CHAPTER 5
PHASE III ARCHAEOLOGICAL DATA RECOVERY AT THE HISTORIC BRICKWORKS COMPONENT OF 36AL480 IN LEETSDALE, ALLEGHENY COUNTY, PENNSYLVANIA
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By Andrew R. Sewell, RPA

ABSTRACT

Between November 2000 and April 2001, a Phase III Data Recovery project was performed on the historic brickworks component of site 36AL480 in Leetsdale, Pennsylvania, known as the Harmony Brickworks. The Harmony Brickworks was a late nineteenth-century, industrial brick-manufacturing concern owned by the Harmony Society of nearby Economy, Pennsylvania. The factory contained two banks of kilns, a large hot floor complex, and associated outbuildings. The focus of the Phase III Data Recovery project discussed here was on the area containing the main hot floor complex. Excavations revealed that a great deal of the technological elements of the brick-drying process were relatively intact. Much data was obtained on the brick drying technology, along with information on plant layout and architecture. Also recovered was information on kiln architecture, on an earlier 1870s brick factory that operated on the same site, and on the post-industrial use of the site area. Analysis of the excavation results led to the conclusion that the Harmony Brickworks was a fairly typical brick factory for its size and period; it appears to have experimented with different hot floor technologies and used a kiln type that produced a large amount of low-quality brick. Although owned by the Harmony Society, it was not apparent that any of their societal values influenced the design and operations of the Harmony Brickworks.

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Hardlines Design Company carried out this project under contract with the U. S. Army Corps of Engineers – Pittsburgh District. The HDC field crew for this project included Project Manager R. Joe Brandon; Principal Investigators Andrew R. Sewell, M.S., RPA, and Craig Keener, PhD; Historian Roy A. Hampton; and field archaeologists Diane Beley, James Foura, Rory Krupp, David Lynch, Tim Hill, Jim Miller, Joe Navari, Chris Nicholson, Christi Pritchard, Jim Pritchard, and Gretchen Stranges. The backhoe operator was Lambert Bruce. The February 2000 salvage operation on the kiln bank at the Harmony Brickworks was directed by Alan Beauregard of BHE Environmental, Inc., under contract with Hardlines Design Company, with the assistance of Roy Hampton and Stanley Popovich of Hardlines Design Company. Steven A. Martin, April M. Boyer, Andrew R. Sewell and Robert Tate produced the maps, plans and profiles used in this report. Lab work was directed by Andrew Sewell and performed by James Foura, Joe Navari, Chris Nicholson, Gretchen Stranges and Robert Tate. Andrew R. Sewell performed the artifact analysis. Andrew R. Sewell and Tom Ng produced the artifact catalog. Andrew Sewell authored this chapter, and Susan Maughlin and Katy Mollerud provided editorial support.

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INTRODUCTION

This chapter presents the results of a Phase III Data Recovery project performed at the historic component of site 36AL480 in Leetsdale, Pennsylvania (Figures 5.1 and 5.2). The data recovery project was located in Area 1 (Figure 5.3) as set aside in the overall archaeological data recovery plan of the Pittsburgh District, U. S. Army Corps of Engineers (COE). This project focused on a late nineteenth-century brick factory once owned by a locally important religious group, the Harmonists. This brickworks was known as the "Harmony Brickworks" and will be referred to as such throughout this chapter. The work was performed to mitigate impacts from a COE project, the construction of a casting basin for offsite fabrication of the new Braddock Dam on the Monongahela River (known as the Leetsdale Casting Basin Facility). This project necessitated the removal of several key features of the brickworks site, including the archaeological remains of a bank of kilns outside the boundaries of Area 1. These kilns were documented before their destruction in February 2000. Further work on the brickworks within Area 1 was recommended based on the results of both the kiln documentation and on a previous Phase I survey performed in 1999, which indicated the possibility that significant portions of the brickworks related to brick processing remained intact below the ground surface (Christine Davis Consultants 2000). The Phase III Data Recovery on this portion of the site was performed from November 2 through December 22, 2000, and from March 19 to April 16, 2001.

This chapter focuses on the Phase III Data Recovery of the historic brickworks component at 36AL480, with brief references to earlier excavations for contextual purposes. Complete, in-depth discussions of the historical and technological background of the Harmony Brickworks can be found in the historic context (Chapter 4) of this report. All elevations used in this report are in reference to the National Geodetic Vertical Datum (NGVD) of 1983, and are reported as metric elevations. Measurements for features and artifacts in this report are given in metric first, followed by Standard English in parentheses. The Standard English measurements are given in addition to metric measurements, as this measurement system is presumed to be identical to the measurement system used in construction and manufacturing at the time periods relevant to this report. Standard English measurements are not given for elevations.

Research Goals

The COE recommended a Data Recovery Plan in December 2000 was proposed in accordance with the Programmatic Agreement between the COE, the Advisory Council on Historic Preservation (ACHP), and the Pennsylvania State Historic Preservation Officer (PASHPO). The Data Recovery Plan focused on three fenced portions of the construction site that were of archaeological interest. These areas were labeled Areas 1, 2, and 3 and were set aside for further investigation during construction. Area 1 once enclosed a portion of the Harmony Brickworks a short distance east of the casting basin (Figure 5.3). Areas 2 and 3 were portions of the site with solely prehistoric components set aside for later data recovery.

The following research goals were proposed as part of the Data Recovery Plan for the Harmony Brickworks site and were designed to address the technical aspect of brick making at the Harmony Brickworks, as well as the association of the site with the Harmony Society.

The specific research questions below are quoted from pages four through seven of the Scope of Work (SOW), presented in Appendix D. The literature investigation and archaeological data recovery used these goals to guide the research and fieldwork for this project.

a. Harmony Brickworks Industry – Site-Specific Context

Questions that can best be answered from the archaeological record include:

- What types of defects were observed on discarded bricks at the site? Where were these defected bricks deposited?
- How do the results of the archaeological investigation compare with expectations based on the documentary research?
- What was the process used to manufacture the bricks? Did the manufacturing process change over time?
- What types of bricks were produced at the site (e. g., pavers, common, fire, etc.)?
- What was the source of water? Is there evidence of water lines running into any of the identified structures?
- Is there evidence of trash and/or waster brick dumps in the data recovery area? Where were trash and/or waster bricks discarded?

b. Technology at the Brickworks Component

The technology and the architecture of a brick factory are closely related. Nineteenth-century brick kilns were either of the periodic or continuous type, and the construction design of the kiln varied depending on which type was chosen. These two kiln types are distinguished by the direction and method of controlling air circulation inside the kiln. The means of directing airflow is most evident on the lower portions of the structure, and signs of the system occasionally survive in the archaeological record.

The archaeological record can best answer the following questions:

- What were the size, shape and capacity of the kilns?
- Which types of kilns were used (periodic or continuous)?
- What was the direction and method used to control the flow of hot air (updraft or downdraft) in the kilns?

c. Architecture at the Brickworks Component

Questions that can best be addressed through examining the architectural record include:

- What are the construction features of the structural remnants examined during the data recovery?
- The floor and foundations of five structural remnants of similar size were excavated in February and appear to be intact subsurface archaeological remains. Did these five structural remnants represent kilns? How were these five structures constructed, in terms of materials, builder's trenches, size, thickness, etc., of footers, foundations, walls, floorings, etc.? When were the kilns and other structures built?

- What was the function of the large structure located within Area 1? Was this large structure built at one time, or did it grow through a series of additions? Is there any evidence of structural expansion and/or retrofitting during the use-life of the structure?
- How was the large structure in Area 1 constructed? Did it have a basement or cellar? Where was the door (s) for this structure? Was the front of the structure oriented towards the kilns?
- Within Area 1 there is a square hole with linear piles of dirt along each side. Does this represent a structural feature, possibly a cellar? If so, how was it constructed, and what was its function? Is it associated with the large structure shown on the surveyor's map?
- The early surveyor's map shows a small square structure in the southwest corner of Area 1. How was this structure constructed? What was the function of this structure? Where were the entrance and front side of this structure?
- Tree clearing and spring rains caused part of what seems to be a brick sidewalk or flooring to collapse into a circular, brick-lined chamber. The chamber measured approximately five feet in diameter. What is the function of this feature (cistern, well, or something else)? Looking at the spatial layout of the site, is it possible to discern why this feature was located near the edge of the T-3 terrace? Why was this feature covered by a brick sidewalk or flooring?
- Are there any other features located outside the areas covered by structures in the surveyor's drawing?
- Is there evidence of earlier historic structures or features beneath the structures shown on the surveyor's drawing?

d. Site Proxemics

- Which of the expected components of a typical brick factory were identified in the archaeological investigations undertaken at this site?
- Based on knowledge of the steps required for the manufacture of bricks, the movement of raw material and the spatial location of structures, activity areas, and other features, what was the spatial layout of the site? Was the site layout designed for the easy movement of material and products from one step to the next? Was it designed to fit the landscape?

e. Economics of the Brickwork Component

A critical factor for the economic success of brick factories was the marketing of bricks. The key aspects of marketing were transportation and consumers. The quality of bricks, scale of production and minimized periods of idleness were also critical to the economic success of this type of business.

Questions that can best be answered from the archaeological record include:

- What was the size of each structure identified?
- Does the size of the brick factory, including kilns and other structures, indicate that this was a large operation compared to other brick factories of a similar date range?

- Is there evidence that this brick factory produced inferior bricks? Superior bricks? Specialty bricks for a specific market?

f. Religion at the Brickworks Component

Other research questions can best be answered by archaeological research, including:

- Were any artifacts found that might be considered religious in nature?
- Was there any religious aspect to the design and construction of the buildings? Were the design and/or construction of the structures considered "typically" Harmonist?

g. Transportation Network for the Brickworks Component

How were raw materials brought to the brick factory?

- What was the transportation system used to move the finished product to market?
- It appears that a railroad line may have entered the factory, and that separate lines led to each kiln. In order for the road and rail line to enter the brick factory, the relict back channel of the Ohio River was filled in up to present grade for these transportation features? Is there any archaeological evidence of a road or railroad bed in Area 1?
- How does the elaborate transportation system at this factory compare to that at other brickworks during the same time period?
- Did the river serve as a major transportation corridor for the finished bricks? Did the railroad serve as a major transportation corridor for these products?

The literature investigation most effectively addressed some of these questions, including the question of kiln capacity, relative size of the brickworks' operation in comparison to contemporary brick manufacturers, and the transportation of raw materials to the factory and delivery of finished product to the market. Archaeological testing then confirmed these explanations. Other questions were better answered by archaeological fieldwork, such as structure size, spatial layout, identification of structures on the surveyor's map, and the location of features not indicated by the surveyor's map. The results of archaeological fieldwork also provided a wealth of data on topics not addressed by the above research goals, including the technology of heated dry floors and the presence of features related to a brickworks on the site that predated the Harmonists.

REVIEW OF PREVIOUS RESEARCH AT 36AL480, BRICKWORKS COMPONENT

Previous fieldwork at 36AL480 relating to the historic brickworks component included a Phase I survey by Christine Davis Consultants, Inc. (CDC) in 1999. The description of the CDC work was cited from the 2000 draft report of the Phase I investigations (Christine Davis Consultants 2000).

Phase I Survey

CDC archaeologists conducted a Phase I archaeological survey of the proposed Casting Basin from September 13, 1999, to December 24, 1999. The archaeologists encountered stratified prehistoric components and the subsurface remains of the Harmony Brickworks. During the Phase I survey, the CDC team excavated fifteen geomorphology trenches, fifty-three archaeology trenches, and sixty 1-m^2 excavation units. With regard to the Harmony Brickworks, the Phase I survey crew identified a clay pit, a dumping area, a structural foundation, two possible kiln locations and part of the nineteenth-century road system through the brickworks (Christine Davis Consultants 2000).

Because of the discovery of large, intact subsurface features related to the brickworks, the COE decided that the brickworks site required further excavation to recover data important to our understanding of the brick-making technologies in use at the factory. Hardlines Design Company (HDC) commenced work at the site in February 2000 to begin a limited Phase III Data Recovery Project by performing a salvage excavation of the main kiln bank, which was slated for demolition as part of the casting basin excavation. For the brickworks component within set-aside Area 1, the HDC team began Phase III data recovery in the autumn of 2000 and completed fieldwork in the spring of 2001.

METHOD

Method Overview

The initial work at 36AL480 consisted of a limited salvage excavation in February 2000 that concentrated on a bank of kilns that would be removed as part of the dam basin excavation. A full archaeological crew began a larger-scale Phase III Data Recovery on the rest of the brickworks site in November 2000. This excavation was completed in April 2001 after a three-month winter hiatus.

February 2000 Investigations Method

The method used to investigate the five large kilns at the Harmony Brickworks was designed to provide a maximum return of data from a limited operational timeframe for fieldwork. Field crews completed archaeological investigations from February 10-14, 2000, before the excavation of the casting basin for the Braddock Dam. The teams excavated trenches across the kilns using a track grader, and they manually excavated a 1-m^2 test unit (Figure 5.5). Further manual excavations concentrated on features exposed by the track grader. The stratigraphy of this part of the site was recorded from one trench and from the manually excavated test unit.

Phase III Data Recovery Method

The Scope of Work (SOW) provided by the COE required 60 m^2 of manual excavations, including shovel testing and test-unit excavation, and four 28-m^2 mechanically excavated blocks, one of which had to be located outside the footprint of the large building represented on the 1894 map (Figure 5.4). All excavations were required to be oriented to a predetermined grid system laid over the site, and were not to extend below the base of historic deposits.

The team began by excavating 50-cm^2 shovel test units every five meters on the grid. The results of the shovel testing, presented below, led to an approved change in method, as outlined in the SOW, to include long, narrow mechanical trenching across the site to better identify areas of interest for placing test units. Manual test units measured 1 m x 2 m and 2 m x 2 m. The 1-x-2-m units were placed perpendicularly across walls exposed by the trenching, while the 2-x-2-m units were excavated over non-wall features. The team also excavated one unit measuring 1 m x 4 m. The mechanically excavated blocks were specifically located to open large areas suspected to contain concentrations of intact features. The team used a backhoe with a blade welded across the teeth to excavate a total of seven large blocks. The soil from the shovel-test units was screened through ¼" hardware-cloth screens for artifact collection. The manually excavated blocks were only subjected to soil screening when excavation reached a depth of 10 cm (4 in) above the natural soils, per COE instructions. The level of natural soils was determined through examination of nearby trenches and shovel test units.

Only large artifacts relating to the brickworks were saved from the mechanically excavated blocks. The matrix was not screened from the large mechanically excavated blocks. All features and excavations were mapped with a total station and data logger for precision measurements, and the data were used to produce site maps and plans using Didger, Surfer7 and ArcMap 8.2 mapping software.

Site Clearing

The site was immediately cleared once fieldwork began. Tall weeds had grown over the site, and a small Terramyte backhoe was used to clear this vegetation by flattening it against the ground. Because it was late in the season, there was no subsequent regrowth. After the site was cleared, the four mapping datum stakes placed by the COE were relocated to begin mapping.

Mapping

A Pentax PCS-2 total station with a data logger was used to gather all required mapping data. The total station was used for everything from general site mapping to the profiling and defining of features in block excavations. Data from the mapping was downloaded into the mapping programs and was used to produce excavation maps, block plans, and project area maps.

Photography

Site photography required the use of 35 mm black-and-white film, 35 mm color slides, and digital photography. Disposable cameras were also used as a management tool, and daily and weekly video summaries of the site were recorded with a handheld VHS camcorder. At least twenty-five percent of the shovel-test units, all trenches, and all blocks were photographed, including detail shots of features. Crew photos and site overviews were also taken. Each subject was recorded with one image in black and white and one photograph each from the digital camera and the disposable camera. Every subject was further documented with three bracketed exposures using color slide film.

Feature Treatment

Features were assigned a field feature number as soon as they were encountered. Because of the complex and often confusing nature of an industrial site, and considering the large size of this particular site, several feature numbers were often assigned to one distinct feature that covered a large area. For example, Feature 9, the subfloor flue system, was assigned 16 separate feature numbers during fieldwork before it was determined to be a single feature. Features that had multiple individual feature numbers had all the numbers subsumed into the earliest feature number assigned to them, which became the primary feature number. In the discussions of the individual excavation units, any feature numbers assigned in the field to a particular feature are noted, but afterwards only the primary feature number is used. In the sections following the results of excavations, only the primary feature number is used to reference the features in the text. Appendix C contains a table of all features that were assigned a feature number during the project and identifies which feature numbers are the primary numbers and which are redundant numbers. Because of this consolidation of feature numbers, some features might seem to be absent in the feature discussion, when in fact they have been subsumed under a prior feature number.

Encountered features consisted almost entirely of architectural elements from the factory and remains of the brick-manufacturing process. Excavators cleared these features using trowels, whiskbrooms, and leaf blowers; and features were selectively excavated if they contained elements that could be excavated, such as builder's trenches or an interior fill. The fill in many features consisted almost entirely of brick rubble, which was carefully excavated by hand but was not screened. The fill from selected features was screened. All features were planned and profiled according to the nature of the feature. For example, a representative profile would have been recorded for a long wall section exposed by a trench, while a full sectioned profile might have been completed for a kiln firebox.

Shovel-Test Unit Excavation

A total of 106 of a possible 111 shovel test units (STUs) were excavated every five meters on the predetermined grid across the site. The five unexcavated STUs were located at grid coordinates where a surface obstruction was present (such as the entry to Area 1, tree stumps, or log piles). Each unit was 50 cm x 50 cm (1 ft 7 in x 1 ft 7 in) and was excavated down to historically undisturbed subsoil, soil conditions permitting. Although the author recognizes that thermal alteration of soils can be considered a disturbance, for the purposes of this report, soils that were thermally altered but otherwise untouched by historical activity (i.e., the soil was in the same location as it had been prior to European-American use of the site

area) are considered “undisturbed.” The soils from the STUs were screened through ¼ ” hardware cloth, and all recovered artifacts were collected.

Trenching

Because of the limited area exposed by the STUs, and the need to locate large architectural features quickly, HDC archaeologists used a small Terramyte backhoe to excavate trenches across the site. Most trenches were oriented according to the long axis of the large building on the 1894 surveyor’s map, rather than according to the grid. This was done to determine more easily the orientation of features in relation to the building footprint and also to be able to better follow long linear features such as wall foundations. A second crew member monitored the excavations. Excavations stopped upon encountering features or undisturbed subsoil. All trenches were assigned numerical designations. All trenches were a minimum of 50 cm (1 ft 7 in) wide.

Manual Block Excavation

HDC archaeologists manually excavated 14 blocks in the project area. Both the manually and the mechanically excavated blocks were assigned alphanumeric designations to distinguish them from the trenches. Each manually excavated block was further subdivided into 1-m^2 units, as outlined in the SOW, which were numerically designated. The blocks were positioned to allow the maximum exploration of features uncovered by the STUs and trenches.

Five blocks were located on non-wall features, while eight blocks were situated over previously identified wall features. The blocks that focused on the walls were excavated perpendicular to the wall and measured 1 m x 2 m, with two 1-m^2 units within each block. The blocks that focused on the non-wall features were excavated as 2-x-2-m blocks, with four 1-m^2 units within each block. Crew members also excavated a 1-x-4-m block, divided into four 1-m^2 units. After the block was fully excavated, the backhoe was used to cut a post-excavation trench through some of the wall features in these blocks to ensure that any interior details not evident from the excavation were recorded.

Because of the ubiquitous presence of demolition fill and later household-disposal fill across the site, only the last 10 cm of each unit was screened through ¼” hardware cloth. All artifacts recovered in the screens were collected for analysis.

Mechanical Block Excavation

Eight blocks were mechanically excavated on the site to expose areas of interest. Field crews excavated these blocks using a full-size backhoe with a toothless 51 cm (20 in) bucket. One block was positioned outside the 1894 building footprint to test for post-1897 development in that area, per the SOW. Blocks were mechanically excavated until features were encountered. Once features were uncovered, the blocks were then manually excavated to the base of the historically altered soils. No soils from within the gross mechanical blocks were screened, and only features with stratified fill related to the actual use of the factory were screened. Artifacts significant to understanding and/or dating structural features were collected for further analysis as they were uncovered with the backhoe.

Laboratory Method

Treatment of Historic Artifacts

All historic artifacts were washed and initially sorted by material. Historic artifacts are catalogued using a coded direct-data-entry system into a Microsoft Access® database, and information is recorded on form, function, material, temporal placement, color, count, weight, and manufacturing technique. Material classifications are subdivided to allow greater flexibility and detail. Data entered into this database are coded according to the physical attributes of the artifact (such as form, material, manufacturing method, and decorative techniques), and can be manipulated according to the specific attributes the researcher wishes to examine. Assigning a special code to each attribute of an individual artifact allows for standardized data entry and eliminates typographical variations and errors that would hinder data manipulation.

Ceramics and Glass

The following descriptions for ceramics and glass are presented according to common archaeological usage. Identification and classification of other classes of artifacts are limited to descriptive overviews of the nature of recovered materials. The identification and classification of ceramic and glass artifacts are emphasized here because of their utility in chronological, economic, and behavioral reconstruction.

Typology and Chronology

The typological attributes of an artifact must be identified before the chronological placement of the artifact can be determined. Historic artifacts are normally assigned dates by identifying attributes known through previous research to be temporally sensitive. These datable attributes include manufacturing technique, material, and decoration. Because ceramics and glass are the most durable of historic artifacts, they retain many datable attributes. Furthermore, to provide narrow date ranges for occupation, knowledge about the historical popularity of certain ceramic decorative styles, combined with an understanding of the economic situations for the general time period of the ceramic types, can be applied to a site assemblage. The same is especially true for glass bottles, which is the type of glass artifact most likely to retain information about manufacturing technique.

Ceramics

Ceramic sherds can be divided into three major groups, based on body and manufacturing technique: earthenware, porcelain, and stoneware. Earthenware is generally fired at low temperatures, and can be subdivided into refined, coarse, and/or utilitarian wares. Most have soft-paste bodies, with the exception of the later ironstone and white granitewares. Stoneware is a hard-paste ceramic fired at high temperatures and is found mainly in utilitarian forms such as jugs, bottles, crocks, and bowls. Eighteenth-century European potters, however, shaped some white salt-glazed stonewares into tablewares in an early attempt to mimic porcelain. Porcelain is a highly vitrified hard-paste ware made from a blend of kaolin, silica, and feldspar, and is normally used in the manufacture of fine teaware, tableware, and miscellaneous ornamental pieces.

Many historical archaeologists have depended on use-popularity patterns to place ceramic artifacts in a chronology. These patterns are based on periods of manufacture and market demand for various ware types. Date ranges used in these patterns have been established through documentation of merchants' and manufacturers' records (Miller 1991). Changes in glazes and body composition during the nineteenth century can be used to refine date ranges of white-bodied earthenwares, along with the identification of datable decorative designs on tablewares. Care must be taken, however, to account for time lags in assigning date ranges for ceramic assemblages. A recent article by Adams indicates that the time lag between the production of a ceramic vessel and its disposal can be a fairly significant amount of time, such that ceramic sherds from an archaeological deposit may have come from a vessel broken 20 years or more after acquisition in the market (Adams 2003).

The different kinds of ceramic types included in this study range from the nineteenth century through the early twentieth century. Separate chronologies for wares and decorative technologies have been established for this study. These chronologies are used to establish probable functional-date ranges for the ceramics in this study by considering dates of manufacture, use-popularity, and time lags between production and disposal dates.

Earthenwares

The most commonly recovered ceramic artifacts consist largely of refined earthenwares. European refined earthenwares were developed to compete with the highly popular hard-paste Chinese import porcelain of the seventeenth and eighteenth centuries. Some early refined earthenwares included tin-enameled earthenwares: delft from the Netherlands, French faience, and majolica from Spain and Italy. In England, potters from the Staffordshire region developed refined earthenwares such as white salt-glazed stoneware and creamware.

Creamware and Pearlware

Creamware is a "yellow, lead-glazed ware developed in the 1740s as a successor to white salt-glazed earthenware" (Noel Hume 2001). This ware achieved marketing success when the ware's developers, Josiah Wedgwood and Thomas Bentley, sold a set of creamware to Queen Charlotte of England. The ware was then marketed as "Queen's Ware" to the public, and demand led to a surge in production in the late eighteenth century. Generally, the earliest creamwares have a deep yellow tint to the body, while the bodies of later creamwares gradually whitened as potters used new ingredients and methods. Creamware is also sometimes identifiable by regions of thickened glaze on a vessel body (such as the foot ring), which can be greenish-yellow in hue.

Pearlware originated with a ware called "China Glaze," which was developed around 1774 in the Staffordshire Potteries to compete with porcelain, which at that time could only be produced by the holder of the British patent for the ware (Miller 1993). China Glaze is recognizable for its blue-tinted glaze, blue painted patterns that imitate Chinese designs and motifs, and vessel forms that sometimes mimicked Chinese vessel forms, such as handleless teacups. The popularity of China Glaze declined by the War of 1812. In the late 1770s, Wedgwood produced a ware to compete with China Glaze by using cobalt in the glaze formula to produce a ware that appeared whiter, which he termed "Pearl White." This ware is actually the ware archaeologists know as pearlware. For identification purposes, pearlware is usually identifiable by a blue tint to the glaze (but not the body—blue glazed bodies are

found in later white granite wares). This blue tint is especially evident in areas of a vessel where glaze can pool after dipping, such as on foot rings or under sharply angled rims.

In 1790, Josiah Spode of Stoke-on-Trent produced a whiter-bodied "bone china," an English soft-paste porcelain that gradually replaced Chinese porcelain in the English market. Spode's bone china was made using bone ash to harden the paste. The bone ash gave the ware a slight yellowish cast. In response to the popularity of Spode's product, English earthenware potters began to alter their glaze formula to produce a whiter-bodied ware. The glaze tints of creamware and pearlware eventually lost all color by the 1840s, and archaeologists usually classify examples of these wares recovered from post-1840s deposits as whitewares.

It should be noted that many potters and marketers of ceramics in the late eighteenth and nineteenth centuries did not use the terms "creamware," "pearlware," and "whiteware," but instead used the term "cream-colored ware" (or CC ware) to cover all white earthenwares in their pricing lists (Miller 1991). To produce whiteware, potters reduced the amount of cobalt in the glaze formulas to an amount just sufficient to neutralize any yellow tint, but without producing a blue tint in the glaze. It is important to note that many whitewares have a light blue tint in the footring area of the vessel where glaze tends to pool. This can cause a misidentification as pearlware, and Miller (1993) cautions that the intent of the manufacturer must be considered, and that white-glazed earthenwares that have this light blue tint in the footring should be classified as whitewares. Miller states that this specific type of whiteware can be found on American sites between the War of 1812 and the 1840s. Whitewares are still in production today.

Ironstone

Around the period whiteware was developed, ironstone or white-granite ware entered the market, first known as stone china in England. The term "ironstone" originates from the name Charles Mason gave his patented stone china in 1813. Early stone-china wares were another attempt to compete with porcelain, and they featured blue-tinted glazes similar to those found on pearlware. Stone-china wares rarely occur on American sites, and are almost never undecorated. Stone china can be distinguished from pearlware in the hardness of the body or paste, since pearlware is a soft-paste ware and stone china has a much harder paste. Ironstones began to appear in America in the 1840s as a ware the potters termed "white granite." This ware was one that between the 1840s and 1860s had a highly vitrified paste and often had molded marlys and geometrical plate shapes. (A "marly" is the space between the concave center of a plate and its rim.)

The popularity of this style declined in the 1870s in favor of round plate forms, which often had no molded decorations. American-made white granite/ironstone is associated with the postbellum period, since a tariff on imported ceramics during the war effectively doubled the price of British ceramics. As a result, British potters immigrated to America, and American-made wares generally began to supplant British imports. Because the new immigrant potters were inexperienced with American clays and other materials used to make ceramics, the ironstones from ca.1865-1890 often exhibit a heavily crazed glaze. (Crazing refers to the cracks exhibited under the glaze of many ceramic sherds found in archaeological contexts.) White granite/ironstone is still produced today.

Types of Decoration

In pricing earthenware vessels, nineteenth-century ceramic manufacturers used the decoration of a ware rather than the body; therefore, the decoration is the most accurate temporal information for dating earthenwares. Potters referred to plain, undecorated wares as "CC Wares." Miller (1993) notes that after the War of 1812, CC ware was used mostly for kitchen and toilet wares, and rarely functioned as table or teaware. After 1840, undecorated teawares are usually ironstone/white granite, and undecorated tablewares are also commonly ironstone/white granite. The following decorative type definitions are paraphrased from Miller 1991, supplemented with some additional information from Sussman 1977.

Shell-edge

Shell edge is a decorative technique, so named because it appears on the edges of flat tablewares and resembles the rim of a seashell. Shell-edge decoration includes both a molded, wavy rim that directly resembles a shell, and a more stylized edge treatment that only incorporates impressed lines to represent the shell edge. Although the latter type is most common in nineteenth-century shell-edge wares, it was also produced during the eighteenth century alongside the more elaborately molded shell-edge wares (Sussman 1977:106). The molded edges of shell-edge wares normally featured underglaze painting, usually blue, but green underglaze painting was also used earlier in the period. On some later shell-edge wares, the molding is completely absent, and the underglaze painting of closely or irregularly spaced lines is all that is left to refer to the earlier molded versions of shell edge. Shell edge is only known to occur on pearlwares and whitewares. Generally, shell edge was most popular on American sites in the antebellum period, although production continued into the 1890s. According to potters' pricing lists from the nineteenth century, shell-edge wares were the cheapest decorated wares available (Miller 1991:6).

Spatterware

Spatterware was a decorative technique produced by applying colored powder to the vessel. The exact method of application is undetermined, but the precise patterning of some spatterware designs suggests the use of a brush or sponge. Spatterware is an old decorative technique that dates back to the seventeenth century, and production continued until the mid-nineteenth century (Miller 1991:6). A closely related decoration is spongeware, discussed below, and archaeologists often classify the two types together.

Spongeware

Spongeware was a decorative technique named for its use of sponges; the sponges were cut into patterns and then used to apply colored dyes to the vessels. This form of decoration began in England during the 1840s (Miller 1991:6). Spongeware and spatterware were comparable to shell edge in pricing for their period.

Dipped Wares

Potters produced this class of decorated ceramics by applying colored clay slips to the unfired vessel. This procedure often simply involved dipping the vessel into the slip to coat the entire surface, but banded vessels (sometimes called Annular ware) are another form of dipped ware. Banded wares exhibit lateral banding and include Mocha ware, which has a dendritic pattern and dates to the early eighteenth century on American sites. This category

also includes blue-banded wares, which also are commonly found on American sites dating from the nineteenth century.

Underglaze-Lined and Enameled-upon-Glaze-Lined Wares

These wares simply exhibit one or two lines painted on the inner edge of the marly or on the rims of tablewares. These lines were painted either over or under the glaze. Potters often used this technique to apply brown lines on creamware, or to paint green and blue lines on pearlwares. This form of decoration tends to occur in early nineteenth-century assemblages, especially in a British military context.

Band-and-Line Wares

This ware features a thin line painted next to a thicker band under the glaze on a vessel's rim. This decorative type occurs in late nineteenth-century assemblages on teawares and tablewares, often as institutional ware. This ware was common until the 1950s and the introduction of paper plates, but it can still be found in use in restaurants and hotels. The most common color used was green.

Painted Wares

There are two types of painted wares: overglazed or enameled, and underglazed. Painted wares include all ceramic types from white salt-glazed stoneware to stone china. Enameled wares feature painted decoration applied on top of the glaze in a wide variety of colors. The image is crisp in appearance, unlike underglaze painting. Enameled wares were more expensive than underglaze painted wares because the ware required a second, low-temperature firing after the vessel was painted. Overglaze enamel was the most common form of decorating creamware until it was replaced in popularity by underglaze painting in the 1780s (Miller 1991:7).

According to Miller (1991), underglaze painting supplanted enameling as a decorative technique once new technology was developed to refine cobalt for paints used on Staffordshire potteries in 1772. The early blue-painted pearlware was part of the trend of imitating Chinese porcelain. These Chinese-style wares dominated the market from the 1770s until the War of 1812. From the end of the eighteenth century through the 1820s, potters used other colors, such as browns, yellows, and greens, on painted wares, most commonly on teawares to make floral patterns. Beginning in the 1830s, red, black, and lighter greens were introduced into the floral designs, and after the 1840s, designs on teawares and tablewares commonly included a sponge-stamped pattern and hand-painted details. "Sprig"-painted wares became popular about this time, and were supplanted in popularity in the 1870s by larger painted-polychrome floral motifs.

