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Introduction:

Bricks have served as the building materials for structures like homes and farmsteads for thousands of years. Discovering brick at an archaeological site can help indicate the past presence of a structure. There are several different types of brick, which can help archaeologists determine the context surrounding the buildings and structures from which they were built. Most brick that is found at archaeological sites in the United States is red brick, which is the type of brick most people think of when discussing brick buildings and foundations. Yellow brick, however, was discovered at the Manlick Farm site in Belle Prairie, Minnesota, possibly indicating a past presence of a yellow brick structure. Although brick plays an important role in determining the location of a previous structure, there are other artifacts, including window glass and nails, which also help archaeologists come to this conclusion. Both types of artifacts were recovered at the Manlick Farm site. The brick is probably the most interesting because of its color. The fact that the brick is yellow may indicate that it was made locally and could have a connection to a yellow brick manufacturer in Minnesota. An understanding and analysis of the yellow brick discovered at the Manlick Farm site might help us identify the use of Chaska brick in Belle Prairie as well as understand the importance of a local brick manufacturer during the historic period of Minnesota.

Data Set:

The bricks being analyzed for this study were collected via pedestrian survey at the Manlick Farm site in Belle Prairie, Minnesota. This study was conducted as part of the 2020 St. Cloud State University archaeological field school. The farm field had recently been plowed, and students surveyed a total of 12 transects. The transects were placed 10 meters apart on the north line from the datum point, which is the arbitrary reference point established when setting up the transects. Each student then used a compass to find a point across the field to walk toward in order to maintain a straight transect line. Despite this, there were some slight inconsistencies in the straightness of the final transect lines, likely due to human error and the slight curve to the field (indicated by the darker soil at the bottom of the slope). This survey occurred on August 29th, 2020 with surface visibility nearing 100%. Diagnostic artifacts were piece plotted using the total station and Global Positioning System (GPS). Some of these diagnostic pieces included the brick, but for the most part, the brick was not piece plotted. The diagnostic bricks that were

mapped and collected were more intact than those left on the site. These bricks that were collected were large enough to analyze for any stamps or diagnostic properties such as inclusions or frogs left by potential manufacturers. The first bricks discovered were not recovered until other diagnostic artifacts such as pottery, glass and nails, were recovered, as in addition to these artifacts, the presence of brick might be diagnostic of a potential farm or farmstead that existed on this property. The diagnostic artifacts as well as historical records indicate that the site dates between 1853-1911. Deed documents, provided by Morrison County, indicate that the Manlick Farm site was occupied by Orrin A. Coe and his family between 1861 and 1911 (Warner 2006). This history helps provide an approximate date of the site and can be utilized by archaeologists to determine what type of occupation occurred at this site. In addition, the diagnostic artifacts recovered at the Manlick Farm site supports Coe's occupation.

Six out of 12 transects contained brick that were recovered. The bricks that were recovered were from transects 4, 5,6,7, 9, and 10. The bricks recovered varied from brick bats, or fragments of brick, to almost complete pieces of brick. Although most of the brick was recovered, there were a couple of pieces that were plotted, but left in the field.

Methods:

Once recovered from the field, the bricks were washed, cataloged and labeled by the individuals who collected from that particular transect. Once this was completed, the bricks that were recovered from the site were gathered for analysis. First, measurements were taken of each piece of brick. The measurements were taken in maximums and include maximum length, width and depth. These vary as some bricks did not have a measurable width due to fragmentation. After general size was determined, each piece of brick was weighed in grams. For the most part, the bricks were weighed using a normal counter scale, but one brick had to be weighed via a hanging scale due to its size. Determining the size of the bricks enabled archaeologists to determine what function the brick might have served. After the weights were acquired, the bricks were described using a Munsell Color chart. For the most part, two sections were utilized in the Munsell book, 7.5 YR and 10 YR. The coloration of the brick is the most crucial portion of analysis because the coloration of the brick can be utilized to determine the manufacturer of the brick as well as the use of the brick. After determining color, general observations were made of each brick, mainly analyzing different inclusions in the brick, damage to the brick, including things like plow scars, and any sort of diagnostic feature that might help identify where the brick originated. Finally, the bricks were photographed using a Samsung Galaxy S8 camera enabled with dual pixel technology. Each photo includes a gray background, a 10-centimeter scale, and features different angles of the bricks to illustrate different colors, inclusions and damage. The inclusions were also described utilizing a Munsell Soil Color Chart in order to determine if there was a pattern in the coloration, which could indicate a pattern utilized by a certain brick manufacturer.

