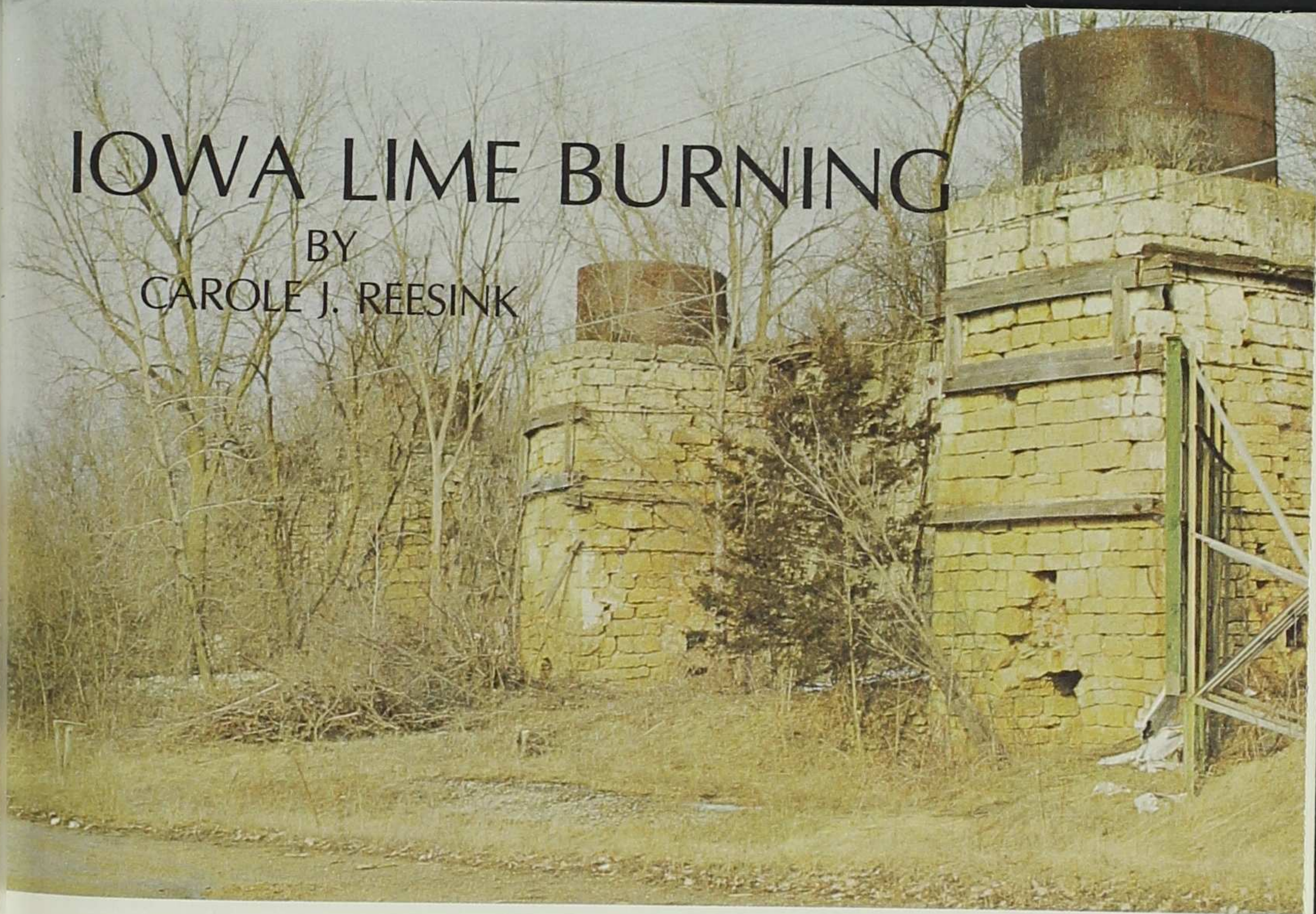


IOWA LIME BURNING

BY
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