Transfer Printing

Transfer printing involves pressing a piece of paper onto an inked engraved design, and then transferring the image by applying the paper with the wet, inked design to the ceramic vessel. Early transfer printing was applied on top of the glaze, while later versions of the process applied the print before the application of glaze. One of the earliest and most famous patterns is the Willow pattern, which was a combination of at least two different patterns found on Chinese porcelain. The pattern was standardized in 1790 and is still in production today.

Willowware only appeared on tablewares until the second half of the nineteenth century, when it also began to appear on teawares. Potters considered Willowware to be the cheapest available transfer-printed pattern.

The technique used by the engraver can be an additional clue to dating transfer-printed patterns. Generally, the early prints were line-engraved with minimal shading and heavy designs (Miller 1991:9). In the early nineteenth century, stippling appeared in the designs to provide a wider range of shading. In 1810, designs began to include English landscapes, and American landscapes followed the War of 1812. In the 1830s, romantic views began to become more popular. The color of the print can also be a clue to dating. About 1818, dark blue prints became very popular in America, which resulted in the production of very dark prints, several of which left the subject unprinted (white) while the backgrounds were completely filled with blue printing. Import of brown printed wares began in 1809, and by 1829, wares printed with brown, red, green, and purple were available in the American marketplace (Miller 1991:9). Flow-blue transfer printing (so called because the ink from the print runs into the glaze, blurring the image) became briefly popular in the 1840s, before transfer printed wares fell out of favor in the 1850s and the new molded white-granite/ironstone wares became popular. Demand increased again in the 1870s for ivory-bodied wares with brown painted Japanese-style designs.

Gilded Ware

Gilded ware features a band of gold that is applied onto a vessel. The earliest examples date from the early eighteenth century. Prior to the 1830s, gilding was expensive and was only applied to porcelain vessels. A new process of gilding was developed in Germany that reduced the labor involved and simplified the process. The process was called “liquid gold gilding,” and English potters were using this new technique by the 1870s. The use of inexpensive gilding increased and is still practiced today.

Black Wares

The two black wares that archaeologists are most likely to encounter are basalt ware and Jackfield ware. Basalt ware is a dense stoneware with a black-dyed body that was usually left unglazed, and was most commonly used to manufacture vessels for serving tea, although not for teacups or saucers. Production of basalt ware began in the 1760s. Jackfield ware is a “thin, red-or gray-bodied, high-fired earthenware under a shiny iron-black glaze” that dates from the second half of the eighteenth century (Noel Hume 2001:275).

Porcelain

True porcelain is a hard-paste ceramic ware fired at high temperatures. Porcelain is made from kaolin (a very fine clay), feldspar, and silica; it is translucent and features a pure white body. This ware was first developed in China and inspired frequent imitation by European potters. Chinese porcelain found on American sites belongs either to the Ming dynasty (1364-1644) or the Ch’ing dynasty (1644-1912). Decorations mostly consisted of underglaze blue painting, although some red and gilded highlights were applied over the glaze. Generally, the designs on later Chinese export porcelains are of a much lower quality than the earlier porcelains (Noel-Hume 1969:258-262). English porcelains began to be developed in the 1740s and were soft-paste porcelains, which contained ground glass in the body.

William Cookworthy developed the first true English hard-paste porcelain in 1768 using kaolin and feldspar from Cornwall (Miller 1991:11). Bone china replaced other types of porcelain in popularity both because of its wider range of decoration, possible because of the lower firing temperature, and because of its highly translucent body. Porcelains from England are very uncommon in assemblages from American sites that pre-date the 1850s.

"Porcelaneous stoneware," or "semi-porcelain," was a later ware related to porcelain and similar to ironstone in its body. Porcelaneous stoneware was a hard-paste, non-porous ware commonly manufactured as institutional tableware

Redware

Redware is a type of ceramic with a red body, and it usually has a lead glaze. Although redware can be made from a variety of different clays, the end result is the defining red body. Redwares are often associated with folk potters and were commonly made as utilitarian kitchenwares, although tablewares were also produced. Pennsylvania redwares are noted for sgraffito decoration, in which an opaque slip was applied to the face of a vessel (usually flatware), and then a design was scratched through the slip to reveal the red body of the vessel underneath. This decoration was sometimes augmented by the application of slip using a small cup with holes in the bottom. The potter passed this cup over the vessel and regulated the flow of the slip by covering some of the holes with his fingers (Ketchum 2000). One disadvantage to redware was its fragility.

Stoneware

Stoneware is a very dense, non-porous ceramic type that is fired at extremely high temperatures. The bodies of stonewares range in color from light tan to gray. Stoneware has generally been made into utilitarian wares, especially for food and beverage storage. Commonly found examples include crocks, jugs, bowls, bottles, churns, jars, and chamber pots. An exception is the early white salt-glazed stoneware tableware produced in England to compete with porcelain. Stoneware is waterproof and requires no glazing, but it usually is glazed to provide some degree of decoration. Salt glazing was a common technique in which salt was added to a stoneware kiln at the peak of temperature to produce a clear finish with a rough texture. Since the salt could not reach the interior of stacked vessels in the kiln, the interiors were often slipped. In the 1820s, a deep brown glaze became widely used on stoneware vessels made in Albany, New York, for which Albany-slipped stoneware was named (Ketchum 2000:18-19). It should be noted that brown-slipped stonewares were produced prior to the 1820s, and that such wares did not originate in Albany, as is commonly believed. Bristol glaze is another common glaze for stoneware. It is a pale, creamy glaze commonly found on bottles, often in combination with a dark brown glaze similar to Albany slip.

Yellow Ware

Yellow ware is made from clays that, when fired, produce a yellow body. Although produced in England in the eighteenth century, yellow ware was not produced in America until the 1820s, after which it became increasingly popular, especially for kitchenware and sanitary ware. Yellow ware is waterproof but was nearly always coated with a clear glaze to accentuate the yellow body. Bowls were commonly decorated with brown and white or

cream-colored lines and bands. A popular finish for yellow ware resulted in Rockingham ware, which was produced by applying a manganese-based brown glaze to a revolving vessel. The final appearance was reminiscent of tortoise shell.

Glass

Until the nineteenth century, glass was handblown and glass making was essentially a craft. Glassblowers were specialists involved in the entire manufacturing process for glass products. The early glassblower inserted a long blowpipe into a glass furnace that contained a clay pot filled with molten glass. He dipped the blowpipe into the clay pot and extracted a blob of red-hot molten glass. The glassblower then blew through the pipe to expand the glass as he formed it into the desired shape. This basic process was used to manufacture all glass objects until the late nineteenth century when the industry adopted automation.

Glassblowers used specialized tools to form glass, including shears, molds, and devices for securing glass vessels while they worked the glass. Many of these tools left diagnostic marks on the vessel that can be dated by the archaeologist. This fact is especially true of glass bottles, which are commonly found in archaeological assemblages and retain the most information about the manufacturing process.

Bottles

When attempting to define a date range for bottles, the four most important characteristics to consider include the type of mold, the base treatment, the finishing, and the color of the glass. These traits are discussed below, following a brief summary of bottle nomenclature.

Nomenclature

Bottle nomenclature is generally zoomorphic, in that terms used to describe animal body parts are applied to bottle description. The bottom of the bottle is called the base, which can exhibit diagnostic marks from pontil rods, molds, and embossing. The heel is the part of the base that joins the main part of the bottle, or the body. The neck rises from the shoulder, which is the part of a bottle that curves inward from the body to meet the finish, which consists of the mouth and lip. The lip of the bottle is the margin of glass immediately around the opening, which is called the mouth or bore (White 1978, Jones et al. 1989:76).

Molds

Molds have been used in bottle making for hundreds of years, alongside the more ancient technique of free-blowing, which produces a bottle without the use of a mold. Free-blown larger bottles began to decline in production in the first half of the 1700s, but smaller bottles such as medicine vials continued to be free-blown until the nineteenth century. Typically, a free-blown bottle is asymmetrical; lacks mold seams, embossing, and molded decorations; has smooth, rounded contours instead of sharp angles or lines; and has a general body form that is a globular or elongated cylinder (Jones et al. 1989:22).

After ca. 1730, the use of molds in bottle manufacture became increasingly common. Various forms of molding were employed, such as dip molding and the use of two-piece molds:

- Dip molding involves blowing the glass into a mold that forms the body of the bottle, and then free-forming the shoulder and neck of the bottle. This technique leaves no

mold seams. The body may be textured from contact with the mold, while the shoulder and neck are always smooth. Dip-molding was likely in use prior to the eighteenth century and disappeared in the early nineteenth century in America and England, although it was still used in France in the 1870s (Jones et al. 1989:26).

- Two-piece molds are hinged either at the side or bottom, and date from ca.1750–ca. 1880. Characteristics include mold seams that begin just below the neck and run down the body, across the base, and up the other side of the body to end below the neck on the opposite side of the bottle; a basal mold seam that either goes straight across the base or forms a half-circle around the pushup; and a hand-tooled neck and finish. This type of mold was modified to include a third piece for the base. This modified form left a mold seam around the circumference of the base-body junction, and body mold seams that begin from the base-body junction and extend to the shoulder. These bottles date from ca. 1850 to the early twentieth century (Jones et al. 1989:28), but they should not be confused with three-piece, or Ricketts type, molds.

In 1821, Henry Ricketts was granted a patent in England to produce bottles with a three-piece mold that had a separate mold piece for the base. This type of bottle has no mold seams on the body and was widely imitated. Besides the lack of body mold seams, these bottles feature textured surfaces on the body, shoulder, and sometimes the neck from mold contact; a mold seam on the circumference of the junction of the body and shoulder; two vertical seams that run vertically from the junction over the shoulder and partially up the neck; a possible mold seam around the circumference of the base-body junction and embossing on the base, if a separate mold form is used; and possible embossing on the shoulder, but never on the body. This mold technique was in use from 1821 until the early twentieth century.

Machine molding first appeared in the late nineteenth century. The machine replaced the glassblower by supplying the air needed to blow the bottles. The first such machines were semi-automatic and required manual feed of molten glass, but later machines were fully automated and did not require manual labor to produce bottles. All of the machines successfully developed to mass-produce bottles share three techniques: a ring mold to shape the finish, a part-size mold to give an initial shape, and a full-size mold to produce the final shape (Miller and Sullivan 1991:99). Typical characteristics of machine-made bottles include multiple mold seams, with horizontal seams around the top of the lip, at the junction of the lip and neck, and at the base-body junction. Machine-made bottles also feature vertical seams extending from the lip to the base-body junction, and “ghost seams” left by the part-size mold that join the seams from the full-size mold at the finish. Ghost seams may be faint and tend to “wander” from the full-size mold seam on the body. The base may have seams from cup or post-bottom molds, Owens-machine scars, valve marks, and possibly ghost seams.

Base Treatment – Empontilling

The pontil is an iron rod used to hold a bottle while the lip and finish are formed. The detachment of the pontil from the bottle base leaves a scar, or pontil mark. There are four different types of pontil: the glass-tipped pontil, blowpipe pontil, sand pontil, and bare iron pontil, each of which leaves a distinct identifying mark (Jones et al. 1989:45). Marks left by glass-tipped pontils are generally small and leave a small amount of excess glass on the base. Blowpipe pontil marks are distinct rings that have the same diameter as the neck. Sand pontil

marks feature a thin circle of glass chips around the pushup and a pebbly surface from the grains of sand used. Bare iron pontil marks are circular marks with black or red ferric oxide deposits (White 1978:65).

The use of the pontil slowly ceased after the development of the snapcase in the 1840s; by the 1870s, this replacement was nearly complete. A "snapcase" is a holding device that cradles the bottle body and leaves no distinguishing marks. A bottle that lacks a pontil mark but that has characteristics indicating that it was hand-blown, was probably made with a snapcase and likely dates to after the middle of the nineteenth century.

Base Treatment – Post Bottom and Cup Bottom Molds

These terms describe two kinds of base molds that were used in multiple-piece bottle molds to form the base. A post bottom mold is a "raised area centered in the bottom of the bottle mould which forms part or all of the bottle base" (Jones et al. 1989:45). The post leaves a mold seam, located on or inside the resting point and the vertical body seams join this seam (*ibid*). A cup bottom mold features a depression in the bottom of the base mold and leaves a horizontal seam on the inside of the heel, which may be beveled.

Owens machines are automatic bottle machines that leave a distinct scar on the bases of the bottles they manufacture. The machine makes bottles by sucking molten glass into a parison or part-size mold, where a blade cuts the glass off at the base of the mold. This process leaves a scar to one side of the opening. The suction scar may be off-center and can cover the entire heel on small bottles. Miller and McNichol (2002) have presented a tightly dated sequence for the use of the Owens machine on various bottles, beginning in 1905 for beer, milk, patent medicines, and soda water bottles.

Valve marks are small circular indented grooves found on the bases of wide-mouthed glass containers and milk bottles. Valve marks are formed when a valve in a part-size mold ejects the parison out of the mold to be transferred to the full-size mold.

Finishes

The finish is the top part of a bottle, including the lip, and is formed to receive a specific type of closure. Before the advent of automated bottle machines, this procedure was the last step in the manufacturing process; however, it is the first step when bottles are machine-made. There were many different methods used to form the finish, including cracked-off, burst-off, fire-polished, grinding, molding, and adding glass. Some datable types include blow-over container molding and the use of a finishing tool.

Blow-over container molding refers to a method employed in manufacturing containers with screw threads or lugs. The mold included the entire vessel and extended past the point where the lip would occur. The excess glass was then ground down to the point where the lip would start. This technique has a general date range of ca. 1850–1920 (Jones et al. 1989:42).

A finishing tool was a clamp with a central plug used to form a standard finish on bottles. The plug formed the bore of the bottle while the clamp faces were contoured to form the finish. Characteristics of its use include: partial erasure of mold seams from the top of the bottle down the neck; horizontal turn lines on the surface of the vessel above where the neck

seams were erased; an exceptionally well-formed and neat finish; and the presence of fine threads and ridges. Finishing tools were commonly used from the1820s to the early twentieth century (Jones et al. 1989:43).

Color

Glass color can be a useful characteristic for sorting assemblages and determining minimum numbers of vessels, but it is a poor characteristic to use in establishing the date of objects. Most types of colored glass were widely used for long periods, and therefore do not lend themselves to any precise dating. However, some glass colors have known use-popularity ranges. Glass colors are commonly determined by the presence of mineral oxides, often as an unwanted impurity, such as iron oxides. Iron oxides can produce glass colors that range from light yellows and greens to browns and very dark greens that are effectively black. To counter this, decoloring agents such as selenium and manganese were introduced into the glass formula.

Until recently, it was widely believed that glass containing manganese was one of the best indicators of a date range of ca.1870–1914, due to the fact that this glass solarizes to a purple or amethyst color after exposure to ultraviolet rays from the sun. The end date for the use of manganese was widely attributed to interruption of the manganese supply from Germany at the outbreak of World War II, when selenium then became the decolorant of choice. Recent research, however, has shown that this is an erroneous conclusion. According to George Miller in a posting to the Internet mailing list HISTARCH (Thursday, January 24, 2002, searchable at http://lists.asu.edu/cgi-bin/wa?S1=histarch), the shift from manganese to selenium as a decoloring agent was unrelated to supply. Rather, this switch reflected the growing use of automatic bottle machines, which used a type of furnace in which manganese was too unstable to use effectively. A more accurate end date for the use of manganese as a decolorant is therefore sometime in the 1920s, when the switch to automatic bottle machines had become almost complete. In addition, manganese was also used to produce a purple color, and occurs in glass tablewares earlier in the nineteenth century.

Glass colors should be noted with the following modifiers: light (or pale); dark (to describe an intense color); translucent, opaque (will transmit light through the glass but is not transparent); iridescent (to describe deliberately produced iridescence, such as carnival glass, and not natural patination); and marbled (two different colors of glass mixed together to resemble marble, found in decorative glass objects such as lampshades or decorative window glass) (Jones et al. 1989:14). Patination is simply the natural degradation of glass when exposed to the environment. Therefore, patination cannot be used as an indicator of age.

Window Glass

The manufacture of window glass prior to mechanization in the nineteenth century used three distinct methods: crown, cylinder, and plate. To make crown glass, a glassmaker used a blowpipe to remove a blob of glass from a pot of molten glass. He then blew the glass into a larger bubble, attached a pontil, and removed the blowpipe. He then spun the glass until it flattened into a disc. The pontil leaves a thick mark in the middle after removal, and the glass varies in thickness. Archaeologists can identify crown glass by holding large pieces at an oblique angle to the light to reveal curved distortion lines (Lorrain 1968:37).

To make cylinder glass, the glassmaker first blew through the blowpipe to expand the glass blob into a large bubble, and he then swung the blowpipe in a circular motion to elongate the glass form. He then removed the ends of the glass form, and slit the cylinder down the middle. The cylinder was then reheated until it fell open into a flat form. Cylinder glass exhibits straight rather than curved distortion lines, but these lines are usually impossible to see on small sherds of glass (Lorrain 1968:37).

Plate glass was the most expensive of historic flat glasses because of the labor-intensive manufacturing method. Molten glass was poured onto a flat sand-covered table and rolled evenly. The resulting plate of glass was then ground and polished until transparent. Plate glass is identifiable by its clarity and lack of distortion (Lorrain 1968:37).

Metals

Metals in archaeological contexts tend to suffer from some degree of corrosion and can be difficult to identify. The following discussion is summarized from Light (2000), and focuses on the types of metals included in the artifact assemblage from this project.

Copper

Copper is a soft, malleable metal with a bright orange-red hue that oxidizes to a pale green. Because of its low melting point, copper scrap is more rare than iron scrap. Copper is an excellent conductor and has been used in the manufacture of cookware and wiring. Because it does not spark, copper was commonly used for barrel straps on black powder kegs. This metal also commonly occurs as an alloy. The three most common copper alloys are bronze (copper and tin), brass (copper and zinc), and nickel-silver (brass and nickel). Bronze ranges in color from brown to pale gold. Brass ranges in color from coppery-red to pale yellow, depending on the amount of zinc. Nickel-silver ranges in color from pale yellow to white and is frequently marked as nickel-silver. All of these alloys are quite ancient, although nickel-silver was known in Europe only through Chinese imports, and Europeans did not produce it themselves until the early 1800s.

Ferrous Metals

Ferrous metals are metals that contain iron as the principal ingredient. Most iron is magnetic, although some modern alloys are not. All iron objects made before the last quarter of the nineteenth century are magnetic.

Wrought Iron

Wrought iron is the oldest form of worked iron. Wrought iron was produced either by direct reduction of ore in bloomery forges or by indirect reduction from cast iron. Wrought iron contains slag, which becomes aligned in the metal in formations called stringers. These are formed when a blob of mixed, semi-molten iron and slag is pulled from a bloomery or finery forge and hammered to remove most of the slag. This forms the stringers, which resemble a wood grain visible in broken pieces of wrought iron. Wrought iron is highly ductile, and blacksmiths worked with this metal until the introduction of mild steel in 1856, as a product of the Bessemer process of iron making. Wrought iron is rarely made today. Common objects made of wrought iron include horseshoes, tools, hardware, and gun parts.

Cast Iron

Cast iron is made in a blast furnace, in which both the metal and slag are completely melted. The slag separates from the iron and floats on top of the metal, from which it is skimmed. This process results in a very pure iron. The molten iron is then poured or cast into molds. Cast iron is brittle and breaks easily. At an archaeological site, pieces of iron with clean breaks are likely cast iron. Common objects made of cast iron include iron cookware, machine parts, and ploughs.

Steel

Steel is a ferrous metal that contains iron and up to about 1.7 percent carbon and other elements. The most common method historically used to produce steel was to remove pig iron from a blast furnace and place it in a finery forge to burn away all carbon from the iron. This method produced wrought iron, but because it lacked carbon, the metal was not hard. A carefully controlled amount of carbon was reintroduced to the iron to produce steel. The process of making steel was fairly expensive, so steel was often used as the "business end" of tools, such as the bit for an axe or the tips of picks, while the rest of the tool was iron. Files were always made from steel.

Nails

Nails are a common component of historical archaeological assemblages, but they are underutilized as an artifact class in analysis. Because of historical knowledge of the various dates of invention, production, and use of nails, it is possible to use a nail assemblage in the construction of site chronology. The following discussion mainly uses information from William Hampton Adams' excellent article in *Historical Archaeology*, "Machine Cut Nails and Wire Nails: American Production and Use for Dating 19th-Century and Early 20th-Century Sites" (2002).

There are three types of manufactured nails found on American sites: hand-wrought, machine-cut (or simply "cut"), and wire nails. Hand-wrought nails were individually made by hand from nail rods or sheets of wrought iron. The new nail was then placed in a vice and hammered to produce a head. Machines for producing cut nails were in use in Boston by 1794 (Adams 2002:68). These machines cut the nails, and then the heads were formed manually. These nails have a parallelogram-shaped cross-section, a grain that runs across the width of the nail, a rounded end, and a head shape that reflects hand hammering. This early type of nail ranges in date from ca. 1790–ca. 1820. By 1807, a machine had been produced that could both cut and form the head on the nails. This nail type differs from the early type by having a rectangular cross-section and a thicker, more standardized head. This nail ranges in date from ca. 1810–ca. 1840. Finally, the later machine-cut nails have rectangular cross-sections, a grain that runs the length of the nail, a rectangular head that is thick and uniform, and a square tip. This nail type dates from ca. 1835–ca. 1890.

The first American patent for a wire nail was issued in 1877, but wire nails might have been produced as early as 1850. The French first developed wire nail technology in 1816, while British patents were issued in the 1850s. Wire nails were first used not for construction but for boxes and furniture. Wire nails were not produced in significant numbers until the 1890s, and in 1892 they comprised half of total nail production in the United States. By the end of

the nineteenth century, wire nails dominated the market. Why did wire nails take so long to become predominant, or rather, why did they eventually dominate the market at all? Cut nails have long been praised for their superior holding power, but wire nails weigh less and were cheaper to buy in bulk once production levels reached a sufficiently high level in ca. 1884. Wire nails are distinguished by a circular cross-section, no grain in the nail (because wire nails were made from steel), a uniform circular head, and a pointed tip.

Adams states that "very few, if any, buildings in the United States could have been built using wire nails prior to about 1883. In the United States, virtually all construction of frame buildings after about 1900 used wire nails exclusively . . . While those general statements are supported by the manufacturing data, we must always bear in mind that some carpenters were more conservative than others. One may well find a house constructed after 1900 using cut nails entirely or using them in special applications, but one will simply not find any house built before 1883 using wire nails" (Adams 2002:70). It should be noted, however, that buildings are repaired with the nails available at the time of the improvement, so wire nails may be present in buildings constructed before 1883. The above date ranges for nails should not be used as the sole reason to date a site if other data, especially documentary sources, are available.

Traditionally, nails have been classified according to the pennyweight system, which is still in use today. The symbol for pennyweight is "d" and applies to all nails regardless of manufacture. Nails from 2d to 10d are classed in quarter-inch increments starting at one inch for 2d and ending with three inches for 10d nails. Nails larger than 10d are classified as follows: 3 ¼" nails = 12d; 3 ½" nails = 16d; 4" nails = 20d; 4 ½" nails = 30d; 5" nails = 40d; 5 ½" nails = 50d; and 6" nails = 60d. The small nails (2d-5d) are finishing nails used in the final stages of construction, the medium-sized nails (6d-16d) were used for most general construction purposes, and the larger nails (20d and above) were used in framing, fence construction, and other similar activities (Sutton et al. 1998: 169-170).

Other Common Artifacts

Smoking Pipes

Clay smoking pipes are a common find on historic sites in the United States. The introduction of tobacco to Europe in the 1600s resulted in the new industry of pipe making. Clay pipes were made by preparing the clay to remove air pockets, then molding the material into a rough pipe shape. A thin rod was inserted into the stem to form the bore, and the pipe was placed into a mold. A press formed the bowl interior, and the pipe maker trimmed the excess clay before the pipe was sent in a batch to be fired (Ayto 1999:12). Clay pipes can be datable according to certain attributes, such as maker's marks or certain morphological attributes. A good source on how to analyze smoking pipes is "Smoking Pipes for the Archaeologist," by Charles S. Bradley, published in *Studies in Material Culture Research* (2000).

Tin Cans

The appellation of "tin" to cans is something of a misnomer, since what we call tin cans were actually made of steel or tin-plated steel. Canning began in America in the early 1800s, although the earliest canned foods were preserved in glass containers. While the British had

been using tin-plated steel cans since the 1810s, the switch to metal cans in the food preservation industry did not occur in America until 1839, when canners first switched to tin cans due to an increase in the price of glass. Cans possess a morphology that bears many diagnostic attributes that reflect the method of manufacture, and they are relatively easy to date. Busch presented a can chronology in her excellent article, "An Introduction to the Tin Can," which provided the data used in this brief discussion (Busch 1991).

Functional Analysis

Historic artifacts can be sorted by function as well as material type. Using functional and material classification, the archaeologist can analyze recovered data in a way that permits the recovery of functionality from the site.

Stanley South is widely recognized as a pioneer in this method. In 1977, he developed a system to classify artifacts according to function. South developed several models based on the classification of artifacts according to a perceived function—for example, all ceramics were classed in the "Kitchen" group, while nails and bricks were classified in the "Architectural" group. South intended for these models to be applied to sites of a certain cultural and temporal period to assist in intersite comparisons using group frequencies. The Carolina Pattern was one such model, which indicated that British Colonial sites should display a range of artifacts in certain frequencies. This was widely compared with the Frontier Pattern, which indicated that sites such as forts or trading posts should display a much different pattern (South 1977). Later research using South's concepts determined that his patterns are less useful on sites located elsewhere in the United States, as well as on sites that date from the nineteenth and twentieth centuries. However, the method has proven useful in intrasite spatial analysis, for example to distinguish discrete activity areas (Sewell 1999). Grouping artifacts by function without immediately tying the grouping into a statistical analysis or theoretical model allows for a multiplicity of ways to approach site interpretation. The concept of grouping artifacts into functional groups for analysis remains a basic tool for any historical archaeologist.

Using these concepts, a basic classification system was set forth for this project. This system includes the following groups:

- *Domestic group*: Artifacts are directly associated with food preparation, service, and storage, and are functionally equivalent with South's Kitchen group. This group was subdivided into food preparation, food service, food storage, drink storage, and food remains. When possible, the group is subdivided further, as allowable by the diagnostic attributes of artifacts. For example, ceramics can be broken down into tablewares, teawares, kitchenwares, and toilet wares, all of which can be further divided by specific function, such as teacups, ale bottles, dinner plates, and chamber pots. Similar subdivisions are possible for glass and metal artifacts.

- *Architecture group*: Artifacts are directly associated with the construction of buildings and typically include nails, spikes, brick, window glass, mortar, door hardware, and shingling.

- *Furnishing group*: Artifacts include items that are not structural elements but that are related to the basic accoutrements of the built environment. This group includes furniture elements, including tacks and brads used in furniture construction, as well as flowerpots, mirror glass, figurines, and other decorative household items.

- *Arms group*: Artifacts are related to weaponry. This group has been divided into gun parts, ammunition, and miscellaneous, which includes large knives, swords, bayonets, and armor.

- *Clothing group*: Artifacts are associated with clothing, such as buttons, snaps, belt buckles, shoe hooks, and shoes. Also included are artifacts associated with the construction and repair of clothing, including needles, pins, scissors, and thimbles.

- *Personal group*: Artifacts include those associated with an individual or with individual use. This group includes smoking pipes, coins, keys, combs, and toys, as well as artifacts such as eyeglasses and toothbrushes.

- *Transportation group*: Artifacts include elements associated with agriculture and non-mechanized transportation, such as wagon parts, plow parts, horse tack, horseshoes, ox shoes, and such. This group also includes artifacts associated with mechanized transportation, such as railroad spikes, and automotive elements, such as windscreen glass and spark plugs.

- *Activities group*: Artifacts include items not easily categorized elsewhere. This group includes tools, fishing gear, and other miscellaneous artifacts.

- *Utilities group*: Artifacts are connected to water supply, electricity, and natural gas supply, such as wiring and insulators.

- *Industrial group*: Artifacts are associated with the manufacture of items for sale to a mass market. This group is subdivided into raw material, fuel, waste products, machinery parts, and end products.

RESULTS OF EXCAVATIONS

The results are presented by type of excavation, beginning with the February 2000 work and ending with the mechanical block excavations. The complete artifact catalog is presented in Appendix A, while tables listing individual artifacts from each block are presented in the section of text covering that particular block. A section analyzing the recovered assemblage is presented in the interpretation of findings. For a discussion of brick-factory technology and common structures associated with brick factories, see pages 4-18 to 4-30 and 4-49 to 4-62 in Chapter 4, *Historic Context for Site 36AL480 in Leetsdale, Allegheny County, Pennsylvania* by Hampton et al. (2003).

February 2000 Investigations

In February 2000, exploratory excavations were completed at the remains of five brick kilns located at site 36AL480 (Beauregard et al. 2000). Although these five updraft kilns were demolished within four years after the Harmony Brickworks closed, enough remained of the foundations and lower walls to reflect the construction of the kilns. These kilns were given sequential numbers beginning with the northernmost kiln. Feature numbers were not assigned to the kilns. Due to the accelerated timeframe assigned to this phase of the project, the goals of this stage of fieldwork were to identify the location of the kiln bank (by exposing the edges and corners to confirm positions), to gain sufficient data to identify the kiln type and construction (by sectioning one kiln and testing whether construction was standardized by trenching the southeastern kiln), and to document post-brick factory soil formation (by excavating a 1 m x 1 m test unit on the center of a kiln). Field methods consisted of the use of a track grader to cut shallow trenches across the kiln bank, and manual excavation of one test unit and manual excavation of the southeast and southwest corners of the northernmost kiln, Kiln 1. Trenching over the four other kilns revealed that they were of largely identical construction. Notes from this excavation are sparse and apparently few measurements were recorded, although scale can be inferred through photographs that include a sign board or trowel.

The BHE archaeologist who directed this stage of fieldwork had the track grader cut six trenches across the kiln bank, along with a manually excavated unit (Figure 5.5). The bulk of trenching was concentrated on Kiln 1 at the northern end of the kiln bank, with a trench each on Kilns 4 and 5 on the southern end. The trenches on Kiln 1 were numbered H1-H4. The manually excavated unit was also placed on Kiln 1 and labeled “Test Unit H1.” The two trenches on Kilns 4 and 5 were not labeled, and are thus referred to in this text as “Auxiliary Trenches 1 and 2.”

Trench H1 was excavated to the west of the kiln bank location and did not encounter any brick factory features. Trench H2 was excavated east from the southeast end of Trench H1 and uncovered part of the floor of Kiln 1. Trench H3 cut northwest-southeast through the entire short axis of Kiln 1 and revealed the most information about its construction. The kiln was built with a large main brick wall on a dry-laid stone foundation, with a smaller brick wall on the exterior. The gap between the two brick walls remained an empty air space, roughly 30 cm (11.8 in) wide (Figure 5.6). The kiln had a red brick floor set over a layer of brick rubble and clay measuring approximately one meter (3.3 feet) in thickness (Figure 5.7). The furnaces for the kiln were constructed of firebrick for the furnace tops and purple

building brick for the ash box bottoms (Figure 5.8). Trench H4 was excavated crossing the southwest edge of Kiln 1 and terminated in the middle of the kiln.

The two auxiliary trenches cut across Kilns 4 and 5 revealed similar flooring, while Auxiliary Trench 1 (excavated through the wall of Kiln 4) revealed a construction method identical to that observed in the trenches on Kiln 1. A brick-lined alley was also discovered between Kilns 4 and 5 (Figure 5.9).

One furnace or firebox was cleaned by hand, photographed and examined at Kiln 1 (Figure 5.7). Although not completely excavated, enough of the furnace was exposed to document that the furnace superstructure consisted of an arched roof of firebricks set atop a red brick foundation, into which a receptacle was constructed. Many of the furnace's firebricks were vitrified, indicating that the furnace had been subjected to intense heat, although none of the foundation bricks were vitrified. In Figure 5.7, the vitrification can clearly be seen, with coal slag still adhering to the upper walls of the furnace. The vitrification has an abrupt boundary with the lower portion of the furnace, which exhibits no vitrification. This abrupt transition suggests the location of the furnace floor and the identification of the area below as a receptacle for waste products.