Background Information:

Brickmaking has been a common practice for centuries, dating back over 10,000 years ago in the Fertile Crescent (Gurcke 1987:39). The brickmaking process has changed dramatically over the years, shifting from sun-dried bricks made by hand to the machine-molded bricks of the current era (Gurcke 1987:39). According to Gurcke (1987:39), "the first use of a box mold seems to date to the Early Bronze Age, around 3,000 B.C." Fired brick was uncommon at first, mostly seen in wooded areas, where it was placed in a kiln to be fired (Gurcke 1987:39).

Brick was used by several different civilizations, from China to the Roman Empire, eventually making its way to the United States in the 17th century, where it was both made locally by the colonists as well as imported from Europe (Gurcke 1987:40). The process of making bricks became more industrialized as the industrial revolution took place, and brick machines were emerging across the United States. According to Gurcke (1987:84):

> Until the late eighteenth century bricks were predominately made by hand. By the mid-nineteenth century, however, the main kinds of brick machines in use today had already been invented and were in use, and at the beginning of the twentieth century machines could virtually eliminate hand labor from all aspects of the industry, from mining clay to removing the bricks from the kiln.

With the emergence of a more industrialized brick manufacturing process, came competition between different brick manufacturers in different states. These brick manufacturing companies would often stamp their logo or state into the brick, which can now be utilized by archaeologists to determine the origin of the bricks found at sites. There are several different types of bricks, which vary due to their composition, the manufacturing process as well as function. Three types of molding techniques were utilized in the United States, including soft-mud, stiff-mud, and dry-pressed. There is a fourth type, found in England, called the stiff-plastic process. According to Gurcke (1987:13), "this terminology refers in part to the water content of the mud or clay mix and in part to the process used in manufacturing the brick. For the soft-mud method, the water content is approximately 20% to 30%, for stiff-mud 12% to 15%, for dry-pressed up to 10%, and for the stiff-plastic method it is from 9% to 15%."

In addition to the different mold types, there are also different types of bricks, defined by the function of the brick. These functions have different category names which include common bricks, face bricks, firebricks, paving bricks, sanitary bricks, and engineering bricks. Each of these bricks serve different purposes from making the fronts of buildings (face bricks), interior and exterior walls (common bricks), in places of extreme heat like fireplaces (firebricks), street paving (paving bricks), restrooms and kitchens (sanitary bricks) and finally in construction projects such as bridges (engineering bricks) (Gurcke 1987:99-100). These different types of brick also have different colors, which can help identify them. According to Kelly et al. (1977:85), "Common" or "face" bricks are reddish-brown from the "common" clays used in the manufacturing process. Paving bricks are also usually of this type. "Fire" bricks are lighter in shades of yellow or cream because of higher alumina oxide or silica inclusions in the "fire," "china," or "ball" clays used" (Kelly et al. 1977: 85). Each of these bricks have different manufacturing processes and material attributes that make them able to provide these various functions.

Minnesota is known for its yellow brick, sometimes referred to as "Chaska" brick because much of it originated from Chaska, Minnesota. In fact, one of the first brick machine patents in Minnesota was filed from Chaska (see Figure 1). This patent was filed by Michael Bierline in 1891, which would improve the manufacturing process of the "Chaska" brick, which is a unique and diagnostic type of brick for Minnesota (Bierline 1892). According to the National Register of Historic Places (NRHP), Chaska brick "is a cream-colored, common brick that was produced for 100 years, from 1857-1961, in Carver County" (USDI: NPS 2013). This brick was the main type of brick in the state of Minnesota during this time period and the brick was made for the towns of Chaska and those in Carver County but was also used by other cities in Minnesota. According to the National Register of Historic Places, "while Chaska brick was exported to the Twin Cities, a significant amount was used by area residents to build houses,

