REPORTS OF THE
DEPARTMENT OF
CONSERVATION AND DEVELOPMENT
STATE OF NEW JERSEY
HENRY B. KÜMMEL, State Geologist and Director

BULLETIN 36

Geologic Series

# THE MINERAL INDUSTRY OF NEW JERSEY FOR 1929

Compiled by
MEREDITH E. JOHNSON
Assistant State Geologist

Published 1931
Division of Geology and Topography

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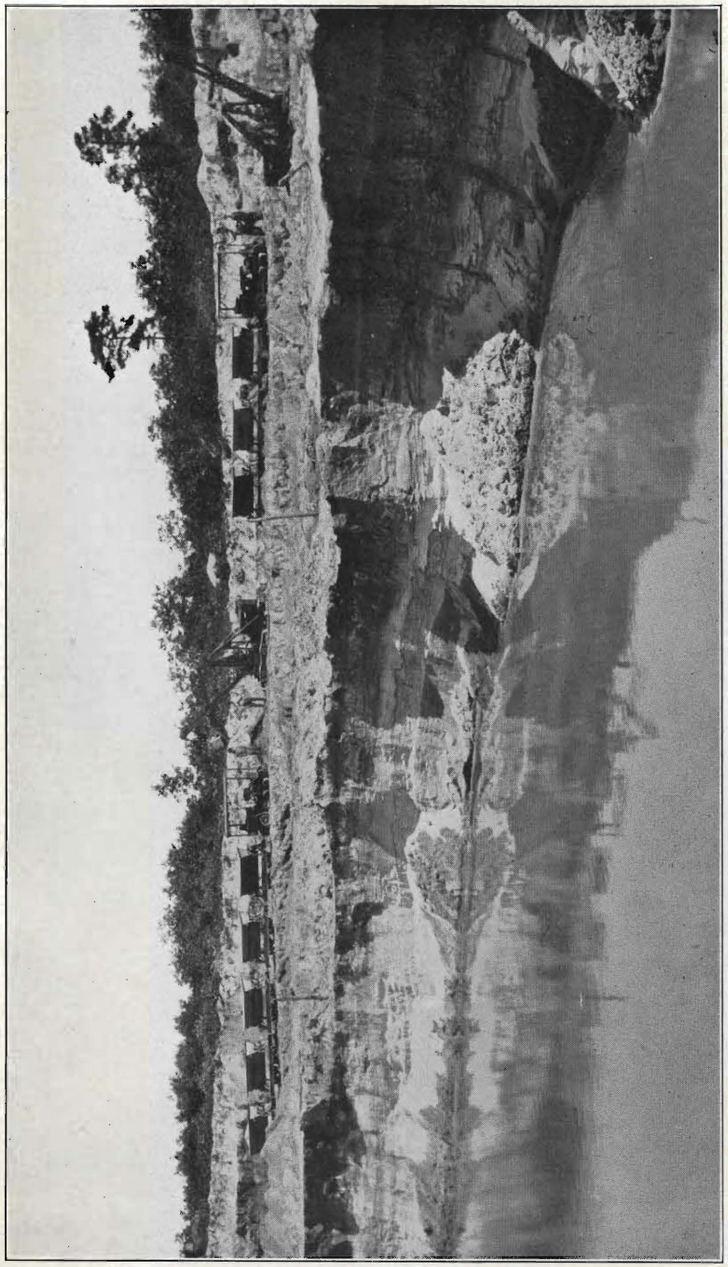


*Sand pit near Manumuskin, Cumberland County. Well-bonded molding sand is dug from above the steep bank and carried in the cars shown to a railroad loading station. "Sharp" sand for foundry use is dug from the lower bank by a dredge operating in the pond shown.*

# THE MINERAL INDUSTRY OF NEW JERSEY FOR 1929

By MEREDITH E. JOHNSON

*Assistant State Geologist*

## INTRODUCTION

This bulletin is a continuation of the series devoted to the mineral industries of the State of New Jersey and published by the Division of Geology and Topography of the Department of Conservation and Development. It is made possible by the whole-hearted co-operation of New Jersey's mineral producers in furnishing the statistics which are the basic part of the report, and it is to their credit that the published figures are believed to represent over 97 per cent of the entire mineral production of the State.

As in previous years the Department co-operated with the Bureau of Mines and the Bureau of the Census of the United States Department of Commerce in the statistical canvass. This policy was adopted many years ago in order to avoid duplication of effort and annoyance to producers through the receipt of printed statistical forms from more than one organization. The policy of all three organizations is never to reveal the production figures of any one firm or individual without written consent, the rule being to publish only the combined figures or three or more producers.

## SUMMARY OF THE MINERAL PRODUCTION IN 1929

Although the year 1929 is usually considered to have marked the climax of the post-war era of prosperity in the United States, statistics show that the peak of prosperity for the mineral industry of New Jersey was reached in 1926. In that year the total value of all mineral products amounted to $90,008,915. In 1927 the value of the production declined to $83,071,441, and in 1928 to $80,246,485. The 1929 figures show a slight increase in value, the total amounting to $81,150,322, but the entire increase can be accounted for by the production of firms not previously included in the statistical canvass. Examination of the detailed statistics, moreover, reveals that ten of the sixteen mineral products listed declined in total value. In general it may be said that the year was one in which the mineral industry sailed along on a fairly even keel, some industries doing better than in the previous year, others not so well. In many industries productive capacity was increased without a proportionate increase in demand and consequently competition

was increased. The natural result was a tendency to cut prices. Toward the end of the year price reductions were made on nearly all commodities, including those of mineral origin.

Specifically, the increase in the total value of the mineral production can be attributed chiefly to a larger production of sand and gravel; to a record-breaking production of zinc ore from the mines at Franklin Furnace and Ogdensburg; and to increased sales of brick and tile. The value of non-clay refractories and refractory cements was also increased greatly in 1929. To offset these gains, iron ore production declined 14.6 per cent (in value); sales of raw clay declined 9.7 per cent; pottery products lost over $1,500,000 in value; and sales of cement and by-product coke declined 13.7 and 9.7 per cent, respectively.

A statistical summary of the entire mineral industry for the year 1929 is given in the following table:



MINERAL PRODUCTION IN NEW JERSEY IN 1929 AND 1928

| Products | No. of operations [a] | Quantity—short or long tons 1929 | Quantity—short or long tons 1928 | Value—Dollars 1929 | Value—Dollars 1928 | Per cent increase or decrease Tonnage | Per cent increase or decrease Value |
|---|---|---|---|---|---|---|---|
| Zinc ore | 1 | 789,552 s. t. | 648,797 s. t. | (b) | (b) | +21.7 | + 7.7 |
| Iron ore (shipped) | 5 | 285,317 l. t. | 350,618 l. t. | 1,159,206 | 1,357,877 | —18.6 | —14.6 |
| Stone | 45 | 2,815,259 s. t. | 3,210,845 s. t. | 4,338,955 | 4,601,895 | —12.3 | — 5.7 |
| Sand and gravel | 127 | 6,721,498 s. t. | 6,292,636 s. t. | 5,585,285 | 4,261,390 | + 6.8 | +31.1 |
| Clay (sold raw) | 35 | 244,258 s. t. | 260,742 s. t. | 1,023,803 | 1,133,848 | — 6.3 | — 9.7 |
| Brick and tile | 67 | | | 19,112,238 | 18,160,009 | | + 5.2 |
| Pottery | 56 | | | 19,598,651 | 21,219,269 | | — 7.6 |
| Greensand marl | 5 | 13,016 s. t. | 12,295 s. t. | 253,180 | 209,047 | + 5.9 | +21.1 |
| Feldspar (ground) [c] | 4 | 22,764 s. t. | 24,085 s. t. | 434,095 | 459,507 | — 5.5 | — 5.5 |
| Other products: | | | | | | | |
| Lime | 1 | | | | | —21.7 | —13.2 |
| Portland cement (shipped) | 2 | | | | | — 7.4 | —13.7 |
| Pulverized sand | 5 | | | | | — 1.7 | —13.2 |
| Zinc ore | 1 | | | | | +21.7 | + 7.7 |
| Talcose rock (ground) | 1 | | | 29,644,909 | 28,843,643 | +100.0 | +100.0 |
| Graphite | 3 | | | | | —100.0 | —100.0 |
| Non-clay refractories and rferactory cements | | | | | | | +96.3 |
| By-product coke [c] | 2 | | | | | — 0.6 | — 9.7 |
| Total value | | | | 81,150,322 | 80,246,485 | | + 1.1 |

a. Number of mines, quarries, pits or plants as the case may be.
b. Value included in other products.
c. Raw material from other states.