Phase III Data Recovery

HDC archaeologists investigated Area 1 using several excavation methods, ranging from systematic sampling through shovel test excavation on a grid to the mechanical removal of soil from large blocks. All excavations performed in Area 1 are shown on Figure 5.10, which also includes topographic data for Area 1 and identifies feature locations. For the sake of legibility, only the locations of the shovel-test units on the west and south edges of Area 1 are labeled for reference on this figure. Figures 5.11, 5.12, and 5.13 each focus on a third of the overall map in figure 5.10, but at a greater scale in order to show more detail. Figure 5.11 depicts the northern third of Area 1, Figure 5.12 shows the middle third, and Figure 5.13 illustrates the southern third of Area 1.

The data recovery project experienced several problems during fieldwork. The most severe negative factor on the project was inclement weather. Temperatures in the winter of 2000 were often well below freezing, and frequent snow fall unavoidably obscured details in much of the photography from that period of the project. The temperatures affected crew morale and hindered the Total Station from operating efficiently. The soil on site began to freeze, which made mechanical excavation very difficult. Eventually, the cold temperatures resulted in the postponement of fieldwork until the spring thaw.

Another significant problem was incomplete data recording. Due to crew error or management oversight, in some instances certain information failed to be recorded on field paperwork or in the notes of the project director, including the rationale behind field decisions on excavation placements. Also, data file management was frankly poorly carried out in the field, resulting in several data files with uninformative labels that created confusion in attempting to manage the vast amount of data that was recorded.

Finally, the last significant problem encountered by this project was the corruption of data files, specifically the Total Station logs. Perhaps due to the inclement weather or to employee

error, or even simply random data corruption, locational data from certain days were irretrievably corrupted. Thus, the author was forced to estimate locational data in several instances, which is indicated by the use of the word “approximate” in relation to locational data in this text.

Shovel-Test Units

The shovel-test units (STUs) revealed that most of the site was covered by a layer of fill containing demolition debris and household waste that dated from the early- to mid-twentieth-century occupation of the surrounding area. This fill layer capped the Harmony Brickworks component. Industrial activity had disturbed the soils to a depth of approximately 40 cm across the site. All 106 STUs excavated were positive for cultural remains. Thirty-seven STUs revealed the presence of 21 distinct subsurface features (Figures 5.10-5.13). Several STUs revealed elements of a common large feature, such as Feature 9, the flue system (12 STUs) and Feature 2, Kiln 6 (five STUs). See Table 5.1 for a list of STUs containing features, and Appendix B for a log of all excavated STUs.

3,453 artifacts were recovered from the STU excavations, mostly twentieth-century domestic refuse and bricks. A separate artifact table for the STUs is not presented here, but is included with Appendix B. Only three STUs had no artifacts related to the brickworks, and 19 STUs had no twentieth-century component (Figure 5.14a, 5.14b). Twenty-two STUs had a prehistoric component (Figure 5.14c). Soils had been thermally altered in 62 STUs, in a pattern that reflects the known orientation and locations of the hot floors in the main factory complex (Figure 5.14d). Five STUs, however, revealed patches of thermally altered soils outside of the building footprint (N275 E170, N285 E165, N295 E155, N295 E160, and N315 E145). These patches of thermal alteration might be related to the burning of the hot floor complex in 1897 or could be the result of soil mixing during the various phases of demolition at the factory site. The STUs uncovered numerous features, including courses of laid brick or stone, and regions of thermally altered soils. However, feature identification was difficult to determine from the limited area exposed by the shovel tests, so mechanical trenching was performed to identify more effectively which areas would yield intact features.

Table 5.1. Shovel-Test Units Containing Features.

STU Number	Feature Number	Feature Identification
N250 E150	1	Coal-rich, compacted surface
N255 E150	1	Coal-rich, compacted surface
N260 E150	2	Kiln 6 (ash box)
N260 E155	2	Kiln 6 (kiln floor)
N260 E160	2	Kiln 6 (ash box)
N260 E165	36	Sandstone block
N265 E150	3	Possible flooring or rubble
N265 E155	1 and 2	Coal-rich, compacted surface under Kiln 6 (kiln floor)
N265 E160	2	Kiln 6 (ash box)
N265 E170	1	Coal-rich, compacted surface
N285 E155	15	"Oval" shaped layer of brick fragments
N290 E150	20	Charcoal concentration
N295 E125	9	Flue system for hot floors

STU Number	Feature Number	Feature Identification
N300 E140	29	Brick wall (interior of north wing hot floors)
N300 E145	31	Circular brick feature
N300 E155	24	Brick stack foundation for steam-drier wing
N305 E140	9	Flue system for hot floors
N305 E145	39	Steam pipe for Steam-heated dry floor (SHDF)
N305 E155	24	Brick stack foundation for steam-drier wing
N310 E120	9	Flue system for hot floors
N310 E125	30	Brick alignment
N310 E140	9	Flue system for hot floors
N310 E150	27	Stone flooring
N315 E120	10	Brick wall three courses wide
N315 E145	33	Ash/rubble deposit
N315 E150	23	Stone slabs
N320 E115	13	Thick domestic artifact midden
N320 E120	16	West foundation of steam drier
N320 E125	50	cement/crushed brick flooring for steam drier
N320 E140	34	Gas line running NW/SE
N325 E115	9	Flue system for hot floors
N325 E120	9	Flue system for hot floors
N325 E125	9, 26	Flue system for hot floors and west foundation of steam-heated dry floor
N325 E130	9	Flue system for hot floors
N325 E135	9	Flue system for hot floors
N330 E115	9	Flue system for hot floors
N330 E120	9	Flue system for hot floors
N335 E115	9	Flue system for hot floors

Trenches

The field crews excavated a total of 19 trenches across the site (Figures 5.10-5.13). The trenches were more successful than the shovel testing in determining areas of intact features, as well as feature identification, as they were able to quickly open long strips of the site to visual inspection. Few artifacts were collected from the trenches (Table 5.2). The archaeologists first identified the flue system for the pre-1897 hot floor (Feature 9) as such through trench excavation, and also initially identified the remains of seven wall foundations (Features 52, 53, 55, 56, 64, 79, and 80), part of Kiln 6 (Feature 2), two gas lines (Features 47 and 62) , and two ceramic water pipes (Features 48 and 63).

Trench 1 was oriented east-west and extended from STU N280 E146 to STU N280 E150. The trench measured 4 m in length, and its maximum depth was 85 cm below ground surface (cmbs), at an elevation of 216.56. The trench was excavated to distinguish the change between the area of thermally altered soils in STU N280 E146 and the natural, unaltered soils in STU N280 E150, which occurred around the halfway point in the trench. The typical soil profile in the trench consisted of a very dark grayish-brown, silt loam (217.41-217.20, 0-21 cmbs) over a mottled dark yellowish-brown/grayish-brown stratum of sandy loam (217.20-216.83, 21-58 cmbs), which capped the natural subsoil, a dark yellowish-brown silty sand (216.83-216.56, 58-85 cmbs) (Figure 5.15). Feature 56, a brick wall later identified as

the eastern foundation of the southern coal/gas heated hot floor, was present in this trench (Figure 5.16).

Trench 2 was a 10 m long trench excavated from STU N260 E145 to N270 E145. The trench was excavated to a maximum depth of 140 cmbs, at an elevation of 216.27. The trench uncovered elements of Features 63, a ceramic drain pipe and Feature 64, an east-west oriented brick wall later identified as the south foundation of the southern coal/gas-heated hot floor (Figure 5.17). A metal grate was found in Trench 2 and was originally assigned Feature 72, but was later determined through excavation of Block P to be the cover to the drain opening for Feature 63. The trench also uncovered Feature 81, the furnaces for the southern coal/gas heated hot floor. The soil profile at the location of Feature 81 was a fill layer of red silt loam tending towards sandy loam (217.52-217.13, 0-39 cmbs) over a stratum of dark grayish-brown silt loam (217.13-216.99, 39-53 cmbs). This in turn overlay a thick fill stratum of red silt loam mixed with red sandy loam that measured from 216.99-216.43 (53 to 109 cmbs), which was very similar to the first stratum. This fill capped Feature 81, which was present from 216.43-216.27 (109 to 140 cmbs) in the trench (Figure 5.18).

Trench 3 was excavated from STU N325 E115 to grid coordinate N321.5 E136.0, to a maximum depth of 95 cmbs, at an elevation of 216.35. The trench was later extended 6.2 m west of STU N325 E115 to the fence surrounding Area 1, for a total length of 27.2 m. This east-west trench uncovered a large section of Feature 9, the sub-floor brick flue system associated with the drying floors. This feature extended the length of the trench. The soil over the feature was a dark brown silt loam with brick debris at 217.30-216.75 (0-55 cmbs), while the soil around and under the feature was a thermally altered dark reddish brown sandy silt with brick fragments at 216.75-216.35 (55 to 95 cmbs) (Figure 5.19). A brick wall feature identified as Feature 40 was encountered about midway down the trench. This wall was clearly constructed after the flues were in place, since it clearly interrupted the linear design of the flue system (Figure 5.20). This feature was later identified as the rear and side foundations of the chimney stack for the steam drier tunnel, which postdates the earlier hot floor.

Trench 4 was a northwest-southeast trench excavated between grid point N324 E124 and grid point N299 E138, for a total length of 25 m and a maximum depth at 216.50, or 70 cmbs. The soil profile recorded for this trench showed a very dark grayish brown silt loam fill (217.20-216.90, 0-30 cmbs) over a dark yellowish brown silt loam fill(216.90-216.65, 30-55 cmbs), which capped a strong brown silt loam fill (216.65-216.50, 55-70 cmbs). The trench ended at a stratum of dark reddish brown silt (Figure 5.2, not recorded in profile). This trench uncovered Feature 116, later identified as the brick pillar supports for the chimney stack of the steam drier tunnel. This feature was initially labeled as part of Feature 40, but subsequent excavations in Block T revealed that it was a separate feature. Other features uncovered in the trench include Feature 49, a brick cover over a drain pipe (assigned Feature 51 in this trench); Feature 50, a packed floor for the base of the steam drier tunnel; and Features 10 and 52, which were both similar brick walls measuring 32 cm wide, three brick courses across (Figure 5.22).

Trench 5 was excavated perpendicular to Trench 4, beginning at grid point N316 E 119 and terminating at grid point N323 E140, for a total length of approximately 15 m. The maximum

depth of Trench 5 was 70 cmbs, at an elevation of 216.11. The typical soil profile was a very dark grayish brown silt loam fill (216.80-216.60, 0-20 cmbs) located over a layer of strong brown sandy loamfill (216.60-216.23, 20-57 cmbs). A strong brown fill, texture not recorded, was present from 216.23-216.10 (57 to 70 cmbs) to the base of the trench at the location of the type profile (Figure 5.23). The purpose of the trench was to expose more of Feature 49 and determine its function. Feature 49 began in Trench 5 about 1.5 m northeast of the western end and extended for 6 m at 50 cmbs. Feature 48, a ceramic drainpipe, began northeast of the end of Feature 49 and continuing to the end of the trench (Figure 5.24). Feature 49 evidently served as a cap for Feature 48.

Trench 6 was excavated parallel to Trench 4, 5 m to the northeast. Trench 6 began approximately at grid point N320 E132, intersected the northeast end of Trench 5 and terminated at approximately grid point N325 E130 for a total length of 5 m, where it intersected Trench 3. The maximum depth of Trench 6 was 77 cmbs, at an elevation of 216.95. The soil profile recorded for this trench showed a dark yellowish brown silt loam with brick fragments at 217.72-217.43 (0-29 cmbs), capping a layer of crushed brick and compacted yellowish red silt at 217.43-217.12 (30-60 cmbs). The last stratum encountered before excavation ended was a thermally altered red sandy silt at 217.12-216.95 (61-78 cmbs) which was unturbated subsoil (Figure 5.25). This trench uncovered a gas line, Feature 47, in the south end of the trench (Figure 5.26).

Trench 7 was excavated in the southern half of Area 2, beginning at STU N255 E150 and terminating at N275 E150 for a length of 20 m. The maximum depth of Trench 7 was 120 cmbs at 215.79. The trench uncovered several elements of Feature 2, the southeastern kiln (Figure 5.27). The trench also uncovered Features 62 to 65, which were a gas line, ceramic drainpipe, a brick wall running northeast-southwest, and a posthole in the wall, respectively. All these features are associated with the southern coal/gas hot floor. A soil profile taken at 80 cm north of Feature 64 revealed a very dark grayish brown silt loam with brick debris at 216.99-216.59 (0-40 cmbs) overlaying an stratum of almost solid brick rubble at 216.59-216.41 (40-58 cmbs), with minor inclusions of mixed very dark grayish brown silt loam and yellowish brown sandy silt. The last stratum in the profile was a thick fill layer consisting of a large amount of architectural debris with yellowish brown sandy silt, from 216.41-215.79 (58 to 120 cmbs) at the base of the trench (Figure 5.28).

Trench 8 began at approximately grid point N267 E150 and terminated at grid point N269.5 E155, for a length of 4 m. This trench was excavated to determine the extent of Feature 64, the brick wall exposed in Trenches 2 and 7 (Figure 5.29). The feature extended 1.5 m into the trench from the southwest end, at which point it was apparently truncated by a demolition event. The remainder of the trench indicated a region of disturbed soils. The profile was taken from STU N270 E155; therefore, all elevations for this trench are estimates based on the elevation recorded for that STU. The maximum depth of Trench 8 was 103 cmbs, at an approximate elevation of 216.27. The profile indicated a thick layer of brick debris from 217.30-216.62 (0-68 cmbs), which capped a stratum of silt loam with brick inclusions at 216.62-216.27 (68-103 cmbs) (Figure 5.30).

Trench 9 was excavated from STU N295 E150 to grid point N278.25 E167.5, for a total length of 25 m and a maximum depth of 50 cmbs, at an elevation of 217.30. The trench was

excavated to discover any architectural features from the southern auxiliary wing of the main hot floor structure, as depicted on the 1894 surveyor's map. The first stratum of the soil matrix was a very dark grayish brown loam with brick debris at 217.80-217.62 (0-18 cmbs). This capped a fill layer located at 217.62-216.34 (18 to 46 cmbs) and consisted of bricks mixed into yellowish brown/dark yellowish brown silt loam, which in turn overlay a coal, cinder, and ash lens that overlay the natural dark yellowish brown silty sand subsoil at 216.34-216.30 (46-50 cmbs) (Figure 5.31, subsoil not included on profile). No features were located in this trench (Figure 5.32).

Trench 10 was excavated beginning at a deflated trench associated with the 1999 CDC Phase I testing (at approximately grid point N310 E143), and extended 18 m northwest to STU N325 E135, where it intersected the eastern end of Trench 3. The maximum depth was 97 cmbs, at an elevation of 216.27. Remnants of a long brick wall and associated builder's trench (Feature 53) were present in Trench 10 (Figure 5.33). The soil profile along the extent of the trench revealed disturbed soils to the base of excavation throughout, with the heaviest concentrations of rubble present from an elevation 217.24 to 216.77 (0-47 cmbs) (Figure 5.34). The brick wall was identified as the eastern foundation of the steam heated dry floor. This wall was intact in only three locations along the length of the trench. Burnt nails, probably associated with the 1897 fire, were found on top of a portion of the intact wall sections.

Trench 11 began at grid point N325 E120 and terminated after extending 14 m to grid point N336 E116, which corresponded with the northeast corner of the fence around Area 1. The trench was excavated to follow the flue system (Feature 9), which was exposed in Trench 3, to the north. Feature 9 was present from the southeast end of the trench to the approximate location of STU N335 E115, where it was no longer evident (this was later determined to be the point of origin for the northern section of the flue system). This trench also uncovered part of Feature 76, the furnaces for the north coal/gas hot floor, but it was not given a feature number until it was subjected to further excavation in Block F (Figure 5.35). An individual profile was not completed for this trench, as the project manager at the time of the trench excavation decided that the profiles for Block F (which intersected Trench 11) would suffice as a typical profile (see Block F discussion, below). The crew in the 2000 field season recorded no maximum depth for the trench.

The crew excavated Trench 12 from STU N300 E140 to grid point N292 E148. The trench was 12 m long with a maximum depth of 116 cmbs, and an elevation of 216.70. Soils were mixed fill deposits to the base of excavation throughout the entire trench. A representative profile displays the types of fill encountered. A very dark grayish brown silty clay fill with architectural debris was encountered at elevations of 217.86 to 217.60 (0-26 cmbs), capping a stratum of mostly architectural debris with some dark brown soil (texture unrecorded) at 217.60 to 217.30 (26-56 cmbs). The next stratum was a dark yellowish brown silt loam fill with architectural debris at 217.30 to 216.95 (56-91 cmbs), overlaying a fill layer of dark yellowish brown silty clay fill mixed with bricks and coal to base at 216.95-216.70 (91-116 cmbs) (Figure 5.36). The trench uncovered two brick wall features running northeast-southwest (Features 29 and 55). Feature 29 (labeled as Feature 54 at this provenience in the field) was encountered at the northwest end of the trench and Feature 55 at a point 8.1 m

southeast of the beginning of the trench. Feature 86, which consisted of truncated sections of a hard-packed surface, was located between the two wall features (Figure 5.37).

Trench 13 was excavated to examine the stratigraphy of Feature 7, a large, crater-like pit on top of a slight rise in the southeastern section of the site. The 10 m trench began at approximately grid point N272.5 E157.5 and ended on the rise and at the pit opening at approximately grid point N282.5 E157.5. The trench was excavated to a depth of 216.78 (a maximum of 162 cmbs) and encountered fill deposits that included car parts, beer bottles and brick debris over the natural subsoil. The stratum in the representative profile included a thick layer of modern fill (texture and color unrecorderd) at a maximum extent of 218.00 to 217.24 (0-76 cmbs), a layer of dark yellowish brown silt loam with architectural debris at maximum extents of 217.45 to 217.38 (55-62 cmbs), and the natural clay loam subsoil at 217.24 to 216.78 (76-162 cmbs), with a lens of black silt loam with historic debris at 217.45 to 217.25 (55-65 cmbs) (Figures 5.38, 5.39). No internal features were encountered. The absence of features and the presence of fairly modern rubbish indicate that the pit is a recent formation.

Trench 14 was excavated from grid point N272 E148 to grid point N298 E132 for a total length of 25 m. The trench had a maximum depth of 69 cmbs, at an elevation of 216.31. Most of the soil matrix in the trench consisted of soils mixed with demolition debris, though a section of flues (Feature 9) was uncovered at 50 cmbs near grid point N285 E140, along with thermally altered soils (Figure 5.40). No other features were encountered. A profile was recorded at N279 E145 (Figure 5.41), with a stratigraphic sequence of a very dark grayish brown silt loam at 217.00-216.84 (0-16 cmbs), a thermally altered yellowish red silt with crushed brick at 216.84-216.60 (16-40 cmbs), and a thermally altered red sandy silt subsoil at 216.60-216.31 (40-69 cmbs).

Trench 15 began at grid point N291 E141 and extended over the southern end of Trench 12 to terminate at grid point N296 E155, for a length of 11 m. This trench was excavated to examine Feature 55, which is a brick wall that was part of the northern auxiliary wing of the hot floor complex (Figure 5.42). The trench was extended to the southwest in 2001 to uncover more of Feature 55, for a final trench length of 15 m. The maximum depth of the trench was 150 cmbs, at an elevation of 216.60. The 100 cm tall wall was present for the entire length of the trench and contained 16 courses of red brick set in common bond. Feature 5, a brick wall of similar height running northwest-southeast, intersected Feature 55 about 6 m from the southwestern end of the trench. The trench stratigraphy consisted of a layer of yellowish brown silt loam fill that ranged from 218.10 to 217.85 (0-25 cmbs), a stratum of thermally altered dark red silt loam that began at 217.85 – 217.35 (25-50 cmbs) and ended 10-20 cm deeper to 217.25 – 217.15 (70-80 cmbs), and a fill layer of mixed dark yellowish brown silt loam and architectural debris that extended to the base of excavations, on the north side of Feature 55 (Figure 5.43).

Trench 16 began at STU N260 E150, extended northeast across Feature 2 (the southeastern small kiln, or Kiln 6), and terminated at grid point N268 E164, for a length of 15 m. The maximum depth of Trench 16 was 89 cmbs, at an elevation of 216.10. The profile for this trench revealed a complex stratigraphy of soils altered by industrial activity at the site (Figure 5.44). The strata consisted of a very dark grayish-brown silt loam deposited after the site was

abandoned at 216.99-216.84 (0-15 cmbs); the red crushed brick kiln floor of Feature 2 at 216.84-216.68 (15-31 cmbs); a stratum of solid coal (Feature 1) at 216.68-216.39 (31-60 cmbs); a layer of very dark brown silty clay with coal dust leaching from Feature 1 at 216.39-216.30 (60-69 cmbs); a stratum of dark reddish brown silty clay with slight coal leaching at 216.30-216.20 (69-79 cmbs); and a dark yellowish brown silty clay subsoil at 216.20-216.10 (79-89 cmbs). This trench exposed the crushed brick and thermally altered kiln interior and crossed a stone foundation and brick structure at the northeastern edge (Figures 5.45 and 5.46). No other features were located in this trench. Several elements of Feature 2 were given separate feature numbers in the field before the true nature of the feature was realized (See Appendix B).

Trench 17 was excavated from grid point N247 E152 and extended 6 m south to the fence line enclosing Area 1 (Figure 5.47). A small portion was excavated from the north end of this trench to connect with the south end of Trench 7. The trench was excavated to an elevation of 215.90 (110 cmbs). No structural features were encountered, and the stratigraphy indicated that road building and other activity had recently disturbed the soils (Figure 5.48). The strata consisted of a recently deposited alluvial yellowish brown sand at 217.00-216.90 (0-10 cmbs), a very dark gray silty clay with brick rubble that emitted a strong fecal odor suggestive of a cesspool at 216.90-216.26 (10-74 cmbs), and a dark grayish brown silty clay subsoil at 216.26-215.90 (74-110 cmbs).

Trench 18 extended northwest from the intersection of Trenches 3 and 10 to approximately grid point N333 E122, for a total length of 14 m. The maximum depth of Trench 18 was 77 cmbs, at an elevation of 216.95. The soil profile recorded for this trench exhibited a very dark grayish brown silt loam at 217.72-217.52 (0-20 cmbs), a reddish brown sand at 217.52-217.27 (20-45 cmbs), a brown sand at 217.27-217.08 (45-64 cmbs), and a brown silty clay with coal inclusions at 217.08-216.95 (64-77 cmbs) (Figure 5.49). Feature 9 (the flue system) was present in the southern 4.2 m of the trench but seemed truncated elsewhere in the trench. A section of wall running northeast-southwest was identified at grid point N330 E128 and was labeled Feature 79, later identified as the northern foundation of the steam heated dry floor (Figure 5.50). No other architectural features were encountered.

Trench 19 was a short trench that extended 3.5 m west from the north end of Trench 18 (Figure 5.51). The trench was excavated to a depth of 100 cmbs, at an elevation of 215.73. No intact architectural features were encountered, but a builder's trench and two soil anomalies were noted and assigned feature numbers 80, 84 and 85, respectively. Features 84 and 85 were later determined to be noncultural features. Later excavation in Block K revealed that a wall foundation was still intact at the base of the builder's trench, and this was identified as the east foundation of the northern coal/gas hot floor. An individual profile was not completed for this trench, as the project manager at the time of the trench excavation decided that the profiles for Block K (which intersected Trench 19) would suffice as a typical profile (see Block K discussion, below).

Table 5.2. Artifacts from Trench Excavations.

Cat. No.	Trench	Fea	Name	Group	Material Type	Manufacture	Segment	CT
326.1	03	--	Slag	Activities - Industry	Slag	By-product	Fragment	1
326.2	03	--	Brick	Architecture - Construction material	Brick - Fire	Stiff mud	Partial	1
327.1	05	--	Brick	Architecture - Construction material	Brick - Fire	Stiff mud	Complete	1
328.1	07	--	Plate	Domestic - Food service	Porcelain – Undecorated	Soft paste	Base	1
328.2	07	--	Bottle	Domestic - Food storage	Transparent – Colorless	Molded	Fragment	1
328.3	07	--	Unspecified form	Domestic - Miscellaneous	Opaque - White	Molded	Fragment	1
329.1	10	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
330.1	11	--	Brick	Architecture - Construction material	Brick - Fire	Stiff mud	Complete	1
330.2	11	--	Unidentified object	Activities - Miscellaneous hardware	Iron/steel	Unspecified manufacture	Fragment	3
331.1	18	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
332.1	01	56	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
333.1	02	81	Brick	Architecture - Construction material	Brick - Fire	Stiff mud	Partial	2
334.1	11	09	Machine part	Architecture - Construction material	Other	Mixed	Fragment	4
335.1	15	55	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
336.1	14	09	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
337.1	07	09	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Partial	9
							Total	**30**

Manually Excavated Blocks

Fourteen manually excavated blocks were excavated at the site (Figures 5.10-5.13). Types of features exposed in these blocks included:

- a section of a coal furnace for the hot floor (Feature 76),
- a section of vents associated with a steam drying floor (Feature 9),
- a cylindrical brick feature (Feature 6) overlaid by part of an chimney stack base (Feature 24),
- portions of a kiln (Feature 2),
- part of the stack base for the post-1897 steam drier tunnel (Feature 116), and
- a water pipe (Feature 63).

The manually excavated blocks clearly demonstrated that significant portions of the site remained intact below the surface. These blocks also helped determine the placement of the larger mechanically excavated blocks. Features encountered in blocks are not described in

this section, and are instead fully discussed in the section, "Interpretation of Findings," below.

Block A

Block A was excavated in four 1-m^2 units numbered 1 through 4. Block A was positioned adjacent to Trenches 3 and 4. The south corner of the block was located at grid coordinates N323.09 E121.73, at an elevation of 217.58 m. The block was located in this position because Trench 3 had exposed a series of flues oriented at 156° (Feature 9), parallel to the longitudinal axis of the large building footprint. Trench excavation revealed that there was an architectural feature (Feature 40) constructed through the pre-existing flues, and which therefore post-dated the flues' construction. The block exposed Feature 40, a brick wall, and Feature 116, which was present in the block as two large brick pillar constructions (Figures 5.52, 5.53). All three features were identified as elements of the chimney stack and receiving end for the steam drier tunnel built in 1898. Feature 40 is the brick foundation for the rear of the stack and Feature 116 consists of three brick pillars that supported the stack for the steam drier tunnel. No profile was completed for this block.

Unit 1 (southwest quadrant) was excavated first, and it immediately verified the presence of fill between the features throughout the block. Units 2, 3 and 4 were then excavated in that order, exposing the remainder of Feature 116 in Unit 2 and the continuation of the brick wall running east to west along Units 3 and 4 (Feature 40). The maximum depth for the block was 216.70 m (88 cmbs). The top of Feature 40 was at 217.18 m, while the tallest extent of Feature 116 was at 217.47 m.

The bases of the features stood upon hard, compact, red silt loam. The soil matrix between the brick pillars (Feature 116) in Units 1 and 2 was a historic fill of sandy, ashy soil with coal, brick and mortar debris. This fill differed from the fill debris throughout the rest of the block, which consisted of silty clay loam and dense brick rubble. The dense brick rubble was randomly mixed with mortar, metal, and glass debris within mottled soils. Examination of the fill resulted in a determination after on-site consultation with a COE representative that any in situ or feature-related artifacts in the block would only be found near the floor of the feature. Therefore, only the final 10 cm of the soil and debris fill above the floor was screened. Thirty-four artifacts were recovered from Block A (Table 5.3). The only datable artifacts were five cut-nail fragments with date ranges of 1835-1890.

Table 5.3. Block A Artifact Assemblage.

Cat. No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
86.1	--	--	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Fragment	6
108.1	--	40	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
126.1	01	--	1	Window came	Architecture - Construction material	Flat - Colorless	Melted	Fragment	3
126.2	01	--	1	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	2
127.1	03	--	1	Nail	Architecture - Hardware	Iron/steel - Common	Cut	Fragment	2
127.2	03	--	1	Window glass	Architecture - Construction material	Flat - Colorless	Melted	Fragment	1
127.3	03	--	1	Bone	Non-cultural -	Faunal - mammal	Bone	Fragment	12
127.4	03	--	1	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	1
127.5	03	--	1	Unspecified form	Domestic - Miscellaneous	Earthenware Undecorated	Whiteware	Fragment	1
128.1	04	--	1	Knob	Activities - Industry	Iron/steel -	Cast	Complete	1
128.2	04	--	1	Unspecified form	Domestic - Food storage	Transparent - Colorless	Melted	Fragment	1
128.3	04	--	1	Nail	Architecture - Hardware	Iron/steel - Common	Cut	Fragment	3
								Total	**34**

Block B

Block B measured 2 m x 2 m, and consisted of four 1-m^2 units numbered 5 through 8 (Figure 5.54). The south corner of this block was located at grid coordinates N299.54 E155.56, at an elevation of 217.56 m. This block was positioned to expose more of Feature 6, a cylindrical brick feature, and Feature 24, a brick foundation overlaying Feature 6. Both of these features were first identified during shovel testing. The feature was not excavated during work on Block B, but was instead relegated for later excavation in Block V. Feature 24 was a brick wall foundation that partially overlay Feature 6 and was associated with an iron tie rod. This wall (later identified as the base for one of the chimney stacks for the wing of the steam drier tunnel) extended from the north wall of the block, and cornered over Feature 6. Part of the wall foundation of Feature 24 had collapsed into Feature 6, apparently because of prior heavy machinery operation over the area (Figure 5.55). No profile was completed for this block. The maximum depth for the block was 216.49 m (107 cmbs).

The fill in the block consisted of sand, ash, cinder, and whole and broken bricks throughout the matrix. No undisturbed soils were encountered at the base of excavations, since the feature constructions filled the entire block. One hundred and nineteen artifacts were collected from the soil matrix in Block B (Table 5.4). These consisted mainly of domestic waste from the fill capping the brickworks component. Most of the rubbish was highly fragmented, making identification of datable attributes difficult. One rimsherd from a flow-

blue pearlware saucer was recovered, with a floral pattern and scalloped edge (cat. # 133.7). This artifact dates to the mid-1840s, but as it was recovered from deposits containing domestic refuse unrelated to the brickworks, it is likely the rimsherd is part of an heirloom ceramic from one of the households that used the area as a dumping ground after the site area was abandoned.

Table 5.4. Block B Artifact Assemblage.