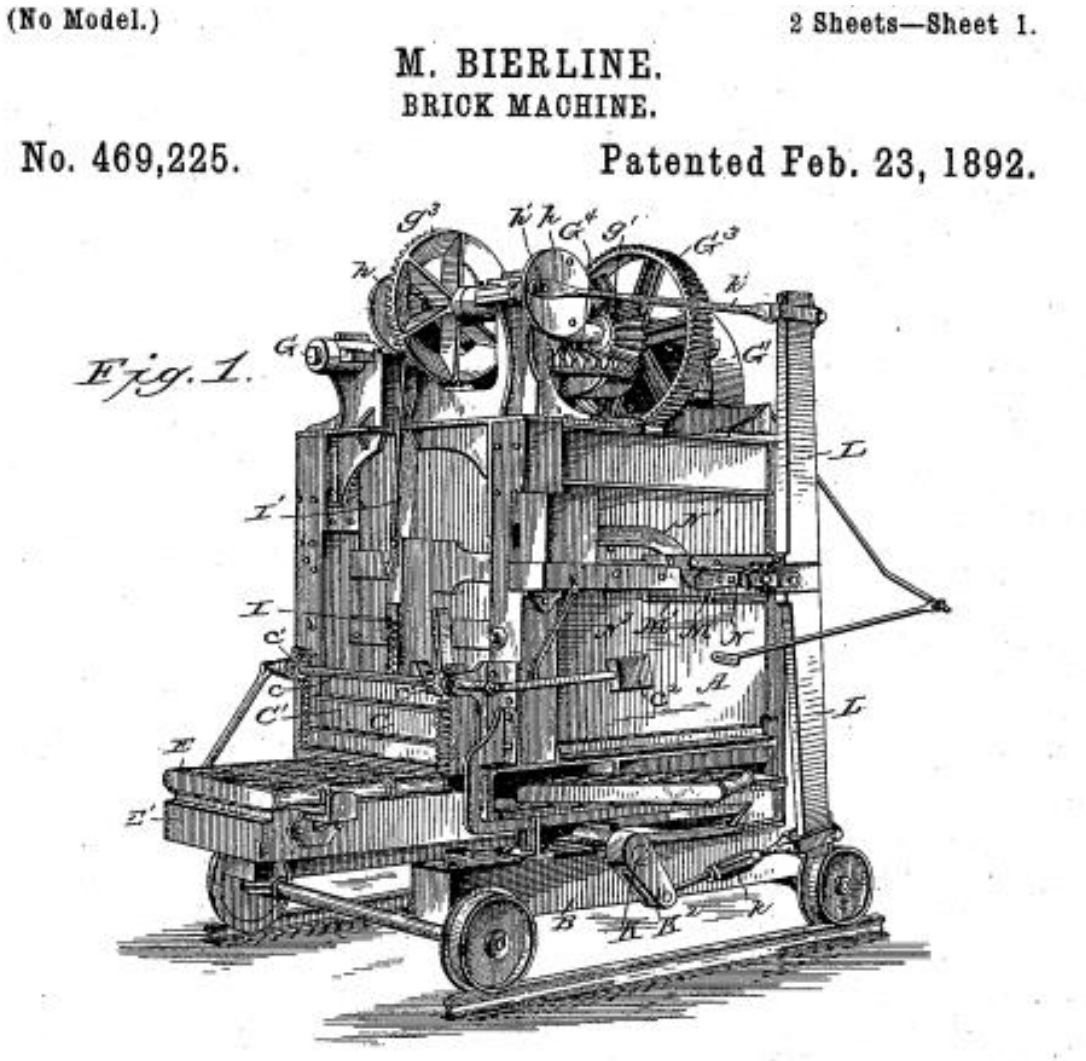
schools, churches, and commercial buildings" (USDI: NPS 2013). Chaska Brick Manufacturing was the most successful brick maker in the state, operating 11 brickyards in the 1890s, resulting in approximately 20% of the town's population being employed at the brickyards between 1870-1895 (USDI: NPS 2013). Common bricks were one of the main types of brick produced by C. H. Klein Company of Chaska (Grout 1947:4). There were several other companies who also produced this common brick, and according to Grout (1947:4), "these establishments, which produced light-colored brick for back-up purposes operate principally in the summer, when the bricks are air-dried." Some manufacturers utilize the sun as a way to bake the bricks, but most manufacturers utilize kilns, which are "giant ovens used for baking things made from clay, like bricks, pottery, and tiles" (Sewell et al. 2004:15). The type of baking process provides diagnostic characteristics for archaeologists to utilize in order to potentially determine the manufacturer of the brick. These characteristics could include color as well as markings on the brick produced by stacking the bricks in a kiln (Sewell et al. 2004:15). Chaska brick was produced using the sun and kilns. The sun was utilized during the summer months (Grout 1947: 4). According to Grout (1947:4), "The Klein Company at Chaska with 10 kilns and an annual capacity up to 20,000,000 bricks might increase production as much as 50%." The Klein Company at Chaska utilized their kilns in order to increase production during times of demand rather than sun-dry their bricks, which often took longer. Grout also discusses smaller brick-manufacturing plants in Minnesota, including ones in St. Cloud, Anoka, Willmar, Warren and Winona (Grout 1947:4). This is interesting because if St. Cloud had a plant producing similar styled bricks, these bricks could be the ones that were recovered at the Manlick Farm site, given the geographic proximity of St. Cloud to Belle Prairie compared to Chaska. The brick manufacturing plants in and around St. Cloud may have produced similar styled brick as the Klein Company, but the St. Cloud brickyard was much smaller and there is little information regarding the bricks manufactured at this location. Despite the lack of information regarding the St. Cloud brickyard, there is some geological evidence that could point to St. Cloud being a potential source of the brick recovered at the Manlick Farm site. Kaolin is a type of clay that is sometimes utilized in brick manufacture. A geological survey conducted in 1998 determined that Stearns County as well as St. Cloud have several deposits of kaolin (Heine et al. 1998). This report discusses the use of kaolin in brick and cement industries, but this survey discusses the type of clays utilized by Southern and Central Minnesotan brick and cement manufacturers in the 1990s and does not include a survey of Carver county, where Chaska brick was manufactured. Another study conducted by F. Grout in 1914 discusses the different clays and shales available in the different counties of Minnesota. According to Grout, there are three types of clays found in Carver county, which include alluvium, which is the most recent deposits followed by gray lake and river clays as well as gray drift from the Pleistocene (Grout 1914:84). The clays being utilized by brick manufacturers in Chaska are mainly from the "gray laminated river clays of the glacial River Warren" (Grout 1914:84). Grout also conducted his survey in Stearns County, where he determined the most common clays found in the area included lake clay, which was the most recent, gray lake and river clays from the Pleistocene as well as red drift and gray drift from the Pleistocene. Grout's survey also determined that shale and basal clay from the Cretaceous period existed in Stearns. Finally, residual clay from the Archean period was also discovered (Grout 1914:157). Grout also mentions a deposit that was being utilized by two brick manufacturers three miles south of St. Cloud. According to Grout (1914:158):