## DETAILS OF THE PRODUCTION IN EACH INDUSTRY

### ZINC

The production of zinc in 1929 was stimulated by slowly rising prices for that metal during the first half of the year. Largely because of that stimulus, production outstripped consumption, and when that fact became evident the mounting surplus of zinc caused a rather sharp decline in prices in November and December. Nevertheless, the average price paid for zinc during the year was such that low-cost producers were able to earn good profits. Prominent among these is the New Jersey Zinc Company and as shown by its financial statement its earnings for the year were very satisfactory. An important part of this company's production comes from its mines at Franklin Furnace and Ogdensburg and in 1929 those mines were made to yield the largest tonnage in their long history. The magnitude of the production from these two mines in recent years is shown by the following table:

PRODUCTION OF ZINC ORE AT
FRANKLIN FURNACE AND OGDENSBURG

| *Date* | *Ore production* [a] | *Zinc content in short tons* [b] |
|---|---|---|
| 1900 | 154,447 gross tons | ..... |
| 1901 | 191,221 " " | ..... |
| 1902 | 209,386 " " | ..... |
| 1903 | 279,419 " " | ..... |
| 1904 | 250,026 " " | ..... |
| 1905 | 323,062 " " | ..... |
| 1906 | 361,330 " " | ..... |
| 1907 | 329,205 " " | ..... |
| 1908 | 356,457 " " | ..... |
| 1909 | 428,303 " " | ..... |
| 1910 | 339,434 " " | 68,584 |
| 1911 | 341,543 " " | 66,027 |
| 1912 | 411,489 " " | 76,283 |
| 1913 | 481,899 short tons | 79,070 |
| 1914 | 489,230 " " | 82,956 |
| 1915 | 745,838 " " | 117,722 |
| 1916 | 736,830 " " | 112,020 |
| 1917 | 720,561 " " | 120,846 |
| 1918 | 668,449 " " | 98,470 |
| 1919 | 639,714 " " | 92,516 |
| 1920 | 550,770 " " | 78,511 |
| 1921 | 400,080 " " | 56,447 |
| 1922 | 512,290 " " | 73,657 |
| 1923 | 584,891 " " | 75,227 |
| 1924 | 610,944 " " | 84,370 |
| 1925 | 606,177 " " | 89,261 |
| 1926 | 573,300 " " | 80,629 |
| 1927 | 629,108 " " | 95,695 |
| 1928 | 648,797 " " | 99,871 |
| 1929 | 789,552 " " | 103,740 |

[a] These figures are from reports and bulletins of the New Jersey Geological Survey.



[b] Figures for the years 1910 to 1918 inclusive are from "Mineral Resources of the United States—1918," compiled by the U. S. Geological Survey. Figures for subsequent years (exclusive of 1929) are from the report "Zinc in 1928," published by the U. S. Bureau of Mines. It must be understood that only a portion of the zinc ore is used in the production of zinc metal.

Since 1880 the New Jersey Zinc Company has taken more than 15,000,000 tons of ore from these two mines alone. So large an amount is difficult to visualize, but if we assume the average content of the ore to be: [1]

[1] Spencer, A. C., The Mine Hill and Sterling Hill Zinc Deposits of Sussex County, New Jersey: Annual Report of the State Geologist for the Year 1908, N. J. Geol. Survey, p. 33, 1909.

| | *Per cent of ore* |
|---|---|
| Franklinite | 50 |
| Willimite | 30 |
| Zincite | 3 |
| Carbonates | 10 |
| Silicates | 7 |
| Total | 100% |

then the average weight would be approximately 272 pounds per cubic foot, and the volume represented by 15,000,000 tone of ore can be pictured as a column with a base 100 feet square which, if vertical, would extend for over two miles into the air.

### IRON ORE

The year 1929 will long be remembered pleasantly by many of those in the iron business. Production of iron ore and pig iron was greater than in any year since the World War and prices were steady and high enough to permit the profitable operation of both mines and furnaces. Towards the close of the year it was realized that production was exceeding consumption and there was some curtailment of activities, but the iron industry as a whole was one of the last to feel the business depression which later enveloped the whole country.

In New Jersey, production was maintained at a high level at the Mt. Hope and Richard Mines, and was considerably increased at the Beach Glen Mine. In April, the Peters Mine of the Ringwood Company was reopened and in August approximately 100 men were employed there in the mill and mine. Historically, this mine, located in the northern end of the State and less than a mile from the boundary line between New York and New Jersey, is one of the most interesting in the country. Facts concerning its early history are few, but it is known that Peter Hassenclever of colonial fame operated it for several years prior to the American Revolution and it seems probable that iron from this mine entered into some of the cannonballs fired in that war. In the early years of its history all the ore was obtained from open pits, but in the latter part of the nineteenth century shafts were sunk to obtain ore at deeper levels. The head-frame of the shaft

or incline now in use is located at the southwest end of the open-cut workings and the incline extends downward at a pitch of 35 to 40 degrees (the same as the pitch of the orebody) to a vertical depth of over 1080 feet below the surface of the ground. A peculiarity of the ore from this mine is that approximately 20 per cent of it is martite, a variety of hematite which crystallizes in the same forms as magnetite. It differs from magnetite, however, in being non-magnetic, granular and silver-gray; whereas magnetite is highly magnetic, massive and dark gray. Because martite is non-magnetic the process of separating ore and gangue is more difficult than at most of the other iron mines in the Highlands district and additional mill equipment is required; however, the fact that the resulting concentrates are part martite makes a product more desirable for use in blast furnaces than magnetite alone for the reason that it is more easily smelted. At the Peters Mine the mill is located beside the head-frame. Recently its capacity was enlarged by alterations and the addition of new equipment including a large Symons cone crusher for the direct reduction of ore from 4-inch to 3-16-inch size, and additional magnetic separators (Ding's). In the process of concentrating the ore, the iron content is increased from about 50 per cent to more than 64 per cent and the phosphorus is reduced from 1 per cent or more to less than half of one per cent. The ore contains practically no sulphur.

The year 1929 also marked the return to activity of two of New Jersey's best-known iron mines: the Washington Mine at Oxford, and the Scrub Oak or Replogle Mine at Wharton. These mines, which have been inactive since 1923, were leased on November first to the Alan Wood Mining Company of Conshohocken, Pa. It is hoped and believed that this act marks an important step in the progress of the iron industry in New Jersey, for the factors which influenced it should also lead to the reopening of other iron mines in time. Briefly stated these factors are as follows:

1. Furnace operators have found that other conditions being equal, sintered ores will give better results and a larger daily tonnage than raw ores.
2. Other conditions being equal, it is more economical to sinter magnetic iron ore than hematite, because the former contains less fines and can therefore be sintered much more rapidly than the latter. Moreover, since magnetite contains a higher percentage of iron than hematite, any given volume of the former will yield a greater tonnage of iron than if using hematite.
3. Freight rates from New Jersey mines to eastern furnaces are slightly less than those from competing mines in New York and other states. It is of course true that the above factors will influence the reopening of New Jersey's inactive iron mines only to the extent that ore from such mines can be obtained at reasonable cost, for obviously, if the cost per ton of ore mined exceeded the cost at New York mines



by an amount greater than the freight differential, then the New Jersey mines could not compete on an equal basis. But if mining costs could be kept as low as those at New York mines, then New Jersey operators would have a slight advantage.

Overshadowing all the above considerations is the necessary factor of sales. No matter how cheaply ore is produced the net result will be a financial loss unless the ore can be sold. At the present time most of the ore mined in New Jersey is used by nearby foundries and small, independent furnaces in eastern Pennsylvania. Before mine production can be greatly increased new sales outlets must be found. The chief hope in that direction would seem to be the Bethlehem Steel Company. At the present time that company is using approximately a million tons of magnetite annually from its mine at Cornwall, Pa. But the iron deposit at Cornwall is known to be of a type that is bound to become leaner with depth, and the mine has been operated on a large scale for many years. It would seem reasonable to believe, therefore, that before very long all the available ore at Cornwall will have been mined and the company will then have to look elsewhere if it wishes similar ore. When that time comes, the advantageous location of the New Jersey ores with respect to the Bethlehem plant should weigh heavily in their favor.

