

REPORTS OF THE
DEPARTMENT OF
CONSERVATION AND DEVELOPMENT
STATE OF NEW JERSEY

HENRY B. KUMMEL, State Geologist and Director

BULLETIN 42

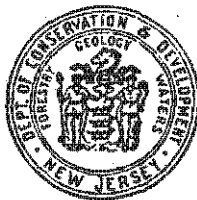
Geologic Series

THE MINERAL INDUSTRY
OF NEW JERSEY
FOR 1933

Compiled by

MEREDITH E. JOHNSON

Assistant State Geologist



Published 1935

Division of Geology and Topography

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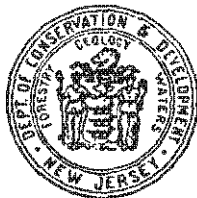
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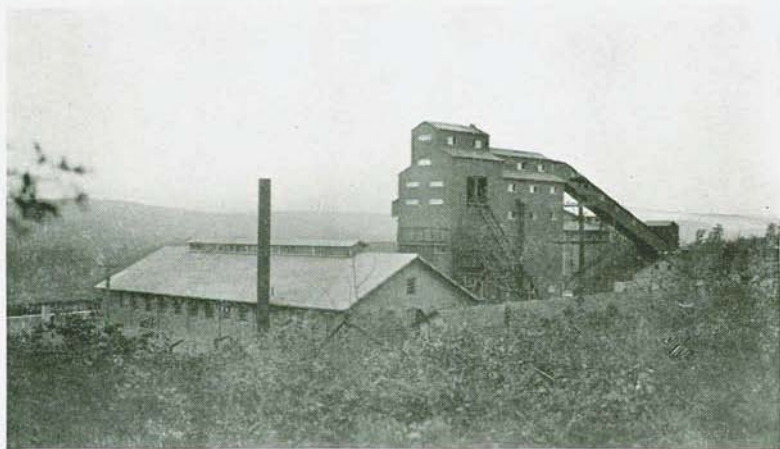
CONTENTS

	Page
Summary of the mineral production in 1933	5
Zinc ore	7
Iron ore	7
Stone	8
Trap rock	8
Other stone	9
Sand and gravel	11
Clay	13
Brick and tile	14
Pottery	15
Greensand marl	15
Other products	17
Lime	17
Portland cement	17
Pulverized sand	17
Non-clay and miscellaneous clay refractories	18
By-product coke	18
Diatomaceous earth	19
Ground-water supply	19

ILLUSTRATIONS

	Facing Page
PLATE I. A. Headframe, mill and office building at the Scrub Oak Mine of the Alan Wood Mining Company near Wharton. B. View to left of that above. Shows buildings which house crushing and screening equipment for reduction and sizing of rock waste, storage bins for ore concentrates, and tailings conveyor	5
PLATE II. A. Part of the quarry operated by the Haskell Granite Company southwest of Haskell, Passaic County. B. View to show use of "ironstone" at Stone Church in eastern Monmouth County	10
PLATE III. A. Quarry of the Berkshire Silica Company near Wharton. B. Shipping molding sand by barge from Dorchester, Cumberland County	11
PLATE IV. A. Greensand marl pit and treating plant of the Hoffman-Caps Chemical Company at Ewansville, Burlington County. B. Plant erected by J. G. Marcum to dry and pulverize the diatomaceous earth from a deposit just west of Lake Musconetcong	16

PLATE I.



A. *Headframe, mill and office building at the Scrub Oak Mine of the Alan Wood Mining Company near Wharton.*



B. *View to left of that above. Shows buildings which house crushing and screening equipment for reduction and sizing of rock waste, storage bins for ore concentrates, and tailings conveyor.*

THE MINERAL INDUSTRY OF NEW JERSEY

FOR 1933

By MEREDITH E. JOHNSON

Assistant State Geologist

This bulletin is one of a long series of annual reports on the mineral industry of New Jersey by the State Department of Conservation and Development. It is a compilation of statistics furnished by the mineral producers of New Jersey to this Department, the U. S. Bureau of Mines and the U. S. Bureau of the Census; and its value as a source of fundamental information relative to the industries covered is due entirely to the whole-hearted cooperation of the individuals and corporations supplying the basic data.

As in previous bulletins, no figures are published which might disclose the amount or value of the production of an individual concern unless specific consent has been given to do so. This policy, adopted many years ago by the governmental agencies concerned, will be continued as long as these statistics are published.

SUMMARY OF THE MINERAL PRODUCTION IN 1933.