> Here, a tributary stream, Three Mile Creek, has eroded the sand, and made the clay accessible. Two brick yards are at work upon this material. As usual the clay has

irregular pockets and layers of sand, which, when rather fine, are called quicksand. These sands make very poor brick, but if proper attention is paid to the mixing of the plastic and sandy parts of the deposit, excellent cream-colored brick can be produced.

The presence of brickyards near St. Cloud utilizing these deposits that produce cream-colored brick might provide an origin for the brick recovered at the Manlick Farm site that would differ from the Chaska brick manufacturer. In order to determine this, however, samples of each type of brick would need to be compared to the bricks recovered at the Manlick Farm site.

Figure 1: Bierline Brick Machine Patent Model
(Bierline, Michael 1892 Brick-Machine. *United States Patent Office.* *https://patentimages.storage.googleapis.com/28/c7/79/2e4ee65de0b980/US469225.pdf*)


(No Model.) 2 Sheets—Sheet 1.

M. BIERLINE.
BRICK MACHINE.

No. 469,225. Patented Feb. 23, 1892.

Fig. 1.

Results:

The bricks were analyzed using a Munsell Soil Color Chart (Table 1). According to Stuart (2005: 83), "the disadvantage of all these charts is that the full range of potential colors is unlikely to be continued within the one chart." Although Stuart believes that these charts are useful for analyzing the color of brick, it should be taken with caution because bricks are often not uniform in color, (Stuart 2005: 83). The bricks analyzed were all similar colored, ranging from very pale brown (10YR 10/4)/ yellowish brown (10YR 6/4) to pink (7.5YR 7/4). Most of the bricks analyzed were of the pale brown variety. The pink colored brick was rarer, only occurring on specimens recovered from Transect 4 and only on certain parts of the brick.