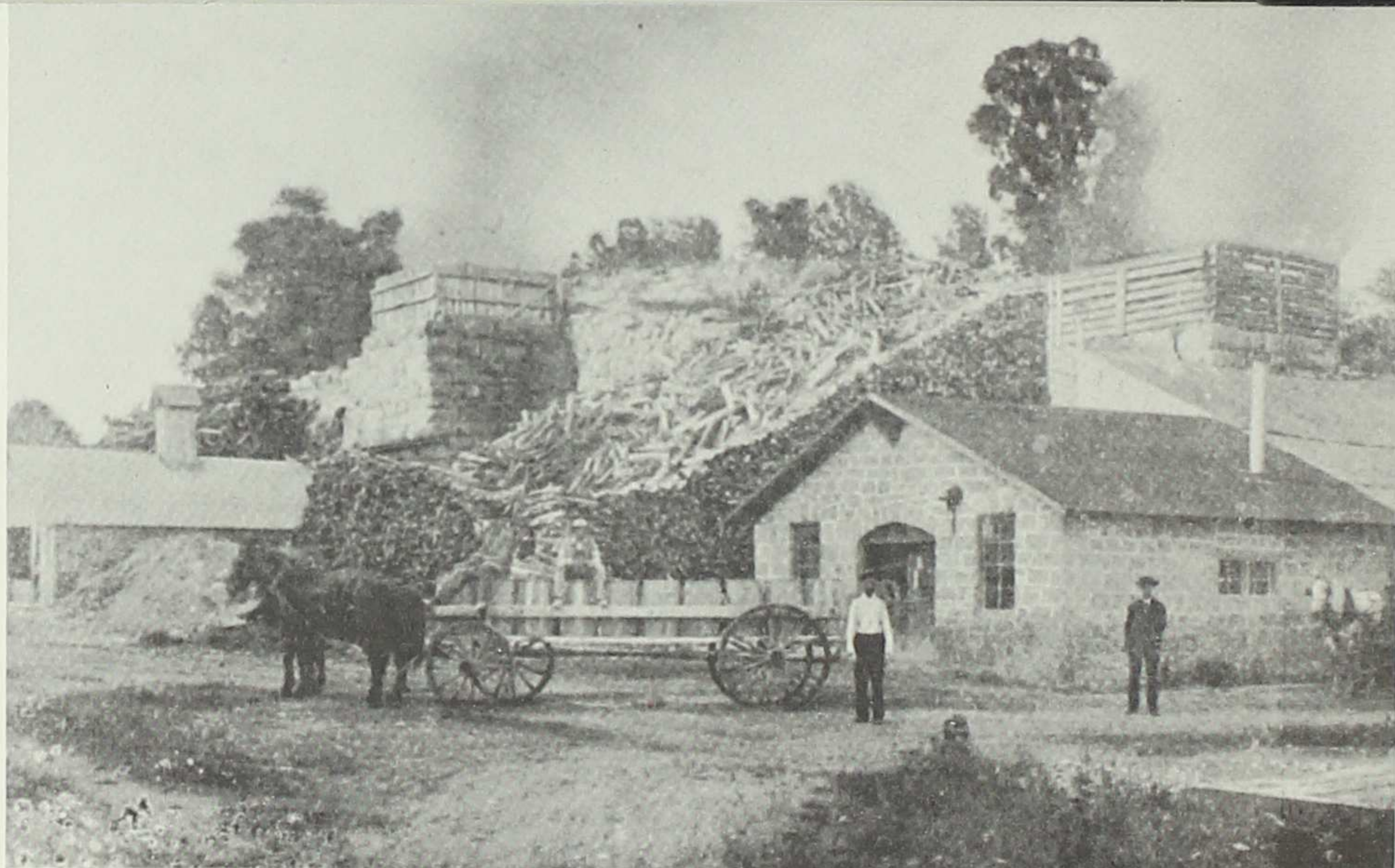
The four remaining lime kilns at Hurstville (courtesy of the author)

