

History of Brick Manufacture in Indiana¹

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Abstract

In Indiana bricks were commonly burned at the construction site in the first decades of the 19th century, but by 1840-1860 centralized brickyards were operating in or near most communities. Pennsylvanian shales and underclays, Mississippian and Devonian shales, leached glacial drift and alluvium, and residual soils have supplied the raw materials for common brick, face brick, paving brick, and firebrick manufactured during the 19th and 20th centuries.

The brick industry has progressively centralized to fewer but larger installations concentrated near particularly favorable shale and clay supplies. By 1971 less than 200 million bricks were manufactured in only 12 plants in Indiana, but the annual value of the product had grown to nearly \$8 million. This stable industry will continue indefinitely to be a significant factor in Indiana's economy.

Introduction

Indiana has long had a flourishing ceramics industry that has contributed substantially to the economic growth of the State. Plants producing building bricks have added aesthetic quality to Indiana towns and landscapes (Fig. 1).



FIGURE 1. *Andrew Wylie house, built in Bloomington in 1835 of brick fired from local clay.*

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Little was recorded concerning the early history of the brick industry in Indiana. In 1833, the second edition of Scott's *The Indiana Gazetteer* (18) had only one description of brick clay, although brick buildings were recorded in nearly every community. Much of the brick for major structures, small groups of buildings, and isolated localities was burned at the site by itinerant craftsmen who specialized in this skill. The magnitude of brick manufacture may be judged from Scott's description (18) of Charlestown, in Clark County:

"The public buildings are a court house, a jail, an office for the clerk and recorder, and a market house, all of brick; in addition to which the Episcopal Methodists, the Reformed Methodists, the Baptists, and the Presbyterians, have meeting houses, all of brick, and an extensive brick building has lately been erected for the purpose of a county seminary . . . There are in Charlestown, about sixty-five brick dwelling-houses, and about a hundred of wood."

It is known that by the 1840's and 1850's almost every community in the state had a brick yard that manufactured common brick (11). Some clay deposits and ceramic plants were briefly identified by early authors ranging from David Dale Owen in 1839 (17), through Cox (9, 10), and Collett (7, 8), to Maurice Thompson in 1886 (19), and W. H. Thompson in 1889 (20), but these reports were short and offered little basic information on the extent and geology of the deposits and the facilities at the factories.

In 1895 the newly appointed State Geologist, W. S. Blatchley, began to gather information concerning the clay and shale resources of Indiana.

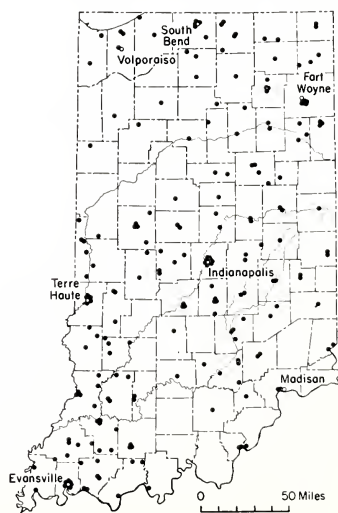
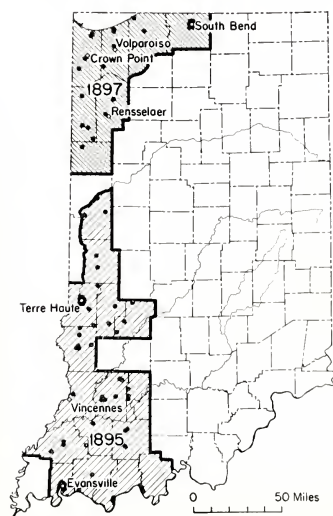


FIGURE 2. Brick plants of southeastern Indiana in 1895 (2) and of northeastern Indiana in 1897 (3).

FIGURE 3. Brick plants of Indiana in 1904 (4).

This inquiry led to the 1896 publication of a report (2 and Fig. 2) on the clay and related industry of some counties in southwestern Indiana. Two years later a report on the clays and the clay industry of northwestern Indiana followed (3 and Fig. 2). Blatchley's work on clays culminated in the publication, in 1906, of a very extensive report on the clays of the entire state (4 and Fig. 3).

