive scale, banks or large pits being worked and steam shovels sometimes employed.

No washing of clay at the mines before marketing is done, except in the case of ball clay.

Brick and Tile.—The brick and tile industry is well developed at many points in the State. The various branches of the industry are, however, somewhat localized. Building bricks are made in large numbers at Hackensack and Little Ferry, Cliffwood and Keyport, and also at Trenton and Camden; fire brick at Woodbridge, Sayreville and South River; architectural terra cotta chiefly at Perth Amboy, South Amboy and Rocky Hill.

An inexhaustible supply of good raw material, and the proximity of large centers of population have combined to make brick manufacturing a thriving industry in New Jersey for over half a century. As will be seen from the table below, the value of the common brick produced is more than double that of any other variety. Fire brick show a valuation of a little less than half that of common brick, and front and enameled brick are next in relative order of importance.

MINERAL INDUSTRY.

The value of the architectural terra cotta is one of the large items of the figures of the brick and tile industry. In 1909, New Jersey was a close second to Illinois, which reported the largest production of all the states in this industry.

Fireproofing is another important product of this branch of the clay-working industry, New Jersey, as previously stated, ranking first among the States in the output of this in 1909.

The chief facts regarding the production of brick and tile are summarized in the following table:

PRODUCTION OF BRICK AND TILE IN 1910.

| | <i>No. of Plants Producing.</i> | <i>No. of M.</i> | <i>Value.</i> | <i>Aver. Value. per M.</i> |
|---|-------------------------------------|------------------|---------------|--------------------------------|
| Common Brick, | 67 | 401,103 | \$2,215,628 | \$5.55 |
| Front Brick, | 9 | 47,651 | 609,845 | 12.80 |
| Fancy Brick, | 2 | ..... | 246,257 | |
| Enameled Brick, | 2 | | | |
| Fire Brick, | 13 | 38,349 | 1,001,063 | 25.96 |
| Total Brick, | | | \$4,072,793 | |
| Drain Tile, | 7 | ..... | \$23,147 | ..... |
| Architectural Terra Cotta, | 5 | ..... | 2,000,039 | ..... |
| Fire-proofing and Hol- low Blocks, | 9 | ..... | 1,582,101 | ..... |
| Tile (not drain), | 9 | ..... | 1,199,113 | ..... |
| Miscellaneous, ¹ | 6 | ..... | 368,661 | ..... |
| Total All Products, | | | \$9,245,854 | |

The total of all products in 1909 was \$9,380,958.

In 1910 there was a slight falling off in all kinds of brick, except fire brick (in which there was an increased production), and a decrease in the production of drain tile.

The production of architectural terra cotta and of fireproofing was slightly in excess of that of the previous year.

STONE INDUSTRY.

The stone industry of New Jersey consists in the quarrying of building and monumental and paving stone, and also the quarry-

¹ Includes glass-melting pots, gas-furnace linings, underground conduits, retorts and muffles, sewer pipe, chimney brick, wall coping and stove lining.

ing and crushing of large amounts of stone for road material, railroad ballast and concrete work. The production of crushed stone, chiefly trap rock, constitutes an important industry, but quarrying for building monumental purposes has not received the attention for some years that it undoubtedly merits.

The statistics for 1910 for granite show that over fifty per cent. of the production was crushed, and in the case of trap rock, with the exception of a small percentage that was made into paving blocks, practically the entire production was reported as crushed stone.

Stone embracing a wide range of material and suitable for all the purposes above mentioned occurs at numerous localities northwest of a line passing through Trenton diagonally across the narrowest part of the State, and separating the low-lying Coastal Plain from the hilly region to the north. Granites, gneisses and crystalline limestone are found in the Highlands and belts of limestone and slates in the Kittatinny Valley.

Trap rock and brown, gray and light-colored sandstone occur in the Newark (Triassic) system. This forms a belt which extends across the northern part of the State, varying in width from thirty-two miles along the Delaware River to fifteen miles at the New York State line.