The yellowish brown bluffs on the east bank of the Maquoketa, like most bluffs bordering the streams and rivers in this section of Jackson County, contain a lime rock called dolomite. In the late 1800s, before the advent of the Portland Cement Company, burned lime was the major ingredient in the mortar used in constructing buildings and bridges. When the dolomite lime in Jackson and Cedar counties was discovered to burn purer and whiter than any lime then on the market, an industry grew up beneath the bluffs that became the Midwest's foremost supplier of lime. Two men, Alfred Hurst and Otis Joiner, were responsible for the growth of this industry. Both established lime plants in Iowa in the late 1800s and employed men who lived in the small company towns of Hurstville and Joiner-

ville, and quarried, processed, and transported the lime by horse and wagon to the railroad.

Alfred Hurst was born in Brimsby, England in 1846. When he was six, he and his family immigrated to America, traveled up the Mississippi River by steamboat, and settled in Davenport, Iowa. Here Alfred's father — Abraham Hurst — found work as a bricklayer. In 1856 Abraham Hurst died, and nine-year-old Alfred went to work to help support the family. When the Civil War broke out, Alfred and his brother William enlisted in the transportation service of Mississippi, and during the next 19 months, Alfred fought at Paducah, Ft. Donelson, and Shiloh. He was captured once by the Confederate Army, but managed to escape and rejoin his unit.

After the war, Alfred worked for a short time on steamboats on the Upper Mississippi, then returned to Davenport where he learned the



The Joiner Lime Works, ca. 1905, with O.W. Joiner standing center, and M.W. Joiner standing right (courtesy of the author)

trade of brick and plaster masonry, a job he held until 1871. During his years as a mason, Alfred made extensive studies of the lime he used and decided he could improve the quality of mortar. When the railroad to Maquoketa, Jackson County was completed, he took a trip to this section of the county, searching for a lime rock of the Clinton and Niagara strata (now called Hopkinton Formation of the Silurian Age) which he knew from experience burned purer and whiter, and possessed more adhesive properties than any lime on the market.

The lime rock in the 60-foot ledges of the bluff along the South Fork of the Maquoketa was exactly what Alfred needed. He bought 30 acres of stone and timber land a little more than a mile north of Maquoketa at Sand Ridge, built a small, single kiln lime plant, and began quarrying the rock from the bluffs.

A section of New Oklahoma — as Hurst's quarry was called — on the east bank of the Maquoketa River shows that the Hurst lime beds contained several different layers of dolomite. There is a 15-foot ledge of decayed, yellowish brown dolomite, weathered into layers a few inches to three or four feet thick,

containing *Cerionites*, *Crinoids*, and *Pentamerus* fossils. Below this stands a massive, 30-foot ledge of yellow dolomite imperfectly separated into layers six to eight feet thick, containing a slightly different fossil make-up: *Crinoids*, *Halysites*, *Favosites*, and numerous *Pentamerus*. Finally, at the base is a smaller, eight-foot ledge of buff-colored dolomite crowded with small individual rocks of *Pentamerus oblongus*.

Alfred's first kiln was a "pot" kiln, and in it he began burning lime on a small scale, first loading rocks into the kiln, then building a fire in the chamber. After the lime had burned, he extinguished the fire and unloaded the finished product. The pot kiln had its disadvantages — it produced only one batch of lime before it had to be unloaded, and the lime was discolored from its contact with the firewood. Nearly all of Alfred's first year's production, averaging 100 barrels a week (a barrel weighed about 140 lbs.) and totaling 3,200 barrels for the year, was consumed at home. Encouraged by the year's business, he built a "draw" kiln the second year. Unlike the pot kiln, the draw kiln

allowed for a continuous lime-burning process, and left the lime a pure white. Rock was loaded into the stack atop the kiln. It gradually filtered to the bottom, where it was removed and spread on a slab floor to cool before being packed into barrels for shipment. At the height of production, Alfred had four draw kilns operating and could produce 800 barrels of burned lime a day.

