REPORTS OF THE

DEPARTMENT OF

CONSERVATION AND DEVELOPMENT

STATE OF NEW JERSEY

HENRY B. KÜMMEL, State Geologist and Director

BULLETIN 41

Geologic Series

THE MINERAL INDUSTRY OF NEW JERSEY FOR 1932

Compiled by

MEREDITH E. JOHNSON

Assistant State Geologist

Published 1934

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CHARLES P. WILBER, *State Forester, and Chief of the Division of Forests and Parks.*

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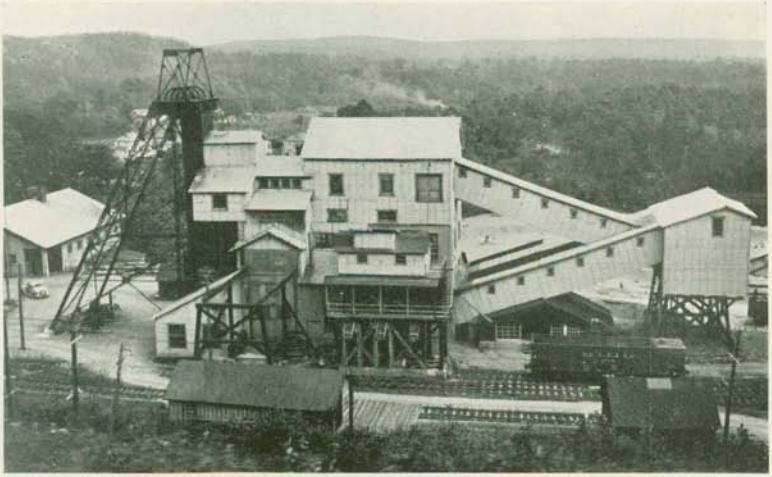


B. *Mill and headframe at the Richard Mine of the Thomas Iron Company. Beyond is Lake Hopatcong.*

THE MINERAL INDUSTRY OF NEW JERSEY FOR 1932

By MEREDITH E. JOHNSON
Assistant State Geologist

This report is one of a series published by the State Department of Conservation and Development. It presents statistics of the production of mineral commodities in New Jersey in 1932 and comparable figures for previous years. The data for the report were furnished by the mineral producers of the State, and for a majority of the industries, 100 per cent of the production is represented. This fine record of voluntary cooperation has made possible the presentation of figures which are believed to be as complete as those from any other State in the Union.

The work of collecting and compiling much of the data for this report was done in cooperation with the Bureau of Mines of the United States Department of the Interior. Statistics relating to the brick, tile and pottery industries were obtained through the courtesy of the Bureau of the Census of the United States Department of Commerce.

SUMMARY OF THE MINERAL PRODUCTION IN 1932.

The prediction made in a press release dated March 30, 1933, that the total value of the mineral production in New Jersey in 1932 would be approximately $30,000,000, came very close to the mark. Final figures show that the actual total was $29,950,976, a decrease of more than $20,000,000 from 1931 and the smallest amount recorded since 1909. The best that can be said for the year 1932 is that it represents a nadir of industrial activity which one must look back upon with feelings of relief that it is past. The stagnation of industry was so complete that only one iron mine was operated, and it for only a few months. Many potteries were closed throughout the year, and the others operated on very curtailed schedules. The one bright spot in the general picture of declining production was the small increase in the output of greensand marl. The ability of this small industry to run counter to the general trend is based upon the fact that a large proportion of the marl produced is used for water softening, and since the fluctuation in consumption of water is small, the demand for water softening agents is relatively stable. Details of the production of each of the mineral industries in 1932 and 1931 are given in the following table and the ensuing text.

MINERAL PRODUCTION IN NEW JERSEY IN 1932 AND 1931

Products	No. of operations/a 1932	No. of operations/a 1931	Quantity Short or long tons 1932	Quantity Short or long tons 1931	Value in dollars 1932	Value in dollars 1931	Per cent increase or decrease Tonnage	Per cent increase or decrease Value
Zinc ore	b 2	b 2	559,651 s. t.	640,560 s. t.	(c)	(c)	—12.6	
Iron ore (shipped)	1	5	30,844 l. t.	239,722 l. t.	(c)	984,021	—87.2	
Stone	37	43	1,514,810 s. t.	d 2,474,253 s. t.	1,743,362	d 3,110,377	—38.8	—43.9
Sand and gravel	101	97	2,646,090 s. t.	4,329,994 s. t.	1,993,281	3,433,176	—38.9	—41.9
Clay (sold raw)	29	32	62,114 s. t.	135,537 s. t.	248,582	515,821	—54.2	—51.8
Brick and tile					e 2,259,886	9,102,906		
Pottery					4,263,261	11,257,406		—62.2
Greensand marl	6	5	9,231 s. t.	8,252. s. t.	201,172	196,327	+11.9	+2.5
Other products								
Lime	3	1						
Portland cement (shipped)	2	2						
Pulverized sand	5	4			19,241,432	21,696,277		
Non-clay and miscellaneous clay refractories f								
By-product coke g	2	2						
Zinc ore	See above							
Iron ore h	See above							
Total value					29,950,976	d 50,296,311		—40.4

a. Number of mines, quarries, pits or plants as the case may be.
b. Previously listed as one operation. Actually, two separate mines operated by one company.
c. Value included in "Other products".
d. Revised figure.
e. In order to conceal the figures of individual producers a part of the total was included with non-clay refractories.
f. Figure for 1931 does not include the value of any clay refractories.
g. Raw material from other states.
h. Value of 1931 production is given separately.