Logan (15) presented some information about the clay industry in the *Handbook of Indiana Geology*, published in 1922, and in 1933 Whitlatch (21 and Fig. 4) published a comprehensive study on the clay resources of the state. Whitlatch's report, which was his Ph. D. dissertation, updated Blatchley's information on the clay industry and also emphasized the regional geology of the clay deposits.

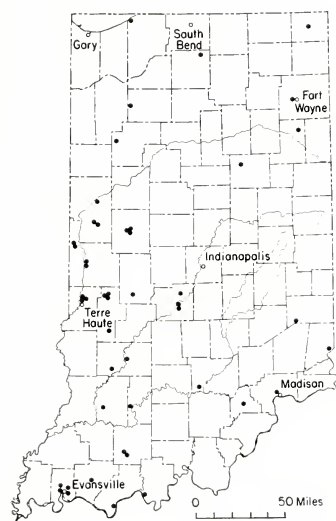


FIGURE 4. *Brick plants of Indiana in 1933 (21).*

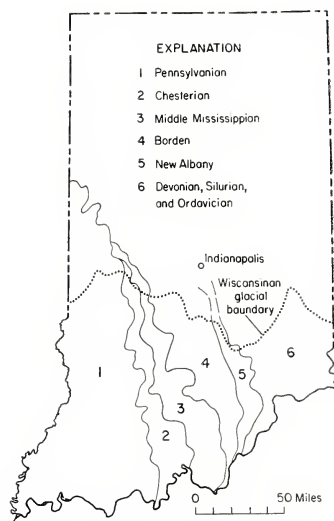


FIGURE 5. *Map showing the distribution of clay materials in Indiana.*

Since 1933, publications on the development of the clay industry have been limited to five directories (1, 6, 12, 14, 16) of the producers and users of clay and shale. Geological aspects of the clays have been explored in one publication (13), and numerous reports have been issued on special aspects of clay mineral research.

Regional Geology of Indiana Clay and Shale Deposits

The clays of Indiana can be divided for discussion into eight types or regions (Fig. 5): 1) Pennsylvanian shales and underclays are near the surface and readily accessible in southwestern Indiana; 2) lying just east of these exposures are shales of the late Mississippian Chesterian Series; 3) in the south-central part of the state, clays lying above the middle

Mississippian limestones comprise a central residual belt, and 4) east of this belt are the shales of the early Mississippian Borden Group; 5) to the east of the Borden outcrops are exposures of the New Albany Shale, and 6) in extreme southeastern Indiana residual clays lie above limestones of Devonian and Silurian age and limestone-shale sequences of Ordovician age. A seventh type of clay material is obtainable at numerous places in northern Indiana, where glacial drift that includes both till and glacial lake sediments can be used as raw material for a ceramic industry. An eighth type of ceramic raw material consists of alluvial clays which are related to present-day streams at various localities throughout the state, and of leached loess found in the southwestern part of Indiana.

In the 19th century and the early part of the 20th, all of these eight types of materials were used by plants producing brick from local raw material. As the 20th century progressed, the brick industry consolidated, not only because of the greater efficiency of larger plants but also because of the superior product that could be manufactured from proper materials. In addition, modern rail and truck transportation provided enlarged market areas. Smaller and less efficient plants were abandoned. Small kilns were replaced by larger ones. Wood as fuel was displaced by coal, which in turn is being replaced by natural gas. Round periodic kilns are giving way to continuously fired tunnel kilns. With growth and automation, very accurate control is necessary over all parts of the brick-making process to produce modern bricks with their wide range of predetermined colors and textures. Clay or shale units that vary greatly in composition or are thin or interbedded with other types of rocks generally have been eliminated as a source of raw material. Unusual rocks or minerals are tolerated only if they can be removed by screening or their deleterious effects minimized by grinding and dispersion. Residual clays overlying various carbonate rocks in southeastern and south-central Indiana and leached alluvial clays throughout the state are not adequate. The thin shales of the Chesterian Series, the carbonaceous New Albany shale, and the commonly variable glacial till have generally been eliminated.

Only shales and siltstones from the Borden Group, a thick sequence of fine-grained Mississippian rocks in south-central and west-central Indiana, and several of the thick shales of Pennsylvanian age found in southwestern Indiana are commonly used in the production of brick. Some brickyards using these materials also consume a lesser amount of the kaolin-rich clay that underlies certain coalbeds in the western part of the state. Kaolin clays increase the firing temperature, widen the firing range, and decrease the firing shrinkage of bricks made from rocks of the Borden Group. For the few firebrick still made in Indiana, underclays are used.