When Alfred's brother William joined him in the business, the firm had \$75,000 invested, owned a large tract of farming and timber land — 820 acres — near the kilns, and employed 50 men at \$1.50 a day, whose annual wage amounted to thousands of dollars.

Good quality lime requires a close control of temperature. The chemical formula of dolomite is $\text{Ca Mg}(\text{CO}_3)_2$ (with the ratio of Ca to Mg varying from sample to sample). Because of their like charge and size, calcium and magnesium can substitute for each other. When lime is burned in kilns to be prepared for mortar, carbon is given off as a gas, and magnesium and calcium oxide remain as the "burned lime." A temperature of 750° to 900° C is necessary for the dissociation of the lime, and because of extreme winter temperatures, this was not possible in Hurst's plant. Though the kilns did not run all year round, Hurst's employees were kept busy making barrels, sawing cord wood (a kiln used eight to ten cords of wood per day), and feeding the cattle during the winter.

Note on Sources

Sources for this article include two essays in the 1906 *Iowa Geological Survey Annual Report*, Vol. 17 (Des Moines: Iowa Geological Survey): S.W. Beyer's "Physical Test of Iowa Limes," and S.W. Beyer's and Ira A. Williams' "The Geology of Quarry Products." Also valuable were the *Portrait and Biographical Album of Jackson County* (Chicago: Chapman Brothers, 1889); Edwin C. Eckel's *Cements, Limes and Plasters* (New York: John Wiley & Sons, 1928); M.W. Joiner's "Lime Industry Made Maquoketa Famous" in the *Jackson Sentinel*, Vol. 100 (June, 1954); J.N. Rose's *Fossils and Rocks of Eastern Iowa: A Half Billion Years of Iowa History* (Iowa City: Iowa Geological Survey, 1967); and T.E. Savage's "Geology of Jackson County" in the *Iowa Geological Survey Annual Report*, Vol. 16 (Des Moines: Iowa Geological Survey, 1905). In addition, Melvin W. Joiner and Grace Holihan of Maquoketa, and Sarah Hurst Cooper of Iowa Falls provided valuable research assistance.

In 1888, Alfred organized the Maquoketa, Hurstville & Dubuque Railway Company and constructed a spur from Maquoketa to his lime works. This was made possible by Hurst's political affiliations, and greatly helped his business. Besides owning a prospering company, Alfred was a member of the board of supervisors and a state senator for eight years until 1894. Alfred Hurst purchased three more lime kilns from Poff and Nickerson who owned a plant at Pinhook, on the Maquoketa River about a mile west of Maquoketa. After his death in 1915, the lime plant continued operation for five years as a requisite of his will. The business, which had been doing poorly for some time, was discontinued in 1920.

Otis W. Joiner came to the Maquoketa area from the Lake George area in New York in the 1870s, attracted by the potential building boom. With his brother, he started a lumberyard in Maquoketa. They sold the lumberyard a few years later when Otis Joiner decided to go into the lime business. He purchased a tract of land about six miles west of Maquoketa, containing the same type of limestone Hurst used in his kilns, and constructed two draw kilns. His business was successful, and a small town — Joinerville — grew up around the plant. Like Hurst, Joiner hauled the burned lime to a nearby railroad, the Northwestern, where it was shipped throughout the Midwest.

The Joiner Lime Company closed down sometime between 1920 and 1930, and in the early 1950s road construction forced the demolition of the lime kilns. The rock, however, was discovered suitable for road work and a new quarry behind the site of the kilns was established. The only buildings still standing are the farm buildings once occupied by O.W. Joiner. The Hurstville works, except for the sheds that surrounded the kilns themselves (torn down because of their hazardous condition), still stand. □