The ruinously low prices at which zinc was sold in 1932 (i.e. the price of prime western spelter at St. Louis averaged only 2.88 cents a pound for the year) offered little encouragement for the mining or smelting of zinc. Nevertheless the mines of the New Jersey Zinc Company at Franklin Furnace and Ogdensburg, strategically located near the center of the great eastern industrial markets, were operated throughout the year and provided steady employment for several hundred men. The rate of production was slackened a little, the volume of ore mined being 12.6 per cent less than in 1931; but even so, the estimated mine production of recoverable zinc amounted to 81,460 tons, or 28.6 per cent of the entire producton of primary zinc in the United States.[1] This output exceeded the production of all zinc mines in Oklahama by 18,000 tons, and was more than twice as great as that from any other state.

The history of the development of the ore-bodies at Franklin and Ogdensburg is most interesting. According to a report submitted to the president of the New Jersey Zinc Company by A. C. Farrington in 1852, ".....They (the mines of the company) were known, and extensive mining operations were carried on, before any permanent settlements were made by the whites, in their immediate neighborhood; as several shafts and galleries still remaining on Sterling Hill, clearly prove. These old works, from the fact that Lord Stirling was once the owner of the lands upon which they are situated, have been attributed to him. The time Lord Stirling became the owner has not been ascertained, but an original survey of the tract made in 1749, describes "the old mine holes". A section has been taken from the remains of a red cedar, that has grown in one of the pits since the working was abandoned, and it proves that period to have been more than one hundred and twenty years ago. In 1755, an old mining pick was found in one of the galleries by a hunter, who subsequently settled in the vicinity, and has a son, now a very aged man, living in the county.

"It is a fact pretty well established by tradition, and slightly corroborated by history, that about 1640, while New York was held by the Dutch, a colony of miners, from the Duchy of Nassau, settled on the Minisink flats, upon each side of the Delaware river, and worked the copper mines at Paquarrhy, sending their mineral to the Hudson river, at Esopus, now Kingston. The zinc mines are situated in almost a direct line between Kingston and Paquarrhy, and from their prominent position would have attracted the attention of persons acquainted with mining; but if the large amount of labor that was performed here was by these old German miners, it would be interesting to know for what object they mined, as the remains of their work shows it was not zinc they sought, for their excavations

[1] Minerals Yearbook 1932—1933, U. S. Bur. of Mines, p. 73, 1933.

were not on the zinc vein. Lord Stirling caused a large quantity of the Franklinite ore to be mined, and taken to the Charlottenburg Furnace, of which he was a proprietor; but the attempt to smelt it as an ore of iron, proved unsuccessful, and most of the ore, removed at a great expense over mountain roads, ninety-five years ago, may now be seen at Charlottenburg."

Lord Stirling also mined some of the red ore (zincite), apparently in the belief that it was an ore of copper, and in 1774, shipped several tons of it to England. Between that date and 1810 the Mine Hill ore deposit came into the possession of Edward Sharp, for it is a matter of record that in the latter year he sold it to John Odell Ford and Dr. Samuel Fowler. The latter purchased Ford's interests in 1816–1817 and about the same time purchased the Ogdensburg deposit from his wife's relatives. Dr. Fowler was convinced that the unique ore deposits in his lands should be of great value and energetically sought to devise processes for using them and to interest others in their development. Although his efforts were unsuccessful from a financial standpoint, it was work done on his behalf which first pointed the way to the use of zinc oxide as a pigment. In 1836, a few years prior to his death, Dr. Fowler sold his land and mineral rights, but these were subsequently repurchased by his son, Colonel Samuel Fowler, who, in 1849, sold the Sterling Hill tract to The New Jersey Exploring and Mining Company—the fore-runner of the New Jersey Zinc Company—which, by 1852, was successfully manufacturing zinc oxide paint from zincite. The New Jersey Zinc Company acquired the right to mine zinc ore from a part of the Mine Hill deposit in 1851 and since that date mining operatons at Franklin have been continous—a record for longevity which, insofar as the writer can determine, is far greater than that of any other zinc mine in the country.

IRON ORE

The stagnation of the entire iron industry in 1932 and its revival in the late spring and summer of 1933 are now history. Of particular interest to the citizens of New Jersey is the fact that four of the five iron mines which had operated in 1931 were idle throughout 1932. The one mine still operating at the beginning of the year—the Mount Hope Mine of the Warren Foundry and Pipe Corporation—closed down after operating only a few months. The inactivity of the mines, however, was in some respects a blessing in disguise; for it enabled the various managing officials to give time to a study of improving methods of operation which unquestionably will lengthen the life of the mines through lowered costs and greater recoveries. Several valuable papers, incorporating the results of some of the work done, were read at the February, 1933, meeting of the American Institute of Mining and Metallurgical Engineers. One of these told of a microscopic examiniation of iron ore from an

un-named mine in northern New Jersey which demonstrated clearly the size to which the ore must be crushed (48 mesh) in order to seperate apatite (the source of phosphorus in the ore) from magnetite. It also showed that the apatite is associated only with the magnetite, and not with the martite, the other iron-bearing mineral present in the ore. Another paper described a new and greatly improved type of wet, magnetic concentrating machine; and a third, the "Mining Methods and Costs at the Washington Mine of the Alan Wood Mining Company". The latter paper gave interesting details of improved mining practices, as well as valuable cost data. Other papers described the mining and milling of ore at the Scrub Oak Mine of the Alan Wood Mining Company and the same information subsequently was given in greater detail in the April, May, June and July, 1933, issues of the Engineering and Mining Journal. Mining methods and costs at the Mount Hope Mine are given in Information Circular 6601 of the U. S. Bureau of Mines, published in April, 1932.

The papers and reports cited bring out the interesting fact that whereas a few years ago a production of seven tons per man-shift was considered the peak of mine efficiency, today both mines of the Alan Wood Mining Company are capable of producing more than eleven tons per man-shift, and it is probable that this figure will be improved under full operating conditions.