Cat. No	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
87.1	--	--	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
109.1	--	24	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
110.1	--	24	--	Brick	Architecture - Construction material	Brick Fire	Stiff mud	Complete	1
110.2	--	24	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
110.3	--	24	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
129.1	05	--	1	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	1
129.2	05	--	1	Mortar	Architecture - Construction material	Other	Unspecified manufacture	Fragment	2
129.3	05	--	1	Unspecified form	Domestic - Food storage	Transparent - Colorless	Melted	Fragment	2
129.4	05	--	1	Bottle	Domestic - Food storage	Transparent - Colorless	Unspecified manufacture	Base	2
129.5	05	--	1	Crock	Domestic - Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Base	1
129.6	05	--	1	Unspecified form	Miscellaneous - Unidentified type	Unspecified	Unspecified manufacture	Fragment	21
130.1	06	--	1	Battery part	Activities - Miscellaneous hardware	Copper alloy	Cast	Fragment	1
130.2	06	--	1	Wire	Activities - Miscellaneous hardware	Unspecified	Wire-drawn	Fragment	1
130.3	06	--	1	Bottle	Domestic - Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	1
130.4	06	--	1	Washer	Activities - Miscellaneous hardware	Iron/steel	Stamped	Complete	1
130.5	06	--	1	Bolt	Activities - Miscellaneous hardware	Iron/steel	Cast	Complete	1
130.6	06	--	1	Nail	Architecture - Hardware	Iron/steel - Common	Cut	Fragment	3
130.7	06	--	1	Unspecified form	Domestic - Food storage	Transparent - Colorless	Melted	Fragment	1
130.8	06	--	1	Bottle	Domestic - Miscellaneous	Transparent - Aqua	Molded	Body	1
130.9	06	--	1	Bottle	Personal - Medicine	Transparent - Colorless	Molded	Fragment	2
130.10	06	--	1	Strap	Activities - Miscellaneous hardware	Iron/steel	Unspecified manufacture	Fragment	1
130.11	06	--	1	Spike	Architecture - Hardware	Iron/steel - Spike	Cut	Complete	1
131.01	06	--	2	Bottle	Domestic - Food storage	Transparent - Aqua	Unspecified manufacture	Finish	1
131.02	06	--	2	Nail	Architecture - Hardware	Iron/steel - Common	Cut	Complete	1
132.1	07	--	1	Bottle	Domestic - Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	1
132.2	07	--	1	Bottle	Personal - Medicine	Transparent - Green	Pharmaceutical	Neck	1
132.3	07	--	1	Nail	Architecture - Hardware	Iron/steel Common	Cut	Fragment	7

Cat. No	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
132.4	07	--	1	Bottle	Domestic - Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	1
132.5	07	--	1	Mortar	Architecture - Construction material	Other	Unspecified manufacture	Fragment	4
132.6	07	--	1	Lumber	Architecture - Construction material	Floral	Wood	Fragment	3
132.7	07	--	1	Unspecified form	Activities - Industry	Iron/steel	Cast	Fragment	1
132.8	07	--	1	Spike	Architecture - Hardware	Iron/steel - Hand-made head	Cut	Complete	1
132.9	07	--	1	Unspecified form	Domestic - Miscellaneous	Transparent - Colorless	Molded	Fragment	3
132.10	07	--	1	Bottle	Personal - Medicine	Transparent - Aqua	Molded	Neck	1
132.11	07	--	1	Unspecified form	Miscellaneous - Unidentified type	Iron/steel	Unspecified manufacture	Fragment	16
133.1	08	---	1	Mortar	Architecture - Construction material	Other	Mixed	Fragment	1
133.2	08	--	1	Vial	Personal - Miscellaneous	Transparent - Green	Unspecified manufacture	Fragment	1
133.3	08	--	1	Unspecified form	Domestic - Miscellaneous	Transparent - Colorless	Molded	Fragment	1
133.4	08	--	1	Unspecified form	Domestic - Miscellaneous	Transparent - Colorless	Molded	Fragment	4
133.5	08	--	1	Unspecified form	Domestic - Miscellaneous	Transparent - Colorless	Melted	Fragment	2
133.6	08	--	1	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	2
133.7	08	--	1	Saucer	Domestic - Food service	Earthenware - Flow blue transfer printed	Pearlware	Rim	2
133.8	08	--	1	Bolt	Activities - Miscellaneous hardware	Iron/steel - Threaded	Cast	Complete	1
133.9	08	--	1	Pipe	Utilities - Unspecified	Iron/steel	Unspecified manufacture	Fragment	1
133.10	08	--	1	Unspecified form	Activities - Industry	Iron/steel	Cast	Fragment	1
133.11	08	--	1	Pipe	Activities - Industry	Iron/steel	Unspecified manufacture	Fragment	1
133.12	08	--	1	Nail	Architecture - Hardware	Iron/steel - Common	Cut	Fragment	10
133.13	08	--	1	Bottle	Personal - Medicine	Transparent - Green	Unspecified manufacture	Neck	2
133.14	08	--	1	Unspecified form	Miscellaneous - Unidentified type	Iron/steel	Unspecified manufacture	Fragment	1
								Total	**119**

Block C

Block C was an excavation block measuring 2 m x 2 m with a 1-m^2 extension at the northwest corner. The south corner of the block was located at grid coordinates N261.75 E149.54, at an elevation of 217.28 m. This block contained units 9 through 12 and Unit 18, each of which measured 1 m^2 (Figure 5.56). Unit 18 was located on the north wall of Unit 9, in the northwest quadrant of the block. Block C was excavated both mechanically and manually. The block was positioned to examine a brick feature exposed in Trench 7 (Feature 2, Kiln 6, which was originally labeled Feature 59 in the field). Excavation of this block uncovered more elements of Feature 2 (See also Block S). The part of Feature 2 that was

uncovered was a section of an ash box for a kiln furnace (Figure 5.57). No profile was recorded for this block.

The particular ash box exposed was part of the northernmost furnace on the west edge of Kiln 6. The north corner of the ash box, part of the stone foundation of the main kiln wall, and part of the air space for the furnace were all excavated, although the particular function of the feature was not apparent at the time of excavation (these elements labeled as Features 43, 44, and 45 in the field). The sections of the ash box foundation and stone foundation on either side of the air space were roughly level with each other at an elevation of approximately 217.1 m, while the north wall of the ash box was 8 cm (3 in) taller at 217.9 m. The brick foundation that the ash boxes were set in was at an elevation of 217.26 m, some 8 cm (3 in) above the ash box wall. This was also the elevation for the stone foundation wall. The floor of the ash box was at 216.75 m, while the base of excavation in the air space was at 216.31 m. In other terms, the floor of the ash box was 43 cm (1 ft 5 in) lower than the ash box wall. The base of the air space corresponded to the base of the stone foundation, giving it a height of 95 cm (3 ft).

Feature 2 was slightly damaged during the backhoe excavation of Unit 18, which was opened to facilitate access to the north portion of the feature. The soil matrix in this block consisted almost entirely of brick rubble. Excavation of Unit 18 stopped at 215.96 m, where the dry-laid stone foundation base for Feature 2 was visible. The soil below the foundations was a mix of silty clay with bits of red earth and brick rubble, most of which was the remnants of arch brick. Due to the 1 meter limit imposed on excavations during this phase of the project, this unit did not uncover Feature 121, later exposed in the same location during the mechanical excavation of Block P.

Artifacts recovered from Block C included a mixture of architectural debris from the brick factory and domestic waste from the post-factory use of the area as a local dumping ground (Table 5.5). Datable artifacts from the block C assemblage include a 1933 penny (cat # 132.2), two clear colorless machine molded jar finish fragments (ca. 1880-present) (cat # 134.13), and seven fragments of a clear colorless pharmaceutical bottle with graduation marks on the side in cubic centimeters (cc) and an Owens machine scar on the base, with a partial embossed mark ("/-ENS/-3") (cat # 134.7). This bottle can be dated to the 1920s, according to Miller and McNichol (2002).

Table 5.5. Block C Artifact Assemblage.

Cat. No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
88.1	--	--	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
88.2	--	--	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Fragment	6
88.3	--	--	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
134.1	09	--	1	Jar	Domestic - Food storage	Transparent-Colorless	Molded	Rim	2
134.2	09	--	1	Bone	Domestic - Food remains	Faunal - mammal	Bone	Fragment	2
134.3	09	--	1	Nail	Architecture - Hardware	Iron/steel - Common	Cut	Fragment	1
134.4	09	--	1	Nail	Architecture - Hardware	Iron/steel - Common	Wire-drawn	Fragment	1

Cat. No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
134.5	09	--	1	Zipper	Clothing - Apparel	Non-ferrous alloy	Unspecified manufacture	Fragment	1
134.6	09	--	1	Toy	Personal - Miscellaneous	Iron/steel	Cast	Complete	1
134.7	09	--	1	Bottle	Personal - Medicine	Transparent - Colorless	Molded	Fragment	7
134.8	09	--	1	Crock	Domestic - Food storage	Stoneware - Bristol glazed	Domestic buff stoneware	Body	2
134.9	09	--	1	Buckle	Clothing - Accessories	Non-ferrous alloy	Unspecified manufacture	Complete	1
134.10	09	--	1	Unspecified form	Activities - Miscellaneous hardware	Unspecified white metal	Wire-drawn	Fragment	3
134.11	09	--	1	Unidentified object	Miscellaneous - Unidentified type	Iron/steel	Unspecified manufacture	Fragment	3
134.12	09	--	1	Cotter pin	Activities - Miscellaneous hardware	Ferrous alloy	Unspecified manufacture	Complete	1
134.13	09	--	1	Jar	Domestic - Food storage	Transparent - Colorless	Molded	Rim	2
134.14	09	--	1	Jar	Domestic - Food storage	Transparent - Colorless	Machine-made	Rim	1
134.15	09	--	1	Hinge	Architecture - Hardware	Unspecified	Unspecified manufacture	Unknown length	1
135.1	10	--	1	Jug	Domestic - Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Body	1
136.1	12	--	1	Spike	Architecture - Hardware	Iron/steel - Spike	Cut	Complete	1
136.2	12	--	1	Crock	Domestic - Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Body	1
136.3	12	--	1	Unspecified form	Domestic - Food service	Earthenware-Undecorated	Whiteware	Fragment	1
136.4	12	--	1	Bottle	Domestic - Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	4
136.5	12	--	1	Bottle	Domestic - Food storage	Transparent - Brown	Machine-made	Fragment	1
136.6	12	--	1	Bottle	Domestic - Food storage	Transparent - Aqua	Unspecified manufacture	Fragment	1
137.1	18	--	1	Jug	Domestic - Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Handle	1
137.2	18	--	1	Unspecified form	Domestic - Miscellaneous	Opaque - White, opaque	Machine-made	Base	1
165.1	09	02	--	Brick	Architecture - Construction material	Brick	Soft mud, handmade	Complete	1
223.1	11	--	--	Belt	Clothing - Accessories	Faunal	Leather	Fragment	11
223.2	11	--	--	Penny	Personal - Coins	Copper	Stamped	Complete	1
223.3	11	--	--	Rivet	Architecture - Hardware	Unspecified	Unspecified manufacture	Complete	1
223.4	11	--	--	Tile	Architecture - Construction material	Slate	Cut	Fragment	1
223.5	11	--	--	Bead	Clothing - Accessories	Opaque - Blue, dark	Non-machine made	Complete	1
223.6	11	--	--	Bottle	Domestic - Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	4

Cat. No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
223.7	11	--	--	Jug	Domestic - Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Fragment	1
223.8	11	--	--	Bottle	Personal - Medicine	Transparent - Aqua	Embossed	Body	1
								Total	**71**

Block D

Block D measured 1 m x 2 m, and was divided into two 1-m^2 units that were numbered 13 and 14 (Figure 5.58). The south corner of the block was located at grid coordinates N299.30 E 145.67, at an elevation of 217.71 m. The maximum depth of the block was 89 cmbs, at an elevation of 216.82 m. The block was positioned to investigate a horizontal brick alignment uncovered by the backhoe (Feature 5). Excavation revealed that the feature was the continuation of a brick wall previously exposed during the CDC preliminary Phase II evaluation in a deflated excavation trench to the north. The feature was surrounded by fill on either side.

Feature 5 stretched across the entire block, and had a maximum elevation of 217.71 m (Figure 5.59). The top course of the wall was loose and in poor condition, while the remainder of the wall fabric was intact and in good condition. The fill was excavated by hand until eleven courses of brick were exposed, at which point the one-meter excavation limit set by the SOW for this stage of the project was met. The historic fill on either side of the wall was recorded as silty clay with minimal brick debris until 30 cmbs. At this depth, the soil matrix to the west of Feature 5 was noted as changed to thermally altered sandy clay and brick rubble debris. Feature 5 continued south outside the boundaries of the block. No Munsell soil colors were recorded at the time of this excavation.

The few artifacts noted during excavation consisted of glass fragments, historic ceramics and animal bone, which was determined to be twentieth-century household waste. Excavators did not screen the fill because the base of historic deposits was not reached within the one-meter excavation limit.

Archaeologists returned to Block D in the spring of 2001 and excavated Units 13 and 14 down to the level of natural soils (Figure 5.59). A crewmember drew a profile of the north wall to record the stratigraphy and its relation to Feature 5. The stratigraphy west of the feature had a sequence consisting of a very dark grayish brown silt loam at 217.71 to 217.62 (0-9 cmbs), rubble fill at 217.62-217.47 m (9-24 cmbs); crushed brick at 217.47-217.39 m (24-32 cmbs); very dark gray silt loam at 217.39-217.35 m (32-36 cmbs); thermally altered dark red clay at 217.35-217.23 m (36-48 cmbs); and a dark yellowish brown clay subsoil at 217.23-216.82 m (48-89 cmbs). The stratigraphy east of the wall consisted of a very dark grayish brown silt loam at 217.71 to 217.62 (0-9 cmbs), rubble fill at 217.62-217.23 m (9-48 cmbs), and a dark yellowish brown clay subsoil at 217.23-216.82 m (48-89 cmbs). The stratigraphy indicates that there was some sort of thermal activity occurring to the west. The excavators screened the final 10 cm of fill, without recovering any artifacts. Four bricks were recovered from the unscreened fill (Table 5.6). Finally, a post-excavation trench was placed

through Feature 5 with the backhoe to determine if there were any interior details to the wall construction not evident from examination of the wall exterior. No such details were noted.

Table 5.6. Block D Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
89.1	--	--	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
89.2	--	--	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
89.3	--	--	--	Brick	Architecture - Construction material	Brick – Fire	Stiff mud	Complete	1
								Total	**3**

Block E

Block E measured 2 m x 2.5 m, and was divided into six units, numbered 15 through 17 and 19 through 21 (Figure 5.61). Units 15, 16, 19 and 20 were 1-m^2 units, while Units 17 and 21 measured 1 m x 0.5 m. The south corner of the block was located at grid coordinates N303.71 E1432.58, at an elevation of 217.13 m. Maximum block depth was 77 cmbs, at an elevation of 216.36 m. The field crew excavated this block adjacent to a large, deflated CDC Phase I excavation trench to examine features exposed in the trench deflation in more detail. These features consisted of two parallel brick structures aligned east-west and exposed in the west side of the open pit. Archaeologists manually excavated each unit and screened the final 10 cm of fill above the floor for artifacts. No wall profiles were recorded for this block, although a section showing the relationship of Feature 39 and Feature 9 was produced (Figure 5.62).

Excavators identified the southern wall in Unit 16 as a building wall (Feature 69). They determined that the wall to the north was the beginning or entrance point to a section of the subfloor flue system in the pre-1898 drying house. This flue entrance was subsumed into Feature 9 after being temporarily designated in the block as Feature 70. Two iron pipes were located adjacent to each wall in the base of Unit 16 (Feature 39, designated in the field as Feature 90). These pipes passed through Unit 19, located east of Unit 16, and continued outside the bounds of the block. All of these features were later examined in more detail in Block Q, which allowed for the identification of Feature 39 as a section of a steam delivery system and Feature 69 as the southern wall of the steam heated dry floor.

Archaeologists excavated Units 16 and 17 to define more of Feature 4 and to uncover a brick floor surface north of the feature. Excavators found that the flue entrance consisted of six courses of brick set on top of the flue system, which was visible in Units 16 and 20. The top course of brick consisted of large firebricks set as headers, more than three courses of red brick stretchers, and one course of red brick headers. In turn, the red brick was set on a course of firebrick stretchers that covered the firebrick flues. The top of this construction was at an elevation of 216.98 m. Excavation in Units 16 and 17 to the north of the brick flue entrance uncovered a brick floor two courses deep covering the flues, at an elevation of 216.72 m, or 26 cm below the top of the flue entrance wall (Figure 5.63). This brick floor cover was considered part of Feature 9. A layer of hard packed soil covered this flooring. This layer was located just below a mottled layer of silty loam and appears to have been

placed deliberately over the brick flooring. This soil was thermally altered and was dry, compact and crumbly, similar to baked clay. The soil between the walls to the base of the excavation was identified as recent historic fill, since it contained twentieth-century household trash and brick rubble (not collected). The artifacts that were retrieved included three segments of Feature 39 (Table 5.7), nine corroded cut nails (ca. 1835-1890), and a red brick from Feature 5 (discussed in detail in the section "Interpretation of Findings" below).

Table 5.7. Block E Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
111.1	--	09	--	Brick	Architecture - Construction material	Brick – Fire	Stiff mud	Complete	1
112.1	--	05	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
138.1	15	--	Fill	Pipe	Activities – Industry	Iron/steel	Unspecified manufacture	Fragment	1
139.1	16	--	1	Nail	Architecture – Hardware	Iron/steel - Common	Cut	Fragment	9
140.1	16	--	Fill	Pipe	Activities – Industry	Iron/steel	Unspecified manufacture	Fragment	1
141.1	20	--	Fill	Pipe	Activities – Industry	Iron/steel	Unspecified manufacture	Fragment	1
								Total	**14**

Block F

Block F measured 1 m x 2 m, and was divided into two 1-m^2 units numbered 22 and 23 (Figure 5.64). The south corner of the block was located at N334.80 E114.35, at an elevation of 217.22 m. The archaeologists excavated the block in six levels to an elevation of 216.00, a maximum depth of 122 cmbs. The field crew positioned the block to examine the north end of a section of firebrick flues running northwest-southeast and that were first exposed in Trench 11 (designated in the field as Feature 35, but later subsumed into Feature 9). These flues were present at an elevation of 216.87 m in the block.

Excavators also uncovered a firebrick support wall for two arched "barrel-vaulted" furnaces, also oriented northwest-southeast (Figure 5.65). A heavy concentration of brick rubble was found on top of the barrel vaults, which were only present in the north profile (Figure 5.66). This rubble may represent a wall collapse. The numbers of all such features in this location have been subsumed into Feature 76, the furnaces for the northern coal/gas hot floors. The support wall sloped down towards the north end of the unit, where portions of the furnace roof were still intact in the profile. This wall had an elevation of 216.91 m at its southern extent and an elevation of 216.60 m at its northern extent in the block. The wall was set on the crushed red brick flooring of the furnace interiors that ranged in elevation from 216.22 m to 216.00 m in the block.

The excavator found a layer of furnace waste on the floors of the furnace chambers (labeled Features 77 and 78 by the excavator, later determined to be part of Feature 76). The chamber floors did not extend to the beginning of the flues. The excavator observed a possible section of red brick flooring under the flue system (Feature 9, labeled in the field as Feature 87) in the south end of the block. The excavator also noted a red brick wall (labeled in the field as Feature 88, later subsumed into Feature 76) running across the north profile of the block, at

an elevation of 216.60 m. This wall was later identified through excavation of Block R as the rear wall of the furnace.

The west profile of the block at its midpoint exhibited a brown loam fill with twentieth-century household waste at 217.22-216.72 m (0-50 cmbs); a brown silt loam fill with brick debris at 216.72-216.35 m (50-87 cmbs); a dark yellowish-brown sandy loam with numerous artifacts at 216.35-216.32 m (87-90 cmbs), which became much thicker at the north end of the profile, extending from 216.70-216.14 m (52-108 cmbs); and the floor of the furnace, at 216.32-216.20 m (90-112 cmbs), which ended at the north end at an elevation of 216.00 m (122 cmbs). Natural soils were not encountered before excavation was halted (Figure 5.66). Artifacts recovered included numerous examples of early twentieth-century domestic refuse, as well as nails, bricks, sheet metal, and one chert flake (Table 5.8). The only datable artifact recovered was a clear, colorless bottle base with an Owens machine scar, which gives it a *terminus post quem* date of 1903 (cat # 142.7). Also recovered was a tin cap for a threaded bottle. The cap had the brand "CRUIKSHANKS/TOMATO/KETCHUP" and might be the cap for the bottle discussed below under Block R (cat. # 102.13).

Table 5.8. Block F Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
090.1	--	--	--	Brick	Architecture - Construction material	Brick – Fire	Stiff mud	Complete	1
107.1	--	--	--	Brick	Architecture - Construction material	Brick – Fire	Stiff mud	Complete	1
142.1	22	--	1	Bone	Domestic – Food remains	Faunal – cut	Bone	Fragment	7
142.2	22	--	1	Screw	Architecture – Hardware	Iron/steel	Unspecified manufacture	Complete	1
142.3	22	--	1	Bone	Domestic – Food remains	Faunal – cut	Bone	Fragment	10
142.4	22	--	1	Vessel	Domestic – Food service	Earthenware – Painted	Ironstone	Fragment	1
142.5	22	--	1	Vessel	Domestic - Miscellaneous	Transparent - Colorless	Melted	Fragment	1
142.6	22	--	1	Window glass	Architecture - Construction material	Flat – Colorless	Unspecified manufacture	Fragment	2
142.7	22	--	1	Bottle	Domestic – Food storage	Transparent - Colorless	machine-made	Base	1
142.8	22	--	1	Bottle	Domestic – Food storage	Transparent – Aqua, light	Unspecified manufacture	Body	2
142.9	22	--	1	Mortar	Architecture - Construction material	Other	Mixed	Fragment	1
142.10	22	--	1	Nail	Architecture - Hardware	Iron/steel – Common	Cut	Fragment	1
142.11	22	--	1	Lumber	Architecture - Construction material	Floral	Wood	Fragment	6
142.12	22	--	1	Bone	Domestic – Food remains	Faunal – cut	Bone	Fragment	3
142.13	22	--	1	Bottle	Personal – Medicine	Transparent - Colorless	Machine-made	Fragment	2
142.14	22	--	1	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	1
142.15	22	--	1	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	1

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
142.16	22	--	1	Lumber	Architecture - Construction material	Floral	Sawn	Fragment	5
143.1	22	--	2	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	1
143.2	22	--	2	Bottle	Domestic – Food storage	Transparent - Colorless	Melted	Fragment	1
143.3	22	--	2	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	3
143.4	22	--	2	Vessel	Domestic – Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Body	1
143.5	22	--	2	Jar	Domestic – Food storage	Transparent - Colorless	Machine-made	Rim	1
143.6	22	--	2	Bone	Domestic – Food remains	Faunal – mammal	Bone	Fragment	1
143.7	22	--	2	Eyelet/rivet	Clothing – Apparel	Unspecified	Unspecified manufacture	Complete	1
143.8	22	--	2	Bottle	Domestic – Food storage	Transparent – Aqua	Unspecified manufacture	Fragment	1
143.9	22	--	2	Window glass	Architecture - Construction material	Flat – Colorless	Unspecified manufacture	Fragment	1
143.10	22	--	2	Can	Domestic – Food storage	Iron/steel	Unspecified manufacture	Fragment	2
143.12	22	--	2	Corroded iron object	Miscellaneous - Unidentified type	Iron/steel	Unspecified manufacture	Fragment	2
143.13	22	--	2	Nail	Architecture - Hardware	Iron/steel	Unspecified manufacture	Fragment	4
144.1	22	--	3	Nail	Architecture - Hardware	Iron/steel – Common	Cut	Fragment	13
144.2	22	--	3	Nail	Architecture - Hardware	Iron/steel – Common	Wire-drawn	Fragment	13
144.4	22	--	3	Charcoal	Miscellaneous - Unspecified function	Floral	Charcoal	Fragment	2
144.5	22	--	3	Bone	Domestic – Food remains	Faunal – cut	Bone	Fragment	32
144.6	22	--	3	Corroded Metal Object	Miscellaneous - Unidentified type	Iron/steel	Unspecified manufacture	Fragment	5
145.1	22	--	4	Bone	Domestic – Food remains	Faunal – cut	Bone	Fragment	11
145.2	22	--	4	Bone	Domestic – Food remains	Faunal – cut	Bone	Finish	2
145.3	22	--	4	Bone	Domestic – Food remains	Faunal – cut	Bone	Fragment	66
145.4	22	--	4	Mortar	Architecture - Construction material	Unspecified	Mixed	Fragment	2
145.5	22	--	4	Button	Clothing – Apparel	Opaque – White, opaque	Molded	Complete	1
145.6	22	--	4	Button	Clothing – Apparel	Celloid – Other plastic	Unspecified manufacture	Complete	1
145.7	22	--	4	Plate	Domestic – Food service	Earthenware – Gilded	Whiteware	Rim	1
145.8	22	--	4	Plate	Domestic – Food service	Earthenware - Undecorated	Whiteware	Base	1
145.9	22	--	4	Vessel	Domestic – Food service	Earthenware - Undecorated	Whiteware	Body	3
145.10	22	--	4	Jug	Domestic – Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Base	2
145.11	22	--	4	Jug	Domestic – Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Body	1

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
145.12	22	--	4	Vessel	Domestic – Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Body	2
145.13	22	--	4	Vessel	Domestic – Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Body	1
145.14	22	--	4	Jug	Domestic – Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Base	1
145.15	22	--	4	Vessel	Domestic – Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Base	1
145.16	22	--	4	Bakelite	Domestic - Miscellaneous	Bakelite – Other plastic	Molded	Fragment	2
145.17	22	--	4	Nail	Architecture - Hardware	Iron/steel – Common	Wire-drawn	Fragment	1
145.18	22	--	4	Wire	Miscellaneous - Unspecified function	Copper	Wire-drawn	Fragment	1
145.19	22	--	4	Nail	Architecture - Hardware	Iron/steel – Common	Cut	Fragment	1
145.20	22	--	4	Vessel	Domestic - Miscellaneous	Transparent - Colorless	Melted	Fragment	4
145.21	22	--	4	Window glass	Architecture - Construction material	Flat – Colorless	Unspecified manufacture	Fragment	4
145.22	22	--	4	Bottle	Personal – Medicine	Transparent – Aqua	Molded	Body	1
145.23	22	--	4	Bottle	Domestic – Food storage	Transparent – Aqua	Machine-made	Fragment	3
145.24	22	--	4	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	4
145.25	22	--	4	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	7
145.26	22	--	4	Vessel	Domestic – Food service	Transparent - Colorless	Machine-made	Fragment	1
145.27	22	--	4	Bottle	Domestic – Food storage	Transparent - Colorless	Melted	Fragment	1
145.28	22	--	4	Vessel	Domestic - Miscellaneous	Opaque – White, opaque	Molded	Fragment	1
145.29	22	--	4	Vessel	Domestic - Miscellaneous	--	Molded	Fragment	1
145.30	22	--	4	Bottle	Personal – Medicine	Transparent - Colorless	Molded	Fragment	1
145.31	22	--	4	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	10
145.32	22	--	4	Baked clay object	Non-cultural	Other mineral	By-product	Fragment	1
145.33	22	--	4	Corroded metal object	Miscellaneous - Unidentified type	Iron/steel	Unspecified manufacture	Fragment	1
145.34	22	--	4	Corroded metal object	Miscellaneous - Unidentified type	Iron/steel	Unspecified manufacture	Fragment	10
145.35	22	--	4	Bolt	Architecture - Hardware	Iron/steel	Unspecified manufacture	Fragment	12
146.1	22	--	5	Bone	Domestic – Food remains	Faunal – cut	Bone	Fragment	7
146.2	22	--	5	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	2
146.3	22	--	5	Nail	Architecture - Hardware	Iron/steel	Unspecified manufacture	Fragment	4
148.1	23	--	Fill	Bone	Domestic – Food remains	Faunal – mammal	Bone	Fragment	10
148.2	23	--	Fill	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	1

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
148.3	23	--	Fill	Window glass	Architecture - Construction material	Flat – Colorless	Unspecified manufacture	Fragment	1
148.4	23	--	Fill	Nail	Architecture - Hardware	Iron/steel – Common	Cut	Fragment	4
149.1	23	--	--	Brick	Architecture - Construction material	Brick – Fire	Stiff mud	Partial	1
149.2	23	--	--	Brick	Architecture - Construction material	Brick – Fire	Stiff mud	Complete	1
150.1	23	--	1	Brick	Architecture - Construction material	Brick – Fire	Stiff mud	Complete	1
150.2	23	--	1	Bottle	Domestic – Food storage	Transparent - Colorless	Molded	Fragment	1
150.3	23	--	1	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Base	1
150.4	23	--	1	Nail	Architecture - Hardware	Iron/steel – Common	Wire-drawn	Complete	1
150.5	23	--	1	Bottle	Domestic – Food storage	Transparent - Colorless	Molded	Body	4
150.6	23	--	1	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	10
150.7	23	--	1	Nail	Architecture - Hardware	Iron/steel – Common	Cut	Fragment	2
150.8	23	--	1	Jar	Domestic - Miscellaneous	Solarized – Amethyst	Molded	Rim	1
150.9	23	--	1	Bottle	Personal – Medicine	Transparent – Aqua	Pharmaceutical	Body	3
150.10	23	--	1	Bottle	Domestic – Food storage	Transparent - Colorless	Machine-made	Base	1
150.11	23	--	1	Unidentified object	Miscellaneous - Unidentified type	Unspecified	Unspecified manufacture	Fragment	1
150.12	23	--	1	Rolled metal	Miscellaneous - Unspecified function	Ferrous alloy	Rolled	Fragment	1
151.1	23	--	2	Mortar	Architecture - Construction material	Other	Mixed	Fragment	2
151.2	23	--	2	Lid	Domestic – Food storage	Unspecified white metal	Molded	Complete	1
151.3	23	--	2	Nail	Architecture - Hardware	Iron/steel – Common	Cut	Complete	1
151.4	23	--	2	Shot	Arms – Ammunition	Lead – Dropped	Cast		1
151.5	23	--	2	Leather	Clothing – Apparel	Faunal	Leather	Fragment	8
151.6	23	--	2	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	6
151.7	23	--	2	Jar	Domestic – Food storage	Solarized – Amethyst	Molded	Fragment	1
151.8	23	--	2	Bottle	Domestic – Food storage	Transparent - Colorless	Molded	Base	2
151.10	23	--	2	Can	Domestic – Food storage	Ferrous alloy	Unspecified manufacture	Fragment	16
152.1	23	--	3	Nail	Architecture - Hardware	Iron/steel – Common	Cut	Fragment	10
152.2	23	--	3	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	1
152.4	23	--	3	Bone	Domestic – Food remains	Faunal – cut	Bone	Fragment	26
152.5	23	--	3	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	1
152.6	23	--	3	Can	Domestic – Food storage	Ferrous alloy	Unspecified manufacture	Fragment	4

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
152.6	23	--	3	Nail	Architecture - Hardware	Iron/steel – Common	Wire-drawn	Fragment	2
152.7	23	--	3	Nail	Architecture - Hardware	Iron/steel	Unspecified manufacture	Fragment	13
152.8	23	--	3	Leather object	Clothing – Apparel	Faunal	Leather	Fragment	1
152.9	23	--	3	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	1
152.10	23	--	3	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	2
152.11	23	--	3	Bottle	Domestic – Food storage	Solarized – Amethyst	Unspecified manufacture	Fragment	1
152.12	23	--	3	Nail	Architecture - Hardware	Iron/steel – Common	Wire-drawn	Fragment	3
152.13	23	--	3	Window glass	Architecture - Construction material	Flat – Colorless	Unspecified manufacture	Fragment	1
152.14	23	--	3	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	1
153.1	23	--	4	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	1
153.2	23	--	4	Nail	Architecture - Hardware	Iron/steel – Common	Wire-drawn	Fragment	1
153.3	23	--	4	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	1
153.4	23	--	4	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	1
153.5	23	--	4	Bone	Domestic – Food remains	Faunal – cut	Bone	Fragment	2
153.6	23	--	4	Bottle	Domestic – Food storage	Solarized – Amethyst	Unspecified manufacture	Fragment	1
								Total	**464**

Block G

This 1-x-2-m block was positioned partially overlapping Trench 7 to investigate a set of north-south running flues (Feature 9, designated in the block as Feature 66) and to look for an associated wall. The archaeologists divided the block into two 1-m^2 units, Unit 24 on the east and Unit 25 on the west side of the block (Figure 5.67). The south corner of the block was located at grid coordinates N273.95 E150.65. Elevation data for the block was corrupted and could not be used. However, elevation data was available for the northwest and northeast corners of Trench 7. Therefore, the elevation of the northeast corner was selected to serve as an arbitrary maximum elevation for the unit, at 217.00 m. The maximum depth of the block was 133 cmbs, or an approximate elevation of 215.67 m. All elevations in this discussion are taken from that figure, and therefore contain some degree of error. This error should not be any greater than about 10 cm, however. Due to an oversight in the field, no photographs were taken of this block.

The initial goal was to excavate the units to the level of Feature 9 (at an approximate elevation of 216.42 m, or 60 cmbs). However, the fill stratum was still present at this level in the block, so excavation continued deeper. At this level, the archaeologist excavating the block identified a distinct break between thermally altered, silty loam continuing to the east of the flues, and yellowish-brown sandy silt loam fill to the west. The archaeologist continued the excavation to an approximate elevation of 215.67 m (133 cmbs) in Unit 24,

following the stratum of historic fill, which contained large brick fragments. The break between the thermally altered soils and the yellowish-brown fill continued to the base of excavation. It was not until near the end of the excavation, and the removal of a balk, that the excavator noticed a vertical break in the soils in the east wall, indicating that this was a builder's trench for a now-absent wall (Feature 56) (Figure 5.68). The archaeologist discovered an iron pipe (Feature 89) at an approximate elevation of 215.74 m (126 cmbs) in the middle of the builder's trench.