Although shipments of ore from mines in New Jersey declined 18.6 per cent, production at the mines increased by approximately 22 per cent. Stocks of ore on hand at the end of the year were therefore depressingly large.

Total shipments of ore from mines in New Jersey have been as follows:

| | | |
|---|---|---|
| Total shipments from 1870 to 1928, inclusive | 24,718,950 | gross tons |
| Shipped in 1929 | 285,317 | |
| Total shipments | 25,004,267 | gross tons |

The grade of magnetic iron ore shipped in 1929 ranged from 61 to 64 per cent iron as compared with 60 to 62 per cent iron in the previous year. Since presumably the grade of ore mined was the same, the improvement in the grade of concentrates shipped must be credited to the milling departments of the various mines.

As in other recent years, a small amount of limonite ore was shipped from stock at the Ahles Mine of the Basic Iron Ore Company for use in the manufacture of paint and for gas purification.

## STONE

The total production of stone in 1929 was 12.3 per cent less than in 1928. The major part of the decrease was due to a decline of 16 per cent in the amount of trap rock produced, although the smaller amount of sandstone quarried was a factor in the decline. That conditions might have been worse is shown by the fact that the average price received for crushed trap rock was 11 cents a ton more in 1929 than in 1928, the price rising from $1.38 to $1.49 a ton.

TOTAL PRODUCTION OF STONE IN 1929 AND 1928

| | *No. of quarries* | | *Production—short tons* | | *Value* | |
|---|---|---|---|---|---|---|
| *Kind* | 1929 | 1928 | 1929 | 1928 | 1929 | 1928 |
| Trap rock | 32 | 34 | 2,457,610 | 2,925,110 | 3,650,332 | 4,025,637 |
| Limestone | 5 | 5 | 227,069 | 187,395 | 434,863 | 360,161 |
| Other stone | 8 | 6 | 130,580 | 98,340 | 253,760 | 216,097 |
| | 45 | 45 | 2,815,259 | 3,210,845 | 4,338,955 | 4,601,895 |

*Trap rock.* As stated above, although the production of trap rock declined sharply in 1929, prices were maintained at a better level and the decline in the total value of the production, therefore, was much less severe—amounting only to 9.3 per cent. Analyzing the production figures we find that the lost tonnage was divided as follows:

| | *Decline in tonnage* | *Percentage loss from 1928* |
|---|---|---|
| Road metal | 202,365 | 31.4 |
| Railroad ballast | 80,378 | 27.3 |
| Concrete | 185,139 | 9.4 |
| Other uses | Unimportant | |

If we may rely on a uniform practice in the allocation of tonnages to the different uses for the two years (and this seems reasonable since the list of reporting operators is practically the same for both), then we may safely infer that the loss in tonnage was primarily due to a greatly reduced demand for the use of trap rock in road work and to retrenchment in the maintenance-of-way policy of the railroads rather than to the decline in building activity.

PRODUCTION OF TRAP ROCK IN 1929 AND 1928

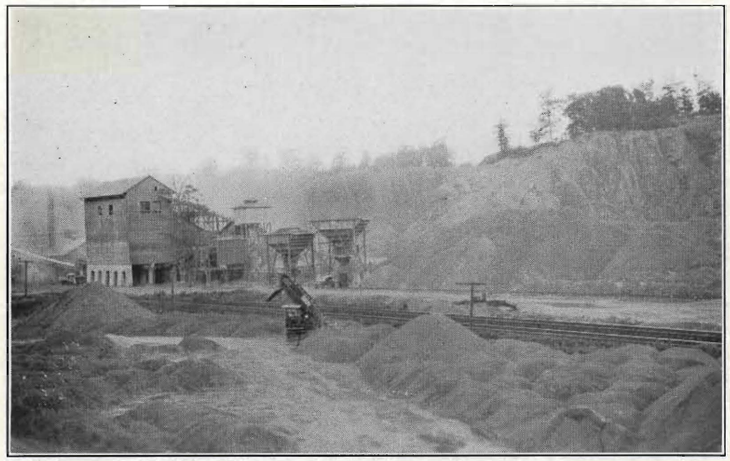
| | *Quantity—short tons* | | *Value—dollars* | |
|---|---|---|---|---|
| *Use* | 1929 | 1928 | 1929 | 1928 |
| Road metal | 442,583 | 644,948 | 664,145 | 916,034 |
| Railroad ballast | 217,612 | 297,990 | 255,185 | 368,139 |
| Concrete | 1,792,634 | 1,977,773 | 2,722,278 | 2,733,770 |
| Other uses | 4,781 | 4,398 | 8,724 | 7,694 |
| Totals | 2,457,610 | 2,925,109 | 3,650,332 | 4,025,637 |

Few changes were made in the list of active quarries in 1929. The Hoffman Construction Company of Bernardsville reopened the old quarry just south of that town, and Thomas Adametz reopened the old

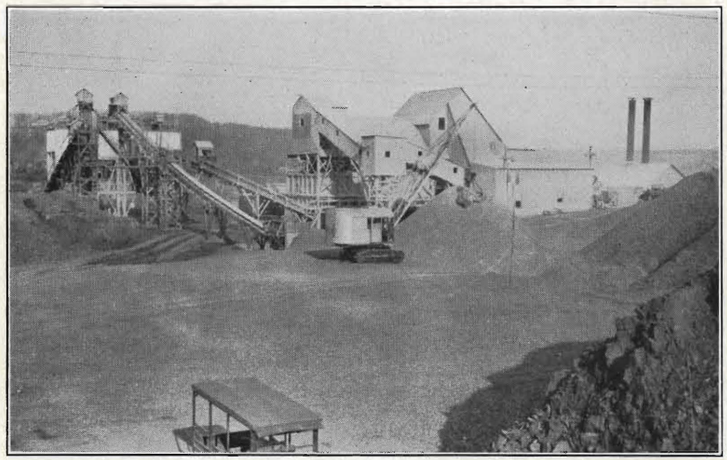


PLATE I

Typical Trap Rock Quarries



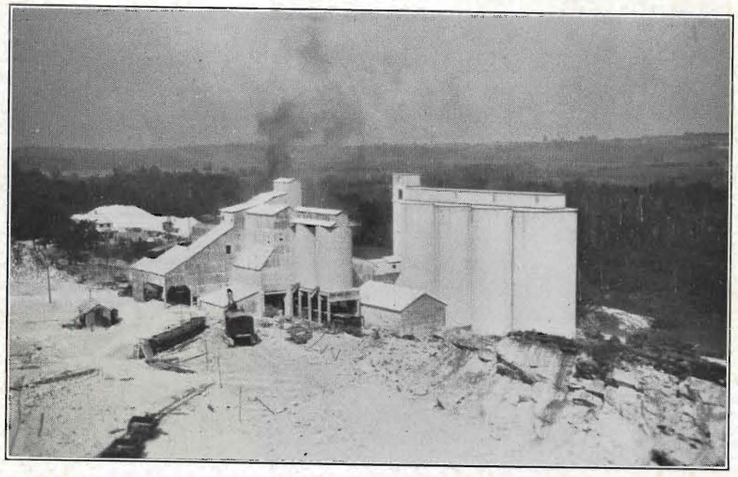
(a) *Great Notch quarry of the Consolidated Stone and Sand Company.*



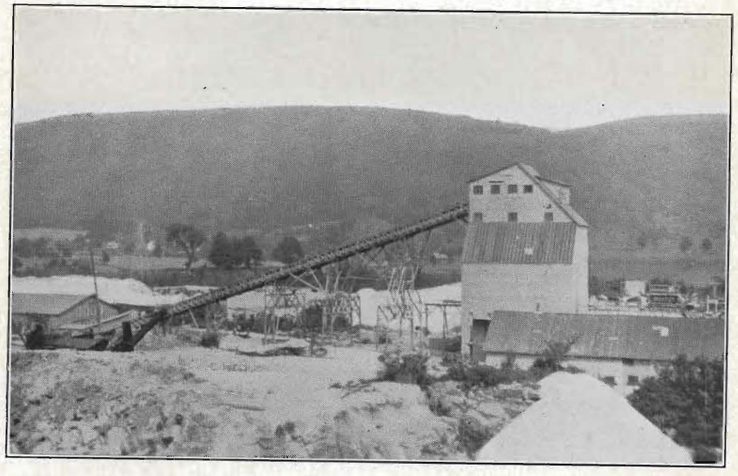
(b) *Quarry No. 1 of the Commonwealth Quarry Company, located in Springfield township just south of Summit.*

PLATE II

Limestone Quarries in the White Limestone of Sussex County.