Another interesting fact made public is that a diamond-drilling campaign at the Scrub Oak Mine has developed sufficient reserves to provide for at least 15 years of operation at the rate of 500,000 tons of crude ore per year.

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

Shipments from 1870 to 1931 inclusive..	25,635,517 gross tons
Shipments in 1932	30,844 gross tons
Total shipments	25,666,361 gross tons

STONE

The decline in the production of building and crushed stone which began in 1930 with a decrease of only 10 per cent in its value as compared with 1929, was accelerated in 1931 to 20.5 per cent (compared with 1930), and reached a climax in 1932 with a drastic cut of 43.9 per cent. Total sales amounted to only $1,743,362, whereas in 1929 the sales of trap rock alone amounted to more than $3,650,000, and total sales were $4,025,637.

Although all stone producers were forced to curtail their operations to some extent, the sandstone quarries seem to have been hardest hit, for no sales whatever were reported in 1932. This is probably the first time in more than a hundred and fifty years that at least one sandstone quarry has not been operated in New Jersey. In 1908 when annual, systematic reports of the stone industry were first begun

by the New Jersey Geological Survey, a dozen or more quarries were operated and the value of the production (including some argillite and quartzite) was $154,422. In 1868 Cook[1] listed some 20 active quarries and estimated the production of the North Belleville quarries alone as about 60,000 cubic feet a year. He also stated that "the red sandstone in the vicinity of Newark has been used as a building stone ever since the first settlement of the country. The first Presbyterian Church, which was built in the last century, and for a long time was the largest church in the State, was built of this stone, and still is a conspicuous sample of its good qualities." Time has shown that not all of the sandstone quarried in the nineteenth century was of equal quality, for some of it spalled rather badly; but selected stone appears to resist weathering fairly well and it is to be hoped that the future will see a re-awakening of interest in this former structural favorite. Though lacking some of the advantages of brick and concrete, it nevertheless possesses a dignity and solidity which is seldom achieved by modern substitutes for building stone.

A reduction in the number of limestone quarries operated has necessitated the grouping of statistics of that stone with similar statistics relating to the production of argillite, marble and talc.

TOTAL PRODUCTION OF STONE IN 1932 AND 1931

	No. of quarries		*Production—short tons*		*Value—dollars*	
Kind	1932	1931	1932	1931	1932	1931
Trap rock.....	28	31	1,351,773	2,207,762	1,431,895	2,641,524
Granite[a]	4	5	77,841	[b] 125,612	103,297	[b] 129,536
Other stone.....	5	7	85,189	141,879	208,170	339,317
Totals.....	37	43	1,514,803	[b] 2,475,253	1,743,362	[b] 3,110,377

a. In part a by-product of iron-mining operations.
b. Revised figure.

Trap rock. Although 28 quarries were operated in 1932, most of them ran only a few days a week or were shut down for long periods. Reports from producers do not list stocks on hand, but it seems likely that little inroad was made on accumulated stocks in view of the very low rate of bulding activity which prevailed throughout the year. The following quarries were inactive in 1932:

Thomas Adametz (the old Preakness quarry), Totowa.
Commonwealth Quarry Co., Quarry No. 2, Springfield
(Some stone shipped from stock)
Delaware River Quarry & Construction Co., Gilboa Quarry, Lambertville.
Joseph Devlin, Fort Lee. Mr. Devlin has retired from the quarry business.
Dyer-Kane, Clifton. The Dyer-Kane Co. has been dissolved.
Philip Kramer, Paterson.
Luckenbach Trap Rock Corp., North Bergen
Preen Crushed stone, sand and Gravel Co., Oldwyck.

[1] Cook, George H., Geology of New Jersey: pp. 504–512, 1868.

The Sowerbutt Quarries, Quarry No. 2, Clifton.

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

PRODUCTION OF TRAP ROCK IN 1932 AND 1931.

Use	*Quantity—short tons* 1932	1931	*Value—dollars* 1932	1931
Concrete	995,158	1,782,148	1,068,358	2,092,577
Road metal	240,798	324,414	244,450	434,443
Railroad ballast and other uses	115,817	101,200	119,087	114,504
Totals	1,351,773	2,207,762	1,431,895	2,641,524

It will be noticed that whereas production declined 39 per cent, the value of that production declined 46 per cent, indicating that further price concessions were made in 1932 in the keen competition for the small amount of available business.

Limestone. Although four limestone quarries were operated in 1932, the entire production of two of them was used in the manufacture of portland cement and lime, respectively, and is reported under those headings elswhere in this bulletin. M.C. Mulligan and Son at Clinton produced crushed stone for road work, concrete and flux, and a small amount for use in the production of lime. The quarry of the Limestone Products Corporation of America was operated throughout the year.[1] This company now produces 31 different products ranging in size from Rock Garden Stone to the finely pulverized rock-flour used in whiting and as a filler in asphalt and rubber. The quarry is situated about three and a half miles east of Newton in a belt of white, coarsely crystalline, Franklin limestone, much of which analyzes 95 per cent or more $CaCo_3$. This high-calcium rock is very much desired for fluxing. The balance of the rock is suitable for most other purposes, including the preparation of a widely-sold chicken grit; road metal; sized stone for concrete, walks and driveways; stone for stucco and the manufacture of rock wool; and pulverized agricultural limestone.

The Hamburg Ridge Lime Company reported that its quarry was idle in 1932. It was also learned that the crushing plant formerly operated by Clarence Warne at Oxford was dismantled in 1931.