The trap rock so extensively used in New Jersey for road metal is obtained from the Newark system, its distribution therein being generally that of long areas of relatively narrow lateral dimensions. Some trap rock also occurs as dikes in the gneisses of the Highlands.

As previously stated, nearly all the trap rock quarried is crushed, its toughness and lack of rift or definite planes, along which a stone cleaves with more or less ease, rendering the working of it up into building material to any large extent too expensive.

In addition to the varieties of stone already mentioned, a conglomerate that gives a pleasing effect as a building stone occurs in the vicinity of Greenwood Lake in the Highlands, and in the southern part of the State semi-consolidated sandstones and conglomerates are utilized locally for building purposes.

The total value of the production of all classes of stone in 1910, exclusive of slate, talc and soapstone, amounted to \$1,675,174. Of this nearly 76 per cent. was trap rock, 4¾ per cent. granite, 6¾ per cent. sandstone and a little more than 13 per cent. limestone.

In 1909 the total production, exclusive of slate, talc and soapstone, was \$1,613,861.

The table below shows the value of the stone used for various important purposes, with the percentage in each case of the total value.

USES OF STONE AND VALUES, 1910.

| | | |
|------------------------------------|-----------|----------|
| Building stone, | \$90,338 | (5.3 %) |
| Rough, | 72,175 | |
| Cut or dressed, | 18,163 | |
| Paving blocks, | 61,376 | (3.6 %) |
| Crushed stone, | 1,278,609 | (73.8 %) |
| Road metal, | 739,727 | |
| R. R. ballast, | 269,760 | |
| Concrete, | 269,122 | |
| Blast furnace flux, | 199,532 | (4.5 %) |
| All other uses, ¹ | 74,259 | (4.3 %) |

Trap rock—The trap rock quarried in 1910 amounted to about 73 per cent. of the total value of the production of stone in the State. Of this 56½ per cent. was sold for road construction. Smaller, but considerable amounts, were used for railroad ballast and for concrete.

The following table gives the chief facts regarding the production of this class of stone:

PRODUCTION OF TRAP ROCK, 1910.

| | No. of Producers. | Amount Short Tons. | Value. | Aver. Price Per Unit. |
|---|----------------------|------------------------|-------------|--------------------------|
| Building stone (rough and dressed), | 8 | 7,308 | \$7,989 | \$1.12 |
| Rubble, | 3 | 2,541 | 3,073 | 1.20 |
| Riprap, | 2 | 2,095 | 1,298 | .61⅔ |
| Road metal, | 53 | 836,770 | 721,761 | .84 |
| R. R. ballast, | 14 | 355,460 | 223,817 | .62½ |
| Concrete, | 36 | 318,137 | 229,906 | .72 |
| Paving blocks, | 9 | (2,114 M) | 60,976 | 28.82 |
| Other uses, | 6 | 5,905 | 8,892 | 1.50 |
| | | 1,548,216 ² | \$1,257,712 | |

¹ Includes roofing slate and talc and soapstone.

² Paving blocks not included.

Granite.—Granite is quarried at a number of localities in the Highlands, several varieties of different colors and texture being worked.

A pink granite is quarried at Pompton, and a pinkish-gray stone has been worked near Charlotteburg and Waterloo. Gray and gray-white are common tones of color, and, in addition to granite, both light and dark-colored gneisses are common throughout the Highlands. The gneisses are quarried at a number of localities and crushed for railroad ballast, concrete, and other purposes.

Nine quarries reported production in 1910.

The total output was valued at \$80,105, as against a production of \$60,175 in 1909, an increase of 33 per cent.

The table given below shows how the production was divided. It will be noted that only about 13 per cent. was used for building and monumental purposes. Over 50 per cent. was crushed and sold for railroad ballast.

Several quarries, yielding building and monumental stone, that were idle in 1910 have recently become active, and it is probable that this branch of the granite industry will show larger returns for 1911.