(a) *Plant and a small part of the quarry of the Limestone Products Corporation of America. Located near Sparta Junction.*



(b) *Plant of the Jersey Limestone Quarries, Inc., near Hamburg.*

Preakness quarry in Totowa. The Gilboa quarry of the Delaware River Quarry and Construction Company, which was operated in 1928, was idle in 1929.

*Limestone.* It is pleasant to record a small upward swing in the limestone industry of New Jersey. In 1929 five quarries were operated, three in the Franklin limestone of Sussex County, and two in the Kittatinny or blue limestone of Hunterdon and Somerset Counties. The increased production is accounted for partly by the inclusion for the first time of production from the quarry of the Hamburg Ridge Lime Company near Sparta, but more largely by increased production from the other quarries. The Hamburg Ridge Lime Company has for the present abandoned its grinding mill for the production of pulverized agricultural stone, and has built a small but efficient plant beside its quarry for the production of concrete aggregate and road metal.

In 1929, as in other recent years, the bulk of the limestone produced was used as fluxing stone in blast furnaces, in the manufacture of Portland cement, and as road metal. Lesser amounts were used for agricultural purposes, as poultry grit and in various manufactured products.

PRODUCTION OF LIMESTONE IN 1929 AND 1928

| | *Quantity—short tons* | | *Value—dollars* | |
|---|---|---|---|---|
| *Use* | 1929 | 1928 | 1929 | 1928 |
| Road metal and concrete | 48,093 | 40,140 | 68,714 | 52,259 |
| Agriculture | 28,496 | 23,770 | 85,448 | 70,200 |
| Other uses [a] | 150,480 | 123,485 | 280,701 | 237,702 |
| Totals | 227,069 | 187,395 | 434,863 | 360,161 |

a. Includes limestone for use as flux and in the manufacture of cement, also smaller amounts for use as poultry grit, as a filler in manufactured products, and in the manufacture of chemicals.

*Other stone.* The production of argillite, granite, marble, conglomerate, slate and sandstone is grouped under this heading in order to conceal the output of individual operators. The production of conglomerate included in this year's statistics is a non-recurring item which represents the boulders and blocks of Shawangunk conglomerate taken from the surface nearby and used in the construction of the recently dedicated monument at High Point on Kittatinny Ridge.

The production of argillite in 1929 was considerably increased by the reopening of an idle quarry.

In recent years practically all of the stone from the argillite quarry in Princeton operated by C. A. Williamson has been used in constructing new buildings on the grounds of Princeton University. Other people wishing to use this stone in the construction of homes, or for other purposes, have been unable to obtain a supply. It was in response to this

unsatisfied demand that H. G. Houghton decided to reopen the old quarry situated about one mile north of Lawrenceville and adjacent to the interurban trolley line connecting Princeton and Trenton. The stone is in every way simliar to that quarried in Princeton and has the same beautiful range of colors. It is also hard and durable—as is evidenced by the good condition of buildings in the immediate vicinity which were constructed of this stone in colonial times. Most of the stone is broken out with bars, as this practice gives less shattered material than the use of dynamite or powder. Barring—as the practice is termed—is made possible by the existence of many fractures or joint planes. Most of these are referable to one or the other of two systems of joints. In the more conspicuous system the joints are spaced from one to four feet apart and have a bearing which deviates little from N 55° E (magnetic). The dip of these joints is 74 to 79 degrees southeast, or approximately at right angles to the bedding which here dips 14 degrees northwest. A second system of fractures traverses the rock in a direction N 42° W, or approximately at right angles to the other system. These fractures dip 82 to 86 degrees southwest and are spaced usually from two to five feet apart. As a result of these two systems of joints, blocks of convenient size are easily obtained which require little or no dressing to make them suitable for building stone. The beauty of the stone when properly laid is well illustrated by several recently completed residences in and near Trenton.

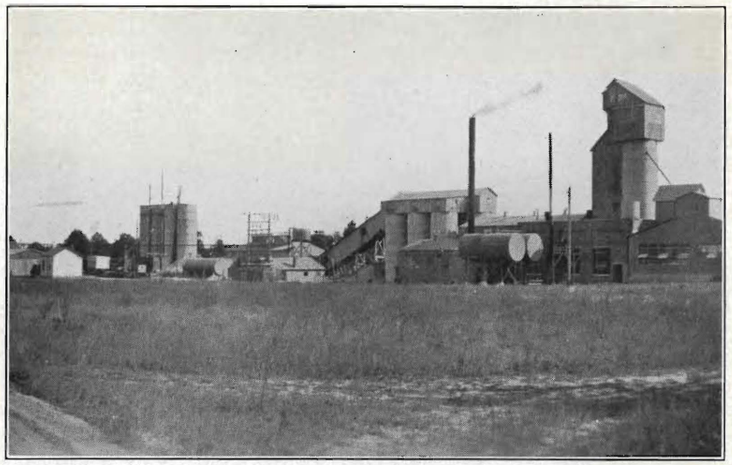
As in 1928, the only granite produced in New Jersey came in the form of tailings from some of the iron mines in the Highlands district, and from the quarry of the Pompton Crushed Stone Company near Bloomingdale. This company supplies a large local demand for crushed stone and screenings and maintained a good rate of production in 1929.

Although the Lafayette Slate Mining Corporation operated throughout most of the year, 1929, it found difficulty from the start in selling its product (roofing slate) in competition with well-established firms in Pennsylvania and Vermont. It is believed the sales problem, rather than difficulties in production, was primarily responsible for the fact that when visited in the latter part of May, 1930, the quarry had every appearance of being abandoned.

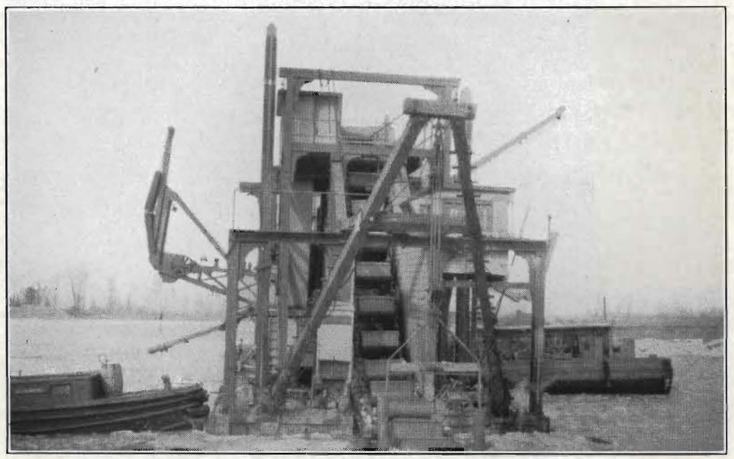
Sandstone and marble were produced in small amount from the same quarries as in 1928.

PLATE III

Sand and Gravel Operations in Southern New Jersey



(a) *Cleaning plant (left) of the South Jersey Sand Company. Storage and pulverizing plant of the Pennsylvania Pulverizing Company shown at right. Located near Dividing Creek Station, Cumberland County.*



(b) *River dredge operated by the Warner Company in Delaware River below Riverside, Burlington County.*



Due largely to the inclusion in this year's statistics of the production from a number of new pits and one large dredging operation, last year's production figure for sand and gravel was exceeded by 6.8 per cent, and the value of that production was exceeded by 31.1 per cent. Even the record figure of $4,381,855 established in 1923 was exceeded by 27 per cent. That the increase in value is so much greater than the increase in production is explained by the fact that much of the increased production was washed sand and gravel which was sold in the Philadelphia market at better-than-average prices.