Granite. Total sales of granite in 1932 amounted to 77,841 tons a decrease of 23,770 tons, or 23.4 per cent, from 1931. The value of sales amounted to $103,297, a decline of 18 per cent. Sales were reported by the Pompton Crushed Stone Company, Trimmer Stone Company, Alan Wood Mining Company and Charles Heigold. The first-mentioned company operates a quarry near Bloomingdale, Butler County. The second a crushing plant near Pattenburg which utilizes the granite-gneiss blasted from Musconetcong Mountain during the

[1] It was mistakenly reported in last year's bulletin that this quarry was idle during much of 1931. As a matter of fact it has been in continuous operation for at least a decade.

construction of a tunnel for the Lehigh Valley Railroad. The Alan Wood Mining Company and Charles Heigold sell stone produced as a by-product in the operation of the Scrub Oak and Richard mines, respectfully.

Other stone. The production of building stone in New Jersey has reached a very low ebb indeed. As already reported, not a single sandstone quarry was operated in 1932. Verde antique marble and talc were produced from the Lizzie Clay quarry of the Rock Products Company, and argillite by the Lawrenceville Quarries, Inc. (Princeton Quarries, Inc., reported some stone sold from stock but its quarry was not operated.) Some of the stone from the Lawrenceville quarry was used in constructing a bautiful new buildng for the First Church of Christ Scientist in Trenton. (See Plate II).

Because so few quarries were active in 1932 the statistics of production of "Other stone" and limestone have been combined in order to conceal the output of individual operations. Direct comparisons with the production in years prior to 1931 (see table) cannot therefore be made.

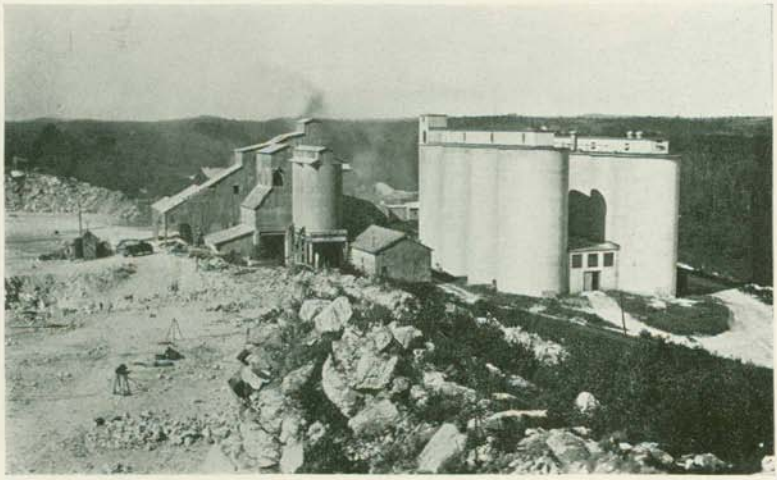
SAND AND GRAVEL.

By far the most interesting feature of the detailed statistics relating to the sand and gravel industry is the unexpected reversal of the trend towards centralization of the industry in the hands of a few large producers. For several years prior to 1932, these had been capturing an increasingly large proportion of the total business and it was expected that hard times would merely accentuate this trend; but it appears that some of the big companies were over-capitalized, so that when business declined they were unable to meet fixed charges and so were thrown into receivership, whereas the "little fellow", with a relatively small charge for overhead, was able to continue in business by pulling in his belt a few notches. Hence we find that even though the total production of sand and gravel declined 38.8 per cent as compared with 1931, the number of active pits *increased* from 97 to 101.

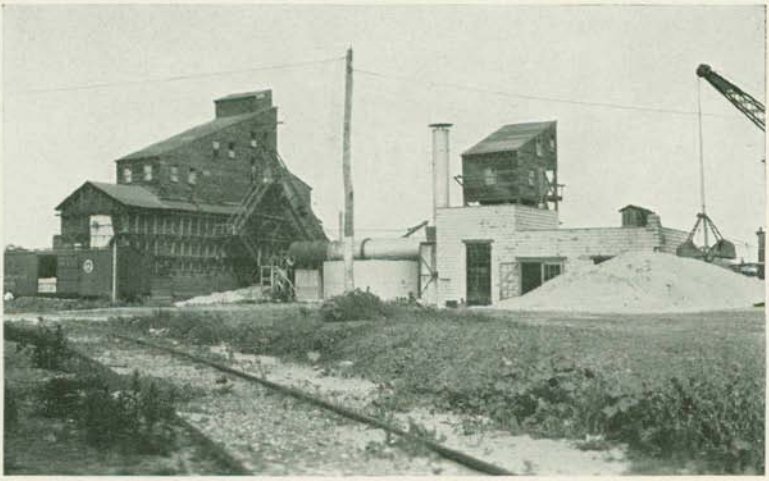
Another unexpected, but less important feature of the detailed statistics is the abrupt decline shown in sales of filter sand. Available statistics indicate that there was little decline n the consumption of water. Hence it seems probable that this represents an effort on the part of water companies to reduce current expenses by reducing inventories; and if this guess is correct, then there should be a rapid increase in the demand for filter sand as soon as the pressure for a reduction in operating expenses is lifted a little.

Reduction in the output of most of the other sand and gravel products was about in line with expectations. So, also, was the small increase in consumption of glass sand which resulted directly from the public's demand for bottled beer as soon as that beverage was made legal.

A. *Modern church built of Lockatong argillite and recently completed in Trenton. N. J.*



B. *Plant and storage silos of the Limestone Products Corporation of America. Quarry which supplies plant is to the left of the picture. Located near Newton, Sussex County.*



A. *Plant of the Cape May Sand Company at Cape May Point.*

B. *Small sand pit near Paterson. Note mechanical loaders and irregularity of deposits.*

PRODUCTION OF SAND AND GRAVEL IN 1932 AND 1931.