PRODUCTION OF GRANITE IN 1910.

| | No. of Firms Reporting. | Value. |
|---|----------------------------|----------|
| Sold Rough—Building, | 5 | \$6,772 |
| Sold Rough—Monumental Work, | 1 | } 2,465 |
| Sold Rough—Other Purposes, | 2 | |
| Dressed—Building, | 4 |  | 1,338 |
| Paving Blocks, | 1 | } 1,730 |
| Rubble, | 1 | |
| Riprap, | 1 | |
| Crushed Stone for Road Building, | 1 | } 66,924 |
| Crushed Stone for Railroad Ballast, | 1 | |
| Crushed Stone for Concrete, | 3 | |
| Other purposes, | 2 | 876 |
| | | \$80,105 |

Sandstone.—Under the head of sandstone are included brownstone, gray and white sandstone, black argillite and quartzite, all of which are quarried in New Jersey.

It will be noted from the figures given below that this is the

only variety of stone quarried in the State at present, the maximum percentage of the production of which is utilized for building purposes.

Practically all of the sandstone quarried is from the Newark system. The area of this is in the smoother, middle section of the State, and near the large centers of population, affording the chief markets. Brownstone, the reddish-brown to dark chocolate-colored sandstones of this formation, once so popular for building purposes, is now used to a limited extent only, but in the sandstone district white, creamy and light gray-colored stone abounds and offers promise of a steady building-stone industry.

The value of the sandstone quarries in 1910 was \$112,650 as against \$189,098 for the previous year, a decrease of 40 per cent.

The different uses and value of each class of material quarried are shown in the following table:

PRODUCTION OF SANDSTONE IN 1910.

| <i>Uses.</i> | <i>No. of Producers.</i> | <i>Value.</i> | <i>Per Cent.</i> |
|---------------------------------------|--------------------------|---------------|------------------|
| Building Stone, Rough, | 12 | \$56,099 | 50 |
| Building Stone, Cut or Dressed, | 4 | 16,600 | 15 |
| Concrete, | 3 | 27,010 | 24 |
| Curbing, | 2 | 12,941 | 11 |
| Flagging, | 1 | | |
| Riprap, | 1 | | |
| Rubble, | 1 | | |
| Road Metal, | 2 | | |
| | | \$112,650 | |

Limestone.—The limestone statistics do not include the amounts nor value of that used in the manufacture of lime and Portland cement, this portion of the production appearing in the statistics of those industries.

PRODUCTION OF LIMESTONE IN 1910.

| <i>Uses.</i> | <i>No. of Producers.</i> | <i>Amount Short Tons.</i> | <i>Value.</i> | <i>Average Per Unit.</i> |
|---------------------------|--------------------------|---------------------------|---------------|--------------------------|
| Road Metal, | 4 | 33,606 | \$22,806 | \$0.67½ |
| Concrete, | 4 | | | |
| Blast Furnace Flux, | 9 | 419,983 | 199,532 | 0.47½ |
| Building Stone, | 3 | | 2,369 | |
| Other Uses, | 2 | | | |
| | | | \$224,707 | |

As will be seen from this table, the stone used for fluxing purposes forms the largest percentage of the product. Another large item of limestone production, not showing in the figures above, is that used for raising the lime content in the manufacture of Portland cement and the cement rock used in making this material. The latter is an earthy limestone containing from 60 to 70 per cent. of lime carbonate, and is obtained chiefly in Warren County. About 275,718 tons of limestone were quarried during the year in connection with the Portland cement industry. In addition a smaller tonnage was produced for the manufacture of lime.

The value of the limestone production in 1909 was \$224,017.

Slate, Talc and Soapstone.—As there were less than three producers in each of these industries, the values for all are totaled in order that the figures of individual producers may not appear.

The slate quarries reporting operations are in Sussex County and the production is used entirely for roofing. As, however, the most of the New Jersey slate is a hard slate, it might also be utilized to advantage for other purposes such as flagging, steps, etc., where resistance to wear and weathering are important qualities.