Production of sand and gravel was reported from 127 pits, 14 more than in 1928. These pits are located in 17 different counties, only Union, Hudson, Hunterdon and Somerset importing all their needed supplies. Unquestionably the factor of greatest importance in boosting production was the operation of the large river dredge, Independence No. 2, by the Warner Company of Philadelphia, at a point on the east bank of Delaware River about a mile and a quarter south of the mouth of Rancocas Creek. By means of a long boom and an endless chain of steel buckets this dredge can dig material from a depth of 40 feet below the surface of the river. As the bank of the river is 5 to 10 feet above water level, that means that for every square yard of property the company has bought, the dredge can dig 45 to 50 cubic yards of sand and gravel—unquestionably an important consideration in the economical operation of the dredge. Moreover, operating on the edge of the river, it has an inexhaustible supply of clean water with which to wash the dredged material—another tremendous asset. A third advantage enjoyed by this operation is that the washed material can be loaded directly into barges and transported to unloading terminals in Philadelphia at very low cost. In view of these advantages and the fact that the material produced is of excellent quality, the continued operation of the dredge seems assured.

Many operators improved their plant equipment during the year and as a direct result the grade of sand and gravel produced was better than ever before. Of the total production in 1929, 80.4 per cent was washed, as compared with 66.2 per cent in the previous year.

Although many counties participated in the total production, Burlington County led all others by a wide margin, both in the tonnage produced and in the value of that tonnage, the amounts being 1,476,631 tons and $1,370, 325 respectively. Middlesex County was second in the volume of production with 963,829 tons, but the value of the production, $658,307, was considerably less than the value—$972,478—of the sand and gravel produced in Cumberland County.

Tabulating the production according to the class or type of product, we find that based on the total value of each product the leading counties rank as follows:

RANK OF LEADING COUNTIES IN THE SAND AND GRAVEL INDUSTRY IN 1929

| *County* | *Structural sd.&gr.* | *Paving sd.&gr.* | *Molding sand* | *Glass sand* | *Blast sand* | *Fire sand* | *Filter sand* | *Engine sand* |
|---|---|---|---|---|---|---|---|---|
| Burlington | 1 | 1 | 2 | ..... | ..... | 2 | ..... | 2 |
| Camden | ..... | ..... | ..... | 2 | ..... | ..... | ..... | ..... |
| Cape May | ..... | ..... | ..... | ..... | 1 | ..... | 1 | ..... |
| Cumberland | ..... | ..... | 1 | 1 | 2 | ..... | 2 | 3 |
| Middlesex | 3 | 3 | 3 | 3 | 3 | 1 | ..... | ..... |
| Monmouth | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Morris | ..... | 2 | ..... | ..... | ..... | 3 | ..... | 1 |
| Sussex | ..... | ..... | ..... | ..... | ..... | ..... | 3 | ..... |

Perhaps the most interesting fact brought out by the above tabulation is the diversity of product achieved by the producers in all the counties with large production.

The total production of sand and gravel has also been tabulated according to the type of product.

PRODUCTION OF SAND AND GRAVEL IN 1929 AND 1928

| *Product* | *No. of pits* | *Quantity—short tons* 1929 | 1928 | *Value—dollars* 1929 | 1928 |
|---|---|---|---|---|---|
| Glass sand | 6 | 166,822 | 227,642 | 257,757 | 307,170 |
| Molding sand | 41 | 731,246 | 692,081 | 903,513 | 937,978 |
| Structural sand | 63 | 1,888,164 | 1,340,186 | 1,111,738 | 731,551 |
| Paving and road-making sand | 46 | 2,044,357 | 1,582,954 | 1,105,122 | 774,124 |
| Cutting, grinding and blast sand | 8 | 67,319 | 53,736 | 163,143 | 155,178 |
| Fire or furnace sand | 14 | 81,546 | 44,824 | 109,527 | 57,939 |
| Engine sand | 6 | 76,348 | 34,139 | 32,728 | 13,807 |
| Filter sand | 4 | 30,039 | 30,039 | 80,725 | 87,208 |
| Other sand | 8 | 12,723 | 16,373 | 11,136 | 15,773 |
| Total sand | | 5,098,564 | 4,021,974 | 3,775,389 | 3,080,728 |
| Structural gravel | 38 | 752,762 | 623,938 | 930,241 | 608,795 |
| Paving and road-making gravel | 30 | 856,166 | 1,619,789 | 864,378 | 553,241 |
| Other gravel | 3 | 14,006 | 26,935 | 15,277 | 18,626 |
| Total gravel | | 1,622,934 | 2,270,662 | 1,809,896 | 1,180,662 |
| Total sand and gravel | | 6,721,498 | 6,292,636 | 5,585,285 | 4,261,390 |

This tabulation provides a comparison with similar statistics for the year 1928 and shows also that more pits were engaged in the production of sand and gravel for concrete work than for any other purpose; that sand and gravel for paving and road-making were next in demand; and that molding sand was produced from 41 separate pits.



The following changes were made in the list of active operators:

ADDED TO LIST

| *Name of Operator* | *Office Address* | *Location of nearest pits (nearest community)* |
|---|---|---|
| Atlas White Brick Co. | Atlantic City | Berlin |
| John Bezdek Sand & Gravel Co. | Little Ferry | Paramus |
| *Bonham Eng. & Constr. Co. | Bridgeton | Bridgeton |
| Henry Bross | Ridgewood | Ridgewood |
| A. W. Davis Lumber Co. | Salem | Salem |
| Jos. Feld & Co. | Lodi Twp., Garfield | Garfield |
| Fennimore & Buzby | Blackwood | Blackwood |
| Wm. H. Knipper | Wharton | Wharton |
| A. H. Lupton | Bridgeton | Bridgeton |
| Millville Gravel & Sand Co. | Millville | Newtonville |
| North Jersey Quarry Co. | Morristown | So. Lakewood |
| Pinehurst Development Co. | Dahlialand P. O. | Williamstown Jct. |
| R. U. Rue Co. | So. Amboy | Sayreville |
| Shaw Dry Sand Co. | Cape May Court House | Cape May Court House |
| Shore Sand & Gravel Co. | Asbury Park | West Spring Lake |
| South Seaville Sd. & Gr. Co. | Bridgeton | Sea Isle Junction |
| *G. Van Decker & Son | Glen Rock | Fairlawn |
| Ward Bros., Inc. | Suffern, N. Y. | Mahwah |
| Warner Company | Philadelphia, Pa. | Riverside |

DELETED FROM LIST

| | | |
|---|---|---|
| Associated Sand & Gravel Co. | Morrisville, Pa. | Williamstown Jct. |
| Bethlehem Mines Corp. | Bethlehem, Pa. | Harmony |
| Wm. Brimfield | Waterford Works | Hayville |
| Brookhurst Sd. & Gravel Co. | Asbury Park | Manasquan |
| Lakewood Sand Co. | Somerville | So. Lakewood |
| Sea Isle Jct. Sand Co. | Philadelphia, Pa. | Sea Isle Jct. |

*Name and address previously listed erroneously.

CLAY

Sales of raw clay in 1929 amounted to 244,258 short tons, valued at $1,023,803, a decline in tonnage of 6.3 per cent and in value of 9.7 per cent from the corresponding figures for the previous year. With the exception of those sales of clay grouped together under the heading "Miscellaneous," all classes shared in the decline. Sales of ball clay were cut in half and sales of stoneware clay decreased 21 per cent. Fortunately the demand for fire clay is somewhat more stable and sales in that class declined only 11 per cent. Although sales of "miscellaneous" clay increased considerably, the value of such clay averaged only $2.62 a ton as compared with $4.44 a ton for fire-clay and $5.54 a ton for ball clay, hence there is little cause for rejoicing because of that increase. Most of the clay included in the term "Miscellaneous" is used in the manufacture of such articles as drain tile and sewer pipe; a much smaller amount for special purposes, such as in tennis courts, cosmetics and pencil leads; as modeling clay, or in filtering oil.