The year 1933 was one of mixed trends in the mineral industries of New Jersey. Whereas the production of pottery, iron ore, and brick and tile was substantially greater than in 1932, the production of stone, sand and gravel was less than that in any year since 1908. The decline of only three per cent in the total value of all mineral products seems to point definitely to the assumption that the depression, which for the mineral industries began in 1927 with a small decline of 5 per cent and then continued with accelerated velocity in 1930, 1931 and 1932, has at last reached bottom. Recovery will probably be at a slower rate than the decline, but it is confidently anticipated that the value of the production in 1934 will be a little greater than that in 1933.

Among the smaller industries, the production of lime and pulverized sand increased slightly, whereas the production of clay and greensand decreased somewhat. Overshadowing this latter decline, however, is the increased value of the clay and greensand. Producers of lime, cement, zinc ore and iron ore all benefited from higher prices; whereas pulverized sand and by-product coke were sold at slightly lower prices.

MINERAL PRODUCTION IN NEW JERSEY IN 1933 AND 1932

Products	No. of operations a.		Quantity Short or long tons		Value in dollars		Per cent increase or decrease	
	1933	1932	1933	1932	1933	1932	Tonnage	Value
Zinc ore	2	2	471,607 s. t.	559,651 s. t.	(b)	(b)		-15.7
Iron ore	1	1	73,144 l. t.	30,844 l. t.	(c)	(c)		+137.1
Stone	35	37	1,101,402 s. t.	1,514,810 s. t.	1,282,547	1,743,362		-27.3
Sand and gravel	89	101	2,064,260 s. t.	2,446,090 s. t.	1,636,406	1,993,281		-22.0
Clay (sold raw)	28	29	57,760 s. t.	62,114 s. t.	259,816	248,582		-7.0
Brick and tile					2,886,737	2,259,886		+27.7
Pottery					6,999,753	4,263,261		+64.2
Greensand marl	5	6	6,734 s. t.	9,231 s. t.	208,002	201,172		-27.1
Other products:								
Lime	2	3						
Portland cement (shipments) ...	2	2						
Pulverized sand	5	5						
Non-clay and miscellaneous clay refractories							15,773,395	19,241,432
By-product coke d	2	2						-18.0
Zinc ore	See above							
Iron ore	See above							
Total value					29,046,656	29,950,976		-3.0

- a. Number of mines, quarries, pits or plants as the case may be.
b. Estimated value of production included in "Other products."
c. Value of shipments. Included in "Other Products."
d. Raw material from other states.

ZINC ORE.

Zinc producers as a class fared much better in 1933 than in 1932. From a low of 2.55 cents a pound in February, prices rose to a high of 5 cents in July, and declined only half a cent therefrom in the second half of the year. This betterment in prices, coupled with a greatly increased demand, led to the re-opening of a number of electrolytic refineries and distillation plants and total production of primary zinc for the year was approximately 50 per cent greater than in 1932.

In 1933 both mines of the New Jersey Zinc Company were operated steadily but on a slightly curtailed basis, total production amounting to 471,607 tons, or 15.7 per cent less than in the previous year. No reduction was made in working forces, the men being given as much work as possible. Additional improvements were effected in the mining systems employed and a concerted program was adopted for the elimination of all possible hazards and injuries to the employees. No additional prospecting was done during the year, but detailed studies of the ore-bodies begun several years ago were pushed vigorously. It was ascertained nearly three-quarters of a century ago that the ores at Franklin and Ogdensburg consist essentially of franklinite, willemite and zincite, an assemblage of zinc minerals that is unique among all the ore deposits of this continent. But it was not fully realized until the present study was undertaken that the ore minerals are not uniform in their occurrence or value, the percentage of zinc in the franklinite, for instance, ranging within fairly wide limits in the Ogdensburg ore-body. This discovery will enable the company to improve the grade of ore mined by abandoning certain outlying blocks of low-grade material which were formerly classed as ore. A well-directed sampling program has also aided in the construction for the first time of accurate geologic maps showing the configuration of the ore-bodies and the occurrence of dikes, faults, and other pertinent data on all levels and in all stopes still open for examination. It is hoped and believed that this information, together with that obtained from a microscopic study of picked specimens to show the relationships between the mineral grains, will, when complete, permit the reconstruction of the genetic history of the ore deposits. This in turn should provide a sounder foundation for the planning of future prospecting and mining operations.

IRON ORE.

The general increase in activity in the iron industry in 1933 was reflected to some extent by the increased production of ore in New Jersey, this amounting to 73,144 long tons as compared with only 30,844 tons in the preceding year. Though the percentage of increase was large, the total production came from less than half a year's operation of one mine (i. e. The Washington Mine of the Alan Wood Mining

Company) and is only a fraction of the potential production of the six modernly equipped mines in Warren, Morris and Passaic Counties.