Table 1: Brick Data (weight, color, size and inclusions)

Catalog #	Weight (g)	Munsell #	Color	Max Length (cm)	Max Width (cm)	Max Depth (cm)	Inclusions
302-7-29 T7	211.4	10 YR 7/4	very pale brown	9.5	N/A	2.5	Red Speck, 10 YR; 5/3-brown; 2.5 7/6-light red
302-4-23 T4	134.5	7.5 YR 7/4 10 YR 10/4	pink; light yellowish brown	8	8	3	7.5 YR 6/4- light brown; 2.5 YR-reddish brown
302-4-23 T4	55.9	10 YR 6/4	light yellowish brown	5	5	3.5	2.5 YR 3/6- dark red
302-4-23 T4	18.7	10 YR 6/3 10 YR 7/4	pale brown; very pale brown	5	3.5	2	302-4-23 all had similar inclusion colors
302-4-23 T4	8.3	7.5 YR 7/3 7.5 YR 8/4	pink	4	2	2	N/A
302-36-1 T5	365.8	10 YR 6/3 10 YR 7/5	pale brown; yellow	9	5	9	10 YR 7/6- yellow Some pink/red inclusions, but really small
302-30-1 T9	183.6	10 YR 7/4 10 YR 5/4	very pale brown; yellowish brown	5.5	5.5	5	2.5/1 -Black 2.5/3 very dark brown
302-6-1 T6	113	10 YR 6/4	light yellowish brown	8.5	6	4.5	10 YR 9/1- white small inclusion: 2.5 YR 4/6-red
302-10-8 T10	700	10 YR 7/4 10 YR 7/6	very pale brown; yellow	10	9	5.3	7.5 YR 6/4-light brown 2.5 YR 6/6-light red
302-10-8 T10	195.3	10 YR 7/4	very pale brown	7.5	N/A	4.5	2.5 YR 6/6-light red 10YR 8/3- very pale brown

One of the bricks from transect 9 was a lighter color than the rest of the bricks recovered. This brick was an outlier, possibly as a result of being burned, due to the lighter color on the outside (See Figure 2) and a darker, almost dark brown shade on the inside (See Figure 3 and 4). The inclusions in this brick were also odd. While most of the bricks recovered had inclusions that were a variety of red to light brown, the brick from transect 9 had black and dark brown inclusions (see Figure 4). Another outlier, in terms of inclusion color, was the brick recovered from transect 6, which had a single white inclusion. Based on the information regarding the type of material that bricks included in Minnesota, we can interpret the red to light brown inclusions to be a type of clay found in Minnesota, which was also included in Chaska brick at the time. The black inclusions might have been due to possible exposure to fire, and the white inclusion

could have been a manufacturing error as it is unusual for manufacturers to include white inclusions, especially the Klein Company of Chaska.

Figure 2: Brick recovered from Transect 9

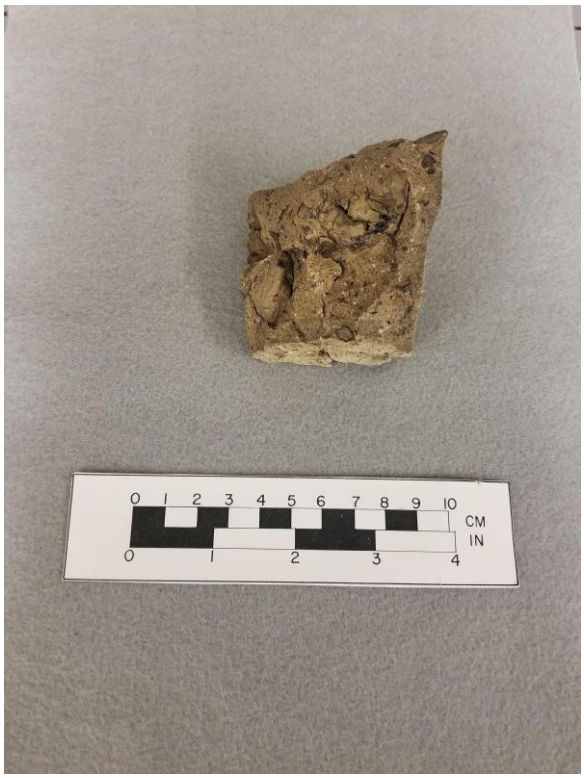


Figure 3: Inside of Transect 9 Brick

Figure 4: Close up photo of inside of brick from Transect 9, not to scale

Interpretation/ Conclusion:

Based on the evidence presented above, the assumption can be made that the brick found at the Manlick Farm site in Belle Prairie, Minnesota, is Chaska brick. The origin of the brick is evidenced by the color of the bricks recovered, ranging from a yellowish cream to a pale brown to a slight pink or salmon color, which is diagnostic for Chaska brick. Although firebrick tends to have this same coloring, the inclusions, except for one brick, indicate that the bricks were not fired again after the manufacturing process. The one brick, from Transect 9, which had a lighter variation of the yellowish-brown color, is thought to be a brick that was exposed to fire after the manufacturing process, which is also evidenced by the fact that the inclusions within the brick were black or dark brown in color, differing from the typical inclusions which were a red or reddish brown.