Details of the clay produced and sold as raw clay in 1929 are shown in the following tabulation:

RAW CLAY SOLD IN 1929 AND 1928

| *Kind of clay* | *No. of pits* | *Production—short tons* 1929 | 1928 | *Value—dollars* 1929 | 1928 |
|---|---|---|---|---|---|
| Ball clay | 4 | 5,464 | 11,377 | 30,272 | 74,073 |
| Fire clay | 31 | 189,125 | 212,514 | 840,025 | 963,609 |
| Stoneware clay | 6 | 10,329 | 13,082 | 50,373 | 61,390 |
| Miscellaneous clay | 9 | 39,340 | 23,769 | 103,133 | 34,776 |
| Total | | 244,258 | 260,742 | 1,023,803 | 1,133,848 |

Several changes were made in the list of operating companies during the year. The Frilan Mining Company of Perth Amboy reported opening a clay pit at Whiting, Ocean County, but to offset that, the brick manufacturing plant and the clay pits of the Ostrander Fire Brick Company have been permanently abandoned. The Raritan River Sand Company, although still operating its sand plant on a large scale, reports that it has withdrawn from the clay business; and Hampshire Clays, Inc., went into the hands of receivers early in the year.

## BRICK AND TILE

The compiled statistics for the year 1929 show that the brick and tile industry as a whole had a slightly better year than in 1928. Nevertheless, many companies operated at a very slight margin of profit and some of the brick companies were forced to discontinue operations. As in the previous year the demand for fire-brick was fairly steady, whereas sales of common brick declined appreciably. The average price paid for common brick in 1929, however, was $11.50 a thousand, as compared with $10.80 a thousand in 1928. Face brick sold for $35.80 a thousand, according to the reports received, but private information is to the effect that carloads of face brick were shipped at a much lower price.

The most outstanding change recorded in the year was in sales of enameled tile, which increased from 1,121,926 sq. ft. in 1928 to 2,018,527 sq. ft. in 1929. Sales of hollow building tile and ceramic mosaic also increased by large amounts, but since reported sales of floor tile declined by 57 per cent, it seems probable that at least a part of the increased sales of ceramic mosaic were due to a change in the classification of sales previously reported as floor tile.

According to the 1929 statistics, the most valuable of New Jersey's clay products—excluding pottery—are terra cotta, hollow building tile and common brick.



BRICK AND TILE PRODUCED IN 1929 AND 1928

| *Products* | *Plants in Operation* 1929 | *Quantity produced* 1929 | 1928 | *Value in dollars* 1929 | 1928 |
|---|---|---|---|---|---|
| Common brick | 23 | 247,730 M | 340,154 M | 2,847,564 | 3,681,065 |
| Face brick | 7 | 21,937 M | [a] 22,379 M | 784,853 | [a] 1,089,814 |
| Fire brick: | | | | | |
| (a) Brick, etc. [b] | 10 | 17,450 M | 17,556 M | 928,170 | 956,114 |
| (b) Special shapes | 4 | 5,551 s. t. | 5,475 M | 262,930 | 239,627 |
| Hollow building tile | 8 | [c] 434,068 s. t. | [d] 368,959 s. t. | [c] 3,496,477 | [d] 3,072,326 |
| Terra cotta, etc. [e] | | 84,730 s. t. | | 4,826,215 | |
| Floor tile | 5 | 2,208,296 sq. ft. | 5,174,361 sq. ft. | 514,641 | 1,095,643 |
| Ceramic mosaic | 7 | 4,256,486 sq. ft. | 3,658,428 sq. ft. | 835,692 | 641,842 |
| Enameled tile | 5 | 2,018,527 sq. ft. | 1,121,926 sq. ft. | 1,098,043 | 620,385 |
| Faience tile | 5 | 285,813 sq. ft. | | 244,664 | |
| Wall tile | 6 | 6,071,835 sq. ft. | 7,695,327 sq. ft. | 2,157,406 | 2,319,620 |
| Drain tile | 5 | 1,474 s. t. | 1,004 s. t. | 20,450 | 15,360 |
| Other brick and tile products | | | | [f] 1,095,133 | [g] 4,428,213 |
| Total value | | | | 19,112,238 | 18,160,009 |

M—Thousands. s. t.—short tons.

a. Includes enameled brick.
b. Includes brick, block, or tile for locomotive and other fire-box lining, etc. (9 inch equivalent).
c. Includes partition, load-bearing, furring and book tile.
d. Includes same products as 1929 figures, also floor-arch, silo and corncrib tile, conduits, radial chimney blocks and fire-proofing tile.
e. Terra cotta and hollow building tile other than partitian, load-bearing, furring and book tile.
f. Includes fancy, enameled and hollow brick.
g. Includes terra cotta, faience tile, glass-house tank blocks, melting pots, stoppers, floaters, rings and other brick and tile products.

Middlesex County is still the center of the brick and tile industry. Of the 67 plants in New Jersey, 28 are located in Middlesex County, 7 in Mercer County, 6 in Monmouth County, 5 in Bergen County, 4 in Burlington County, 3 each in Atlantic and Cumberland counties, 2 each in Passaic, Hudson and Salem counties, and 1 each in Camden, Morris, Somerset, Union and Warren counties. The majority of the tile plants are located in the district adjacent to the mouth of the Raritan River, whereas the brick plants are scattered fairly well over the entire State.

## POTTERY

Many of the older potteries in Trenton are finding it extremely difficult to compete with the newer potteries, both here and in other states. The manufacture of standard plumbing fixtures, which formerly was done by skilled labor, is now done faster and more cheaply by machinery. The same is true of many other standard pottery products. It is only in the manufacture of special shapes and products that the skilled potter can hold his own. This fact is probably best appreciated by those in the industry, and it is greatly to their credit that the small pottery manufacturers have been able to adapt themselves to the changed conditions.

In 1929 there was a further decline in the production of sanitary-ware with a concurrent reduction in prices. The value of shipments therefore was materially below that in 1928. Shipments of all other pottery products also declined in value with the single exception of porcelain electrical products. The net decline in value from 1928 figures for all pottery products amounted to $1,620,618, or 7.6 per cent.

Trenton is still the center of the pottery industry in New Jersey. Of sixty potteries active in 1929, forty-two were located in or near that city. Middlesex County is next on the list with six; and three potteries are located in both Essex and Hunterdon counties. Only four counties —Sussex, Cape May, Gloucester and Ocean—are not represented in the list of manufacturers of clay products.



POTTERY MANUFACTURED IN 1929 AND 1928

| *Products* | *No. of estab.* | *Quantity—pieces* 1929 | 1928 | *Value—dollars* 1929 | 1928 |
|---|---|---|---|---|---|
| Red earthenware (flowerpots, etc.) | 4 | | | 93,428 | [a] 473,121 |
| White ware | 3 | | | 219,720 | [b] 972,622 |
| Vitreous china plumbing fixtures:[c] | | | | | |
| (a) Bathroom and toilet fixtures: | | | | | |
| Closet bowls—Siphon jets | 13 | 180,079 | 148,295 | 958,254 | 1,375,332 |
| Washdowns | 14 | 386,581 | 436,966 | 1,693,643 | 1,860,232 |
| Reverse traps | 13 | 58,905 | 71,272 | 336,165 | 420,543 |
| Flush tanks—Lowdown (large and small) | 13 | 333,941 | 384,028 | 1,888,897 | 2,183,975 |
| Lavatories | 8 | 123,324 | 161,639 | 1,753,001 | 2,154,080 |
| Other bathroom and toilet fixtures | 9 | | | 441,004 | 905,838 |
| (b) Other vitreous china plumbing fixtures | | | | 496,261 | 375,219 |
| Semi-vitreous or porcelain plumbing fixtures:[c] | | | | | |
| (a) Lavatories and bath tubs | 4 | 16,913 | | 183,020 | 3,996,547 |
| (b) Laundry tubs and kitchen sinks | 4 | | | 525,852 | |
| (c) Other semi-vitreous plumbing fixtures | | | | 2,385,723 | |
| Porcelain electrical supplies | | | | 3,967,028 | 3,893,711 |
| Saggers (of own make) | 22 | | | 220,228 | 277,216 |
| Other pottery products including hotel and porcelain china | | | | 4,436,427 | [d] 2,330,833 |
| Total value | | | | 19,598,651 | 21,219,269 |

a. Also includes stoneware, chemical stoneware and chemical porcelain.
b. Also includes porcelain china.
c. Exclusive of fittings.
d. Does not include value of porcelain china or hotel china. Does include art pottery, gas and electric logs, and other pottery products.