Though the Mt. Hope Mine was closed throughout the year, a small amount of ore was shipped from stock accumulated at the mine.

There was little activity at most of the closed mines, but at the Scrub Oak Mine the lull in production was utilized to replace some of the old milling equipment with a new and highly efficient type of wet, magnetic concentrator recently developed by the Dings Magnetic Separator Company and Robert E. Crockett, General Superintendent of the Scrub Oak Mine.

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

Shipments from 1870 to 1932 inclusive	25,666,361 gross tons
Shipments in 1933	73,385
Total shipments	25,739,746 gross tons

STONE

The continued low rate of building activity led to a further decline in the value of stone produced, the total amounting to \$1,282,547, as compared with \$1,743,362 in 1932. The production of trap rock amounted to less than a million tons for the first time since 1906 when separate statistics of the production of trap rock were first compiled. The production of all other stone declined proportionately. A slight stiffening of prices was noted near the end of the year as a result of code regulations, but the average price received: namely, \$1.16 a ton, was only one cent greater than in 1932.

Only 35 quarries operated in 1933 but it is a pleasure to record that one of these is a new operation: to wit, a granite quarry opened by George Davey of Haskell under the name Haskell Granite Company.

Except for trap rock, so few quarries were operated that in order to conceal production of individual concerns the entire output of all other varieties of stone has been grouped under one heading, "Other stone." Total production in 1933 and 1932 is given in the following brief table:

TOTAL PRODUCTION OF STONE IN 1933 AND 1932

Kind	No. of quarries		Production in short tons		Value in dollars	
	1933	1932	1933	1932	1933	1932
Trap rock	26	28	964,760	1,351,773	1,037,649	1,431,895
Other stone ...	9	9	136,642	163,030	244,898	311,467
Totals	35	37	1,101,402	1,514,803	1,282,547	1,743,362

Trap rock. Although most of the quarries operated in 1932 were continued in operation the following year, production was at a still smaller percentage of total capacity. If we estimate the latter at

2,925,109 tons, the actual production in 1928, then the average quarry was operated at only 33 per cent of capacity. The price-cutting so prevalent in 1932 was, however, not carried farther; for the average price received for a ton of trap rock increased two cents to \$1.08 a ton.

The quarry of the Preen Crushed Stone, Sand and Gravel Company at Oldwyck, Hunterdon County, which was idle in 1932, was reopened in 1933. All other quarries reported as idle in 1932 were also idle the following year, and in addition the quarry operated by the Cliffside Trap Rock Company at Cliffside, Bergen County, was temporarily closed.

The large quarry and plant of the Kingston Quarry Company, located beside the Delaware and Raritan Canal between Kingston and the village of Rocky Hill, were sold early in the year to the Kingston Trap Rock Company. The quarry at Little Falls operated for many years by W. A. Ferguson's Sons, Inc., and more recently by the Totowa Production Company, was sold on September first to the Passaic County Quarry Company.

Detailed statistics of the production of trap rock in 1933 and 1932 are given in the following table:

PRODUCTION OF TRAP ROCK IN 1933 AND 1932

Use	Quantity in short tons		Value in dollars	
	1933	1932	1933	1932
Concrete	551,350	995,158	618,889	1,068,358
Road metal	364,566	240,798	372,887	244,450
Railroad ballast and other uses ...	48,844	115,817	45,873	119,087
	964,760	1,351,773	1,037,649	1,431,895

Other stone. The only limestone sold commercially in 1933 came either from the large quarry near Newton operated by the Limestone Products Corporation of America, or from the smaller operation conducted by M. C. Mulligan and Son at Clinton. The first-mentioned company produces chiefly high-calcium rock from the white, crystalline, Franklin limestone. The quarry at Clinton is in the Kittatinny Limestone, the so-called "blue" limestone which extends from the State of New York to northern Alabama and is the source of much of the limestone quarried in the eastern part of the country. Although this great formation contains thick beds of pure limestone in other states, in this State the beds are prevailingly magnesian and hence not suited for many purposes for which a pure calcium carbonate is wanted. The rock quarried at Clinton is used chiefly in road work, although small quantities are sometimes sold for fluxing or as an aggregate for concrete.