In Unit 25, the western half of the block, the excavator noted the thermally altered soil primarily associated with Feature 9. In the center of the block, natural sandy silt was present, bordering the thermally altered matrix of Unit 25 and the builder's trench fill in Unit 24. The large fill episode present in Unit 24 extended into Unit 25 to a point just under the easternmost flues. The remainder of the soil in Unit 25 was thermally altered silty loam over silt and sandy silt to the base of excavations. Using nearby STUs and trenches as guides, the archaeologist determined that historic activity had not turbated the thermally altered soils beginning at an approximate elevation of 216.10 m (90 cmbs). Therefore, the archaeologist excavated the unit in a "stair-step" manner from the vents at an approximate elevation of 216.42 m (60 cmbs) to the base of excavations in Unit 24 at an approximate elevation of 215.67 m (133 cmbs), to avoid as much of the natural soils as possible. As observed in other areas of the site, a crumbly, compact red silt loam to clay loam was present around the flues. This thermally altered soil was consistently found on the site above, below, and around brick features, especially flues, flue covers, and kiln or furnace locations. No artifacts were recovered from the excavation.

Feature 56 was probably the original location of the east foundation of the southern coal/gas hot floor, and was removed during the demolition of the hot floor complex prior to the erection of the steam drier tunnel in 1898. The pipe was probably a gas line for the post-1898 Harmony Brickworks, and the factory workers used the old builders trench for the wall as an expedient trench for the gas line.

The stratigraphy of this block is complex, due to the formation processes involved, which include the excavation of a builder's trench into the subsoil, thermal alteration of the soils in the west half of the block, the removal of the wall that was set into the builder's trench, an episode of alluviation, and subsequent soil accumulation. Referring to the north profile (Figure 5.68), the soil strata vary greatly in width within the profile. Because of these processes and the manner in which the block was excavated, the discussion of the stratigraphy presented here gives elevation data in reference to strata boundaries, rather than a range for each stratum.

The top stratum is the recent soil accumulation, a dark yellowish-brown silt loam that interfaces with the next stratum, a very dark brown silt alluvium, at approximate elevations ranging from 216.78-216.64 m (22-36 cmbs). This alluvium stratum does not extend across the entire profile, terminating at about 44 cm from the north corner of the block, where the first stratum then interfaces with the next stratum, a fill event that dates from the removal of the east wall of the southern hot floor and the installation of the gas line. This interface ranges from approximate elevations of 216.86-216.42 m (14-60 cmbs). The fill stratum interfaces with the natural soils on the east side of the profile and with the thermally altered

soils on the west. The interface with natural soils occurs at an approximate elevation of 216.75 m (25 cmbs), while the interface with the thermally altered soils ranges between about 216.24-216.12 m (76-88 cmbs). The thermal alteration interfaces with unaltered soils at a range of approximately 215.97-216.04 m (96-103 cmbs).

Block H

Block H measured 1 m x 2 m, and was divided into two 1-m^2 units numbered 26 and 27 (Figure 5.69). The south corner of the unit was located at grid coordinates N294.64 E148.72, at an elevation of 217.72 m. The field crew positioned the block to examine an intersection of two brick walls, Features 5 and 55 (Figure 5.70). Unit 26 consisted of the northwest half of the block, with Unit 27 containing the section of Feature 55. After the excavator removed the surface deposits covering Unit 26, he determined that the soil matrix to the northwest of Feature 55 was undisturbed at an elevation of 217.50 m.

The archaeologist excavated Unit 27 to a final depth of 110 cmbs, at an elevation of 216.62 m. The excavator noted a single course of brick that apparently lay against the older wall, one course below the top of the wall on the south side (Figure 5.71). This anomalous course represents where the working surface may have been in relation to the building when it was still standing, and therefore may have been laid soon after the main wall was built. Under this course was a layer of brick rubble that was apparently laid flat against the older wall. This layer of rubble extended to the base of excavations, where natural dark yellowish brown sandy silt subsoil was encountered. The builders of the brickworks constructed the wall against natural soils to the northwest, with the disturbed soils to the southeast in Unit 27 representing a builder's trench. The wall is a near perfect match to the alignment of the southeastern wall for the northern auxiliary wing on the 1894 surveyor's map and is identified as that wall of the hot floor complex. The undisturbed soil to the northwest of Feature 55 and northeast of Feature 5 may indicate the level of the working floor of this portion of the hot floor complex.

One brick sample was taken from Feature 55 (discussed in the section, "Interpretation of Findings," below), with the rest of the assemblage comprising architectural hardware and steel can fragments (Table 5.9).

Table 5.9. Block H Artifact Assemblage.

Cat No.	Blk	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
091.1	H	--	55	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
154.1	H	27	--	2	Spike	Architecture - Hardware	Iron/steel – Spike	Cut	Complete	3
154.2	H	27	--	2	Jug	Domestic – Food storage	Stoneware - Color glaze, translucent	Domestic brown stoneware	Body	1
154.3	H	27	--	2	Nail	Architecture - Hardware	Iron/steel - Common	Cut	Fragment	2
154.4	H	27	--	2	Can	Domestic – Food storage	Ferrous alloy	Unspecified manufacture	Fragment	16
									Total	**23**

Block I

Block I measured 2 m x 2 m, and was comprised of four 1-m^2 units: 28, 29, 30 and 31 (Figure 5.72). The south corner was located at grid coordinates N262.86 E157.34, at an elevation of 217.37 m. The field director positioned the block to investigate elements of Feature 2 (Kiln 6) noted in Trench 16. The feature elements include the kiln floor, a brick wall for one of the kiln ash boxes and the large limestone foundation for the kiln's east main wall (Figure 5.73). The base of excavation was at an elevation of 216.22 m (115 cmbs). The kiln elements as excavated measured approximately 50 cm (1 ft 8 in) tall from the base of excavations. The stone foundation was 92 cm wide and extended across the entire block. The foundation was first encountered at an elevation of 217.10 m (27 cmbs). There was an air space between the north-south brick wall of the ash box and the stone foundation measuring 40 cm. The side walls of the kiln ash box extended to meet the stone foundation and were visible in the north and south walls of the block. The ash box was first encountered at an elevation of 216.97 m (40 cmbs). The north profile for the block exhibited a straightforward soil sequence (Figure 5.74). Feature 2 was completely overlain by a stratum of sandy fill with much building debris present, at 217.37-217.10 m (0-27 cmbs) over the kiln foundation and floor, and extended to the base of excavations elsewhere in the block. The stratigraphy of the kiln floor was recorded as a light-red, crushed brick stratum from 217.10-217.00 m (27-37 cmbs), which overlay a thermally altered, dark-red sandy silt from 217.00-216.22 (37-115 cmbs).

Aside from brick rubble in the air space, the excavator observed no artifacts in any of the excavated soil matrix. The soil matrix west of the stone foundation consisted of a 20-cm stratum of crushed brick that began at the top of the foundation, with the matrix underneath being a thermally altered layer of sandy silt that extended past the base of excavations. One brick sample from Feature 2 was recovered, as well as a loose brick (Table 5.10). No other artifacts were recovered.

Table 5.10. Block I Artifact Assemblage.

Cat No.	Blk	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
092.1	I	--	02	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Fragment	2
092.2	I	--	02	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
									Total	**3**

Block J

Block J measured 1 m x 2 m, and was divided into two 1-m^2 units numbered 33 and 34 (Figure 5.75). The south corner was located at grid coordinates N316.16 E122.27, at an elevation of 217.15 m. The maximum depth of the block was 94 cmbs, at an elevation of 216.21 m. The field director placed the block adjacent to Trench 5, which contained Feature 49 (a brick alignment), in order to study that area in more detail. The excavator noted a gap in the feature, thought to have been a gap for a previously existing north-south running wall. Block J was therefore oriented specifically to discover possible features relating to the gap. One feature was encountered in the initial excavation of this block in 2000: Feature 10, an east-west running brick wall, was first encountered in Trench 4 to the east (Figure 5.76).

The stratigraphic sequence for this block is fairly straightforward (Figure 5.77). A fairly thick deposit of naturally accumulated soils construed the first stratum, which was a very dark gray sandy silt at 217.15-216.89 m (0-26 cmbs). This capped an 18-cm-thick fill episode with high densities of brick rubble, sheet metal, and mortar at 216.89-216.71 m (26-44 cmbs). The bottom of the fill stratum coincided with the level of Feature 49. The next stratum in the sequence was a yellowish-red silt loam at 216.71-216.35 m (44-80 cmbs). Feature 10 was buried in this stratum, appearing at an elevation of 216.51 m (64 cmbs). The loamy silt graded into a yellowish-red clayey silt, at 216.35-216.27 m (80-88 cmbs). A narrow builder's trench was first evident at the base of this layer, extending 6 cm from either side of Feature 10. The stratum the builder's trench was excavated into was a layer of crushed brick at 216.27-216.21 m (88-94 cmbs), which capped the natural clay subsoil.

In 2001, the field crew mechanically excavated a post-excavation trench through this unit, bisecting it north-south. This revealed a 25.4 cm (10")-diameter ceramic drainpipe under Feature 49. This pipe was identified as a segment of Feature 48 (Figure 5.24). Few artifacts were noted for this unit, mainly domestic waste from the fill layers and some architectural debris (Table 5.11). Datable artifacts include the nails (four cut nails, ca. 1835-1890, and two wire nails, ca. 1888-present), and a sherd from an ironstone vessel (ca. 1840s-present).

Table 5.11. Block J Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
093.1	--	10	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
156.1	33	--	1	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	5
157.1	33	--	3	Unspecified form	Domestic – Food service	Earthenware - Undecorated	Ironstone	Body	1
158.1	34	--	2	Nail	Architecture - Hardware	Iron/steel - Common	Wire-drawn	Fragment	2
158.2	34	--	2	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	1
158.3	34	--	2	Nail	Architecture - Hardware	Iron/steel - Common	Cut	Fragment	4
158.4	34	--	2	Bottle	Domestic – Food storage	Stoneware - Salt-glazed	Domestic buff stoneware	Body	1
158.5	34	--	2	Can	Domestic – Food storage	Ferrous alloy	Unspecified manufacture	Fragment	1
								Total	**16**

Block K

Block K measured 2 m x 2 m, and was divided into four 1-m^2 units: 32, 35, 36 and 37 (Figure 5.78). The south corner was located at N329.70 E120.66, at an elevation of 216.65 m. The field crew placed the block to partially overlay the west end of Trench 19 to explore an apparent trench feature running parallel to a section of flues (Feature 9). The overburden, which consisted of architectural debris, was mechanically removed to the level of the brick flues, which were four in number in the block (Figure 5.79). The trench was observed running to the east of the flues and was designated Feature 80. The soils to the east of this feature were thermally altered, but heavily mottled with A horizon soils, which indicated that they were not in their original location. The trench feature was not completely excavated until 2001, when a brick feature in Block N to the south was noted to align with the trench

feature. A subsequent reopening of the block uncovered a section of this brick feature in this block at 104 cmbs. The brick feature was identified as part of the eastern foundation wall for the northern coal/gas hot floor, Feature 80. For reasons undetermined, the wall in this section of Area 1 had been dismantled to its base.

The soil sequence of this block consisted of a top layer of very dark grayish-brown loam with some architectural debris and twentieth-century artifacts, at 216.86-216.34 m (0-52 cmbs at the west end and 216.86-216.74 m (0-12 cmbs) at the east end (Figure 5.80). This overlaid a stratum of architectural debris, into which the trench from the removal of Feature 80 was excavated and refilled with mixed silt, clay, and brick debris. The architectural debris stratum was present at 216.34-216.10 m (52-76 cmbs) at the west end and 216.74-216.26 m (12-60 cmbs) on the east end. On the west side of Feature 80, this stratum capped Feature 9, the top of which was level with the base of excavations to the east of Feature 80, at 216.26 m (60 cmbs). Feature 9 sat atop a stratum of dark red crushed brick, which was the base of excavation in this part of the block. East of Feature 80, the base of excavations was at a thermally altered alluvial sand deposit, thought at the time to be natural soils, but which could also have been part of a builder's trech or other disturbance. The trench associated with Feature 80 began at 216.50 m (36 cmbs) and terminated at the feature at 215.82 m (104 cmbs).

Artifacts recovered from this unit consisted of architectural debris and domestic waste (Table 5.12). No firmly datable artifacts were recovered.

Table 5.12. Block K Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
155.1	32	--	--	Roofing tile	Architecture - Construction material	Unspecified	Unspecified manufacture	Fragment	1
159.2	32	--	1	Glove	Clothing – Apparel	Faunal	Leather	Fragment	2
159.3	32	--	1	Bone	Domestic - Food remains	Faunal - mammal	Bone	Fragment	17
159.4	32	--	1	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	3
159.5	32	--	1	Unspecified form	Clothing – Apparel	Faunal	Leather	Fragment	3
159.6	32	--	1	Knife	Activities - Miscellaneous hardware	Iron/steel	Unspecified manufacture	Fragment	1
159.7	32	--	1	Nail	Architecture – Hardware	Iron/steel - Common	Cut	Fragment	1
159.8	32	--	1	Spike	Architecture – Hardware	Iron/steel - Spike	Cut	Complete	2
159.9	32	--	1	Can	Domestic – Food storage	Ferrous alloy	Unspecified manufacture	Fragment	13
160.1	32	--	2	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	8
160.2	32	--	2	Spike	Architecture – Hardware	Gold - Spike	Cut	Complete	4
160.3	32	--	2	Bottle	Domestic – Food storage	Transparent - Brown	Unspecified manufacture	Fragment	1
161.1	32	--	3	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	7
161.2	32	--	3	Nail	Architecture – Hardware	Iron/steel - Common	Cut	Fragment	1

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
161.3	32	--	3	Roofing tile	Architecture - Construction material	Ferrous alloy	Unspecified manufacture	Fragment	1
161.4	32	--	3	Spike	Architecture – Hardware	Iron/steel - Spike	Cut	Complete	1
161.5	32	--	3	Can	Domestic – Food storage	Ferrous alloy	Unspecified manufacture	Fragment	3
161.6	32	--	3	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	1
162.1	32	--	4	Spike	Architecture – Hardware	Iron/steel - Spike	Cut	Complete	2
162.2	32	--	4	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	1
162.3	32	--	4	Can	Domestic – Food storage	Ferrous alloy	Unspecified manufacture	Fragment	2
162.4	32	--	4	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	2
163.1	32	--	5	Spike	Architecture – Hardware	Iron/steel - Spike	Cut	Complete	1
163.2	32	--	5	Bottle	Domestic – Food storage	Transparent - Colorless	Unspecified manufacture	Fragment	2
163.3	32	--	5	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	1
163.4	32	--	5	Nail	Architecture – Hardware	Iron/steel - Common	Cut	Fragment	4
163.5	32	--	5	Bone	Domestic – Food remains	Faunal - mammal	Bone	Fragment	1
163.6	32	--	5	Lamp chimney	Furnishings - Miscellaneous	Transparent - Colorless	Unspecified manufacture	Fragment	1
163.7	32	--	5	Corroded metal object	Miscellaneous - Unidentified type	Ferrous alloy	Unspecified manufacture	Fragment	2
163.8	32	--	5	Can	Domestic – Food storage	Ferrous alloy	Unspecified manufacture	Fragment	1
164.1	33	--	Fill	Bone	Domestic – Food remains	Faunal - mammal	Bone	Fragment	1
								Total	**91**

Block M

Block M measured 1 m x 2 m, and was divided into two 1-m^2 units numbered 38 and 39 (Figure 5.81). The south corner of the block was located at grid coordinates N265.55 E 150.10, at an elevation of 216.97 m. The field crew positioned the block to investigate a set of features first encountered in Trench 7. Unit 38 was the deepest part of the block and terminated at the natural subsoil at 214.87 m (210 cmbs). Unit 39 terminated at 216.52 m (45 cmbs) and contained four features: 62 (an iron gas line), 63 (a ceramic drain pipe), 64 (brick wall) and 65 (a square posthole in the wall) (Figure 5.82). Features 62 and 63 were south of the wall (Feature 64), which was later identified as the south foundation for the south coal/gas hot floor. These features were examined in much greater detail in Block P.

The stratigraphy of the west wall was indicative of perhaps two fill events (Figure 5.83). The top stratum consisted of a dark grayish-brown silt loam with numerous brick inclusions at 216.97-216.26 m (0-71 cmbs). The tops of each feature in the block were encountered in this stratum: Feature 62 at 216.60 m (37 cmbs), Feature 63 at 216.63 m (34 cmbs), and Feature 65 at 216.70 m (27 cmbs). This stratum represents a different fill event than the next layer, located at 216.26-215.13 m (71-184 cmbs), which was almost solid brick rubble with a dark yellowish-brown silty clay matrix between the chunks of brick. A piece of corrugated steel

roofing was encountered in this stratum at 215.74 m (123 cmbs). At 215.13-214.96 m (184-201 cmbs), there was a stratum of charred wood and coal. A hard-packed dark yellowish-brown sandy clay floor was uncovered at 214.96-214.94 m (201-203 cmbs), which overlaid the natural soil, a dark yellowish-brown sandy silt at 214.94-214.87 m (203-210 cmbs). The excavations in this block were stepped back for safety reasons, which showed that the fill layer covered a large area, indicating that the fill stratum covered a large historic depression or subsurface feature.

The stratigraphy likely represents the following series of events: The hard-packed floor represents the working surface of the furnace room (almost all the recovered artifacts came from this layer), and the stratum of charred wood and coal that caps it likely represents the time of the fire in 1897. The rubble fill above this stratum is structural debris from the demolition of the hot floor building, with a layer of earthen fill capping the debris to form a level surface in the working yard of the brick factory. The very upper portion of this layer may contain soils that postdate the factory as well. That the majority of the fill is attributable to the period when the factory was still in operation is supported by the paucity of domestic artifacts recovered from the unit, which appear in much greater numbers in fill deposits that postdate the factory elsewhere in Area 1. Artifacts recovered from this block include a brick sample from Feature 64, a piece of sheet metal, and various small metal fragments (Table 5.13).

Table 5.13. Block M Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
095.1	--	--	--	Bottle	Domestic - Food storage	Transparent - Colorless	--	Fragment	1
095.2	--	--	--	Bowl	Domestic – Food service	Earthenware - Undecorated	Ironstone	Rim	1
095.3	--	--	--	Crock	Domestic – Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Fragment	2
095.4	--	--	--	Wire	Activities - Miscellaneous hardware	Copper	Wire-drawn	Fragment	1
095.5	--	--	--	Unidentified object-discarded	Miscellaneous - Unspecified type	Unspecified	--	Fragment	1
095.6	--	--	--	Unidentified object-discarded	Miscellaneous - Unspecified type	Unspecified	--	Fragment	12
096.1	--	--	1 & 2	Unspecified form-discarded	Architecture – Hardware	Iron/steel	Unspecified manufacture	Fragment	1
096.2	--	--	1 & 2	Unspecified form-discarded	Architecture – Hardware	Unspecified	Unspecified manufacture	Fragment	3
097.1	--	--	base	Pipe	Utilities – Unspecified	Iron/steel	Unspecified manufacture	Fragment	1
114.1	--	64	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
								Total	**24**

Block N

Block N began as a 1-x-2-m excavation with two 1-m^2 units numbered 40 and 41. At the request of the principal investigator, the archaeologist excavated two more 1-m^2 units, 42 and 45, which extended the block to the south to become a 1-x-4-m excavation (Figure 5.84). The south corner of the block was located at grid coordinates N325.37 E123.48, at an elevation of 216.77 m. The field director positioned the block to locate a projected corner of the pre-1898 drying floor structure and to help explain the function of a trench feature present in Block K to the north. Five features were uncovered in this block (Features 9, 26, 40, 79 and 80).

A north-south section of a brick wall was encountered in the eastern portions of Units 42 and 45, in the southern half of the block (Feature 26). Demolition activity had heavily damaged this wall, which was no more than six courses tall. The wall was encountered at 50 cmbs, where it rested on top of thermally altered soils that extended to the bottom of the unit, to 160 cmbs (Figure 5.85). This wall ended in Unit 41 at a point where the stratigraphy indicated that another wall had been totally demolished (Figure 5.86). This demolished wall once extended to the east from the end of the relatively intact wall (Feature 79). This feature began at the same level below ground surface as the partially intact wall. The former presence of this wall was indicated by a 75-cm-thick section of brick rubble. This layer of rubble was capped with sand and extended all the way to the base of excavations, where it ended at a limestone foundation that corresponded to the western edge of the partially intact wall. This remaining rubble layer appeared to have been the base foundation for the missing wall. These features were determined to be the western foundation (Feature 26) and northern foundation (Feature 79) of the steam heated dry floor.

On the northern side of Feature 79 was a builder's trench within a layer of finely stratified alluvial deposits, which began at about 50 cmbs and continued to a coal lens at 125 cmbs. The coal lens occurred directly above the natural soils. Next to the partially demolished wall was what appeared to be the same trench feature in Block K (Feature 80). Excavation uncovered a section of narrow brick coursing 6.5 cm deep and a maximum of 50 cm wide. Under this coursing was a limestone foundation. This was identified as the eastern foundation of the north coal/gas hot floors. At the southern end of the unit, a portion of the brick foundation for the steam tunnel's chimney base was uncovered (Feature 40), which appeared to rest on the brick coursing of Feature 80. A small portion of the flue system, Feature 9, was also encountered in the west wall of the block.

The only artifacts recovered from this block are related to the post-factory domestic use of the general site area and were recovered from the fill stratum capping the brickworks' features (Table 5.14). One datable artifact was recovered, a clear colorless machine molded bottle base (cat. # 98.2). This base bears a maker's mark from the Hazel-Atlas Glass Company that dates to 1920-1964 (Toulouse 1971:239).

Table 5.14. Block N Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
098.1	--	--	--	Jug	Domestic - Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Fragment	26
098.2	--	--	--	Bottle	Domestic - Food storage	Transparent - Colorless	Machine-made	Base	1
098.3	--	--	--	Plate	Domestic - Food service	Earthenware - Undecorated	Whiteware	Rim	1
098.4	--	--	--	Window glass	Architecture - Construction material	Flat - Colorless	Melted	Fragment	1
098.5	--	--	--	Cup	Domestic - Food service	Porcelain - Enameled	Soft paste	Fragment	12
								Total	**41**

Block O

Block O measured 1 m x 2 m, and was divided into two 1-m^2 units numbered 43 and 44. The south corner of the block was located at grid coordinates N323.31 E135.58, at an elevation of 216.86 m. The field director positioned the block to examine the easternmost wall of the drying floor complex, as uncovered in Trench 10 (Feature 53). This excavation uncovered more of Feature 9 (the brick flue system) as well as Feature 53 (Figure 5.87). Demolition activity has impacted this wall, which was not intact all the way across. The brick wall rose from a limestone foundation, and was first encountered at an elevation of 216.82 m (Figure 5.88). Smaller stone blocks were laid at the top of the foundation to the level of the natural soils in the unit, while larger stones were placed in the bottom of the builder's trench for this wall. A stone floor was also found underneath the flue system. The flooring was only 30 cm (12 in) thick and began at 70 cm (2.3 ft) below surface. The flues began at 50 cm (1.6 feet) below surface.

The stratigraphy of this block was interesting (Figure 5.89). What was assumed at first to be natural soils east of the wall were in fact determined to be a redeposited fill. Natural soils were not encountered in the block until approximately 100 cm (3.2 ft) below surface, where the builder's trench for the stone foundation cut into this stratum. Interestingly, the dividing line between fill and natural soils corresponds with the point where the stone foundation changed from the small blocks on top to the larger blocks on the bottom. No artifacts were recovered from the excavated soils.

Mechanically Excavated Blocks

A total of eight blocks were plotted on the site to expose areas of interest and then mechanically excavated with a New Holland 550 backhoe equipped with a 102-cm (40 in) toothless bucket (Figures 5.10-5.13). The backhoe operator excavated these blocks until features were discovered, at which point crew members continued the excavation manually. Unlike the manually excavated blocks, the mechanically excavated blocks were not subdivided into 1-m^2 units. Use of a highly skilled backhoe operator ensured that these blocks were excavated expediently and with minimum damage to features. The greatest amount of useful data about the site was recovered from these blocks.

Block L

The Block L excavation measured 2 m x 14 m, and was located in the southeast corner of the site area, outside of the projected building footprint of the hot floor complex, as delineated on the 1894 surveyor's map (Figure 5.90). The southwest corner of the block was located at grid coordinates N286.99 E161.64, at an elevation of 217.12. Excavation began on December 12, 2000, but inclement weather prevented completion until the following field season in 2001. No structural features were uncovered in this block. The only features encountered were Feature 1 (coal stratum) and Feature 114, a modern trench.

The stratigraphy in the east half of the block consisted of a layer of dark reddish brown silt loam topsoil and recent historic fill measuring 25 cm thick at 217.54 to 217.30 m, which overlaid a brown silty clay loam fill layer from the brick-factory period of similar thickness at 217.30 to 217.00 m (Figure 5.91). A relatively thin stratum below the fill at 217.00 – 216.80 m consisted of highly compacted coal (Feature 1). The presence of this coal band beneath Feature 2 (Kiln 6) to the west suggests that Feature 1 dates from the Hugh Bevington Brickworks. The compactness of the soil might be the result of a road or rail spur that is shown on the 1894 map as entering the complex in this area. Natural soils were encountered at about 80 cm below surface.

The stratigraphy in the west half of Block L was radically different, in that a very deep trench feature was encountered at the west extremity of the block (Feature 114) (Figure 5.92). Under the supervision of the COE archaeologist, the feature was excavated to natural soils using a backhoe, which necessitated some disturbance of the natural soils into which the feature had been excavated. The feature extended 2.6 m east from the west wall of the block, and its base was located at approximately 200 cm below surface (Figure 5.93). Bricks were scattered throughout the feature, and at about 150 cm below surface, a plastic soda-pop bottle was encountered, which dated the feature to within the last twenty years. This feature may be related to the previous geomorphology study for the area or the Phase I excavations, or more likely to some undocumented earth-moving activity on the site that was unrelated to the COE data recovery.

Five brick fragments were saved from this unit, but no other artifacts were collected (Table 5.15). One of the brick fragments bore a partial brand and is discussed below in the Interpretation of Findings under the Hugh Bevington Period section. Loose sandstone blocks were present in the feature fill, along with more bricks. Bricks were also present in the fill layers elsewhere in the block.

Table 5.15. Block L Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
094.1	--	--	--	Brick	Architecture - Construction material	Brick – Fire	Soft mud, handmade	Fragment	1
113.1	--	01	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Fragment	4
								Total	**5**

Block P

Block P was an irregularly shaped excavation intended to examine a thick stratum of brick rubble uncovered in Trench 2. The block was originally planned to expose an area of 30 m^2, but the proximity of the fence surrounding Area 1, and the need to step back the sides of the block for safety reasons, resulted in a smaller exposed area. The southernmost extent of the block was at N262.00 E149.00, at an elevation of 217.20 m, which is located on top of the northernmost ash box of Kiln 6 (Feature 2). This point will serve as datum for this discussion. The backhoe excavated to the level of features, at which point the field crew finished the excavation manually. The maximum depth of excavations was at 215.54 m, 166 cm below datum (cmbd). Excavators uncovered ten features, which were identified as elements of the south end of the hot floor building and the northwest corner of Kiln 6 (Feature 2), as well as a possible structural remnant of the Hugh Bevington brickworks (Figures 5.94 -5.95). A section was drawn across the middle of Block P and included Block S to demonstrate relationships between features in both blocks (Figure 5.96).

The kiln had a dry-laid stone foundation set on brick rubble (Features 2 and 118). The top of the foundation was at an elevation of 217.05 m (15 cmbd). A thick stratum of rubble filled all of the space between the two southern kilns (Kilns 6 and 7 [Feature 126]) up to the north end of the block. A partial brick floor was uncovered abutting Kiln 6 (Feature 117), at an elevation of 216.91 (29 cmbd). Beneath the rubble in the north part of the block was the furnace room for the south coal/gas hot floor, containing elements of two of the furnaces for this section of the complex (Feature 81). The top of the arch support wall was encountered at approximately 216.58 m (62 cm) below surface, and the tops of the furnace entry bases was found at 216.18 m (102 cmbd) (Figure 5.92). These furnaces were not well preserved, but enough remained to determine that they had arched vaults that sloped upward to the north wall of the block.

The interiors of where the vaults would have been located were filled with cinder and ash. Several examples of hearth bottoms were encountered but not collected. These hearth bottoms consisted of solid blocks of cinder that formed on the bottom of the furnace. The ash and cinder was removed from the east furnace, which revealed a thermally altered floor. Each furnace had a narrow access measuring 80 cm x 40 cm (2 ft 7 in x 1 ft 4 in), wide enough for one worker to shovel coal into the furnace and to rake out cinders. Parts of the gas pipe that supplied the east furnace were still in situ although not connected to any external gas-supply piping.

The remains of a charred, severely decomposed structural timber was found in the fill just above the working floor of the furnace room (Feature 111). This timber was approximately 2 m (6 ft 7 in) x 30 cm (12 in) wide, but because of its poor state of preservation, exact measurements could not be made. The feature could not be removed without crumbling into small pieces of charcoal, so the feature was photographed and removed (Figure 5.97).

The southern wall of the hot floor building (Feature 64) was uncovered in this block at an elevation of 217.17 m (3 cmbd). On the southern, exterior side of the wall, excavation uncovered a ceramic drain pipe (Feature 63) at 216.95 m (25 cmbd), and a gas line (Feature 62) at 216.84 m (36 cmbd). Both of these features were also present in Block M and Trench 7. A brick wall and brick pillars (Feature 120) supported the drainpipe, which had an

opening covered by a metal grating that was first noted in Trench 2 and assigned feature number 72 before it was known to be a part of Feature 63. The pillars, which were an integral part of the wall fabric, were first encountered at an elevation of 216.42 m (78 cmbd). These wall elements were set on a brick floor (Feature 121) (Figure 5.98).

This floor was composed of approximately 50 percent handmade red bricks and 50 percent large firebricks. (Brick samples from this feature are discussed in detail below in the section, "Interpretation of Findings.") The floor covered approximately 3 m^2 in the excavation, at an elevation of 215.98 m (122 cmbd). The stone foundation for the kilns was set on top of a layer of brick rubble that was 60 cm (23.6 in) thick over this floor, suggesting that it may have been an element of the earlier brickworks on the site, operated in the 1870s by Hugh Bevington. This floor was partially dismantled to see if there were additional features beneath it, which revealed a possible prehistoric feature below the brick floor at an elevation of 215.50 m (170 cmbd) (Feature 131). This feature was a blackened patch of soil ringed by thermally altered soils in the natural subsoil (Figure 5.99). Terms of the contract precluded the excavation of prehistoric soils and features, so the feature was not excavated, although it appeared to be a small hearth. One chert flake was recovered from the soil just above the feature.

Artifacts from this block were mainly architectural debris, with some domestic refuse (Table 5.16). Two datable artifacts were recovered, a bottle and a gun cartridge. The bottle (cat. # 99.1) is a clear, colorless bottle made by a semi-automatic bottling machine. The bottle is 188 mm (4 ½ in) tall with a body dimension of 68.2 mm (2 ¾ in) and a capacity of 236.6 ml (8 oz). The front of the bottle is embossed with the legend "CHARLES GULDEN/NEW YORK/PREPARED MUSTARD/NONE GENUINE WITHOUT OUR LABEL" and the base is embossed "2 & 4". Charles Gulden first appeared as a mustard company in 1875, and the company still exists. The bottle itself dates from 1880-1913, based on its manufacture. No specific information on the bottle mark could be found. The cartridge (cat. # 100.1) is a centerfire .38 caliber marked on the base with "PETERS 38 S & W" which has a *terminus post quem* of 1896 (Found on the World Wide Web November 17, 2003, at http://members.shaw.ca/curtito/wraco.htm).