## GREENSAND MARL

The greensand marl industry recorded a small gain in production in 1929 and a 21 per cent increase in the total value of the marl produced. As in other recent years, the bulk of the material was sold for water-softening purposes.

In February, 1929, the U. S. Bureau of Mines issued as Serial No. 2910, Reports of Investigations, a report by J. R. Thoenen on the commercial feasibility of various processes for the extraction of potash from greensand marl. Only those processes were studied which included some plan for the utilization of by-products, for their manufacture and sale were considered essential to help carry the cost of the extraction process used. The report is thorough and discusses in considerable detail all the factors entering into the cost of each process. The conclusion reached is that as yet no process has been devised that is commercially feasible. In the words of the author, "Processes depending on the sale of by-products to carry the manufacturing costs would encounter marketing difficulties on account of the volume of such by-products produced by the extraction of necessary potash in large quantities.

Even if markets should be found for the by-products manufactured, further difficulties would be encountered in the sale of potash, because foreign potash products can be distributed at seaboard and in interior points at lower freight rates than can similar products from New Jersey on our present freight schedules."

## FELDSPAR (ground)

As in previous years, the amount and value of the feldspar ground in New Jersey are included in the statistics of mineral production.

Since the chief use for ground feldspar is in the manufacture of pottery, it is to be expected that conditions in the latter industry will be reflected in the former. In 1928, the value of all pottery products made in New Jersey declined 6.6 per cent from the corresponding figure for the previous year, and the value of feldspar ground in New Jersey declined 5.3 per cent. In 1929 the value of pottery products again declined—this time 7.6 per cent, and the value of the feldspar ground declined 5.5 per cent.

Early in the year Golding Sons Company of Trenton, which for many years had been one of the leading producers of feldspar in the country, was merged with several other companies engaged in the same industry to form the new Consolidated Feldspar Corporation. More recently (1930) this new corporation has acquired the Trenton mill and interests of the Trenton Flint and Spar Company. There are, therefore, only three concerns in this business in New Jersey at the present time (December, 1930): namely, the aforesaid Consolidated Feldspar Corporation, the Eureka Flint and Spar Company, and Standard Flint and Spar Corporation.



## OTHER PRODUCTS

*Lime.* The entire reported output of lime in 1929 came from the plant of the Peapack Limestone Products Company at Peapack. This company operates two stone kilns of the discontinuous or "field" type, which are located close to an important highway and only a few hundred feet from the company's quarry. It seems probable that the advantageous location of the plant, both with respect to a supply of raw materials and to a local market, has much to do with this firm's continued successful operation; although due credit should also be given to the management for keeping costs within a competitive range.

A less cheerful tale relates to the operations of the New Jersey Lime Products Corporation at Ogdensburg. This company spent approximately a half-million dollars just a few years ago in building a scientifically designed and modern plant equipped to produce both quicklime and hydrated lime. Unfortunately, too little attention was given to the matter of raw materials, for after the plant was built it was found that because of variations in the composition of the limestone used it was impossible to produce a uniform, high-grade product. As a consequence the lime which the company manufactured received a bad name and it became impossible to sell it on a profitable basis. The plant has been idle since 1927, and in October, 1929, the company was placed in the hands of receivers.

*Portland cement.*—The cement industry was first developed in the eastern section of the country because that part of the country was the mostly thickly settled and offered the largest market for such a product, and because immense quantities of rock occurred there which contained all the elements necessary for the manufacture of cement in approximately the right proportions. Largely because of the latter feature, cement could be manufactured so cheaply that it could be shipped to all parts of the country and still be sold at a moderate price. Under such circumstances there was little incentive for the construction of cement plants in other parts of the country. As time passed, however, freight rates were raised, necessitating a higher delivered price for cement, and other sections of the country were rapidly developed. Eventually it became possible to build plants at distant points which locally, at least, could undersell the eastern producers. At first the construction of new plants was limited, as there were few localities where the raw materials then thought necessary for the manufacture of cement occurred in close proximity to each other and to a local market. But with increased knowledge of the chemical reactions involved in the manufacture of cement, it was found that the latter could be manufactured from a variety of calcareous and argillaceous materials, provided the proper manufacturing control was maintained. After that fact became established, plants were rapidly built in all sections of the country where a source of raw materials was available and where it was believed the

freight differential favoring a local plant was enough to justify such construction. As a result of this expansion the eastern plants have had to face a gradual curtailment of their markets, in spite of the tremendous growth in the consumption of cement for the country as a whole. Since the cement industry is like many others in that profits are to a large extent dependent upon the full use of available equipment, it is not surprising that strenuous efforts have been made to bolster the faltering total of sales. The result has been a steady decline in prices from an average of $1.90 a barrel in 1923 to approximately $1.45 a barrel in 1929. Unquestionably this decline in prices has hurt all producers, and were it not for the introduction of operating economies few plants would be able to operate profitably with cement selling at the latter figure.

The continued decline in the volume of construction in New York and northern New Jersey necessarily has had an adverse effect upon the sales of local cement plants. Shipments from the Vulcanite Portland Cement Company and the Edison Portland Cement Company, the only plants operating in New Jersey, declined 7.4 per cent and the value of sales declined 13.7 per cent from the corresponding figures for the previous year. As the estimated decline in building operations in the same district was 19.1 per cent, [1] the companies are to be congratulated that their record for the year was no worse.

[1] From figures compiled by the F. W. Dodge Corporation.

*Pulverized sand.* Sand from New Jersey pits was ground by five firms in 1929. The total value of the ground product, $350,480, is a decline of 13 per cent from the total for the previous year, although the tonnage ground declined only 1.7 per cent.

The writer has received many requests for information about this industry in recent years, and it is therefore believed the following details will be of interest.

Seven firms in this state are now equipped to grind sand to a fineness of 200 mesh or more. Two of these, the Trenton Flint and Spar Company and the Standard Flint and Spar Company, have located their mills in Trenton and cater almost exclusively to the pottery industry. They buy all their raw materials from other firms which produce sand or quartzite of a quality suitable to their needs.

One other Trenton concern, the Eureka Flint and Spar Company, recently completed a grinding mill adjacent to the new sand-cleaning plant built by the Tavern Rock Sand Company, about four miles east of the center of Millville.

The New Jersey Pulverizing Company is the only firm which produces its own raw materials. This Company's grinding plant and sand pit are located in Ocean County about a mile and a quarter north of the railroad station at Pinewald. The company has recently installed new equipment to better the grade of the sand which it uses. This equipment consists of a dredge which sucks the sand from below water level (formerly the sand was dug from above water level), scalping screens between the dredge and the main plant which remove the gravel in the sand, and sand cones to give the sand a final washing. The resulting product is a highly silicious, white sand of excellent quality.



The Pennsylvania Pulverizing Company has two grinding plants in New Jersey, one at Toms River and one a mile west of Dividing Creek Station in Cumberland County. The former is a new plant built beside the sand-cleaning plant operated by the Walter C. Smith Mineral Products Company. The latter is adjacent to the sand pits operated by the South Jersey Sand Company. At the latter operation the sand is cleaned by dredging it from below water level, and by passing it through screw washers. As the sand is comparatively clean before washing, this gives a satisfactory product. At the Walter C. Smith operation, a similar method of cleaning the sand was employed during the first few months of operation, but late in 1929 the company installed ten vibrating riffle-tables over which the entire output of sand is now passed. This operation removes practically all of the iron and titanium-bearing minerals, and the resulting product now analyzes better than 99.5 per cent $SiO_2$.

The plant of the National Pulverizing Company is located beside the railroad, a little over one mile northwest of Manamuskin Station in Cumberland County. It is adjacent to the large sand pits of the New Jersey Silica Sand Company (see frontispiece) and obtains its raw material from that company.

One other grinding plant, that owned by the Standard Silica Company, was recently completed beside the sand and gravel pit operated by the Young Sand and Gravel Company one mile north of Dennisville. When visited in June, 1930, the plant was idle.

Geologically, it is of interest to note that the sand used by every one of the above-described plants comes from the same formation—namely, the Cohansey sand—and although immense quantities of sand are shipped each year, the total amount used to date as compared with the amount still in sight is practically negligible. As shown on the geological map of the state, the Cohansey is the surface formation (except for relatively thin, overlying gravel deposits) in three-fourths of the southern half of the State.