The two granite quarries operated in 1933 are both located in Passaic County and are within a mile and a half of each other as the crow flies. One of these, located on the Hamburg Turnpike between Pomp-

ton Station and Bloomingdale, and owned by the Pompton Crushed Stone Company, is a large quarry equipped with a modern crushing and screening plant for the production of graded, crushed stone. This quarry has been in continuous operation every year for the last two decades. The other, located on the northernmost nose of the hill lying west of Pompton Junction and north of Riverdale, is an old quarry which has been recently re-opened by George Davey of Haskell. According to Mr. Davey, the Catholic Church in Butler is built of stone quarried at this location some thirty years ago. The rock now exposed is a banded granite-gneiss of variegated color, the banding of which dips 60 to 65° southeast. It is broken by fractures at intervals of 2 to 4 feet which bear N45 to 55°W (magnetic), and dip 80 to 90° southwest. Low-angle fractures are rare—a circumstance which permits the quarrying of fairly large blocks when needed. The rock is predominantly gray, but some layers are pinkish and others a dark greenish-gray; hence considerable variation in color is afforded the prospective purchaser. Rock from this quarry has been used recently in the construction of a stone house in Haledon, in numerous walls and foundations in and near Paterson, and in the base of a memorial flagpole to be erected by the Pennsylvania Washington Crossing Park Commission at the foot of Bowman's Hill in Buck's County, east of Doylestown.

Not a ton of *sandstone* was reported to have been quarried in 1932, but in 1933 reports were received from Closter Stone Quarries, Inc., and from the Thomas Proctor Company, Inc. The former company operates a quarry in light-colored, arkosic sandstone on the back slope of the Palisades ridge in northern Bergen County. Some of the stone is cut to shape and most of it is used in building construction. According to the report received from this company for 1933, stone from the Closter quarry was used in the construction of the West Side Presbyterian Church in Englewood in 1930, the residence of C. L. Dennison in Saddle River in 1931, the Guttenberg German Lutheran Church in 1932, and in many small houses in northern New Jersey in 1933. The quarry of the Thomas Proctor Company is located at Raven Rock and was formerly operated by Charles Eastburn. The sandstone is quarried in large blocks for use in sea-walls and jetties.

One of the oldest active quarries in the State is the Lizzie Clay quarry of the Rock Products Company, located just north of Marble Mountain in Warren County and just east of Delaware River. The rock quarried is Franklin limestone which has been metamorphosed, or altered, to talc and serpentine (*verde antique marble*). In 1933, as in many prior years, the Rock Products Company reported sales of ground *talc*, and of *verde antique marble* in the form of rough blocks and *terrazzo*.

Lawrenceville Quarries, Inc., reported the sale of some *argillite* for use in the construction of buildings and foundations, but the demand was

PLATE II.



A. Part of the quarry operated by the Haskell Granite Company southwest of Haskell, Passaic County.



B. View to show use of "ironstone" at Stone Church, Monmouth County.

PLATE III



A. Quarry of the Berkshire Silica Company near Wharton.



B. Shipping molding sand by barge from Dorchester, Cumberland County.

NEW JERSEY GEOLOGICAL SURVEY

not large. The argillite quarry operated by Princeton Quarries, Inc., was reported as inactive throughout the year.

Some of the possible uses for the "ironstone" (ferruginous sandstone and conglomerate) which caps many of the high hills in eastern and southern New Jersey are well illustrated in the view of All Saints Episcopal Church given in Plate II. As shown in this photograph the stone has been used in walls, a road curbing, and in the construction of the church itself. Since deposits of this stone are highly irregular and seldom very large, production is usually undertaken only by farmers and local building contractors; consequently statistics of the actual yearly output are practically impossible to obtain and cannot be included in the general summary of stone produced. As a matter of observation over a number of years, however, the writer is confident that in a year of normal building activity several thousand tons of such stone is used for one purpose or another.

SAND AND GRAVEL.

Developments in the sand and gravel industry in 1933 were about in line with expectations. Production declined 22 per cent from the preceding year, and the value of that production 18 per cent. Since the average price received for gravel was almost the same as in 1932—96 cents as compared with 95 cents—the increased value per ton of material sold was largely due to the higher prices asked for the various grades of sand.

Reversing the trend established in the previous year, the number of active pits declined from 101 to 89.

PRODUCTION OF SAND AND GRAVEL IN 1933 AND 1932

Products	No. of pits		Quantity in short tons		Value in dollars	
	1933	1932	1933	1932	1933	1932
Glass sand	4	5	121,418	119,185	189,473	163,252
Molding sand	27	28	235,418	150,579	233,177	164,488
Structural sand	45	57	843,674	866,061	472,862	488,385
Paving sand	26	37	298,143	655,120	162,641	351,075
Grinding, polishing & blast sand	6	7	12,821	15,395	27,155	25,886
Fire or furnace sand	9	4	16,517	5,911	18,326	7,573
Engine sand	6	5	17,353	25,939	7,186	11,208
Filter sand	3	4	8,395	11,273	23,153	25,944
Other sand	10	13	47,956	61,226	52,482	53,327
Total sand			1,601,695	1,910,689	1,186,455	1,291,138
Structural gravel	32	41	324,726	390,548	353,004	428,883
Paving gravel	22	30	120,724	326,827	78,831	251,761
Railroad ballast & other gravel	6	9	17,115	18,026	18,116	21,499
Total gravel			462,565	735,401	449,951	702,143
Total sand and gravel	89	101	2,064,260	2,646,090	1,636,406	1,993,281