Table 5.16. Block P Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
099.1	--	--	--	Jar	Domestic – Food storage	Transparent - Colorless	Semi-automatic machine-made	Complete	1
099.3	--	--	--	Bottle	Domestic – Food storage	Transparent - Colorless	Finishing tool	Finish	1
099.5	--	--	--	Brick	Architecture - Construction material	Brick	Soft mud, machine-made	Complete	1
099.6	--	--	--	Pipe	Activities – Industry	Iron/steel	Unspecified manurfacture	Fragment	2
099.7	--	--	--	Grate	Architecture - Hardware	Iron/steel	Cast	Fragment	2
099.8	--	--	--	Brick	Architecture - Construction material	Brick	Soft mud, handmade	Complete	2
099.9	--	--	--	Brick	Architecture - Construction material	Brick – Fire	Soft mud, machine-made	Fragment	9
099.10	--	--	--	Cartridge	Arms – Ammunition	Unspecified	Cast	Unknown length	1
100.1	--	--	Fill	Cartridge	Arms – Ammunition	Brass Centerfire	Cast	.38 caliber	1
								Total	**20**

Block Q

Block Q was an excavated rectangular block measuring 4 m x 7 m placed in the center of the site to investigate features first examined in Block E (Figure 5.100). These features included an iron pipe (Feature 39); parts of the flue system (Feature 9); and a brick wall (Feature 69). The southwest corner of the block was located at grid coordinates N300 E136, at an elevation of 216.82 m. Archaeologists documented a remnant of a single-course brick floor or pad (Feature 94) in 2000 that corresponded with the location of the block (Figure 5.101). This feature was located on the surface of the block over the space between features 69 and 29 in the eastern part of the excavated block. The wall observed in Block E (Feature 69) was visible in this unit, as was a shorter wall, the corner of which projected into the unit (Feature 29). Feature 69 seemed to have been purposefully demolished, starting at a point 4 m (13 ft) from the east wall of the block, at grid coordinates N301.5 E 139.6. The foundation of the wall continued for 1.8 m (5.9 ft) beyond the terminus of the wall to grid coordinates N300.4 E137.8.

At this point in the block, there was a common boundary of demolition for all features. The block had a wide trench present with a base elevation of 216.46 m, which was 34 cm (1 ft) below the level of the flue floor (elevation of 216.95 m), and contained demolition debris. This excavated region extended east from the west wall of the block and was 20 cm wide on the north wall and 200 cm wide on the south wall (Figure 5.102). It was later calculated that this was likely related to the subfloor piping chamber for the post-1898 steam drier tunnel. Most of the artifacts recovered from this part of the block were related to the twentieth-century domestic occupation of the area. The few factory-related artifacts observed included heavily vitrified bricks and sections of iron piping.

Feature 29 was a low brick wall that emerged from the south wall of the block at grid coordinates N300 E141.6 (or 1.36 m west of the southeast corner of the block) and was first encountered at an elevation of 217.13 m, about 10 cmbs (Figure 5.103). The wall extended 60 cm northeast from the south wall of the block before making a ninety-degree turn to the

northwest, then extending another 150 cm (5 ft), at which point the wall showed signs of severe structural damage, relating to the excavation of a builders trench for Feature 69. The base of the wall extended another 80 cm and joined Feature 69 at its foundation, at grid coordinates N302 E140.8.

Feature 69 (the southern wall foundation of the steam-heated hot floor) was first encountered in the block at an elevation of 217.42 m (12 cmbs). The wall had an elevation of 216.87 m at its point of complete demolition. A builder's trench for this feature was present south of the wall and contained 10YR 3/4 dark yellowish-brown silt loam with rubble. The builder's trench was initially assigned feature number 113 but this was later concatenated into Feature 69. The trench cut through a crushed brick floor on the south side of Feature 69. The significance of this is discussed below.

The edge of the flue system observed in Block E to the east (Feature 9) was uncovered in the north wall of the block. This portion of the system was more heavily damaged than in Block E. The feature extended 4.6 m west into the unit from the east wall, and its southernmost point terminated at grid coordinates N301.6 E137.3, at an elevation of 216.97 m. Seventeen firebrick flues were uncovered. This feature lay on a prepared surface of hard-packed, thermally altered dark red clay loam. One section of this flue system, labeled in the field as Feature 112, was very heavily vitrified (Figure 5.104). The flues were very likely accidentally vitrified when a nearby steam pipe became uncapped and released what was probably a torrent of hot steam into the two flues. Firebricks then either fell into the gap between the flues or were purposefully placed to block the steam.

The rest of the iron pipe observed in Block E (Feature 39) was encountered in the space between the flues and Feature 69, at an elevation of 217.00 m. As present in the block, the pipe was 5.8 m (19 ft) long and 20 cm (7 7/8 in) in diameter. This pipe had two smaller pipes connected to it that extended north, measuring 60 cm (1 ft 11 ½ in) in length and 5 cm (2 in) in diameter. These two extensions continued to two separate pipes that paralleled the flue system, one pipe measuring 110 cm (1 ft 3 in) long and the other pipe 210 cm (6 ft 10 in), (Figure 5.105). Each extension had a twist-valve control in the middle. Cleaning the pipes revealed that each of the small pipes parallel to the flues had a small hole present facing the opening in the flues (Figure 5.106). This hole identified the pipes as steam pipes, which meant that the hot floor in this section of the complex was heated with steam and not coal and/or gas, as were the rest of the floor sections excavated on the site. The steam pipe adjacent to the vitrified section of flues was not capped on the end, which corresponded with the location of the vitrified flues.

Also in the space between the wall and vents was a broken element of a belt drive shaft (labeled in the field as Feature 102), possibly a component of one of the brick presses (Figure 5.107). This was a massive cast-iron artifact that retained a mostly intact belt wheel on a piece of shaft. The wheel originally had six spokes and measured 30 cm (11 7/8 in) wide and 60 cm (23.6 in) in diameter. The drive shaft element was 130 cm (4 ft 4 in) long and 10 cm (4 in) in diameter. A ceramic water pipe (Feature 103) measuring 20 cm (7 7/8 in) in diameter was also uncovered in the block. The pipe emerged from under the flues and extended 2 m west to the point of historic demolition in the block, where it had been smashed. Broken pieces of this pipe were located at the base of the historic trench.

Soils in this block consisted of a mix of different fill events. The east profile presented the best record of these events, with ten different strata representing five sequences of events at the site distinguishable above the natural subsoil. A stratum that consisted of finely crushed dark red brick fragments was present in two places in the southeastern portion of the block. The first occurrence of this stratum was under Feature 94, the brick flooring at the surface of the southeast corner of the block, and labeled Feature 99 (stratum I). The boundaries of this stratum roughly corresponded with the locations of Features 29 and 69 in the block. This stratum was 36 cm (1 ft 2 in) thick at most as it occurred in the east profile (Figure 5.108).

The second occurrence was at 66 cm (1 ft 2 in) below the surface in the block, at a maximum elevation of 217.18 m. This soil (stratum VIII) was confined to the area south of Feature 69, and ranged from 2 cm (7/8 in) to 10 cm (4 in) in thickness. This type of crushed brick stratum was observed elsewhere during excavations at the Harmony Brickworks and seems to have sometimes been used as flooring. Between these two soil strata was a zone of rubble-laden silt loam fill, ranging from 40 cm to 60 cm (1 ft 4 in to 2 ft) in thickness. There were three distinguishable types of fill in this zone: a dark yellowish-brown silt loam that occurred as two distinct lenses, one directly under Feature 99 (stratum II), and one (stratum VI) enclosed within the main fill stratum (stratum V). A lens of strong brown silt loam was present under stratum II but above Feature 69.

The bulk of the fill was a rubble-rich dark yellowish-brown silt loam that ranged from 30 cm to 40 cm (11 7/8 in to 1 ft 4 in) in thickness (stratum V). This layer was present at approximately 30 cm (11 7/8 in) below surface throughout the southern half of the block (south of Feature 69) at a maximum elevation of 217.45 m, and covered the second crushed brick floor (stratum VIII). As mentioned above, the builder's trench (stratum VII) for Feature 69 was the same type of fill as stratum V and cut through the second crushed brick floor and its underlying strata. The first stratum underneath this floor was a black silt loam 10 cm (4 in) thick (stratum IX), which capped a stratum of very dark brown fine clay (stratum X). The excavation halted upon encountering the undisturbed soils, a dark yellowish-brown silt. Soils north of Feature 69 consisted of a fill episode of redeposited thermally altered soils capping the features located there (stratum III).

The builder's trench for Feature 69 is key for interpreting the stratigraphy and construction sequence for the features in this block, as no temporally diagnostic artifacts were found below the first few centimeters of the block. First, as Feature 69 is a structural element of the steam-heated dry floor, it can be then assumed that all the soil that the trench disturbed predates the construction of this part of the brick factory. The second crushed brick soil is likely associated with Feature 29. This soil was present on both sides of the feature, which was constructed through strata IX and X to the subsoil. Therefore, the following sequence for Block Q is proposed:

1. Feature 29 is the earliest construction in the block, with soil strata XIII-X deposited shortly afterwards. This feature and soil strata represents the first sequence of events, and likely occurred when the hot floor complex was constructed in 1889-1890.

2. The second sequence of events is the construction of the steam-heated dry floor, and includes the excavation of the builder's trench for Feature 69 and the construction of

features 9, 39, and 69. The date of construction for this element of the hot floor complex is not known, but as it is shown on the 1894 surveyor's map, it must have been built prior to that year. Therefore, this sequence of events also must have occurred prior to then.

3. The third sequence of events is the deposition of strata V-VII, which likely occurred immediately after the construction of the steam-heated dry floor.

4. The fourth sequence is connected to the demolition of the hot floor complex after the fire of 1897, and includes the deposition of stratum III-IV and Feature 102 at roughly the same time.

5. The fifth sequence involves the construction of the steam drier tunnel in 1897 after demolition of the old complex, and includes the excavation of the trench in the west part of Block Q, the deposition of strata II and I, and the construction of Feature 94 when the new steam drier tunnel was built.

Artifacts collected from this block included some twentieth century domestic waste in a secondary context due to the past use of the area as a dump by the Brickworks; and elements of Feature 39 (Table 5.17). No tightly datable artifacts were recovered.

Table 5.17. Block Q Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
101.1	--	--	--	Jug	Domestic - Food storage	Earthenware – Brown salt-glazed	Coarse earthenware	Rim	1
101.2	--	--	--	Lid	Domestic - Miscellaneous	Stoneware - Painted, overglazed monochrome	White paste stoneware	Rim	1
101.3	--	39	--	Pipe	Activities - Industry	Iron/steel	Unspecified manufacture	Fragment	2
								Total	**4**

Block R

Block R was a 25-m^2 excavation positioned against the fence line in the north end of Area 1, where Block F had previously identified subsurface furnace elements (Figure 5.109). The southwest corner of the block was located at N332.00 E190.00, at an approximate elevation of 217.40 m (taken from nearest recorded elevation point). The maximum depth of the block was 115 cmbs, although the depth across the excavation averaged about 20 cmbs. The soil matrix was a homogenous fill deposit of very dark brown silt loam that contained several artifacts of domestic refuse from the early twentieth century. While not directly related to the operation of the brick factory, a sample of these artifacts was collected according to instructions from the COE archaeologist. Collected samples included decorated and undecorated ironstone ceramics, several intact bottles, and children's toys.

This block revealed a section of Feature 9 (the flue system), one mostly intact furnace and one partially intact furnace (both with vaulted roofs), and one furnace demolished to just

above its base (Feature 76). This partially destroyed furnace allowed excavators to observe the exterior and interior of a furnace (Figure 5.110). Evidence was uncovered for a total of at least five furnaces in this location during the Phase III investigations (see also Block F). A demolition event was noted in the northwest corner that seemed to represent a trench excavated through the westernmost furnace, only notable as a partial arch in the north wall of the block, extended to the west from the west side of the mostly intact furnace. These furnaces appeared to be similar in construction to the furnaces uncovered in Block P and were coal- and gas-fired as well.

The furnaces roughly conformed to dimensions of an interior width of 140 cm (4.6 ft), an interior length of 120 cm (3.9 ft), and an interior height of about 60 cm (2 ft). The entry into the demolished furnace was 80 cm (2.6 ft) long by 50 cm (1.6 ft) wide on the interior. The roofs of the vaulted furnaces were constructed of firebrick, while the bases were normal brick. A section of flues uncovered in this block (Feature 9) began at the openings of the furnaces and extended south, outside of the block. As elsewhere, the flues were set on hard-packed thermally altered silt loam. The section of the flues closest to the furnace mouths was firebrick, while the rest was constructed of normal brick (Figure 5.111). The length of the firebrick sections varying, from 60 cm (2 ft) to 160 cm (5.2 ft).

The archaeologists decided to cross-section one of the more intact furnaces to examine the interior, and discovered a smaller arch that extended through the back wall of the furnaces (Figure 5.112). This small arch corresponded to the small entry into the main chamber of the furnace, as observed for the demolished furnace (Figure 5.113). This arch had an interior height of 55 cm (1.8 ft) and an interior width of 50 cm (1.6 ft). The soil matrix inside the furnaces was a layer of intrusive silt loam containing twentieth-century artifacts over a thin layer of slag and cinder. The floors of the furnaces consisted of highly compact crushed brick. The rears of the furnaces were closed by a brick wall 60 cm (2 ft) thick, which the small, arched opening penetrated to provide access to the main furnace chamber. The furnaces were apparently covered with a thin layer of crushed brick after they were constructed, probably to insulate them against heat loss.

Immediately north of these furnaces and outside the project area, the ground sloped steeply downward. Since there would be little room to maneuver behind the furnaces because of the slope, it is possible that some sort of charging deck was constructed in this location.

Artifacts collected from Block R were similar to the assemblage for Block F, as both blocks excavated the same fill deposits (Table 5.18). The Block R assemblage included five intact bottles among the rest of the domestic refuse recovered. Only two identical bottles could be tightly dated, and both were clear aqua condiment bottles (cat. # 102.12), made with a two-piece mold with separate base part and a finishing tool. The base of each bottle was marked with an embossed “C”, which is associated with the Cunninghams & Co. glass manufacturing concern of Pittsburgh and dates to 1879-1909 (Toulouse 1971:99). Each bottle is 181 mm (7 1/8 in) tall, with a body dimension of 52.2 mm (2 1/8 in) and a capacity of 236.6 ml (8 oz). The other bottles include:

- An unembossed clear colorless bottle with a “Philadelphia Oval”-style body, made with a two-piece vertical body mold and cup bottom, dating from ca. 1850-1920 (cat. # 102.9), measuring 160 mm (6 ½ in) tall with a body dimension of 71.6 mm (2 7/8 in) and a capacity of 236.6 ml (8 oz)

- A clear colorless bottle with continuous thread closure made with a two-piece mold with separate base part dating from ca. 1850-1920 (cat. # 102.14), measuring 266.7 mm (10 ½ in) tall with a body dimension of 63.1 mm (2 ½ in) and a capacity of 335 ml (12 oz)

- A clear colorless condiment bottle with a continuous thread closure and a machine molded hexagonal body (cat. #102.13), measuring 203.2 mm (8 in) tall with a body dimension of 55.2 mm (2 ¼ in) and a capacity of 236.6 ml (8 oz). The base of this bottle bears a valve mark and is embossed with “CRUIKSHANK BROS & CO/ALLEGHENY PA” and may be associated with the cap (cat. #151.2) recovered in Block F, previously noted in the Block F discussion section. The Cruikshank Bros. Company was likely a small local firm, but no information could be found on its operation.

Two ceramic sherds with makers’ marks were also recovered from Block R. One was a whiteware base sherd with a partial maker’s mark of a shield with the lower half of an animal and the legend “/-P. CO./-POOL.” (cat. # 102.3). This mark was used by the D. E. McNichol Pottery Company of East Liverpool, Ohio, ca.1900 (Gates and Ormond 1982:186). The other sherd was an ironstone plate base sherd with an East Liverpool Pottery Company mark dated to 1896-1901 (Gates and Ormond 1982:43).

One other interesting artifact was recovered: a brass coal company check tag (cat. # 103.1). The tag is stamped “A C CO/215”, which does not match with the only coal company documented as a supplier for the Harmony Brickworks, the Stanford Coal Company. Possible matches for this tag for Allegheny County include Acme Coal and Coke Co.; Allegheny Coal Co.; Allequippa Coal Co. (operated ca. 1878- ?), and the American Coke Co. Check tags were used in mining operations where the miners were paid by the carload of mineral. Each miner was assigned a number, which was stamped onto a set of tags. A tag was put into a coal car after it was filled and later retrieved by the coal pickers. The number of tags was used to identify the number of carloads for the miner and hence his pay. Sometimes, the coal tags were not retrieved and mistakenly were sent with the load of coal out to the clients of the coal company, which is likely how this artifact ended up at this site.

Table 5.18. Block R Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
102.1	--	--	Fill	Toy	Personal - Miscellaneous	Lead	Cast	Complete	1
102.2	--	--	Fill	Toy	Personal - Miscellaneous	Ferrous alloy – Blue	Enameled	Complete	1
102.3	--	--	Fill	Plate	Domestic – Food service	Earthenware – Undecorated	Ironstone	Base	1
102.4	--	--	Fill	Plate	Domestic – Food service	Earthenware – Undecorated	Ironstone	Fragment	3
102.5	--	--	Fill	Saucer	Domestic – Food service	Earthenware - Painted, underglazed polychrome	Ironstone	Rim	2
102.6	--	--	Fill	Crock	Domestic – Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Body	5
102.7	--	--	Fill	Plate	Domestic – Food service	Earthenware – Undecorated	Ironstone	Base	3
102.8	--	--	Fill	Lid	Domestic – Food storage	Stoneware – Bristol glazed	Domestic buff stoneware	Rim	1
102.9	--	--	Fill	Bottle	Domestic – Food storage	Transparent – Colorless	2, 3, or 4-piece vertical body	Complete	1
102.9	--	--	Fill	Unspecified form	Domestic - Miscellaneous	Transparent – Colorless	Unspecified manufacture	Fragment	1
102.10	--	--	Fill	Light globe	Furnishings - Miscellaneous	Opaque – White, opaque	Pattern mold	Rim	1
102.11	--	--	Fill	Vase	Domestic - Miscellaneous	Transparent – Colorless	Unspecified manufacture	Base	1
102.12	--	--	Fill	Bottle	Domestic – Food storage	Transparent – Aqua	2-piece mold	Complete	2
102.13	--	--	Fill	Shoe	Clothing – Apparel	Faunal	Leather	Fragment	1
102.14	--	--	Fill	Bottle	Domestic – Food storage	Transparent – Colorless	2-piece mold	Fragment	8
103.1	--	--	Fill	Tag	Activities – Industry	Brass	Stamped	Complete	1
103.2	--	--	Fill	Pipe	Utilities – Unspecified	Iron/steel	Unspecified manufacture	Fragment	3
103.3	--	--	Fill	Cap	Utilities – Unspecified	Iron/steel – Threaded	Cast	Complete	1
								Total	**37**

Block S

Block S was a 30-m^2 excavation located just south of Block P in order to expose more of Kiln 6 (Feature 2) for examination. The block's southwest corner was located at N 258.00 E147.00, at an approximate elevation of 217.30 m (taken from the nearest uncorrupted data point). The maximum depth of Block S was 100 cm. This block uncovered elements of the kiln's furnaces (including two ash boxes) and part of the interior of the kiln (Figure 5.114). An additional ash box from this kiln was uncovered during the safety step-back excavation for Block P. The features uncovered in Blocks C and I, and Trenches 7 and 16 were also components of this kiln.

While somewhat similar in construction to the main bank of kilns examined in February 2000, the state of preservation differed in that this kiln had been dismantled to the level of the ash boxes for the furnaces and to the top of the stone foundation for the main kiln wall. No remnants of the kiln walls were intact (Figure 5.115). Furthermore, this kiln did not have a

solid brick floor, but only a hard-packed crushed-brick surface, measuring 24 cm (9.4 in) thick.

The stratigraphy below the crushed-brick kiln floor was capped by a 8 cm layer of very dark grayish-brown silt, and was superposed on a 6-cm layer of baked strong brown clay (Figure 5.116). Beneath this stratum was Feature 1, a solid layer of coal, 12 cm thick (Figure 5.117), which overlay a 15-cm layer of mixed coal and very dark gray clay. The natural soils occurred below this stratum but exhibited evidence of thermal alteration to a depth of 20 cm below the mixed coal/clay stratum.

West of the kiln, the soil profile in the block exhibited both similarities and differences to the profile taken from within the kiln (Figure 5.118). The profile differed in that the top stratum consisted of mainly brick rubble with silt and some domestic refuse, and was 46 cm thick. A very thin (3 cm) layer of dark yellowish-brown silt alluvium was recorded beneath the rubble, which capped a layer of coal 6 cm thick (Feature 1). The coal stratum overlaid a band of dark brown clay mixed with coal, which in turn was superposed on the natural subsoil, which is similar to the profile taken within the kiln.

The ash boxes for Kiln 6 were built to a standard dimension. Each ash box had an interior length of 140 cm (4.6 ft), an interior width of 90 cm (3 ft), and was set to a depth of 45 cm (1.5 ft) from the top of the brick foundation. The ash box entries were each 50 cm by 40 cm (1.6 ft by 1.3 ft) and 45 cm (1.5 ft) deep, and the ash-box interiors were spaced 120 cm (3.9 ft) from each other. The stone foundation for the main kiln wall was 160 cm (5.2 ft) thick and 85 cm (2.8 ft) tall from the base of excavations. Closer observation of the ash boxes revealed different construction techniques, as two of the three boxes uncovered for this kiln had brick floors with offset coursing. The offset coursing was present in the north and middle boxes, while the floor of the south box consisted of bricks laid side by side. They may represent the work of two different laborers. None of the brick ash-box floors observed were mortared in place.

The kiln was probably re-used for a different purpose after its demolition, as the remains of a wooden post were encountered in a posthole excavated into the southernmost furnace ash box (Figure 5.119). This particular ash box was sectioned to examine its construction (Figure 5.120), which revealed that the brick floor was set on a 5 cm layer of dark reddish brown sand, capping a 5 cm thick layer of dark yellowish-brown clay. This layer in turn capped another 5-cm layer of very dark gray clay, which overlaid the natural subsoil (a dark yellowish brown silt loam). The sides of the box were solid brick construction, and not a brick shell over a soil layer (Figure 5.121). The front of the box was set on a dry-laid stone foundation measuring 45 cm (1.5 ft) thick and 58 cm (1.9 ft) wide that did not extend all the way under the fireboxes. The backs of the fireboxes were not set against the stone kiln foundation, but instead there was an air space between the foundation and ash box that measured 132 cm (4.3 ft) long, 40 cm (1.3 ft) wide, and 60 cm (2 ft) deep. This space was only present where the ash boxes were located. Between the air spaces, the brick foundation was built up to the stone foundation. The interiors of the ash boxes contained numerous fragments of arch brick and firebrick, and the northernmost box (exposed in the Block P step-back excavation) contained a layer of ash and cinder, which was not present in the other fireboxes.

Evidence for a deeper excavation was found in the northwest corner of the block, which may be from the excavation of Trench 6-1 during the geomorphological survey of the area; evidence indicates use of a machine with a toothed bucket (Vento, et al. 2000). Damage to part of the brick furnace foundation, which was otherwise in excellent condition, is thought to relate to this trench.

Few artifacts were recovered from the soil fill (Table 5.19), although fragments of a smashed bottle were recovered from the crushed-brick kiln floor, at about 5 cm (2 in) below the top of the floor (cat. # 104.1). The bottle was partially reconstructed, which revealed that although the entire bottle was not present, enough was left to determine a date range. The bottle was a clear colorless bottle, in a form common to soda bottles of the late nineteenth and early twentieth centuries. The bottle had a "blob" finish that was used in bottles made for the Hutchinson stopper, which was produced from 1880 to 1915. Mold seams were present on either side, but the bottle was too fragmented to determine if the seam ran around the heel of the bottle. The front of the bottle had a raised circular area with the embossed legend "THOMSON & RENGER/ROCHESTER PA". The Beaver County Historical Society was contacted, but no information could be located on this company.

Table 5.19. Block S Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
104.1	--	--	--	Bottle	Domestic - Food storage	Transparent - Colorless	Embossed	Partial	28
104.2	--	--	--	Marble	Personal - Miscellaneous	Opaque – Blue	Molded	Complete	1
104.3	--	--	--	Shoe	Clothing – Apparel	Faunal	Leather	Fragment	1
104.4	--	--	--	Crock	Domestic - Food storage	Stoneware - Albany type slip-glazed	Domestic buff stoneware	Fragment	1
								Total	**31**

Block T

Block T was a trench measuring 6 m x 2 m, including safety step-backs overlapping the southeast half of Block A (Figure 5.122). The south corner was located at grid coordinates N319.94 E120.54, at an elevation of 217.20. The block was placed in order to fully expose Feature 116, the pillars for the stack base of the steam drier tunnel. The backhoe excavated the block to a depth of 215.52 m (167 cmbs). The purpose of this block was to determine the width of the drier tunnel and gather more information about the supports for the chimney stack. The historic photograph of the steam drier tunnel showed that the width of the stack should have been only slightly narrower than the total width of the building, according to Hardlines Design Company historian Roy Hampton (see Figure 4.30, Chapter 4, page 4A-20).

The excavators revealed that the stack had three support pillars, each with an original projected dimension of approximately 90 cm x 72 cm x 72 cm (3 ft x 2 ft 5 in 2 ft 5 in) (Figure 5.123). The height of the pillars here is determined by the height of the middle pillar, which appeared to be nearly intact. All of the pillars exhibited a common bond variation in the brick coursing and were heavily mortared. The tunnel walls were set on small brick

foundations 44 cm (1ft 5 in) wide. The foundations in turn were laid on rubble fill and were spaced back from the pillars to the east and west at a distance of 46 cm (1 ft 6 in). The total interior width of the steam drier tunnel would have measured 6.6 m (21 ft 7 in). Besides the features related to the steam drier tunnel, excavation uncovered the west foundation for the pre-1898 steam-heated hot floor (Feature 80) on the very east end of the block. In addition, part of the flue system from the coal- and gas-fired hot floor (Feature 9) was present 10 cm (4 in) west of the western foundation wall for the steam drier.

The tunnel was constructed on top of a soil sequence of hard-packed, thermally altered soils (Figure 5.124). The first layer consisted of crushed brick, rubble and building debris, presumably from the pre-1898 drying floor building. This stratum was 30-cm deep from the base of the stack pillars. The next stratum was a layer of thermally altered soils that resembled baked clay. These soils contained some elements of fill, namely infrequent brick and mortar debris. This layer was 40 cm thick. An intrusion from the first stratum extended through this layer and protruded into the last stratum, the soil of which was hard-baked and thermally altered but otherwise undisturbed. This stratum was 56 cm thick to the base of excavations, except at the very east end of the trench, where the natural soils sloped up to 90 cmbs. These strata were uniform in color and were dark red thermally altered silty clay noted elsewhere on site. Because of this uniform color and the hard-baked nature of the soils, the natural soils were not recognized at first as thermally altered.

Artifacts noted but not collected from this excavation included sheet metal roofing and what appeared to be a lever or handle from an unidentified piece of machinery.

Block U

The Block U excavation measured 12 m x 3 m, and was placed along the southwestern edge of the fence surrounding the project area (Figure 5.125). The south corner of the block was located at grid coordinates N250.20 E148.45, at an elevation of 217.41 m. The purpose of this block was to find the eastern end of a kiln shown on the 1894 surveyor's map at the south end of the main building, opposite from Kiln 6, uncovered in Block S (Kiln 6). This block was mechanically excavated, and features were cleaned by hand. Soils within the excavation were only excavated enough to expose the kiln and no attempt was made to excavate to the level of undisturbed subsoil.

The archaeologists exposed the full length of the kiln furance found within, and encountered the four ash boxes for the furnaces on the eastern end of this kiln (Feature 126, Kiln 7) (Figure 5.126). The ash boxes were only partially excavated to determine if they were identical to the ash boxes in the kiln opposite, which would in turn indicate that the rest of this kiln was also identical in construction. The ash boxes appeared to be a mirror image of those in Block S, although the southernmost ash box was heavily damaged, and only its north wall and floor survived. The dimensions of the ash boxes and kiln foundation were the same as those described for Kiln 6 in the Block S discussion above, with the exception that as the full length of the kiln's furnace foundation was exposed, it was possible to make a determination of a total length for this set of kilns, which was 9.15 m (30 ft) in length. This excavation also allowed an estimate of the maximum number of ash boxes for these kilns, assuming that they were identical in construction. Kilns 6 and 7 were built with eight furnaces, four furnaces on the eastern and western wall of each kiln.

Artifacts recovered (Table 5.20) included pharmaceutical bottles and a 1916 Liberty head dime (cat. # 105.1) from the fill matrix above and around the kiln feature. The pharmaceutical bottles included one clear colorless machine made bottle, with an embossed "6" on the base (cat. # 106.1). This bottle is 26.7 mm (4 ½ in) tall with a body dimension of 39.7 mm (1 5/8 in), and has a capacity of 29.5 ml (1 oz). The other two bottles are nearly identical pill bottles (cat. # 106.2) that share the same characteristics. The bottles differ only in that one still retains a black Bakelite cap and is embossed on the base with the number "17", while the other bottle is embossed with an "11" on the base. Each is a clear, brown machine-made bottle with a continuous thread closure and with a round horizontal body section with flat sides. The bases bear an Owens machine scar, which dates these bottles to ca. 1911-1920s (Miller and McNichol 2002). Each is 76.2 mm (3 in) tall with a body dimension of 30.3 mm by 31.6 mm (1 3/16 in by 1 ¼ in) and a capacity of 60 ml (2 oz).

Table 5.20 Block U Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
105.1	--	--	--	Dime	Personal – Coins	Silver	Stamped	Complete	1
106.1	--	--	--	Bottle	Personal – Medicine	Transparent - Colorless	Machine-made	Complete	1
106.2	--	--	--	Bottle	Personal – Medicine	Transparent – Brown	Machine-made	Complete	2
								Total	**4**

Block V

Block V was the largest block excavated by HDC in Area 1. The block was an irregularly shaped polygon measuring 24 m on the east side, 15 m on the north, 30 m on the west, and 15 m on the south (Figures 5.127, 5.128). The southwest corner of the block was located at N299.69 E155.63, at an elevation of 217.48 m. The maximum depth of Block V was 200 cmbs, reached during the excavation of Feature 6, although depths attained elsewhere throughout the block were much shallower and in the general range of 20 cm to 40 cmbs. The block was positioned to examine a cylindrical brick shaft over which another brick feature had been constructed (Features 6 and 24, first exposed in Block B), as well as an area north of this feature where the principal investigator noted several iron rods protruding from the ground. Excavation determined that these rods, which were set into three heavily mortared brick pads, were anchor bolts for a steam engine and/or boiler (Features 127-129) (Figure 5.129). Although incompletely excavated, it was clear that the wheel of the steam engine would have been placed in the approximately 1-m (3-ft-4-in) gap between Features 127 and 128.

The archaeologists uncovered more of the stack base (Feature 24), as well as some brick flooring and a portion of Feature 55 (the southeast brick wall foundation of the northern auxiliary wing for the hot floor complex) (Figure 5.130). The stack base seemed to be modular, with four separate chambers. The two chambers built over Feature 6 were 1.5 m x 1.1 m (5 ft x 3 ft 7 in) wide, while the one fully exposed chamber to the northeast of Feature 6 measured 1.48 m x 1.48 m (4 ft 10 in x 4 ft 10 in). The stack base as excavated measured 5.3 m x 4 m (17 ft 4 in x 13 ft) and was reinforced with an iron tie rod 5.05 m (16 ft 5 in) in length.

The stack base was partially dismantled to remove the soil from around the cylindrical brick feature (Feature 6). Removal of this soil revealed that the brick base of the stack was set on metal sheets, possibly to keep the bricks level while they were being set (Figure 5.131). While stepping back the area around the feature, four gas lines were discovered at a depth of approximately 50 cm (1.6 ft) below the base of Feature 24 (Figure 5.132). The feature was only excavated to a depth of 200 cmbs (Figure 5.133), since deeper excavation was not authorized by a contract modification issued on April 1, 2001 (Appendix D). The feature was excavated in ten levels by removing two courses of brick at a time to reveal the feature fill. This allowed for excavation in controlled levels of 13 cm. Due to time constraints, the feature was sectioned only to leave a profile, and not excavated completely.