Products	No. of pits 1932	No. of pits 1931	Quantity—short tons 1932	Quantity—short tons 1931	Value—dollars 1932	Value—dollars 1931
Glass sand	5	5	119,185	115,076	163,252	154,708
Molding sand	28	33	150,579	326,492	164,488	370,112
Structural sand	57	49	866,061	1,507,036	488,385	896,780
Paving & road-making sand	37	31	655,120	924,568	351,075	494,944
Cutting, grinding & blast sand	7	6	15,395	31,343	25,886	64,790
Fire or furance sand	4	7	5,911	14,001	7,573	19,836
Engine sand	5	8	25,939	26,215	11,208	11,782
Filter sand	4	4	11,273	24,717	25,944	54,118
Other sand	13	7	61,226	62,101	53,327	100,760
Total sand			1,910,689	3,031,549	1,291,138	2,167,830
Structural gravel	41	32	390,548	667,811	428,883	826,949
Paving & road-making gravel	30	22	326,827	544,345	251,761	406,348
Other gravel	9	3	18,026	86,289	21,499	32,049
Total gravel			735,401	1,298,445	702,143	1,265,346
Total sand and gravel	101	97	2,646,090	4,329,994	1,993,281	3,433,176

The average quality of sand and gravel produced was undoubtedly better than that for any previous year; as 91 per cent of it was washed, compared with 86 per cent in 1931 and 66 per cent in 1928. It should be noted, however, that these percentages do not take into account a considerable volume of clayey sand and gravel used by the State Highway Department and some of the counties in improving or constructing secondary roads, and in building the shoulders of concrete roads.

As in other recent years, Burlington County led all others in the value of sand and gravel produced, although its margin of leadership over Cumberland County, the second in rank, was much smaller than in 1931. It lost its leadership in the amount of production, being exceeded by both Middlesex and Morris Counties. The latter, which also ranked second from a production standpoint in 1931, dropped from third to fifth place in point of value in 1932, whereas Camden moved up from fifth to third.

The relative rankings of the six counties with largest production are as follows:

County	Production in short tons	Rank	Value in dollars	Rank
Burlington	401,202	3	396,207	1
Cumberland	278,048	6	322,008	2
Camden	399,474	4	296,331	3
Middlesex	435,388	1	275,390	4
Morris	429,101	2	262,929	5
Monmouth	282,864	5	161,059	6

Changes in the ownership of sand and gravel pits have been fairly numerous since the last report of this series was issued. The following are new names on the list of producers.

Owner and address	*Pit location*
Ada Silica Co., Millville, N. J.	Millville, Cumberland Co.
Burton—Canfield, Inc., Cedar Grove, N. J.	Cedar Grove, Essex Co.
Consolidated Stone and Sand Co., Upper Montclair, N. J.	Riverdale, Morris Co.
Banjamin J. Fary, Oakhurst, N. J.	Pine Brook, Monmouth Co.
Hause Gravel Co., Asbury Park, N. J.	Green Grove, Monmouth Co.
Haledon Sand and Gravel Co., Church Lane, Preakness, via Paterson, N. J.	Preakness, Passaic Co.
George C. Kindle, 450 Elmwood Ave., Pitman, N. J.	Pitman, Gloucester Co.
Marshall W. Read, Ledgewood, N. J.	Ledgewood, Morris Co.
Ridgewood Sand and Trucking Co., Inc., Ridgewood, N. J.	Allendale, Bergen Co.
Wall Washed Sand and Gravel Co., R. F. D. Belmar, N. J.	Belmar, Monmouth Co.
I. T. Woolson, 114 W. Taylor Ave., Wildwood, N. J.	Cape May Court House, Cape May Co.

In addition to the above, the newly incorporated New Jersey Sand Company has purchased the stockpile of sand at the Bennett plant of the defunct New Jersey Sand and Gravel Company and plans to dispose of it as conditions permit. The company, whose office is located at the old Bennett plant near Farmingdale, does not plan to produce either sand or gravel.

The following individuals and companies have either sold their interest, retired from business, or for some other reason no longer operate the pits listed.

Owner and address	*Pit location*
John Anzeline (Alzimo?) Carlton Hill, N. J.	Rutherford, Bergen Co.
John S. Carpenter, Salem, N. J.	Salem
Cedar Grove Sand and Gravel Co., Paterson, N. J.	Cedar Grove, Essex Co.
Dallenbach Sand Co., Milltown, N. J.	Milltown, Middlesex Co.
Howard G. Rosevelt, Red Bank, N. J.	Pine Brook, Monmouth Co.
Glen Rock Sand Co., Glen Rock, N. J.	Fairlawn, Bergen Co.
Hackettstown Sand and Gravel Corp., Hackettstown, N. J.	Hackettstown, Warren Co.
Kenvil Sand and Gravel Co., Kenvil, N. J.	Kenvil, Morris Co.
New Jersey Sand and Gravel Co., Asbury Park, N. J.	Wall, Wayside and Farmingdale, Monmouth Co.
Paxson—Taggart, Inc., Philadelphia, Pa.	Hayville, Camden Co. Cedar Lake, Atlantic Co. Lumberton, Burlington Co. Millville, Cumberland Co.
Roxbury Washed Sand and Gravel Co., Jersey City, N. J.	Ledgewood, Morris Co.
Seguine—Jersey Sand Co., Kenvil, N. J.	Kenvil, Morris Co.
Walter C. Smith Mineral Products, Inc., New York, N. Y.	Toms River, Ocean Co.
Van Broekhoven Sons, Inc., Clifton, N. J.	Preakness, Passaic Co.
William Van Kruiningen, Wallington, N. J.	Wallington, Bergen Co.
O. Weisgerber and Sons, Inc., Paramus, via Ridgewood, N. J.	Ridgewood, Bergen Co.