It will be noticed that although only 4 pits produced glass sand, as compared with 5 in 1932, total production was increased slightly and the sales value was bettered by 16 per cent. Since the consumption of glass bottles used as food and medicinal containers is fairly stable, the increased business is probably due largely to the repeal of prohibition. The most marked increase in sales, however, was in sales of molding sand, which advanced 56 per cent, or from 150,579 tons in 1932 to 235,418 tons in 1933, as a result of the greatly increased activity in the iron industry. Sales of structural sand and gravel declined slightly, and sales of paving sand and gravel were greatly reduced as a result of the curtailment of road building and maintenance.

Burlington County maintained its lead as the most important producer of sand and gravel, the value of its production again topping that of all other counties. In addition, it climbed from third place to first in the amount of production. Production from both Middlesex and Morris Counties slumped greatly, whereas production from Cumberland was considerably increased. As a consequence the latter county climbed from sixth to second rank in the amount of production, and retained its position as second only to Burlington County in the total value of its products. The relative ranking of the five counties with largest production are as follows:

<i>County</i>	<i>Production in short tons</i>	<i>Rank</i>	<i>Value in dollars</i>	<i>Rank</i>
Burlington	439,367	1	410,557	1
Cumberland	344,544	2	398,767	2
Middlesex	262,059	4	184,463	3
Camden	261,101	5	178,852	4
Morris	273,467	3	165,873	5

Many changes occurred in the list of producers. The Cedar Grove Sand and Gravel Company of Cedar Grove, Essex County, was purchased and is now operated by Burton-Canfield, Inc. The North Jersey Sand and Stone Company of Carpentersville, Warren County, was succeeded by the Warren Sand and Stone Company in which Gallo Brothers of Netcong have an important interest. The large, new plant of the Morris County Sand and Gravel Company, located between Netcong and Budd Lake and erected in the latter part of 1930, was operated by receivers in 1933 and offered for public sale in 1934. In addition to those already mentioned, the following are new names on the list of producers:

<i>Name</i>	<i>Pit location</i>
Concrete Products Co.	Atlantic County.
Atlantic States Construction Co.	Tansboro, Camden County.
Berkshire Silica Co.	Wharton, Morris County.
H. J. Hinchman	Preakness, Passaic County.

When visited in the summer of 1932, the Atlantic States Construction Company was producing a fine grade of washed white sand from the Cohansy formation, the same sandy formation from which all the glass sand now being dug is obtained. The sand was pumped by a dredge from below water level to screens where the oversize was removed, and then to dewatering cones over concrete storage tanks. The drained sand is sold chiefly for use as plasterer's sand, but some is also sold for use in concrete, and a little is sold to foundries and to golf clubs for use in bunkers.

The Berkshire Silica Company (see plate III, opposite page 11) operates a quarry and crushing plant adjacent to the main line of the Delaware, Lackawanna and Western Railroad and about a mile and a half west of Wharton. Though the raw material utilized is a quartzite rather than a sand and gravel deposit, the rock is greatly sheared and broken and is sold mostly as a finely-crushed product for use in foundries and filters, as roofing granules, and for cement flux. The rock is a part of the Green Pond formation and is highly silicious, a random sample analyzing 95.78 per cent silica. Most of the rock is white in color, but some of it is stained a light pink by hematite. That the staining is accomplished by a very small percentage of iron, however, is shown by the fact that a grab sample which included a proportionate part of this pink rock analyzed only 0.68 per cent Fe_2O_3 .

The plant at Hoffman Station, Middlesex County, operated by Fred Hause under the name Hause Sand and Gravel Company has been abandoned, and the Palermo pit of the Champion Sand and Gravel Company is reported as "closed down." Operators of eleven other pits reported them as temporarily idle, or failed to make a report.

CLAY

The improvement in the pottery and iron industries in 1933 was of considerable benefit to clay producers but was largely counter-balanced by the lack of demand from the building trades. Total sales of clay reported by New Jersey producers amounted to 57,760 tons, a decline of 7 per cent from the figure for 1932; but the value of sales increased 4.5 per cent to \$259,816. Most of the increased value was due to the higher prices received for fire-clay, the average price per ton advancing from \$4.34 to \$4.58. Sales of stoneware clay increased slightly in total value, but the price per ton declined \$1.19 or nearly 23 per cent. How much of the improvement in fire-clay prices was translated into profits is problematical, for costs may have risen in proportion. In one respect, unquestionably, costs must have mounted; for during part of the year the producers operated under a governmental code and the cost of administering that code had to be borne by the concerns operating under it.