*Talcose rock.* The Rock Products Company of Easton reported a small production of ground talc from its quarry north of Phillipsburg. Although talc has been found at several places in the State, it has not elsewhere been developed commercially.

*Graphite.* We regret to report that operations at Annandale seem to have come to a standstill. In 1929 the Annandale Graphite Corporation was inactive, and apparently its plant for the construction of a large, new mill have been at least temporarily abandoned.

*Non-clay refractories and refractory cements.* Under this heading are grouped refractory products, such as silicon-carbide brick, magnesite

brick and refractory cements. A part of the raw materials used in the manufacture of most of these products comes from New Jersey, and hence their value should be shown in statistics of the mineral production of the State. As figures for the value of the finished products only are available those figures are used, although it is realized that in so doing the value of this State's mineral production is thereby slightly padded.

In 1929 the value of all non-clay refractories and refractory cements produced in this State amounted to $2,658,183, an increase of 96.3 per cent over the total for the previous year.

*By-product coke.* Excluding production of the new, low-temperature plant of the International Combustion Engineering Corporation at Piscataway, near New Brunswick, the amount of by-product coke produced in New Jersey in 1929 was 0.6 per cent less than in the previous year. Because of the lower prices, however, the value of the production declined 9.7 per cent. The officials of both the Seaboard By-Product Coke Company and the Camden Coke Company (the only companies operating high-temperature coke ovens in the State) apparently foresaw the industrial depression which was just beginning at the end of 1929 and placed their companies in strong position by greatly reducing stocks of coke during the year. The wisdom of such a policy is now self-evident, but at that time few people were willing to admit the possibility of a protracted business depression.

Statistics of production of the low temperature coke plant at Piscataway are unavailable, but it is known that the plant operated during at least part of the year. This operation was handicapped because of the difficulties into which the parent company, the International Combustion Engineering Corporation, was plunged as a result of over-extension and consequent inability to meet its obligations. After various ineffectual efforts to stave off such action the company was finally placed in the hands of receivers December 19, 1929. It is to be hoped that a reorganization will soon be effected which will permit the many enterprises conducted by this large organization to be continued on a sound basis.

## NEW DEVELOPMENTS

*Ocher.* A new mineral industry may be started in New Jersey as the result of recent prospecting by the Jonwil Mineral Company on the farm of B. S. Rapp south of Carpentersville, Warren County. So far the prospecting has been restricted to that part of the farm which is located near the mouth of Pohatcong Creek and on the north slope of the mountain separating that creek from Musconetcong River.

Fifty to seventy-five years ago a considerable tonnage of limonite or brown iron ore, was obtained from mines strung along the side of this mountain from near Delaware River to a point south of Springtown. The ore was found in residual clay close to the base of the thick Kittatinny limestone formation and near its contact with the gneiss



which forms the backbone of the mountain. In that respect the ore deposits resembled many in eastern Pennsylvania which were worked at about the same time. In those days, ore from the latter deposits was prepared for the market by washing it in some form of log-washer. The overflow from the washers, containing a large amount of clay and fine particles of limonite in suspension, was ponded to allow the suspended material to settle and thus avoid polluting the streams. As a result of these operations, large deposits of mud containing a high percentage of iron were formed near some of the old mines. This mud was considered valueless until C. K. Williams, a paint manufacturer of Easton, Pa., discovered that a good grade of ocher could be prepared from it by washing it and settling the sand in a series of small ponds or tanks.[1] Subsequently the mining of iron became unprofitable and was discontinued, but the demand for ocher led to the opening of several mines in eastern Pennsylvania for that product alone.

The close relationship between the ocher mines and the old limonite mines in eastern Pennsylvania was the basis for the supposition that ocher might be found in commercial amounts associated with the limonite ores of the old mines south of Pohatcong Creek. To test the theory a shaft was started only 50 or 60 feet distant from one of the old, collapsed mine shafts. The Jonwil Mineral Company abandoned the proposition before the shaft had been sunk deep enough to really constitute a fair test; but its successor, the New Jersey Mineral Company, may have stronger backing. When visited in September, 1930, the shaft was 46 feet deep, and although no means were at hand to get to the bottom of the shaft and examine the material there exposed at first hand, the dump from the workings afforded good evidence that most of the material encountered was a hillside wash of sand and partly decomposed granite—gneiss. A small amount of ocherous clay was evidently struck near the bottom of the shaft, as such material was found on the top of the dump. Some of the most likely looking material was secured as a sample and submitted to the State Testing Laboratory for analysis. The results of that analysis show that the material in its present form contains too much silica and is too low in iron to be classified as good ocher; however, it is possible that by screening out the coarser particles (which are largely sand), and by adding limonite ore to the raw material before it is ground, a suitable product could be obtained.

Doubtless a better grade of raw material could also be obtained by sinking the shaft deeper. We know that most of the iron ore in the old workings was found at a depth of 175 to 200 feet, and it is only reasonable to suppose, therefore, that the percentage of disseminated iron in the clay would also be higher at that depth. The cost of sinking the shaft to such a depth, however, would be considerable and quite

[1] Miller, B. S., The Mineral Pigments of Pennsylvania: Topographic and Geol. Survey of Pa. Rep't No. 4, p. 27, 1911.

possibly would not be justified by the amount of ocher that could be obtained.

The results of the tests made on the sample from the Rapp property and of similar tests made on commercial grades of ocher for purposes of comparison are given in the following table.

TEST OF OCHER SAMPLES

| | Per cent of weight | | |
|---|---|---|---|
| *Sieve test* | *Sample from Rapp farm* | *American ocher* | *French ocher* |
| Fine material by elutriation | 75.6 | ..... | ..... |
| Amount retained on 300 mesh sieve | 20.80 | ..... | ..... |
| Amount retained on 325 mesh sieve | ..... | 2.41 | 0.46 |
| *Chemical analysis* | | | |
| Ignition loss | 8.56 | 8.56 | 8.40 |
| Silica ($SiO_2$) | 61.75 | 54.15 | 53.88 |
| Iron oxide ($Fe_2O_3$) | 8.51 | 21.57 | 13.36 |
| Aluminum oxide ($Al_2O_3$) | 19.59 | 13.58 | 24.09 |
| Calcium oxide (CaO) | None | Trace | None |
| Magnesium oxide (MgO) | 1.13 | 1.27 | 0.50 |

## THE DEEP WELL AT JACKSONS MILLS

The well of the W & K Oil Company at Jacksons Mills, which had reached a depth of 5,022 feet, was finally abandoned in the latter part of December, 1929, no oil or gas in commercial amounts having been found. Through the courtesy of the owners, we are permitted to state that rock was first encountered at a depth of 1336 feet. Since the elevation of the well is 110 feet above sea-level, we know that the rock floor upon which the unconsolidated sand and clay beds of the Cretaceous formation were deposited is today at this point 1226 feet below sea-level. A glance at the geologic map of the State will show that the nearest point at which the rock floor is seen at the surface is at Monmouth Junction, 20 miles to the northeast, where the elevation of the surface averages about 80 feet above tide. In 20 miles, therefore, the rock floor has sunk 1306 feet, the average dip between the two places being 65 feet per mile to the southeast. Should the same average hold for the next 15 miles, and all the available evidence points towards such a conclusion, we would expect to find the rock floor beneath Toms River at a depth of 2200 feet below sea-level. This is of more than academic interest, because it means that none of the water wells drilled in the vicinity of Toms River comes anywhere near bed rock, and that should the water supply from present sources ever prove inadequate, it will be possible to sink deeper wells with the expectation of finding water in one or more of the unconsolidated, sandy beds which underlie the present sources of supply. This argument is not, of course, restricted to Toms River—it applies equally to the many resorts nearby. Moreover, since the dip of the rock floor is to the southeast, the depth to rock increases as one goes south along the coast. For that reason a well 2306 feet deep at Atlantic City ended far above bed rock, whereas a well only 1500 feet deep at Asbury Park would probably end in rock.



The information afforded by such deep wells as those mentioned above is of inestimable importance in predicting the depth to various known water-bearing beds in regions where they have not as yet been utilized, and a plea is here made to all those who may participate in the drilling of future deep wells to make careful note of the character of the formations encountered and to record all possible information concerning the quantity and quality of the water found—even though the amount is considered too small to be of importance at the time.