CLAY.

The prediction made early in 1933[1] that the value of raw clay sold by New Jersey producers in 1932 was less than 50 per cent of the corresponding figure for 1931, proved to be quite accurate. Total sales amounted to $248,582, a decline of 51.8 per cent from the value of sales in 1931; and the tonnage declined 54.2 per cent. As shown in the tabulated data, fire-clay constitutes the bulk of all clay sold, and though sales declined 50.8 per cent, the price received *per ton* increased from $4.31 in 1931 to $4.34 in 1932.

Twenty-nine operators reported sales of clay in 1932, three less than in the previous year. The Woodbridge Ceramic Corporation reported that it no longer digs any clay, its needs being met by purchase from nearby producers.

RAW CLAY SOLD IN 1932 AND 1931

Kinds of clay	*No. of pits*	*Production—short tons* 1932	1931	Value—dollars 1932	1931
Fire clay	27	49,370	100,309	214,478	432,656
Stoneware clay	9	2,870	6,640	15,113	33,656
Ball clay and miscellaneous	7	9,874	28,588	18,991	49,509
Totals		62,114	135,537	248,582	515,821

BRICK AND TILE

Statistics now available for the year 1932 show that the clay products industries were among those hardest hit by the industrial depression. In New Jersey the number of operating plants declined from 116 to 97, and the value of all clay products declined 50.2 per cent as compared with 1931. About the only consolation to be derived from the situation is that New Jersey producers fared as well, or slightly better, than their chief competitors. The following table shows[2] that the three leading states have each suffered about the same percentage of contraction in sales during the two-year period 1931-1932, and in the seven-year period between 1925—a good year—and the present.

COMPARATIVE VALUE OF CLAY PRODUCTS MANUFACTURED IN NEW JERSEY, PENNSYLVANIA AND OHIO.

VALUE OF CLAY PRODUCTS

Date	*New Jersey*	*Pennsylvania*	*Ohio*
1932	$10,850,247	$14,997,053	$20,326,012
1931	21,793,479	31,239,562	40,705,217
1930	31,253,423	51,241,680	62,416,385
[a] 1925	47,300,065	67,338,826	97,462,713
Per cent loss 1930–1932	65.3	70.8	67.4
Per cent loss 1925–1932	77.1	77.8	79.1

[a] Exclusive of non-clay refractories.

[1] Press report, released March 30, 1933.

[2] Figures from U. S. Bureau of the Census.

So few plants were operated in 1932 that in order to conceal the output of individual concerns, it has been necessary to group some products usually listed separately. Hence, in the abbreviated table which follows, it will be found that such familiar items as face brick, enameled tile and terra cotta are missing. Although a complete comparison with production in previous years is not therefore possible, it can be stated that the total value of all brick and tile products in 1932 declined some 35 to 40 per cent as compared with 1931. The very low rate of production is exemplified by the manufacture of common brick. As shown in the table the total production was less than 58 million; whereas one company alone could produce a far greater number in one year if the demand warranted it. The same statement applies to most of the other products listed.

BRICK AND TILE PRODUCED IN 1932 AND 1931

Products	*Quantity produced*		*Value in dollars*	
	1932	1931	1932	1931
Common brick.....	57,790 M	134,784 M	472,886	1,508,243
Fire brick, etc.				
(a) Brick, etc.[a]...	3,809 M	8,071 M	174,595	411,762
(b) Special shapes..	8,551 t	12,662 t	223,388	377,202
Hollow building tile..	101,062 t	257,222 t	655,335	1,763,991
Floor tile.....	864,220 s. f.	3,352,597 s. f.	160,553	590,504
Wall tile.....	1,136,489 s. f.	3,679,738 s. f.	320,452	1,073,978
Refractory cement (clay)	5,562 t	7,238 t	233,217	413,671
Clay sold, raw or prepared	2,090 t	6,481 t	19,460	45,375
Other products listed in 1931[b]				2,918,180
Total value.....			c 2,259,886	9,102,906

a. Brick, block or tile for locomotive or other fire-box lining.
b. Face brick, ceramic mosaic, enameled, faience and drain tile, terra cotta and similar products, and "Other brick and tile products".
c. See "Non-clay and miscellaneous clay refractories".
M=thousands.
t=tons of 2000 pounds.
s. f.=square feet.

POTTERY.

A decline of 62 per cent in the value of pottery manufactured in 1932, as compared with 1931, speaks volumes about the state of activity in that industry. The picture is still clearer when one compares the total value in 1932, namely, $4,263,261, with the corresponding figure for a normal year, such as 1926, when production was valued at $24,466,328. It is much more cheerful, and perhaps more profitable, to speak of the future rather than the past. The New Deal promised by President Roosevelt has arrived, and it is to be hoped that the elimination of cut-throat competition as contemplated in the National Indurtrial Recovery Act has achieved some measure of stablization and prosperity in this industry as well as in others.

Statistics for the year 1933 are not yet available, but it is the writer's belief that whether brought about by the New Deal, or by normal demand coupled with the lapse of time, such statistics will show an upward trend in the production of pottery.

Detailed statistics of the production of pottery in New Jersey in 1932 and 1931 are given in the following table.

POTTERY MANUFACTURED IN 1932 AND 1931.