Kind of clay	No. of Pits		Production in short tons		Value in dollars	
	1933	1932	1933	1932	1933	1932
Fire clay	25	27	48,307	49,370	221,241	214,478
Stoneware clay	4	9	3,873	2,870	15,750	15,113
Ball clay and miscellaneous	9	7	5,580	9,874	22,825	18,991
Totals			57,760	62,114	259,816	248,582

Twenty-eight separate pits were operated during at least part of the year. The Atlantic Terra Cotta Company reported that its Woodbridge pit was temporarily closed, and the pit near Trenton formerly operated by the Moon Clay and Kaolin Company has been leased to Joseph Cugliotta of Burlington.

BRICK AND TILE.

Though the total value of all brick and tile products increased nearly 28 per cent from the low point reached in 1932, not all manufacturers fared equally. The manufacturers of common brick, for example, actually produced 21 per cent less brick in 1933 than in 1932, whereas manufacturers of refractory brick, block and tile increased sales by 52 per cent. Sales of special shapes declined slightly, as did sales of raw and prepared clay. Sales of refractory clay cement declined 29 per cent; but sales of tile apparently increased sharply. The tabulated statistics compiled by the U. S. Bureau of the Census follow:

BRICK AND TILE PRODUCED IN 1933 AND 1932

Products	Quantity produced		Value in dollars	
	1933	1932	1933	1932
Common brick	45,691 M	57,790 M	453,395	472,886
Fire-clay products:				
Brick, block or tile	5,514 M	3,809 M	265,263	174,595
Special shapes	7,476 t	8,551 t	213,198	223,388
Hollow building tile		101,062 t	(a)	655,335
Floor tile		864,220 sq. ft.	(a)	160,553
Wall tile		1,136,489 sq. ft.	(a)	320,452
Refractory cement (clay)	4,483 t	5,562 t	165,494	233,217
Clay sold raw or prepared	1,803 t	2,090 t	16,667	19,460
Other clay products			1,772,720	
Total value			2,886,737	2,259,886

(a) See "Other clay products."

M=Thousands.

t=short tons.

There have been many changes in the ownership of brick and tile plants in recent years, but as these are not reported to the Department of Conservation and Development, the full list cannot be given here. Changes ascertained by the writer in the course of field work follow:

Architectural Tile Company of Keyport has been succeeded by the Architectural Tiling Company.

Enterprise Brick Works, Mountain View, has not operated since 1932 and probably will not be reopened.

Independent Brick Company, Trenton, is no longer in business.

Maple Shade Brick Company, Maple Shade, has not operated for several years and probably will not be reopened.

The property of the Mountain View Brick Co., Mountain View, has been sold at public auction and it is very doubtful if the plant will ever be reopened.

The Perth Amboy plant of the Rossman Corporation is now operated by the Perth Amboy Tile Works.

The Old Bridge plant of the Rossman Corporation has been sold to the O-B Company.

The plant of the Woodstown Pressed Brick Company at Oakland, Salem County, has been acquired by the Standard Face Brick Company of Woodstown.

POTTERY.

The value of pottery products manufactured in 1933 increased sharply as compared with 1932, yet in this industry also not all manufacturers fared alike; for whereas the production of vitreous china plumbing fixtures was very much improved, the production of red earthenware and saggars was at almost the same level as in 1932. In spite of the improved picture presented by the industry as a whole, production was still only 28.4 per cent of that in the four-year period from 1923 to 1926, and only 80 per cent of that in the three year, pre-war period, between 1911 and 1914. Moreover, many potteries are still closed and each year that passes lessens the chance of their reopening.

Detailed statistics of the production of pottery in New Jersey in 1933 and 1932 are given in the table on page 16.

GREENSAND MARL

Most of New Jersey's producers of greensand marl did less business in 1933 than in 1932, but in spite of a 27 per cent decrease in total production the value of sales increased 3.4 per cent. This apparent anomaly is largely explained by the fact that Charles C. Colson of Mullica Hill did not dig any marl in 1933, whereas statistics for the previous year included a considerable tonnage of low-cost marl sold by Mr. Colson for use as fertilizer.

The writer here wishes to make a correction. In the previous report on the mineral industries of New Jersey¹ the statement was made that all the active marl pits in the State are in the Hornerstown formation.

¹ Johnson, Meredith E., *The Mineral Industry of New Jersey for 1932*: N. J. Geol. Survey, Bul. 41, 1934.