Only one plant, at Munster in northwestern Indiana, now produces brick from glacial materials, but it does have the sizable production capacity of 260,000 bricks per day. The raw material comes from a very clayey, homogeneous till about 22 feet thick.

Types of Bricks

Structural clay products, including common, pressed, and face brick, structural tile, and drain tile, have consumed most of the clay industry's

output. Paving brick was an important product near the turn of the century, but this phase of the brick industry has been almost entirely abandoned. Firebrick for high-temperature ovens, furnaces, and kilns has been made in Indiana for many years. Indiana's fire clays are still well known and marketed in other states, but now only one Indiana company produces firebrick.

The methods used to produce common brick early in the state's history were some of the most simple processes in the manufacture of ceramic ware, and they have been entirely replaced by other techniques. Until the latter part of the 19th century, most building brick in Indiana was made by the soft-mud process. Sandy clays were mixed in a pug mill and either hand molded or forced into sanded molds. The resulting shapes were sun dried or air dried and then burned in kilns, which in their most primitive form were built around the stacked unfired bricks. Sandy clays of the alluvial or loessial types were used for the soft-mud process. The annual production of common brick by most companies operating in 1904 was small, commonly only a few hundred thousand.

In the late 1800's, dry-pressed brick replaced some of the soft-mud variety, but the process was primarily used in the construction of terra cotta and hollow building blocks. Moisture content was kept to the minimum that would allow shaping by compression into molds, and the resulting products were denser and underwent less shrinkage. The raw ware contained only 7 to 10% moisture, but moisture content was 20 to 25% in the soft-mud process.

The use of brick for bearing walls in building construction decreased progressively from shortly after the turn of the century, and pleasing texture and color became relatively more important as brick came to be used mainly for facing. Face brick is produced more satisfactorily by the dry-press and stiff-mud methods than by the soft-mud process.

Since about 1920, face brick produced by the stiff-mud process has been the principal product of the brick industry. A plastic clay mixture is dewatered by vacuum to 12 to 15% moisture content and this is extruded continuously through a die by auger or plunger pressure. Length and width of the brick are controlled by the die, and thickness is established by cutting the extruded bar at desired intervals.

Changes in the Brick Industry

From the 1840's and 1850's, when nearly every community had a brick yard, to the 1890's and early 1900's, when brick as a construction material was at its zenith, the quantity of brick produced grew steadily. At the turn of the century most brick companies were still small, and therefore their number was great. When W. S. Blatchley visited Evansville in 1895, he recorded (2) that 21 brick yards were operating within 2 miles of the county courthouse. In 1905, more than 200 companies in Indiana were producing brick. Of this total, eight used the dry-press process and the rest used the stiff-mud, soft-mud, or hand processes to produce common brick. In 1904, almost 300 million common bricks were produced by these plants, although a high of 315 million had been reached earlier in 1901.

In addition, about 30 million pressed bricks, 50 million vitrified or paving bricks, and lesser amounts of firebrick and ornamental material, such as terra cotta, were produced. The total value of these products for that year was \$2,640,313. Only 34 companies were listed in 1922 in the *Handbook of Indiana Geology* (15), and even though the list is incomplete, the great change in the number of companies involved in brick making, as expressed by the numbers of companies in 1905 and in 1919 when data for the *Handbook* were collected, reflected the change in the building industry in Indiana. The use of common brick was reduced, and wood construction replaced much of the former brick construction. By 1933, when a more complete record of brick plants was made (21), 47 plants produced brick, and most used the stiff-mud process. According to Whitlatch's figures, in 1929 about 112 million common bricks, 130 million face bricks, and 3½ million paving bricks were produced. Fire clay refractories, composed mostly of firebrick, totaled almost 6 million bricks or the equivalent. The total number of bricks was 252 million, valued at \$3,565,823. In 1970 only 12 brick plants remained in the state (Fig. 6), and they produced about 186 million bricks. The value of these bricks was nearly \$8 million. The value of face brick amounted to more than 80% of that total, and the remainder came from sales of common brick.