The interior diameter of Feature 6 was 128 cm (4 ft 2 in). Before excavation of the feature commenced, it was noted that entire bricks were missing from courses in several locations on the feature (Figure 5.134). Three bricks were absent in the third course from the top, and at least one was missing from the twentieth course. The bricks were also set in such a way that there were small gaps between the edges of bricks in some of the courses lower down on the feature. Based on this evidence, the feature did not seem capable of retaining water without it dispersing into the outside soil. The ten courses at the top of the feature were also more heavily mortared than the lower courses, which were weakly bonded. The boundary between the heavily mortared and weakly mortared courses correspond with the base of an apparent builder's trench noted in the soil matrix in the north wall of the step-backed soils around the feature (Figure 5.135).

The feature yielded few artifacts, mostly brick debris, a few nails, some window glass, wood fragments, and coal. Eight stratigraphic layers were observed in the feature's profile (Figures 5.135, 5.136). The first layer, Stratum 1, was of solid brick rubble and mortar approximately 30 cm thick. Stratum 2 was a layer of dark yellowish-brown sandy silt that ranged from 10 cm to 50 cm thick and contained a high number of brick fragments. Stratum 3 was a lens of coal and cinders that ranged from 2 cm to 10 cm thick. Stratum 4 was a layer of dark yellowish-brown sandy silt that was similar to Stratum 2, except for that it also included cinders and coal, and was 2 cm to 10 cm thick. Stratum 5 was a lens of cinder and ash 2 cm to 8 cm thick. Stratum 6, which extended to the base of the excavation from a point approximately 60 cm below the surface of the feature fill, was a layer of dark yellowish-brown clayey silt with inclusions of brick fragments and charred wood. Stratum 7 was a black lens of clayey silt 2 cm to 8 cm thick, and Stratum 8 was an ash lens completely within Stratum 6. A corer was used to test the depths of the feature. Feature fill, very similar to if not the same as Stratum 6, was still present 2 m below the base of the excavation. The corer did not encounter natural soils.

The stratigraphy of the soils outside the feature was also informative, and the stratigraphy to the north of the feature's exterior was also recorded. Stratum 8 is clearly a builder's trench filled with cobbles and small stones. This builder's trench seems related to later repair or stabilization of the feature, since it began at the top of the feature and ended 50 cm below, and corresponded with the heavily mortared coursing on the feature. Stratum 9, into which Stratum 8 had been excavated, was a layer of dark yellowish-brown clayey silt fill with frequent inclusions of brick rubble. This layer was approximately 70 cm thick, and the stack base was set on top of it. Underlying this layer and beginning at the termination of Stratum 8

was Stratum 10, a finely striated layer of brown clay alternated with yellowish-brown sand 15 cm thick, which appeared to be alluvium.

Under this was Stratum 11, an apparently sterile layer of dark yellowish-brown silty sand that resembled the natural soils identified elsewhere in Area 1. Because of the nature of deeply built features such as wells and cisterns, this soil, which appeared natural, might also be redeposited fill from the initial excavation of the feature. The fact that gas lines, along with brick fragments, were found at depths 50 cm below the historic ground surface speaks to a high amount of historic soil disturbance in the surrounding area. Alternatively, the feature could have been excavated as a shaft and lined from the inside, but the nature of the soils and the poorly laid bricks makes this option seem unlikely for safety concerns.

Few artifacts were collected from the excavation of Block V, all of which were recovered from Feature 6 (Table 5.21). As such, they are discussed under the Feature 6 treatment in the section, "Interpretation of Findings- Harmony Brickworks: 1890-1899, Hot Floor Complex and Other Features."

Table 5.21. Block V Artifact Assemblage.

Cat No.	Unit	Fea	Lvl	Name	Group	Material Type	Manufacture	Segment	CT
116.1	--	06	1	Paper	Miscellaneous - Unspecified function	Floral	Paper	Fragment	1
117.1	--	06	2	Nail	Architecture - Hardware	Iron/steel - Common	Wire-drawn	Fragment	1
117.2	--	06	2	Slag	Activities – Industry	Slag	By-product	Fragment	1
118.1	--	06	3	Window glass	Architecture - Construction material	Flat - Colorless	Melted	Fragment	1
119.1	--	06	4	Lumber	Architecture - Construction material	Floral	Wood	Fragment	1
120.1	--	06	5	Slag	Activities – Industry	Slag	By-product	Fragment	1
120.2	--	06	5	Unspecified form	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	1
121.1	--	06	6	Unspecified form	Activities – Industry	Coal	Unmodified natural material	Fragment	2
121.2	--	06	6	Clinker	Activities – Industry	Slag	By-product	Fragment	1
121.3	--	06	6	Window glass	Architecture - Construction material	Flat - Colorless	Unspecified manufacture	Fragment	1
121.4	--	06	6	Nail	Architecture - Hardware	Iron/steel - Common	Cut	Fragment	1
122.1	--	06	7	Mortar	Architecture - Construction material	Unspecified	Unspecified manufacture	Fragment	4
122.2	--	06	7	Slag	Activities – Industry	Slag	By-product	Fragment	1
122.3	--	06	7	Nail	Architecture - Hardware	Iron/steel	Unspecified manufacture	Fragment	3
122.4	--	06	7	Unspecified form	Activities – Industry	Coal	Unmodified natural material	Fragment	1
123.1	--	06	8	Unspecified form	Activities – Industry	Coal	Unmodified natural material	Fragment	2
124.1	--	06	9	Unspecified form	Miscellaneous - Unidentified type	Floral	Charcoal	Fragment	1
125.1	--	06	10	Unidentified object	Architecture - Miscellaneous	Unspecified	Unspecified manufacture	Fragment	2
								Total	**26**

INTERPRETATION OF FINDINGS

The interpretations are presented according to the specific phase of occupation for the site, beginning with the Hugh Bevington Brickworks in the 1870s, continuing with the Harmony Brickworks from 1890-1897 and from 1898-1901, and concluding with the post-industrial use of the site in the twentieth century. The discussion is further divided within the respective occupation phase by individual building, if identifiable to a definite period. The prehistoric component as encountered during this project is also briefly discussed.

Prehistoric Component

One possible prehistoric feature was encountered during excavations. This was Feature 131, a possible hearth encountered in Block P. Since investigation of prehistoric features was not included in the SOW for the historic component, the surface of the feature was carefully cleaned for a photograph and plan drawing so as to avoid disturbance of the feature matrix, and then covered with plastic for later investigation during the prehistoric component of data recovery in Area 1. During the historic component of the data recovery, 52 prehistoric artifacts were recovered (Table 5.22). Most of these artifacts were chert debitage, although one projectile point was also found. The chert type for most of the debitage was not typable but may be from pebble-chert cobbles from the nearby Ohio River. The only typable chert was Upper Mercer. Almost all prehistoric artifacts were found in context with historic artifacts in fill deposits and were not in an undisturbed context, with the possible exception of a flake found just above the possible prehistoric hearth (Feature 131).

Table 5.22: Prehistoric Artifacts

Cat No.	Blk	Unit	North	East	Lvl	Group	Class	Type	Material	Name	CT
085.1	--	--	--	--	--	Lithic	Tool	Uniface-Unspecified	Unidentified Chert	Unidentified	1
099.2	P	--	--	--	--	Lithic	Debitage	Thinning	Unidentified Chert	--	1
147.1	F	22	--	--	6	Lithic	Debitage	Tertiary Flake	Unidentified Chert	--	1
166.1	--	--	250	150	2	Lithic	Debitage	Secondary Decortication Flake	Upper Mercer Chert	--	1
166.2	--	--	250	150	2	Lithic	Debitage	Thinning	Upper Mercer Chert	--	1
170.2	--	--	255	160	3	Lithic	Debitage	Primary Flake	Unidentified Chert	--	1
176.2	--	--	260	155	2	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
176.3	--	--	260	155	2	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
182.1	--	--	260	180	3	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
194.2	--	--	270	155	2	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
197.1	--	--	270	165	3	Lithic	Debitage	Thinning	Upper Mercer Chert	--	1
197.2	--	--	270	165	3	Lithic	Debitage	Thinning	Upper Mercer Chert	--	1

Cat No.	Blk	Unit	North	East	Lvl	Group	Class	Type	Material	Name	CT
197.3	--	--	270	165	3	Lithic	Debitage	Thinning	Upper Mercer Chert	--	1
197.4	--	--	270	165	3	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
197.5	--	--	270	165	3	Lithic	Debitage	Thinning	Unidentified Chert	--	1
197.6	--	--	270	165	3	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
204.1	--	--	275	140	5	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
206.1	--	--	275	145	3	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
207.2	--	--	275	150	1	Lithic	FCR	FCR Blocky	Sandstone	--	1
212.1	--	--	275	170	2	Lithic	Biface	Biface, Indeterminate	Unidentified Chert	Unknown Type	1
214.3	--	--	280	140		Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
217.1	--	--	280	145	3	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	2
219.4	--	--	280	150	2	Lithic	Debitage	Secondary Decortication Flake	Upper Mercer Chert	--	1
220.1	--	--	280	150	3	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
221.2	--	--	280	155	1	Lithic	Debitage	Shatter	Unidentified Chert	--	1
236.1	--	--	290	130	2	Lithic	Debitage	Secondary Decortication Flake	Upper Mercer Chert	--	1
236.2	--	--	290	130	2	Lithic	Groundstone Tool	Groundstone, Indeterminate	Sandstone	--	1
244.4	--	--	290	155	1	Lithic	Debitage	Secondary Decortication Flake	Unidentified Chert	--	1
255.2	--	--	295	160	1	Lithic	Debitage	Primary Decortication Flake	Unidentified Chert	--	1
258.1	--	--	300	125	1	Lithic	Debitage	Tertiary Flake	Unidentified Chert	--	1
269.1	--	--	305	125	3	Lithic	Debitage	Thinning	Upper Mercer Chert	--	2
288.1	--	--	315	125	2	Lithic	Debitage	Flake, indeterminate	Unidentified Chert	--	2
289.1	--	--	315	130	3	Lithic	Debitage	Flake, indeterminate	Unidentified Chert	--	1
297.2	--	--	320	115	2	Lithic	Debitage	Shatter	Unidentified Chert	--	1
298.2	--	--	320	115	3	Lithic	Debitage	Thinning	Unidentified Chert	--	1
303.2	--	--	320	135	2	Lithic	Debitage	Flake, indeterminate	Unidentified Chert	--	1
322.1	--	--	330	125	3	Lithic	Debitage	Flake, indeterminate	Unidentified Chert	--	1
										Total	**40**

Hugh Bevington Period: 1870s

Three features identified at 36AL480 may date to the Hugh Bevington brickworks that existed on the site in the 1870s (Figure 5.137). This brickworks is indicated on the 1876 atlas of the county and discussed in the historic context section of this report (Hopkins 1876). Since no maps were found that showed distinct identifiable buildings, features attributed to this period are not discussed under any individual building heading.

In addition to the below features, one artifact that was recovered outside of feature context in Block L may date to the Bevington occupation. This was a fragment of a buff-colored firebrick or refractory tile (cat. # 94.1), 3 cm (1 ¼") thick, with a partial stamp: "/-KER, PGH/" on the top face of the brick (Figure 5.138). Gurcke (1987) was checked to identify the mark but did not result in any matches. A World Wide Web search using the Google search engine did produce a likely match, however: the Harbison-Walker Company. Harbison-Walker is a Pittsburgh-based manufacturer of furnace linings and is the oldest operating refractory brick company in the United States. The company started in 1865 as the Star Firebrick Company and changed its name to Harbison-Walker in 1875 (Found on the WWW November 17, 2003, at http://www.ceramicindustry.com/CDA/ArticleInformation/features/BNP_Features_Item/0,2710,11574,00.htm). These dates would coincide with when the Bevington brickworks first appear in documentary literature. However, as the artifact was not in a datable context, the association with the Bevington period is not certain.

Coal Stratum (Feature 1)

Feature 1 was a coal layer found as a stratum over much of the southern quarter of Area 1. The feature was first identified in STU N255 E150 and was more fully exposed in Blocks L and S. The feature was present in an area between grid coordinates N250 E150, N265 E155, N270 E177, and N265 E170. The feature seems to date from the Bevington period, since it predates the kilns that were built on top of this layer in the southern part of the site. However, no artifacts diagnostic of the 1870s were recovered from this layer, nor were any artifacts conclusively dating to the 1890s found. Alternatively, the coal may predate only Kilns 6 and 7 but still be associated with the earliest phase of the Harmony Brickworks, if these kilns were not built at the same time as the rest of the pre-1898 facility. Since those kilns do appear on an early map of the factory, however, this seems less likely than the first interpretation. A highly compacted section of this coal layer was found during the excavation of Block L. This compaction may have been the result of traffic from a rail line or road that entered the factory here, although no further evidence of such a transportation system was found.

Rubble Fill (Feature 118)

This feature is the rubble fill underlying Kilns 6 and 7, and overlaying Feature 121, a brick floor. This fill event may date to the destruction of the Bevington brickworks and be composed of material from that factory, but as no bricks were conserved from this fill, the bricks cannot be compared to either bricks from Harmony Brickworks components or the suspected Bevington period feature, Feature 121, discussed below. The fact that it lies under a known Harmony Brickworks component suggests that an association of the fill material with the earlier brickworks is an accurate interpretation.

Brick Floor (Feature 121)

Feature 121 was a section of brick flooring located between Kilns 6 and 7 and the southern wall of the drying room building, with an approximate centerpoint at N263 E147. The feature was present at an elevation of 215.98 m. The feature does not conform to the layout and construction of the 1890s Harmony Brickworks. The floor, which at first glance appears built against the south wall of the hot floor complex (Feature 64), was in fact the remains of an earlier structure. Construction of the hot floor's southern furnace room probably destroyed much of the structure that this floor represents. The Harmony Brickworks used the remaining floor as a base for supports for a drainage pipe and gas line placed outside the hot floor. The remaining space was then filled with rubble. The stone foundations for Kilns 6 and 7 were placed over this rubble.

As with the other features suspected to date from the earliest brickworks at this site, no diagnostic artifacts of the 1870s were located during the excavation. Three bricks were conserved from this feature, two red bricks (cat. # 99.8) and a large firebrick (cat. # 99.9). All three bricks showed evidence of scorching. The two red bricks were determined to have been handmade, not machine-made, and are smaller than the bricks used in known Harmony Brickworks features elsewhere on site. The larger of the two bricks measured 20.3 cm x 9.5 cm x 5.1 cm (8 in x 3 ¾ in x 2 in), and the smaller measured 19.5 cm x 9.2 cm x 5.2 cm (7 ¾ in x 3 ½ in x 2 in).

The firebrick recovered from this feature was identified as such due to the limestone inclusions in the brick's matrix, similar to that of other firebricks found on site. The brick differed, however, in that it was not the usual buff color of firebricks but rather a reddish-brown color (Munsell hue 2.5YR 4/3). The firebrick fragmented into nine separate pieces upon removal from the floor, but as reconstructed, the firebrick measured 36.8 in x 24.1 in x 6.3 cm (14 ½ in x 9 ½ in x 2 1/1 in). The brick bore identifying marks that indicated it was made by a soft-mud machine, and was impressed with the brand "P&B/E F/B" at one end of the brick (Figure 5.139). The branded side of the brick was laid facing up in the floor and bears black scorch marks. The brand is not documented in Gurcke (1987), and a World Wide Web search using Google did not turn up any candidates for this brand. Other firebricks marked "P&B" were collected from the site, so it is likely a local brand. One nearby brickworks was the Penn Brick Company, but their name does not fit with the use of an ampersand in the brand. The trade journal *Brick* was consulted for Pittsburgh area brick factories for the period of the 1890s, but no matches were found there. The Harmony Brickworks is documented as using firebricks from the S. Barnes Company.

Little can be determined about the structure that once contained this feature. The presence of firebrick and scorching on the floor suggests that it may have been associated with a kiln or with drying the green bricks. The former may be more likely, since heated drying floors were uncommon at the time of the Bevington factory's operation.

In summary, evidence for the 1870s-era Hugh Bevington Brickworks is sparse at 36AL480. It appears that the construction of the Harmony Brickworks in 1889-1890 destroyed all but a few traces of the earlier factory. No information was recovered that could be used to speculate about site layout or answer any other research questions about this phase of site occupation.

Harmony Brickworks: 1890-1897

According to the surveyor's map of 1894, there were eight buildings on the west side of Leet Street, which was the main location of the Harmony Brickworks (Figure 5.140; see also Figure 5.4). Six rail spurs and a water tower were also present. Thirteen other structures that were probably related to the brickworks were located east of Leet Street. For the purposes of this study, the main brick factory buildings as shown on this map are identified as follows: The large building is the hot floor complex, with the wings of the building that extend to the east designated as the northern auxiliary wing and the southern auxiliary wing, respectively; and the kilns are numbered 1 through 7. Kiln 1 is the northernmost kiln in the main bank of kilns, and Kiln 5 is the southernmost kiln in that bank. Kiln 6 is the eastern kiln on the south end of the hot floor complex, and Kiln 7 is the western kiln at that location. Of these buildings and structures, only three were located within, or partially within, Area 1 (the dry floor complex and Kilns 6 and 7), while five others were investigated in the February 2000 excavations (Kilns 1-5).

Excavations largely confirmed the size and construction of the factory, and added important data about the structures not recorded elsewhere. Twenty-three features could be identified as definite components of this phase of the site, while eight features may have been components of either this or the latter phase of the Harmony Brickworks (Figure 5.141).

Hot Floor Complex

The main hot floor structure measured approximately 91.44 m (300 ft) long by 38.1 m (125 ft) wide. The structure had brick exterior foundation walls set on a dry-laid stone foundation, although most of the building was frame construction (as indicated on the 1894 map). By 1894, this structure had three hot floors in the main building, two with coal- and gas-fired furnaces at opposite ends of the structure, and a steam-heated floor on the northeast side of the building (Figure 5.142). It is likely that the steam floor was added shortly after the initial construction of the floors heated by the coal and gas furnaces, which gives it a construction date of between ca. 1890 and the drawing of the 1894 map. No reference to steam heat, or to hot floors in general, is made in documents pertaining to the factory. It is unknown whether this particular type of steam-heated system was unique to this factory, since very little has been found in the documentary record on the construction and technologies of hot floors prior to the introduction of steam drier tunnels in the late 1890s. More on this matter is covered below in the specific section on the hot floors.

Two wings or extensions extended to the northeast from the main hot floor building. Although no archaeological evidence was found to identify functions for these extensions, it is likely that they housed the soak pits and plant machinery such as the Henry Martin soft-mud brick presses and steam engines.

From the positions of walls, furnaces, flues, and the kilns on the south end of the main building, we can assess the accuracy of the 1894 map. Most of the features that were positively identified as pre-1897 components conform so well with the outline of the map that the map supports an interpretation of those features that fall outside of the footprint as belonging to either the Bevington works or the post-1897 Harmony Brickworks component. Although no evidence was found to place functions for these extensions, it is likely that they

housed the soak pits and plant machinery such as the Henry Martin soft-mud brick presses and steam engines.

Little evidence was found for the 1897 fire that damaged the complex, aside from a few burnt nails and pieces of charred wood. This may indicate that the site was cleaned after the fire. After the fire in 1897, much of the hot floor complex was completely demolished to make way for the new steam drier tunnel. During this process, some of the old brick factory components were simply buried instead of completely destroying them. The excavation results demonstrate that the only portions of the 1890-1897 hot floor structure that were demolished without any trace were those that were removed for the installation of the steam drier tunnel.

Wall Features

As stated above, the hot floor building was a large structure that was internally divided into specific activity areas. These areas included two coal- and gas-heated hot floors built facing each other. A steam-heated hot floor was built adjacent to the northern coal- and gas-fired hot floor. Two wings of the complex were built extending from the east side of the main building, which likely housed the brick-making equipment, steam engines and coal repository. The wall foundations of the building were brick walls, usually set on top of dry-laid stone. These walls supported a frame superstructure. Portions of these walls were found in many of the excavations around the periphery of Area 1 and include the features described in the following sections.

South Wall, Southern Coal/Gas Hot Floor (Features 64 and 65)

The south wall of the southern coal/gas hot floor was first encountered in Trench 7 and subsequently examined in Blocks M and P, and labeled Feature 64. The wall extended from grid coordinates N264 E145 to N266 E151 and was 160 cm (5 ft 4 in) tall and 32 cm (1 ft) wide, and was composed of twenty-four courses of brick set three courses thick. The original length of the wall would have been 38.1 m (125 ft) long. The wall was first encountered at an elevation of 217.17 m and ended at an elevation of 215.42 m. It was constructed in a variation of common bond, with a course of headers for every six courses of stretchers. This wall was not set on a stone foundation, but instead stood directly on the subsoil. A gas line and a drainpipe ran along the exterior of the wall, just below the historic ground surface (Features 62 and 63; see below). The interior of this wall also served as the rear wall of the furnace charging room for this hot floor. The wall was also assigned feature numbers 67 and 81 in the field. A brick sample was collected from this feature in Block M (cat. # 114.1). This was a red brick made on a soft-mud machine, with dimensions of 21.6 cm x 10.2 cm x 6.3 cm (8 ½ in x 4 in x 2 ½ in). Feature 65 was a posthole found in the top of this wall. The posthole measured 20 cm x 20 cm (7 7/8 in x 7 7/8 in) and was 30 cm (11 ¾ in) deep into the wall. The posthole likely held a post with dimensions very close to the dimensions of the posthole. This was one of the few features located during excavation that provided information on the construction of the superstructure.

East Wall, Southern Coal/Gas Hot Floor (Feature 56)

The east wall of the southern coal/gas hot floor was first encountered in Trench 1, and was indicated by a single course of bricks running parallel with the long axis of the hot floor

building, as depicted on the 1894 map. The wall was labeled Feature 56, and further investigated in Block G, where it was only indicated by the presence of its builder's trench. Demolition activity seems to have heavily disturbed this area of the site, and the wall was only identified as such in that its alignment conformed to that of the eastern wall on the 1894 map.

East Wall, Northern Coal/Gas Hot Floor (Feature 80)

The eastern wall of the northern coal/gas hot floor was only encountered in Blocks K and N, or just northwest of the steam-heated hot floor and southeast of the furnaces for the northern coal/gas hot floor (see Figure 5.76). This wall was labeled Feature 80 and was also assigned feature numbers 85, 95, and 96 in the field. The brick wall had been almost entirely demolished, although a 50 cm (1 ft 6 in) wide remnant was present at the very bottom of a builder's trench associated with the wall. This wall was constructed on a stone foundation.

East Wall, Steam-heated Hot Floor (Feature 53)

The east wall of the steam-heated hot floor section of the hot floor complex consists of a dry-laid stone foundation supporting a brick wall. This wall was encountered in trenches 10 and 18 and in Block O. The stone foundation was 60 cm (2 ft) thick and 60 cm (2 ft) tall, while the brick foundation was 40 cm (1 ft 4 in) wide and 40 cm (1 ft 4 in) tall, and consisted of six courses of brick in height and four courses of brick in width in Block O, where it was most fully exposed. The bonding pattern was a variation of common bond. The bonding as revealed by a cross section of the wall showed that the middle two courses of the wall were stretchers all the way across, while the course second from the bottom had a course of stretchers on either exterior face with one course of facers in the core of the wall. The bottom course consisted of two facers. This wall would have originally measured 30 m (99 ft) long. The wall would have supported a frame superstructure, and slots that were presumably for the frame siding were found in the top of the wall in Block O. The wall was initially labeled Feature 53, and was also assigned feature numbers 92, 93, and 101 in the field.

West Wall, Steam-heated Hot Floor (Feature 26)

The west wall of the steam-heated hot floor was only identified in STU N325 E125 and Block N, and labeled Feature 26. The wall appeared similar in construction to the east wall of the steam-heated hot floor (Feature 53) in that the brick wall was 40 cm (1 ft 4 in) tall, with six courses of brick in a variation of common bond. The wall was not fully exposed in excavation, so the width is not known. Unlike Feature 53, the wall was not set on a stone foundation. This factor may indicate that the wall was not a load-bearing structure, but was instead a partition wall that separated the northern coal/gas hot floor from the steam-heated hot floor.

South Wall, Steam-heated Hot Floor (Feature 69)

The south wall of the steam-heated hot floor was a brick wall measuring 60 cm (2 ft) tall and 40 cm (1 ft 4 in) wide, and was set on a brick foundation 50 cm wide (19.7 in) (see Figure 5.60). This feature was examined in Blocks E and Q, and was labeled Feature 69. This wall was almost fully exposed by excavations and was a total of 8.3 m (27 ft) long, although demolition from the construction of the steam drier tunnel in 1897 almost certainly removed large sections of the western portion of the wall, which may have originally measured

roughly 30 m (99 ft) long. The wall was two courses of bricks wide and at its tallest point in the block consisted of eight courses. The bonding pattern was a variation of common bond, starting with two courses of stretchers from the top of the wall, a course of headers, four courses of stretchers, and one course of headers. The bond for the foundation consisted of two courses of headers with a course of stretchers in between. Since the wall did not have a large stone foundation, it is likely that it was not a main load-bearing structure, and may simply have served to partition the steam-heated hot floor from the northern auxiliary wing immediately adjacent. A portion of the wall was possibly identified in Block V, although it is uncertain whether this is the same feature. If so, then this means that the wall served as the northern wall for the north auxiliary wing as well as for the steam-heated dry floor. This feature was also labeled Feature 113 in the field.

North Wall, Steam-heated Hot Floor (Feature 79)

The north wall of the steam-heated hot floor was first encountered in Trench 18 and examined in Block N. The wall as present in Trench 18 was 38 cm (1 ft 3 in) wide and was three courses of brick thick. The brick wall had been entirely demolished in Block N, with only brick rubble in the trench where the wall had been. The stone foundation for the wall was present however, which indicates that this was likely a load-bearing exterior wall. This feature also matches the location of an exterior building wall on the 1894 map. The wall would have measured approximately 30 m (99 ft) long. This wall was labeled Feature 79, and also assigned feature number 97 in the field.

South Wall, Northern Auxiliary Wing, Hot Floor Complex (Feature 55)

This south wall was a brick wall first identified in Trench 12 and examined in Block H, and labeled Feature 55. The wall extended into Blocks B and V to the northeast, and measured approximately 15 m (49.5 ft) long. The wall was 110 cm (3 ft 6 in) tall and 40 cm (1 ft 4 in) wide. The wall contained 17 courses of brick and was three courses thick, except for the brick foundation, where it contained two courses of brick that was four courses thick. The manner of bonding was a variant of common bond, described as follows from the east profile (Figure 5.43) from the top of the wall down: Course one was a stretcher on the north side and header on the south. Courses two to four were all headers. Course five was a header on the north side and a stretcher on the south side. Course six was a stretcher on the north side and header on the south. Courses seven to nine were all headers. Course 10 was a header on the north side and a stretcher on the south side. Course 11 was a stretcher on the north side and header on the south. Courses 12 to 15 were all headers. Courses 16 and 17 were both two stretchers and formed the base of the wall.

The wall location conformed to that of the southeast exterior wall of the northern auxiliary wing of the hot floor complex, as depicted on the 1894 map. Feature 5, an interior wall, intersected this wall. This wall did not possess a stone foundation but a brick one, which may suggest that the wing construction was much lighter than that of the main hot floor building. The wall was also assigned feature number 73 in the field. Two brick samples were taken from this wall, one from Block H and one from the intersection of Trenches 12 and 15. The sample from Block H (cat. # 91.1) was from a portion of the wall that was noted as an extraneous or anomalous coursing at the level of the historic surface, and was a red brick measuring 22.8 cm x 10.8 cm x 6.3 cm (9 in x 4 ¼ in x 2 ½ in). The brick from the trench

intersection (cat. #335.1) was taken from the wall and was a red brick measuring 20.7 cm x 10.2 cm x 5.7 cm (8 1/8 in x 4 in x 2 ¼ in).

Interior Wall, Northern Auxiliary Wing, Hot Floor Complex (Feature 5)

This interior wall was a brick wall examined in Block D and labeled Feature 5. The wall was first noted in a deflated excavation trench from the Phase I survey and connected the south wall of the steam-heated dry floor (Feature 69) with the southern wall of the northern auxiliary wing (Feature 55). The original length of the wall can be projected at 10 m (33 ft). The wall consisted of fifteen brick courses and measured 1.5 m (5 ft) tall and 30 cm (1 ft) wide. The position of this wall in relation to the 1894 map places it within the footprint of the northern auxiliary wing of the hot floor complex. The wall was likely an interior partition wall and may have served to separate activities on different levels in the wing.

Early Interior Wall, Northern Auxiliary Wing, Hot Floor Complex (Feature 29)

This interior wall was a brick wall running northeast-southwest that was first identified in Trench 12. The wall was labeled Feature 29, and also assigned feature numbers 55 and 73 in the field. From Trench 12, the wall extended into Block Q, where it made a ninety-degree turn to the northwest and ran until it was truncated by the south wall of the steam-heated dry floor (Feature 69). This wall was 42 cm tall (1ft 4 1/2 in) and 56 cm (1 ft 10 in) wide. The portion of the wall that ran northeast-southwest was exposed to a length of 60 cm (5 ft), while the northwest-southeast running portion as exposed in Block Q was 230 cm (7 ft 6 in) long. This wall was damaged twice, probably originally by the construction of Feature 69 and later during demolition of the hot floor complex and construction of the steam drier tunnel in 1897. The wall was constructed using a variation of common bond. As it exited the south wall of Block Q, the wall showed a bonding pattern consisting of a course of headers at the top of the wall, over four courses of stretchers and then another course of headers at the base. The top coursing of brick was set perpendicular to the rest of the coursing, which may have served to offer a wider surface area for a floor support. The wall did not have a stone foundation and may have served as an interior partition wall or as a floor support.

Hot Floors

Perhaps the most important class of data recovered from the excavations at 36AL480 was that related to the subfloor heating technology, or “hot floors,” as they were known in the brick-making industry. As stated above, little has been previously documented in the archaeological record, on this specific part of the brick manufacturing process (See Chapter 4, pp. 4.52-4.54, for documentary evidence). Gurcke, for example, only writes two paragraphs on hot floors in his book, briefly describing this process as “a system of flues hooked up to either a separate furnace or to the brick kiln so as to borrow the waste heat from firing” (Gurcke 1987:26). Opperman reported on a well-preserved brick factory in Virginia that still had elements of the clay processing and brick making machinery in situ, but he did not find evidence of a hot floor and concluded that the small factory used drying sheds instead (Opperman 1988).

A terracotta factory dating to the 1890s in Melbourne, Australia was documented as using waste heat from down-draft kilns to provide heat for a hot floor, which may have been a more common way to provide heat to such structures than heat sources specific to the hot

floor (Gary Vines, personal communication 23 November 2003). A subfloor heating system was encountered under an orangery in Annapolis at the Calvert site, dating to the 1730s (Yentsch 1994). This hypocaust was used to provide heat in cold-weather months to tropical plants grown at the estate, and like the Harmony Brickworks hot floors, used a furnace and a system of linear subfloor flues to direct heat under the floor of the orangery. This system was slightly different than classic Roman hypocausts, which used a circular system of flues to provide subfloor heat in buildings.

The excavations at the Harmony Brickworks have revealed much about the technology of this process. At this site, we have three examples of hot floor technology represented in the archaeological record. These examples can be divided into two phases: pre-1897 and post-1897, or when the steam drier tunnel was built. The pre-1897 phase can be further subdivided into two different categories of hot floor technology: heat supplied through the burning of coal and gas, and heat supplied through steam. While the source of heat for these two systems is different, they share a common characteristic, in that a subfloor flue system was used to disperse heat. These flues served to direct the flow of hot air along the underside of the hot floor (Figure 5.143). The floor itself was separated from the flues by a brick cover directly over the flues. A wooden floor could also have been laid on top of this layer, but no evidence to support this was recovered by the present excavations. The steam-heated hot floor used the same flue system as the coal- and gas-heated hot floor.

The hot air was likely vented through a chimney stack or stacks located in the center of the complex. Since hot air flowed towards the center of the two coal/gas hot floors, it is likely that the two hot floors shared a common stack. The steam-heated hot floor had its own separate stack.

Flue System (Feature 9)

The flue system was the largest feature in terms of surface area found at the site. Flues were associated with the 1890-1897 hot floor complex and were used in both the coal/ gas hot floors and the steam-heated hot floor. The flues were constructed of weakly bonded or non-mortared bricks laid one course wide and up to four or five courses tall. These brick constructions were spaced about the width of one brick apart to allow heat to disperse through them. The flues directed the spread of heat from the source forward toward the far end of the hot floor. The flues were mainly constructed of red brick, except for the sections nearest the heat source, where they were constructed of firebrick.