That is literally correct but slightly misleading in that one company, the Inversand Company, also utilizes marl from the underlying Navesink

POTTERY MANUFACTURED IN 1933 AND 1932

Products	Number of pieces		Value in dollars	
	1933	1932	1933	1932
Vitreous china plumbing fixtures:				
(a) Bathroom and toilet fixtures				
Closet bowls:				
Siphon jets	21,831	34,202	146,314	252,569
Washdowns	227,236	119,067	793,587	426,919
Reverse traps	15,701	14,514	85,602	72,275
Flush tanks	205,468	135,187	844,020	583,321
Lavatories	27,051	46,113	340,520	537,762
Other bathroom and toilet fixtures			297,177	390,879
(b) Other vitreous china fixtures			346,139	165,780
Semivitreous or porcelain (all clay) plumbing fixtures:				
Laundry tubs and kitchen sinks	18,810		172,216	
Other			411,598	
Red earthenware			59,854	58,810
Porcelain electrical supplies ...			1,743,574	1,257,779
Saggers			19,711	19,160
Other pottery products			1,739,441	498,007
Total value			6,999,753	4,263,261

formation. At Sewell, near which town the company's pit is located, the Hornerstown marl directly overlies the Navesink because of the erosional unconformity which here separates the Cretaceous formations (including the Navesink) from the Eocene. To the northeast, in Monmouth County, the two marl beds are separated by as much as 130 feet of reddish-brown sand, (the Red Bank formation) and 30 feet of consolidated clay marl (the Tinton loam); but a slight warping of the earth's crust at the close of the Cretaceous period elevated the sediments to the southwest more than those to the northeast, and consequently the forces of erosion were more active in the former region. The economic result of this geologic phenomenon is that a marl has been made available, which, according to those using it, is definitely harder than the overlying Hornerstown marl, and hence in less subject to wear and disintegration when used in water-softening apparatus. Through the courtesy of the officers of the Inversand Company, the New Jersey Geological Survey and the State Museum were informed of the discovery and permitted to remove the bones of a crocodile and a large turtle which were uncovered by digging operations in the basal part of the Hornerstown formation. Invertebrate fossils associated with the bones definitely established their age as Eocene and this afforded scientists additional information concerning the character of the life which existed in that period. Though the layman may be more intrigued by the great age—millions of years—attributed to these fossil remains, their real value lies in the possibility

PLATE IV.



A. Greensand marl pit and treating plant of the Hoffman-Caps Chemical Company at Evansville, Burlington County.



B. Plant erected by J. G. Marcrum to dry and pulverize the diatomaceous earth from a deposit just west of Lake Musconetcong.

of correctly dating other geologic formation in distant lands where similar fossils may be unearthed. Only through the recognition of age relationships can the complicated history and geologic structure of the formations in certain regions be solved, and it is the solution of such problems that often provides the key to the location of valuable mineral resources.

OTHER PRODUCTS

Lime. There is little to report in connection with the lime industry. Only two producers were active, these being the Peapack Limestone Products Company whose kilns are at Peapack, and Henry and John H. Kinkle of Stewartsville, Warren County. Total production was substantially greater than in 1932.

Portland cement. The whole cement industry continued in the doldrums in 1933 as a result of curtailed highway programs and the very small amount of private construction. In New Jersey, the plant of the Edison Cement Corporation at New Village was operated for short periods as conditions warranted, but the plant of the Vulcanite Portland Cement Company was closed throughout the year. The plans, first announced some two years ago, for the operation of another cement plant at Piscataway under the name of Metropolitan Cement Corporation, were held in abeyance in view of the continued small demand for cement.

In the fall of 1932 the Edison Cement Corporation was faced with a rather alarming situation when a blast in the northeast corner of the quarry at New Village opened a fracture in the limestone which poured forth a veritable torrent of water. Fortunately the quarry is a large one and consequently there was no danger to the workmen as the water simply spread out as a thin sheet in the lower part of the quarry and the prompt installation of additional pumps of large capacity quickly relieved the situation. It was believed at first that the torrent of water might affect nearby water-supplies, but observation of the water level in wells and nearby abandoned quarries has definitely shown that the effect, if any, has been very slight; and that at a distance of three-fourths of a mile the fluctuations of the water-table due to seasonal variations in the precipitation are far greater in magnitude than any change caused by the flow under discussion.

Pulverized sand. Though not sensational, the improvement in the market for pulverized sand in 1933 was doubtless very welcome to the producers of that product. The amount of production actually increased by 14.2 per cent, and its value by 7.2 per cent. Production was reported by two mills in Trenton; by the National Pulverizing Company, whose plant is located near Manumuskin, a few miles southeast of Millville; by the New Jersey Pulverizing Company, whose plant is at Pinewald, Ocean County; and by the Pennsylvania Glass Sand Corporation, whose plant is between Newport Station and Dividing Creek Station

in Cumberland County.