The combined value of slate, talc and soapstone in 1910 was \$28,938.

SAND AND GRAVEL.

The value of the production of sand and gravel in 1910 was \$1,139,275, and in 1909 \$935,373. The largest gains were in molding and building sands.

Owing to the fact that a large number of small producers keep imperfect records of their production, some selling by wagon loads of varying weights, the compilation of accurate statistics for sand and gravel is more difficult than in the case of other mineral products. The returns, however, from the large miners are usually fairly complete.

Much of the sand dug is reported in cubic yards and wagon loads, as well as in tons. A cubic yard varies in weight from 2,300 to 3,000 pounds, according to the condition of the sand, and a wagon load ranges from a 1,000 to 3,000 pounds. Owing to this indefiniteness in the units of measurement only the values are here given, except in the case of glass sand, which is sold by the ton.

Practically all the sand reported in New Jersey is natural sand, as distinguished from crushed rock, only a very small amount of the latter being produced.

Sand is utilized for a variety of purposes and is designated in trade terms according to the uses for which it is produced, as building sand, molding sand, glass sand, furnace sand, filtration sand, etc.

The first two varieties named are the most important commercially, while sand for glass manufacture, excepting that used for some of the common grades of glass, must be a very pure sand and practically free from any coloring ingredients.

The price per ton varies from as low an amount as 10 cents (in the bank) to \$1.50 or more, depending on the variety of sand, the facilities for transportation, and treatment it may have undergone after mining, such as screening, washing or drying. Glass and molding sands usually sell for more than the other varieties.

The table given below shows the chief facts regarding the production:

PRODUCTIONS OF SAND AND GRAVEL IN 1910.

| | <i>No. of Producers.</i> | <i>Value.</i> |
|----------------------|------------------------------|---------------|
| Building sand— | | |
| Concrete sand, | 32 | \$216,840 |
| Mortar sand, | 12 | 63,653 |
| Unclassified, | 19 | 59,795 |
| Molding sand— | | |
| Brass molding, | 2 | |
| Unclassified, | 3 | 2,988 |
| Steel molding, | 19 | 134,911 |
| Iron molding, | 23 | 119,948 |
| Core molding, | 13 | 178,613 |

| | <i>No. of Producers.</i> | <i>Value.</i> |
|------------------------------|------------------------------|---------------|
| Glass sand, | 9 (87,680 tons) | 61,078 |
| Fire sand, | 10 | 32,562 |
| Engine sand, | 4 | 9,666 |
| Furnace sand, | 6 | 9,246 |
| Filtration sand, | 4 | 25,067 |
| Other sand, | 10 ¹ | 86,316 |
| Total sand, | | \$1,000,683 |
| Concrete gravel, | 16 | 52,025 |
| Road-making gravel, | 15 | 86,432 |
| Other gravel, | 2 | 135 |
| | | \$138,592 |
| Total sand and gravel, | | \$1,139,275 |

PORTLAND CEMENT.

This industry showed increased production compared to the preceding year both in quantity and value. The total output for 1910 was 4,184,698 barrels, valued at \$3,067,265, or 0.73 per barrel in bulk, as against 4,046,322 barrels valued at \$2,813,162, or 0.69 per barrel, in 1909. Expressed in percentages this is an increase of something over 3 per cent. in amount of production and 9 per cent. in value.

The actual production was far short of the working capacity of the plants reporting. All were either closed down during a portion of the year on account of over-production or ran considerably under their capacity.

The industry was confined to Warren County, and the raw materials used were limestone and cement rock.

LIME.

The stone used in making lime is not included in the statistics of limestone in the stone industry, in order that there may not be a duplication of value.

¹ Includes sand for grinding and polishing, asphalt, grading and filling, paving and other miscellaneous uses.

MINERAL INDUSTRY.