The brick industry has responded to the modern trend toward the construction of modular homes by the building trades by producing pre-

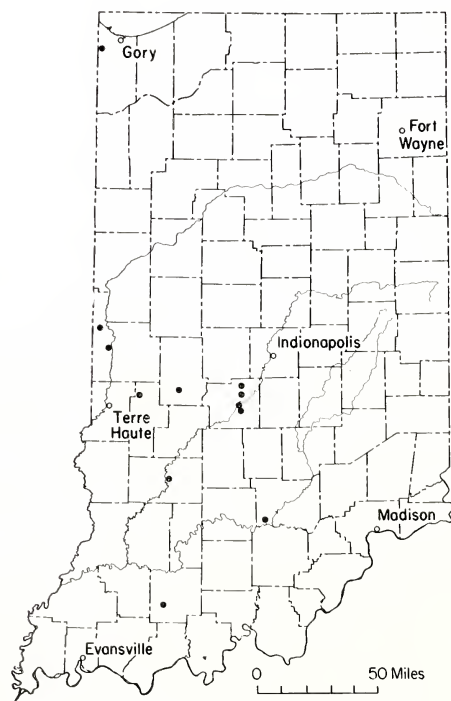


FIGURE 6. Brick plants of Indiana in 1970.

formed brick panels. These panels, which are made with normal or thin brick, are fabricated at the plant, moved by truck to the construction site, and hoisted into place by cranes.

Distribution of Brick

The many small companies that operated in Indiana near the turn of the century probably did not ship their products more than a few miles; however, some larger companies were able to transport their products to destinations many states away. In 1904 the Hoosier Brick Company of New Albany shipped common bricks by rail throughout southern Indiana and Kentucky. During the same year the Cayuga Brick and Coal Company of Vermillion County shipped most of its common brick to Chicago. Dry-pressed brick made at Hobart in Lake County were sold in Philadelphia, Milwaukee, St. Paul, St. Louis, and other cities. The Indiana Paving Brick Company of Brazil began operations in 1891, and by 1904 it was using local shale blended with sand from the shores of Lake Michigan. Paving bricks were shipped from the plant to the larger cities in Indiana and to Cincinnati, Louisville, and many towns in Illinois. Indiana refractory bricks were well known in 1904, and the Burns and Hancock Company of Vermillion County had supplied firebrick to states as far away as Montana, Georgia, and Alabama.

At present most companies find their market within a 200-mile radius of their manufacturing facilities.

Summary

In summary (Fig. 7), by 1900 Indiana's brick industry consisted of more than 200 plants that were distributed broadly throughout the state, that used virtually all types of suitable clay materials, and that produced

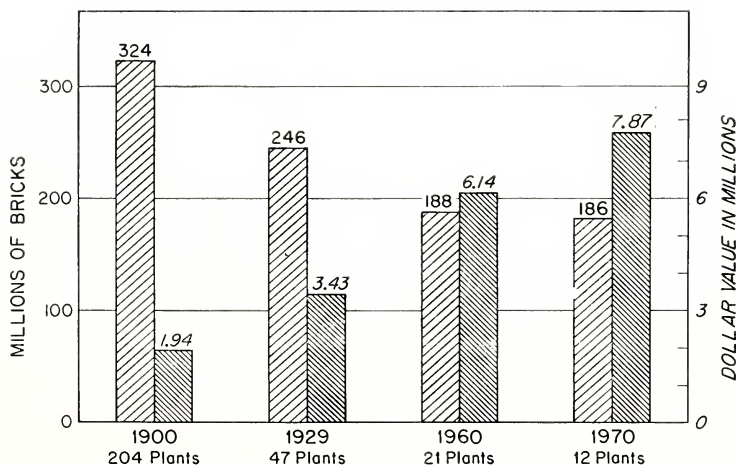


FIGURE 7. *Production and value of brick in Indiana for 1900 (4), 1929 (21), 1960 (5), and 1970.*

more than 300 million brick a year with an annual value of nearly \$2 million, predominantly for common brick. Progressively through the subsequent 70 years the number of plants has decreased to the present 12, the raw materials have been restricted largely to Pennsylvanian shales and underclays and lower Mississippian shales and siltstones, the annual volume has decreased by one-third to slightly less than 200 million brick, and the annual value of the product has grown to nearly \$8 million, partly because of inflation and partly because most of the product is face brick with higher unit value. This is a portrait of a stable industry—one that has lost more ground in relation to the gross state product than is readily apparent from the production figures, but one that is continuing to change with advances in the construction industry and seems likely to continue indefinitely as a significant element in the Indiana economy.

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