By far the most important development in this industry in recent years has been the filing of numerous claims for damage against the operators by employees claiming to have suffered serious injury from the inhalation of silica dust. According to a statement made at the annual meeting of the American Institute of Mining and Metallurgical Engineers in February, 1934, such suits were costing the operators of silica grinding plants in New Jersey \$10 per \$100 of payroll for settlement, although this risk is supposed to be covered by an insurance rating of \$1.46 per \$100 of payroll¹. That employees should be protected from dust which might be permanently injurious to their health and amply compensated for injuries so sustained is a matter which few would care to dispute; but the wholesale manner in which such suits have been filed recently leads one to suspect that not all of these claims may be just. The difficulty of ascertaining the cause of many pulmonary ailments and the date of inception of the trouble make it difficult for even intelligent juries to decide the justice of many claims. For example, experts still disagree as to the cause of silicosis, some believing that it is due to poisoning caused by solution of silicious particles; others, that it is caused merely by the accumulation of the dust in the lungs; and still others, that it is caused by a fine-sized mica, sericite, and not by uncombined silica. It is to be hoped that studies now being made in several parts of the world will soon shed sufficient light upon the subject to enable justice to be done to all concerned.

Non-clay and miscellaneous clay refractories. Under this heading are included items not listed separately in the discussion of brick and tile products manufactured in 1933 and reported to the U. S. Bureau of the Census. Since the items included vary from year to year the figures for the combined value of the production in different years are not strictly comparable. If we add the value of this production to that of the pottery and the brick and tile, we find that in 1933 the total value of all clay products (including a small amount of non-clay refractories) was \$10,869,450, as compared with \$10,850,247 in 1932. This is a gain of less than two-tenths of one per cent, and is probably a fair index of the relative stagnation of the industry in both 1933 and 1932.

By-product coke. The lowering of prices by anthracite dealers in 1933 was naturally met by producers of by-product coke, and the value of their production therefore decreased a little in spite of a small increase in the amount of the production. Although some coke is sold for foundry and other industrial uses, and considerably more for the manufacture of water gas, the bulk of sales is to domestic users and the demand from this source has held up remarkably well during all the depression.

¹ Rock Products; p. 56, April, 1934.

Diatomaceous earth. Between 50,000 and 100,000 tons of diatomaceous earth is used annually in this country as a clarifying agent in sugar refineries, as an insulating material, as a filler in battery boxes, and, quite recently, in concrete. It is also used in lesser amount in abrasives. Because most of the production comes from California and other western states, the price of approximately \$15.00 a ton necessarily includes the cost of transporting the product from California to the eastern seaboard. Hence there is strong inducement for the utilization of eastern deposits where the quality of the material is of suitable grade. One such deposit has been found in Herkimer County, New York and recently another deposit west of Lake Musconetcong in northern New Jersey has been prospected by J. G. Marcrum of Netcong. According to Mr. Marcrum the deposit covers an area of 40 acres and has an average thickness of five feet. It is normally overlain by several feet of peat although this cover has already been stripped from an area of several acres. The earth is greenish-gray when freshly dug and contains a high percentage of water and organic matter. For this reason it is Mr. Marcrum's plan to stack the material and allow much of the moisture to drain away. It will then be calcined in a vertical kiln (see Plate IV, facing page 16) and this will be followed by an additional roasting in an oil-fired rotary kiln to remove the remaining moisture and the organic material. Though the plant was not yet in commercial production when visited in April, 1934, it was expected to be in operation before the end of the year.

GROUND-WATER SUPPLY.

In March, 1934, a large group of the water-well drillers of New Jersey met near Somerville and voted into existence the New Jersey Water Well Drillers Association. Thus New Jersey drillers joined the ranks of 17 other states in forming an association for their mutual benefit and for the improvement of their relations with the public. It is to be hoped that these men will make the most of their opportunity to profit through the interchange of experience and the discussion of mutual problems. By adhering to high standards in all work undertaken they can make the name of their association a synonym for good work and a recommendation in the eyes of prospective customers. And by the adoption of laws for the expulsion of members found guilty of dishonest work they can preserve a reputation for good work once it is earned.

There was slightly more than the usual precipitation in 1933 and ground-water supplies, which had been greatly depleted in the period from 1929 through September, 1932, were fully replenished. This replenishment, together with the continued lull in industrial activity and building operations, led to a greatly curtailed demand for new wells and drilling contractors for the first time were made to feel the

full brunt of the depression. With insufficient work to go around, price-cutting became more and more prevalent and it was this evil more than anything else which finally led to the organization of the New Jersey Water Well Drillers Association.