The production of lime in 1910 amounted to 34,335 short tons, valued at \$128,964. There was a slight falling off from the amount burned in 1909, the figures for that year showing 38,014 tons, valued at \$146,401. This was a decrease of 3,679 in tonnage and \$17,437 in value. The average price per ton in 1910 was \$3.75 and in the preceding year \$3.85.

The white, crystalline pre-Cambrian limestone is used in making over half of the lime manufactured. That produced from the blue magnesian limestone of later geological age is sold almost entirely for fertilizing land.

The most important data concerning the production of lime are shown in the following table:

PRODUCTION OF LIME IN 1910.

| <i>Uses.</i> | <i>No. of Producers.</i> | <i>Amount</i> | | <i>Value</i> | |
|-----------------------|--------------------------|--------------------|---------------|--------------------|--|
| | | <i>Short Tons.</i> | <i>Value.</i> | <i>Per Ton.</i> | |
| Fertilizer, | 16 | 15,254 | \$43,973 | \$2.88 | |
| Quick Lime, | 4 | 856 | 2,080 | 2.43 | |
| Dealers, | 2 | ..... | ..... | 4.55 $\frac{3}{4}$ | |
| Paper Mills, | 1 | 18,225 | 82,911 | | |
| Chemical Works, | 1 | | | | |
| | | 34,335 | \$128,964 | \$3.75 | |

Fuel.—All the plants reporting used coal for fuel except three that burned with wood. One ton of coal to 100 bushels of lime is approximately the average of the figures for the blue or magnesian limestone, while a larger amount of fuel is required for burning the crystalline or non-magnesian limestone.

SAND-LIME BRICK.

Sand-lime brick were manufactured in 1910 at Penbryn and West Palmyra in Camden County and at Rockaway in Morris County. Three plants reported.

The total production of all classes of brick was 2,824 M., valued at \$23,811.

MINERAL WATERS.

The mineral water trade showed an increase in 1910 over that of the preceding year, and the figures for 1909 were greater than those for 1908. This verifies the statement that was made in the discussion of this subject in the annual report for 1908, that the use of bottled spring water for drinking purposes in preference to that of public supplies was steadily increasing.

Eleven companies or individuals engaged in selling spring water in New Jersey reported sales in 1910. The total quantity sold was 1,583,050 gallons valued at \$133,139, or an average of 8½ cents per gallon retail at the spring. The retail price delivered varied from 6 to 25 cents per gallon, and the wholesale price at the spring ranged from 4½ to 10 cents.

In addition to the amount given above, which was sold for either table or medicinal uses, 39,500 gallons were reported as sold for making soft drinks, the value of which is not included in the statistics.

The total figures for the production in 1908, 1909 and 1910 are given below for comparison:

| | | |
|-------|---------------------------------|-----------|
| 1908. | 1,199,023 gallons, value, | \$126,603 |
| 1909. | 1,419,500 gallons, value, | 127,025 |
| 1910. | 1,583,050 gallons, value, | 133,139 |

GREENSAND MARL.

No revival as yet occurred in the marl industry, and the production at present is only a small fraction of what it was in former years. Commercial fertilizers have largely replaced marl on account of their smaller bulk and the less labor involved in handling. Some farmers still dig marl for their own use, but very little is mined at present for shipment.

Reports from ten producers in 1910 gave a production of 5,533 short tons. The bulk of the production being for the use of the owners of the pits, the values returned were very low, being practically the cost of mining.

MINERAL PAINTS.

The mineral paint industry includes natural pigments, pigments made directly from ores, and chemically manufactured pigments. Large quantities of zinc oxide are made from the zinc ores at Franklin Furnace, and lithophone and Venetian red are the chief chemically manufactured pigments. Some shale and slate are ground for natural pigments.

In order to conceal individual productions the values are included with those of coke and marl.

COKE.

Although no coal is found in New Jersey, there is a large plant for the manufacture of coke at Camden, the value of the output of coke and by-products aggregating no small sum.

The combined value of mineral paints, coke and greensand marl in 1910 was \$1,496,019.

Oct. 4, 1911.