Products	*Number of pieces* 1932	[a] 1931	*Value* 1932	[a] 1931
Vitreous china plumbing fixtures:				
(a) Bathroom and toilet fixtures				
Closet bowls				
Siphon jets	34,202	89,431	$252,569	$767,832
Washdowns	119,067	175,807	426,919	770,719
Reverse Traps	14,514	31,425	72,275	168,219
Flush tanks	135,187	184,760	583,321	1,061,743
Lavatories	46,113	102,914	537,762	1,375,266
Other bathroom and toilet fixtures			390,879	202,274
(b) Other vitreous china fixtures			165,780	391,802
Red earthenware			58,810	128,332
Electrical supplies			1,257,779	2,135,729
Saggers			19,160	97,168
Other pottery products			498,007	[b] 4,158,322
Total value			4,263,261	11,257,406

a. Figures subject to revision.
b. Including semi-vitreous or porcelain plumbing fixtures.

GREENSAND MARL.

Even during industrial depressions, people must have water. The treatment of large water supplies is done in sedimentation tanks and ponds, but smaller supplies are often treated in so-called "water-softening" apparatus. For that purpose greensand marl is admirably adapted and the stable business of New Jersey's greensand marl producers is doubtless due to the character of the business it supplies.

Sales of marl in 1932 amounted to 9231 tons, valued at $201,172, an increase, in comparaison with statistics for 1931, of 11.9 per cent in amount, and 2.5 per cent in value. The figures for 1932 include also, for the first time in many years, a small amount of marl sold locally for use as a soil sweetener and fertilizer. This marl was sold by Mr. Charles C. Colson and was dug on his property near Mullica Hill, Gloucester County, from the same geologic formation (the Hornerstown marl) that all the other producers utilize.

Since the Department receives many requests for the names of the companies making a business of supplying greensand marl, the following list of active producers may serve to answer many similar queries.

LIST OF COMPANIES REPORTING SALES
OF GREENSAND MARL IN 1932

Name	*Business address*	*Pit location*
Hoffman—Caps Chemical Co.	Birmington, N. J.	Ewansville
Inversand Co.	Clayton, N. J.	Hurffville
Marl Mining Corp.	Marlton, N. J.	Marlton
The Permutit Co.	440 Fourth Ave., New York, N. Y.	Birmingham
Zeolite Chemical Co.	140 Cedar St., New York, N. Y.	Reeves Sta.

(Note: Mr. Colson is primarily interested in farming and his name, therefore, is not included in the above list.)

OTHER PRODUCTS.

Lime. Small amounts of lime for use locally on farms were made by Henry and John H. Kinkel at Stewartsville, Warren County, and by M. C. Mulligan and Son at Clinton. This lime was made in small intermittent-type field kilns. The Peapack Limestone Products Company operated two larger kilns of intermittent type and managed to keep busy most of the year.

In December, 1932, the plant of the Franklin Lime Products Company at Ogdensburg was bought at a receiver's sale by Bagpak, Inc., and Cooperative G. L. F. Mills, Inc. Subsequently these firms sold their purchase to the Limestone Products Corporation of America which has since partly dismantled the Ogdensburg plant and it seems doubtful if it will ever be operated again.

Portland cement. Whereas New Jersey's two cement plants apparently fared better than the industry as a whole in 1931, the situation was reversed in 1932 when shipments from the New Jersey plants declined approximately 50 percent both in bulk and value, whereas shipments from all plants in the United States declined 36.6 per cent in bulk and 42.7 per cent in value. [1]

Since in this day and age large quantities of cement are used in the constructon of roads, it is worthy of note that in 1932 only 77 contract-miles of concrete highway were completed for the State Highway Department compared with 104 contract-miles completed in the previous year.

The alteration of the industrial plant acquired by the Metropolitan Cement Corporation at Piscataway has been deferred until better times.

Pulverized sand. Reported sales of pulverized sand in 1932 are larger in amount and had a greater total value than similar sales for 1931, but this is because the statistics for 1932 include the production of the New Jersey Pulverizing Company whose plant at Pinewald was erroneously reported as closed in last year's bulletin on the mineral industries.[2] Actually, this plant has operated steadily since 1925 except for brief interruptions due to changes and improve-

[1] Minerals Yearbook 1932-1933, U. S. Bur. of Mines, p. 73, 1933.
[2] Johnson, Meredith E., The mineral industry of New Jersey for 1931; N. J. Dept. of Conservation and Development, Bul. 40, p. 16, 1933.

ments in equipment. One such recent change is the installation of a dust-collecting system which has completely eliminated every evidence of dust in the air. A Sturtevant Air Selector, operated in conjuncton with the pulverizing mills, has also permitted better grading of the finished product. Another improvement was the installation of a chaser mill to crush the pebbles in the material pumped from the dredge. These being practically all pure quartz, the quality of the finished product has been considerably improved. Better control of the quality of the finished product was obtained when sizing cones were installed to seperate the fine and coarse grains. Since the undesirable iron-bearing minerals usually occur in fine grains, the sand cones offer an easy method of grading the sand into coarse, high-silica material, "middlings" of good grade, and fine-grained material of low grade. These products, after being dried and pulverized, are sold for a variety of purposes including the manufacture of porcelain, soap powers, stucco, silica mould wash, wall plaster, silver polish and the investment plaster used in dental work.

Other companies reporting production of pulverized sand in 1932 are: Eureka Flint and Spar Company and Standard Flint and Spar Company of Trenton, the National Pulverizing Company (whose mill is located at its source of supply near Millville), and the Pennsylvania Glass Sand Company. The latter company has two plants in New Jersey, one at Toms River, and the other near Newport, Cumberland County; but in recent months only the latter plant has been operated.

Non-clay and miscellaneous clay refractories. Statistics of the production of non-clay refractories are compiled each year by the U.S. Bureau of the Cansus together with similar information relating to the production of clay products. Because only one or two operators produced certain of the clay products usually listed under "Brick and Tile", their production of those products was grouped with the output of non-clay refractories in order to conceal from competitors the information given. Hence the figure given under the heading "Non-clay and miscellaneous clay refractories" lacks significance and cannot be compared by itself with the value of production in prior years.