Although there was a brick manufacturer in St. Cloud during the same period as the Chaska brick manufacturer, it is unlikely that these bricks came from St. Cloud, but the possibility of the bricks being produced in St. Cloud cannot be ruled out. The Klein Company was one of the top performing brick manufacturers in Minnesota at the time, often exporting to other areas around Minnesota via the Minnesota and Mississippi Rivers. Due to its popularity, it is more likely that the brick recovered at the Manlick Farm Site was from this manufacturer. Despite the evidence presented above, there is still a chance that this brick was not from Chaska, which can only be truly determined by comparing the composition of a known Chaska brick and the ones found at the Manlick Farm site, but even this would be difficult because of the composition variety found in most bricks. This compositional analysis can be completed utilizing X-ray fluorescence (XRF), which would determine the minerals and clays utilized in the brick samples recovered from the Manlick Farm site. This composition could then be compared to known samples of brick that was manufactured by the Klein Company as well as other local brick manufacturers including those in St. Cloud and Minneapolis. If the brick recovered from the Manlick Farm site contains the clays mostly found in Carver county, it most likely was manufactured by the Klein Company, whereas if it contains clays characteristic of Stearns county, the brick might have been manufactured at the two brickyards 3 miles south of St. Cloud.

All in all, although it is likely that the brick recovered at the Manlick Farm site in Belle Prairie, Minnesota is Chaska brick, further analysis is needed to be conclusive. This would include doing further archaeological work at this site, including excavation, finding and utilizing a comparative sample of known Chaska brick as well as more research into the St. Cloud brick manufacturing and the type of bricks they were creating. In addition, it would be beneficial to investigate historic buildings in and in proximity to Belle Prairie and St. Cloud that were manufactured utilizing either Chaska brick or the cream-colored brick produced at the brickyards near St. Cloud. All this information will be needed to draw more conclusive interpretations of the brick recovered at the Manlick Farm site.

References:

Bierline, Michael
1892 Brick-Machine. *United States Patent Office. Patent Number: 469,225.* *https://patentimages.storage.googleapis.com/28/c7/79/2e4ee65de0b980/US469225.pdf*

United States Department of the Interior, National Park Service.
2013 Chaska Brick Resources in the Vicinity of Carver County, 1857-1961. *National Register of Historic Places (NRHP) Multiple Property Documentation Form.*

Grout, F. F.
1914 Preliminary Report on the Clays and Shales of Minnesota. *University of Minnesota, Minnesota Geological Survey.* Bulletin No. 11.

Grout, F. F.
1947 Minnesota Building Brick and Tile. *University of Minnesota, Minnesota Geological Survey*. Summary report Number 2.

Gurcke, Karl
1987 *Bricks and brickmaking: a handbook for historical archaeology*. University of Idaho Press.

Heine, John, J., Patelke, Richard, L., & Oreskovich, Julie A.
1998 Characterization of the Kaolin Occurrences in Northern and Central Minnesota. *Natural Resources Research Institute, University of Minnesota, Duluth.* Technical Report NRRI/TR-98/20.

Kelly, Roger E., & Kelly, Marsha C.S.
1977 Brick Bats for Archaeologists: Values of Pressed Brick Brands. *Historical Archaeology*, *11*(1), 84–89.

Sewell, Andrew, Hampton, Roy, Brandon, R. Joe, & Case, Amy
2004 Archaeology at the Harmony Brickworks. *US Army Corps of Engineers: Pittsburgh District.*

Stuart, Iain
2005 The Analysis of Bricks from Archaeological Sites in Australia. *Australasian Historical Archaeology: Journal of the Australasian Society for Historical Archaeology*, *23*(2005), 79–88.

Warner, Mary E.
2006 A Big Hearted Paleface Man: Nathan Richardson and the History of Morrison County, MN. Morrison County Historical Society, Little Falls, MN.