By-product coke. By-product coke is manufactured in New Jersey by two plants: one at Kearney, which serves the metropolitan district adjacent to New York; and the other at Camden, which caters chiefly to that city and the surrounding cluster of small towns. Each plant has a battery of ovens which produce gas, coke, coal tar and many useful chemicals from the partial distillation of the bituminous coal which is fed into them. Large proportions of the gas and coke are sold to domestic users and it is their steady demand which is largely responsible for the continued operation of these plants at a rate little below that in normal times.

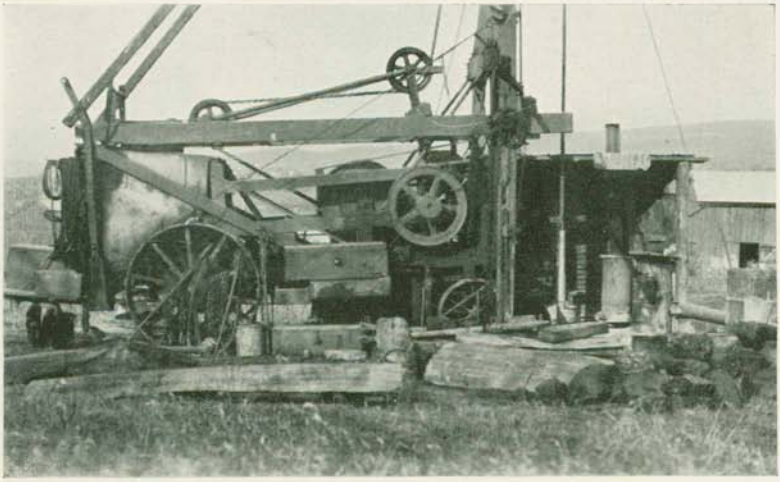
Although fewer wells were drilled in 1932 than in 1931, a number of those reported to the Geologic Division of the New Jersey Department of Conservation and Development were of unusual interest.

One such well, started in 1932 and completed in the spring of 1933, was drilled at Essex Fells, a residential community situated on the west slope of Second Watchung Mountain. Although trap rock (both the Watchung ridges are basalt flows) is usually very dense and yields little water to wells, past experience has shown that this does not hold true in certain, restricted areas. One such area includes the lower slope of Second Watchung Mountain underlying Essex Fells and West Caldwell. A number of highly successful wells have been completed in those communities in years past and the well under discussion was carefully located in accordance with information derived from them. This included data relative to a thin sandstone bed which occurs in the midst of the trap of Second Mountain (it was evidently deposited during a brief interlude between thick lava flows) and which has been the source of good flows in several wells. From the information available, it was possible to predict in advance the approximate depth to this horizon; and although less water was obtained from it than had been expected, the well was quite successful, flowing 50 gallons a minute upon completion and yielding 175 gallons a minute when pumped.

An equally interesting, though less successful well, was drilled for the North Jersey Training School in Totowa. Though fully six miles distant in an air-line from the well in Essex Fells just described and topographically much lower, the location with reference to the geologic formations was almost identical and there was reason to believe that the same (or a similar) thin sandstone bed might underlie the surface within reasonable drilling depth. The drill subsequently verified this conclusion but the yield of water was rather disappointing. After penetrating a fine-grained, clayey sandstone bed between 162 and 180 feet below the surface of the ground, the well was continued in trap to a total depth of 647 feet without picking up much additional water. The final yield was only 39 gallons a minute.

A well which completely fooled the writer but which eventually more than justified the prediction made concerning its probable yield, was completed early in 1933 in the village of Stewartsville, Warren County, for the Stewartsville Water Company. The site selected was on a hill overlooking the central part of the village and it was chosen both because its elevation would help to provide the pressure necessary in the transmission lines, and also because of the belief that a satisfactory water supply could be obtained there without undue difficulty or cost. This belief was largely based on information from several near-by wells of smaller diameter and lesser depth than the proposed well, all of which obtained water in the

A. *Drilling a well to supply pure water for a swimming pool near Princeton Junction. The rig is typical of the type commonly used to drill wells 50 to 1000 feet deep.*



B. *Close-up of rig used in drilling the well recently completed for the Stewartsville Water Company in Warren County.*

underlying limestone; and several of which tested 50 gallons a minute with a relatively small drawdown. Examination of the proposed site had shown that the well would start in old glacial drift, the rock floor being obscured there but exposed at the foot of the hill only a few hundred feet away. Limestone also outcropped in the breast of the hill on the opposite side of the small valley and it was assumed that it formed the backbone of the hill upon which the well was to be drilled. The opinion was therefore expressed that the rock floor underlying the drift at the well site would be found within 25 or 30 feet of the surface. That belief was rudely shattered when the well penetrated 151 feet of drift before striking the underlying limestone. At that depth the rock floor is far below the present valley floor. Subsequent detailed mapping of the distrct showed that the well must have been started above an ancient, pre-glacial sink-hole, for the rock floor rises in every direction from the well site, thus definitely eliminating the possibility that a pre-glacial valley underlies the district.

The drift overlying the limestone proved to be practically dry, but as the limestone was penetrated, more and more water was obtained and when finally completed at a depth of 250 feet, the well yielded 110 gallons per minute with a drawdown of only 8 feet.

Statistics of the consumption of water from privately-owned supplies are not available, but data compiled by the State Water Policy Commission show a decline in the consumption of public supplies from 1931 to 1932 of 3.9 per cent, the actual consumption in the latter year amounting to 367,504,000 gallons daily, of which some 30 per cent was derived from wells.