The flues were built on top of a compacted surface of crushed brick, which in some places was placed above either brick or stone flooring. Bricks laid perpendicularly across the flue openings covered some of the excavated flues and presumably served as a floor support. The exact type of flooring is unknown, since intact flooring was encountered only in one location on site, Block E. This block uncovered a section of brick flooring capping the flues at the flue entry for the steam-heated hot floor, although it is unknown if the flooring was typical for the entire hot floor complex or only the steam-heated hot floor. The gases from the furnaces or steam from the pipes in the steam-heated hot floor traveled the length of the flue system and were vented through chimney stacks. Although no archaeological evidence was recovered for a chimney stack for any of the three hot floors, they would have been present as a fundamental aspect of the hot floor system.

The flues were also assigned feature numbers 17, 19, 21, 22, 25, 28, 32, 35, 38, 42, 66, 68, 70, 87, 91, 98, and 112 at various different proveniences in the field. Two samples of brick from this feature were recovered: one from Trench 7 (Cat. # 337.1) and one from Trench 18 (Cat. #336.1). Both bricks had identical widths and thicknesses of 10.2 cm x 6.3 cm (4 in x 2 ½ in), but the brick from Trench 7 was the longer of the two at 22.5 cm (8 7/8 in), while the brick from Trench 18 was 21.6 cm (8 ½") long.

Furnaces, Northern and Southern Coal/Gas Hot Floor (Features 76 and 81)

These furnaces supplied heat for the northern and southern coal/gas hot floors at the Harmony Brickworks. The exact number of these furnaces remains inconclusive, but it seems likely that there were at least five, and perhaps as many as ten or eleven, at each end of the building. This estimate is based on the size of a typical furnace, the size of the building footprint from the 1894 surveyor's map, and the presence of the flue system across the width of the hot floors. Examples of these furnaces were uncovered for the northern coal/gas hot floor in Blocks F and R (Feature 76), and for the southern coal/gas hot floor in Block P (Feature 81). There were only minor differences in construction of these furnaces, which were built to a general standard plan. The main difference between the furnaces for the northern and southern coal/gas hot floors was that the furnaces for the southern coal/gas hot floors had solid brick construction between each furnace opening, while the northern coal/gas hot floors had only a brick wall with empty space behind it to separate the furnaces.

The internal measurements of a typical furnace were 140 cm (4 ft 7 in) wide, 120 cm (4 ft) long, and 60 cm (2 ft) tall (Figure 5.135). The furnaces were constructed of firebrick in the upper portion of their structures, with a red brick base. The fuel access was 80 cm (2 ft 8 in) x 50 cm (1 ft 8 in) wide. No space was wasted, since each furnace directly abutted its neighbors. These furnaces were supplied with fuel from the rear, through a small arched opening in the rear wall (likely with a separate opening underneath for cinder removal). The access led into the main chamber of the furnace, with a larger arched (or barrel vaulted) roof and a crushed brick floor that slanted upward from the rear of the furnace towards the beginning of the flue system, located at the openings of the furnaces.

The red bricks used to construct the furnaces were soft-mud, machine made; the firebricks used were stiff-mud, wire cut. A firebrick recovered from the southern furnaces (Feature 81) measured 22.2 cm x 10.2 cm x 6.3 cm (8 ¾ in x 4 in x 2 ½ in) (cat. # 333.1). Arch firebricks used in furnace-roof construction measured 21.6 cm x 10.2 cm x 6.3 cm x 3.8 cm (8 1/2 in x 4 in x 2 ½ in x 1 ½ in). Red brick used in the construction of the furnaces ranged in length from 21 cm to 22.2 cm (8 ¼ in to 8 ¾ in) but generally conformed to width and thickness of 10.2 cm x 6.3 cm (4 in x 2 ½ in).

While the condition of the furnaces was such that no data was recovered regarding the closures for the furnaces, the doors were probably of cast iron. One cast-iron furnace door was recovered from the middle of the site at the surface (cat. # 85.7), but it is unclear whether this was associated with furnaces for the hot floor or for the kilns (Figure 5.144).

Little evidence was recovered for the gas lines that were directly associated with these furnaces, aside from two gas-pipe fragments found in situ at the southern furnaces in Block P (cat. #. 99.6) and similar artifacts found with the northern furnaces in Block R (cat. # 103.2,

103.3). The two pipe fragments from Block P were set, but not fixed, adjacent to the access points for two furnaces. No further artifacts or features were found that further illuminated the exact process of supplying gas to the furnaces, although numerous gas lines were encountered in Area 1.

These furnaces are markedly different from the furnaces used to heat the kilns on site, which were solid brick throughout, and did not have crushed brick floors set on the subsoil. The furnaces for the hot floors lack an ash box to catch the cinders from the coal burning, and evidence shows that cinder and slag buildup occurred regularly on the floors of these furnaces, in the form of "hearth bottoms" observed in the southern furnaces. "Hearth bottom" is a term borrowed from research on ironmaking, which describes an accumulation of slag on the floors of furnaces that, when removed, exhibits a mold of the floor on its base.

The northern coal/gas fired furnaces, Feature 76, were also assigned the following feature numbers in the field during different phases of the excavation: 77, 78, 88, and 105-110. The southern coal/gas furnaces, Feature 81, were also assigned feature numbers 122 and 123 in the field.

Steam-Heated Hot Floor

The steam-heated drying floor was an unexpected find, since no reference to such an entity was located in any documents pertaining to the site. As with the other hot floors, this structure, located on the east side of the northern coal/gas hot floor (Figure 5.142), used brick flues to direct the flow of heat, with firebrick used at the beginning of the flue system. One section of the flue system was discovered intact to the level of either the hot floor surface or perhaps an interior wall support, in Block E. Here, the flues were only two courses tall, and were capped by large firebricks laid perpendicularly across them for one course. This course in turn had four courses of red brick laid on top, with two courses of large firebrick capping the structure. The large firebricks were much bigger than the firebricks found elsewhere in Harmony Brickworks structures, and several were noted in the loose fill of excavations around Block E. One was recovered from Block D, and measured 38.1 cm x 17.8 cm x 7.6 cm (15 in x 7 in x 3 in). This structure was assigned feature number 70 in the field, but was later concatenated with Feature 9, the overall flue system of which it is a component.

Instead of coal or gas, the Harmony Brickworks used steam as a heat source for this hot floor. The steam was shot directly into the flues by means of a piping system, described below. This piping system has no direct analog in the documentary record of steam-heated brick drying systems. Several examples of the application of steam in brick drying were found in issues of the trade journal *Brick*, and one in the *Clay Record*. One possible steam drying system was located in a search of regional brick factories in Sanborn fire insurance maps. The earliest representation of a steam drying system found during the literature review is the one documented on a 1893 Sanborn map, a "Sharrar Dryer on Tunnel" at the J. H. Benz Brick Yard in Pittsburgh. That this drier used steam is inferred through the use of the term "tunnel," which elsewhere in the literature had only been used to described steam drier tunnels. However, no further information on this drier or brickyard was located during the literature review.

Chronologically, the next reference to steam heat found during the literature review is in the January 28, 1898 issue of the *Clay Record*, where an advertisement by the Wolff Dryer company of Chicago, Illinois, featured a letter from the Sankey Bros. Brick company, testifying to the effectiveness of the steam drier tunnel they had purchased from the Wolff company in 1896 (*Clay Record* 1896:2). This was a different system from the steam-heated hot floor at the Harmony Brickworks in that a series of steam pipes radiated heat under the floor, rather than a direct venting of steam. However, a similar system was chosen to replace the old hot floors at the Harmony Brickworks after the 1897 fire (discussed below), which was covered in an 1898 issue of *Brick* (*Brick* 1898:295-296).

The third example of steam heat in chronological order in the literature review was in the November 1900 issue of *Brick*, where an article described what was said to be the first steam-heated hot floor (Hurt 1900:220-222). This floor was reportedly built by an unnamed brick company in Pennsylvania about five years prior to the publication of the article (which was written by a former employee of that company). This floor utilized ceramic drain pipes cemented together to serve as flues, and the steam was shot into the ceramic pipes from small one-inch metal pipes inserted into a large steam pipe, which received waste steam from the plant's boiler. The claim of this system as being the first steam-heated hot floor is not accurate, as the Harmony Brickwork's system predates it by at least a year, if the article's timeline is correct.

The next two references to steam heat in chronological order from the literature review are articles in the March and April 1902 issues of *Brick* about steam drier tunnels that used a radiator system, as described in the Wolff Dryer Co. ad, mentioned above (*Brick* 1902:141-142 and *Brick* 1902:196). Finally, the last reference found to steam drying in the literature review was a description in the August 1902 issue of *Brick* of a steam drier tunnel that used a blower system to force steam-heated air through subfloor flues (*Brick* 1902:76-77). It is curious that this hot floor was never mentioned in documents related to the Harmony Brickwork's operations, because it seems that this was a technology that was being experimented with by the factory operators. The steam floor may have been used for a specific brick product, as it was used concurrently with the larger coal- and gas-heated hot floors. The advantages of steam must not have been much greater than that of coal and gas as a heat source, since it only supplemented and did not replace the coal- and gas-heated hot floors.

Thus, it appears that the steam-heated hot floor at the Harmony Brickworks could represent an instance of experimentation on the part of the plant operators, and may be the earliest documented example of a non-radiant heat steam drying system at a brickworks.

Steam Piping (Feature 39)

The piping system that provided heat for the steam-heated hot floor was encountered in Blocks E and Q, and labeled Feature 39. Steam was supplied from a boiler located in the eastern part of the steam-heated hot floor building, or perhaps in the northern auxiliary wing of the complex. It remains undetermined whether the steam was a waste product of the boiler used for the steam engines or a direct product of a boiler dedicated to this hot floor. The steam was directed through a large metal pipe, 20 cm (7.8 in) in diameter, to the southern end of the steam-heated hot floor. Here, smaller pipes, 5 cm (2 in) in diameter, directed steam

from the large pipe out to a series of pipes of the same size set up parallel against the flue openings (Figure 5.137). Each of these pipes had a series of small circular openings approximately 1 cm (3/8 in) in diameter that fed the steam into the corresponding flue opening.

The apparent advantage of steam over the coal/gas furnaces was that each of the smaller pipe sections was equipped with a valve to allow steam into the pipes set against the flues. This allowed the hot floor workers to control which sections of floor were heated. It also allowed the hot floor to continue operation in case of failure in one of the flue pipes, since each individual flue pipe could be shut. An example of this failure was found in Block Q, where one set of flues may have been highly vitrified by steam escaping from a burst end-cap for one of the pipes. This incident may have caused a structural failure in the flues, since vitrified bricks blocked the flues. These bricks may have been placed into the flues after the cap failure, however, to allow use of the adjacent flues that were fed by this pipe. The vitrification was probably caused by repeated exposure to a bath of hot steam, which affected them more than the directed blasts of steam that normally entered the flues. The steam pipe system was also assigned feature number 90.

Brick Manufacturing

We know from the documentary record that the factory employed two Henry Martin Letter "A" soft-mud brick presses, patented by Henry Martin in 1865, and still in use at some brickworks well into the latter part of the twentieth century (Gurcke 1987:90). These machines leave distinct marks on the bricks they produce, most notably a series of linear scratches along one surface of the brick where excess clay was scraped from the top of the mold (Figure 5.145). These bricks also lack sharp, distinct edges. Most bricks observed during fieldwork showed signs of having been produced by a soft-mud machine.

The Martin presses were large machines that weighed over five tons (Figure 5.146). A large cast-iron wheel hub and spoke from one of the large gears used on the brick machines recovered during shovel testing (Figure 5.147), and the massive belt drive wheel and shaft found in Block Q (Feature 102), almost certainly were associated with one or both of the machines known to be present at the factory. The belt-drive wheel and shaft date to this period, since they were found in association with a feature that definitely belongs to the 1890-1897 phase of the brickworks (Features 9 and 69). The drive shaft was 1.3 m (4 ft 3 in) long with a diameter of 6 cm (2 ¼ in). The wheel, which was only partially intact, had a diameter of 60 cm (2 ft) and was 30 cm (1 ft) wide. The wheel would have originally held six spokes.

Square Brick Pillar (Feature 100)

No structural features could be positively identified as associated with brick presses, although one feature was found that possibly could have served as a base for one of these machines. This was Feature 100, a large square brick pillar partially exposed during the mechanical excavation in Block D (done to expose a cross-section of the interior of Feature 5). This feature measured approximately 1 m x 1m (3 ft 4 in x 3 ft 4 in), and was approximately 84 cm (2 ft 10 in) tall. The feature was located within the wall alignments of Features 5, 55 and 69.

Kilns

Excavation confirmed the size and type of the Harmony Brickworks kilns. There were seven kilns at the Harmony Brickworks. For identification purposes, each kiln received its own sequential individual number separate from the feature designation. Kilns 1 through 5 represent the main kiln bank, with Kiln 1 being the northernmost kiln in the bank and Kiln 5 the southernmost. The two smaller kilns at the southeastern end of the hot floor complex were labeled Kilns 6 and 7, with Kiln 6 being the eastern kiln and Kiln 7 the kiln to the west.

The main bank of kilns was examined in the February 2000 investigations, while the two smaller kilns were examined in March 2001. The discussion of the kilns here is divided accordingly. The two kilns within Area 1 were assigned the following feature numbers: Kiln 6 was assigned feature number 2; and Kiln 7 was assigned feature number 126. No feature numbers were assigned to the kilns outside of Area 1. The feature numbers assigned to Kiln 6 that were later subsumed into this feature number include 11, 12, 14, 43-45, 57, 59-61, 71, 75, and 119. Documentary research suggested that these were updraft, open-top, periodic kilns, and the results of fieldwork seem to confirm this.

Kilns 1 – 5

These kilns measured 23.8 m (78 ft) x 11.6 m (38 ft) wide from the edges of the outer walls (Figure 5.142). The furnaces extended at least 1.2 m (4 ft) from the outer kiln walls, giving each kiln a total width of 14 m (46 ft). The kilns were constructed of brick with stone foundations. The sides of the kilns were double-walled, while the end walls were simple single walls. In the kiln that was excavated, the inner portion of each side wall was thicker and was clearly the main wall of the structure. These inner walls were supported by a continuous rubble stone foundation approximately 91 cm (3 ft) wide and extending to a depth of about 91 cm (3 ft) beneath the brick floor. The upper portion of each main wall was built with two types of brick. The outer courses of the walls were composed of yellow-white firebrick. The inner core of these walls were 41 cm (16 in) thick, which consisted of four courses of a bluish-purple brick with mortar of the same color. These walls included small air passages measuring 10.2 cm x 6.3 cm (4 in x 2 ½ in), which equates to about one course wide and one course tall. One air passage was largely clogged with a dense buildup of gray ash.

The outer kiln walls were composed of orange-red brick and stood about 30 cm (1 ft) apart from the main wall. This wall was only 23 cm (9 in) thick, and therefore could not have supported much weight. The outer wall extended approximately 60 cm (2 ft) below the kiln's floor level, where it rested on the subsoil. Considering the relative thinness of the outer wall, it was probably no more than one-half the height of the inner wall and seems to have enclosed a small transitional space for the hot air leaving the furnaces and entering the kiln interior.

When examined in February 2000, the air space was filled with a mixture of red clay, brick rubble, and silt. This air space appears to have formed a buffer between the fire boxes and the kiln interior, where the raw bricks were fired. This matches a description of kiln furnaces found during the literature review, when Grimsley stated: "In the Morrison type of kilns, the lower portion of the wall is built out to form furnaces in which the fuel is consumed, one

furnace giving the heat for three arches. This method is claimed to give better control over the temperature of the kiln and also to use less fuel" (1906:142).

The brick floor of the kiln was laid over a prepared subfloor composed of clay and brick rubble and measuring about 91 cm (3 ft) thick. The brick floor consisted of a single course of bricks laid side to side in rowlock formation (see Figure 5.7). There were no signs of any air circulation spaces or tunnels underneath the main floor of the kiln. Instead, the kiln floor appears to have been laid directly on top of a layer of fill composed of clay, ash, and a few broken bricks.

Shallow trenches across Kilns 4 and 5 revealed brick floors identical in construction of that in Kiln 1, and a cut through the southern wall of Kiln 4 revealed the same double-walled configuration documented for Kiln 1. Furthermore, the walls of Kiln 4 were composed of precisely the same kinds of bricks observed in the components of Kiln 1. The five kilns appear to be of identical size and construction and seem to have been built according to a standardized plan.

Trenching between Kilns 4 and 5 also uncovered a brick-paved passage between the kilns. The bricks used to pave the passage were laid flat in a single course rather than in rowlock bond, and this surface clearly was not intended for the kind of heavy use that the kiln interiors were designed to undergo. It seems likely that this paved passage was used to transport material to and from the kilns between firings. Given the standardized construction of the kilns themselves, it is possible that similar passageways were built between the other kilns at the brickyard.

The structure's walls were almost completely leveled on the east section of the kiln. As a result, the furnace arches in this section of the building collapsed into sections of rubble. In contrast, the demolition crew, for unexplained reasons, left some sections of wall nearly intact to a height of about 1.2 m (4 ft) above ground on the kiln's west side. This oversight by the demolition crew left intact a low section of kiln wall and a furnace arch near the southwest corner of the kiln. The outer portion of the furnace had collapsed, but the inner portion contained an intact section of a barrel vault constructed of firebrick. The archway was formed using a double course of tapered bricks.

Fill from the interior of the furnace was removed and screened, although the base of the furnace was not excavated because of time constraints. As might be expected for a furnace area, the fill contained a high concentration of ash, cinders, and some small brick fragments. The interior of the arch showed signs of burning and heat damage, as expected in a furnace area. The arch itself was built using yellowish-white refractory brick similar in appearance to the refractory bricks used to line the exterior and interior of the inner kiln walls. The upper portions of the arch's underside were scorched and vitrified. The lower portions of the arch were also scorched and vitrified, although to a less severe degree. The straight sides of the arch interior were scorched and partially vitrified in an approximately 60 cm (2 ft) section of wall immediately below the arch. This area was heavily encrusted with a buildup of ash and cinders.

Underneath this section of wall, the vitrification and ash accumulation abruptly disappeared, and the inside surfaces of the bricks were clean. This archway functioned as one of the furnaces used to heat the kiln during firing. A second arch was located just to the south, and evidence of a similar structure was found in a second trench excavated on the other end of the kiln. In addition to these arches, excavation uncovered small sections of brick from identical firebrick arches that had undergone similar vitrification and heat damage. These brick pieces were buried and scattered along the ruined sidewalls of the kiln.

The arched opening that was excavated at Kiln 1 at Leetsdale was the most heavily heat-damaged section of the kiln discovered during the investigation. The pattern of damage on the interior of the arch was consistent with repeated exposure to extremely hot coal and/or gas fires and the accompanying high temperatures. The arch brick was vitrified and the mortar melted most severely at the top of the arch, where updraft air currents would have drawn the flames into direct contact with the top of the arch. In contrast, the lower portion of the arch would have had the most direct contact with the fuel, and the remains of the arch showed heavy ash and cinder accumulations.

The type and consistency of the ash, which included chunks of coke, indicates that coal was used in firing the kiln. Natural gas is a clean-burning fuel, and its use would not have resulted in this type of residue on the firebox walls. This evidence is consistent with an 1898 *Brick* article that describes the kilns as gas-fired, and the firing process finished using slack coal to produce the desired deep red color for the brick (*Brick* 1898:295-296). The firebox excavated clearly showed the type of ash and cinder buildup associated with the burning of coal.

The excavations uncovered ample evidence of the passage of hot air into the central portion of the kiln. In a wall section exposed near the southeastern corner of the ruins, there was a small air passage in the inner kiln wall that measured roughly 15 cm (6 in) square. This air passage had been nearly choked off by a heavy buildup of gray ash and cinders. It appears that hot air was carried from the furnace into the air space between the outer and inner kiln walls, then through a passage in the inner kiln wall and into the central kiln space. As this hot air passed through the narrow air passage, ash residue from the fire was sucked into the main kiln space. Some of this ash was deposited in the small air passage, and eventually the accumulation became so severe that ash choked the passage. This buildup may have had an adverse effect on the kiln operation and would have needed to be cleaned from the air space periodically.

Although the double-walled feature observed on the side elevations of the kiln excavated at the Harmony Brickworks site suggested some of the sophistication seen in downdraft kilns, the preponderance of evidence clearly suggests that the structures at Leetsdale were updraft kilns. The most compelling evidence to support this position is the lack of ductwork beneath the original kiln floor. When a cross-section trench was cut through the kiln foundations, it was determined that the kiln floor rested directly on a bed of fill that consisted of a mixture of clay and cinders. There was no evidence of ductwork or other air circulation features underneath the kiln floor. The combined evidence from the floor excavations and the cross-section trench rules out the presence of air ducts beneath the kiln floor. Such features were a key element in downdraft kilns. The absence of below-floor ductwork strongly points to the

conclusion that the Leetsdale kilns were of the updraft type, which fits with the documentary evidence uncovered in the literature review.

Kilns 6 and 7 (Features 2 and 126)

Kilns 6 and 7, which were updraft kilns similar to those excavated in February 2000, measured roughly 7.5 m (24.6 ft) x 5 m (16.4 ft) wide, with four fireboxes on each of the long sides. The fireboxes were 3 m (9.8 ft) long and 1 m (3.2 ft) wide. Each firebox had a 40 cm (1.3 ft) air space between the main wall of the kiln and the back of the firebox, similar to the main bank of kilns. The unmortared floors of the fireboxes did not have identical construction, in that the bonding pattern varied between offset courses and side-by-side courses. The kilns were set on dry-laid stone foundations. The foundations for the northern part of these kilns rested on a layer of brick rubble (Feature 118), which was used to fill over the location of an earlier feature (Feature 121). Unlike the main bank of kilns, these smaller kilns did not have interior brick floors. It appears they had a similar brick-floored working area between them, as did the main kiln bank (Feature 117). Information on the superstructures of the kilns could not be recovered due to the complete absence of any features or in situ artifacts related to such structural features. Bricks from Kiln 6 (Feature 2) measured in the range of 21.6-22.2 cm x 10.2 cm x 6.3 cm (8 ½ - 8 ¾ in x 4 in x 2 ½ in) and were made by a soft-mud machine.

The type and form of construction rubble found at the site also confirmed that the Leetsdale kilns were relatively simple updraft structures. The typical downdraft kiln had a masonry barrel-vaulted roof. These vaults would have been massive, thick, brick-arched structures. If such a vault existed, it would have collapsed during demolition of the facility, and large sections of it should be strewn across the center of the kiln ruins. Arch sections were recovered during the excavations, but these pieces had a deeply curved profile and appeared to be pieces of small firebox arches similar to the arch found in place on the south wall of Kiln 1. The brick ruins found in the center of Kiln 1 appeared to be consistent with the demolition of simple vertical walls only. A downdraft kiln also should have contained stacks for the evacuation of hot air and gases from the kiln. Again, ruins of a series of small stacks or one to two large stacks should have appeared when the kiln was excavated, but no such ruins were located.

The Harmony Brickworks kilns were fairly typical nineteenth-century open-top, rectangular kiln structures and had features such as side-mounted arched fireboxes that were typical of kilns during this era. The kilns also featured an interesting double-walled design that seems to suggest an attempt to obtain advantages of the sophisticated stacks and air circulation refinements of the downdraft kiln. The destruction of the upper portions of the kilns has made it more difficult to ascertain the probable design of the buildings as they originally stood from the archaeological evidence alone. Examination of the one existing photograph of the factory published in the *Brick* (1898) article confirms the hypothesis that the kilns were typical of updraft kilns used in the late nineteenth century, as they exhibited open tops with wooden roof structures. A detailed discussion of these kilns can be found in Chapter 4 of this report.

Utilities

Gas Supply (Features 34 and 62)

The Harmony Brickworks is documented as using natural gas from wells owned by the Harmony Society to supplement the use of slack coal as a fuel at the factory. Gas seemed to be supplied to the building along the periphery of the structure, which is where all of the gas lines were encountered on site (Features 34 and 62 [Figure 5.82]). Since the gas was used to fire furnaces and kilns, no lines would have been present inside the main building itself. Gas lines would have been used for the entire operational span of the factory, since gas was used to fire the kilns both before and after the 1897 fire.

Coal Supply

No evidence was found during excavation for a coal dump that could be conclusively dated to this occupation of the site, although this may have been present in the southern auxiliary wing of the hot floor complex. The 1894 surveyor's map indicated that this wing was frame construction with a rail spur running through it. This could have served as the necessary coal staging area for a complex of this size. No architectural evidence was found during excavations to support this speculation, however. Feature 1, the coal stratum in the southern portion of Area 1 (Figures 5.10, 5.13, 5.137), may have been partly formed by coal dumping in the very early stages of the brickworks, prior to the construction of Kilns 6 and 7, which was built on top of this stratum.

Water Supply

Water was supplied to the plant from a water tower located west of the main kiln bank, outside of Area 1. Little evidence for the water lines that supplied the plant were located during this excavation, with the possible exception being a water pipe located in Block Q (Feature 103). This water pipe predates the steam-heated hot floor, as the features associated with that structure were built on top of the pipe, damaging it in the process. The pipe was further damaged by the construction of the steam drier tunnel in 1897. The function of the pipe could not be determined, as no evidence was found to support an interpretation of water delivery over water dispersal (i.e., the feature was a drain pipe rather than part of the water supply system).

Electricity

No evidence was found during excavations to support an interpretation that the factory utilized electricity in any way.

Other Features

Cylindrical Brick Shaft (Feature 6)

Feature 6 was a cylindrical brick shaft, measuring at least 4 m (13 ft) deep and 128 cm (4 ft 2 ½ in) wide on the interior (Figure 5.132). The feature was tentatively identified prior to excavation as a well or cistern. The feature was located on the exterior edge of the northern auxiliary wing, as shown on the 1894 surveyor's map (Figure 5.132), and excavations revealed that a component of the post-1897 brickworks was built on top of the feature (Feature 24, a brick stack foundation). The thick (>2 m) stratum of silty fill inside the

shaft seems to have been deposited by seepage of soil matrix from outside the shaft. This situation would have been possible since the brick bonding in the shaft is very poor and would not have been watertight. In places, entire bricks are missing from the coursing.

Because the field crew was not authorized by the contract modification to excavate the feature below a 200 cm limit due to safety concerns, artifacts possibly located at the bottom, such as bottles and ceramics, datable to the first use of the feature, could not be recovered. The only datable artifacts recovered from the feature fill included a cut nail from Level 6 (ca. 1835-1890) and a wire nail from Level 2 (ca. 1883-present). The majority of bricks and brick fragments were present in Stratum 1 of the feature, which likely represents the debris from the final demolition of the factory in 1901. Brick fragments were present throughout the rest of the feature in lesser numbers, which indicates that the feature was likely open and silting in during the occupation of the site by at least one of the brick manufacturers that operated here.

The exact function of this feature has not been determined. The initial identification of the feature as a cistern by the COE archaeologist duirng field visits was based upon its location on the edge of a building, where such features have also been found on other historic sites (Sewell 2000:331). It seems clear, however, that if this was an operational component of the brickworks, its likely function was water dispersal, not water storage. The gaps in the coursing and weak bonding would not have served to retain water. The feature may have been some type of sump, perhaps used to evacuate water from the soak pits.

A similar-appearing feature dated to ca. 1828 was documented at the Augusta Arsenal in Augusta, Georgia in 2001, but was slightly smaller and only 61 cm (2 ft) deep. However, the construction method was nearly identical to that of the lower portion of Feature 6 (Dr. Christopher Murphy, personal communication 10 October 2003). Dr. Carl Steen also mentioned encountering a similar feature at a Civil War-period site, which he interpreted as a privy, with the loose bricks serving as access for a dispersal field (Dr. Carl Steen, personal communication, 10 October 2003).

It appears that this type of feature has been encountered previously in the archaeological record of the nineteenth century, but exact functions cannot be determined as of this writing. The most likely functions would be wastewater dispersal or a privy. It is uncertain whether this feature was a component of the Harmony Brickworks or of the earlier Hugh Bevington brickworks. The bricks used in its construction measured 21.6 cm x 10.2 cm x 6.3 cm (8 ½ in x 4 in x 2 ½ in). This fits the range of brick sizes found in features positively associated with the Harmony Brickworks, but is larger than the brick size found in the feature associated with the Bevington Brickworks, the floor under Kilns 6 and 7 (Feature 121). These bricks were hand made and somewhat smaller in size, the largest being 20.3 cm x 9.5 cm x 5.1 cm (8 in x 3 ¾ in x 2 in), which is outside the range of bricks found in Harmony Brickworks features (see Brick Typology discussion, below). This appears to support a hypothesis that the feature is associated with the first period of occupation by the Harmony Brickworks.

Drain Pipes (Features 63 and 103)

Moisture control was a constant concern in the brick-manufacturing process. Water was directed to the east away from the building, and drainpipes ran both outside and underneath

the hot floors. Features 63 and 103, ceramic drainpipes, may have helped divert water from the hot floors. These pipes were oriented towards the east, indicating a probable disposal point in the relict back channel below the T3 terrace. Feature 63 was located running parallel to the southern end of the steam-heated hot floor, with its opening at roughly the center of the southern wall (Feature 64). The pipe may have been used to divert rainwater away from the outside of the building. The opening for this drainpipe was covered by a grate, which in turn may have been positioned under a gutter spout on the building. The pipe was supported by brick pillars (Feature 120a-c) built on top of a floor section from the old Bevington works (Feature 121) and against the south wall of the coal- and gas-heated hot floor (Feature 64). Feature 103 differed in that it may have been used to collect and divert steam condensation out of the building. An alternative use for these pipes would have been to deliver water from the water tower shown on the 1894 map to the boiler for the steam engine and the steam-heated hot floor.

Drain-Pipe Supports (Feature 120)

The brick supports for Feature 63 were built against Feature 64 and on top of Feature 121. Each support was 80 cm x 80 cm (2 ft 7 in x 2 ft 7 in) in plan, and a maximum of 68 cm (2 ft 2 in) tall in profile. The supports were stepped down from the maximum height to a minimum height of 40 cm (1 ft 4 in). One brick was collected from this feature, which had the number “39” scribed into the surface (cat. #99.5). This brick was made from a soft-mud machine and measured 21 cm x 10.2 cm x 6.3 cm (8 1/8 in x 4 in x 2 ½ in).

Burnt Timber (Feature 111)

This long timber was the only wooden element of the hot-floor-complex superstructure found in excavations at the site, and it measured approximately 200 cm x 30 cm (6 ft 7 in x 1 ft). The timber was heavily charred and had no structural integrity. The feature was photographed and removed to continue excavation. This feature was one of the few discovered indicators of the 1897 fire that damaged the hot floor building. The timber’s location at the south end of the complex indicates that the fire was quite intense at this end of the structure.

Brick Lens (Feature 15)

Feature 15 was a strange curved lens of crushed brick encountered in STU N285 E155. This location would place the feature within the southern auxiliary wing of the 1890-1897 structure. The location of the feature and the construction history dictate that the feature is likely an 1890-1897 component. No structural features were associated with the feature and it was not examined through further excavation.

Large Foundation Stone (Feature 36)

Feature 36 was a large stone identical to those used in the wall foundations associated with the 1890-1897 structure, elsewhere on site. It was encountered at 45 cm below surface in STU N260 E165, a location that places the feature approximately 2.5 m east of the southeast corner of Kiln 6. A thin (approximately 10 cm) layer of ash was present above the stone. The feature’s exact identification and function has not been determined, but it could be part of a walk or road related to the brickworks, or it may simply be a large piece of demolition debris.

Clay Stratum (Feature 115)

Feature 115 was a stratum of homogenous fine, clean clay found in the east wall of Block Q, just above the 1890-1897 floor (Figure 5.108). The clay was a deep purple color with the closest Munsell value correlate recorded as 7.5YR 2.5/3 very dark brown, although it was more purple in hue. The clay seemed to have been processed, as it had a very fine texture with very few inclusions. It is possible that this clay is an example of the clay used to make bricks at the site. The location of the stratum places it as a part of the 1890-1897 component of the Brickworks. The clay's proximity to the wheel and shaft in Block Q may indicate an association with brick production.

Harmony Brickworks: 1898-1901

During this period, the factory underwent a massive change in its layout and operation. After the 1897 fire that destroyed the previous hot floor complex, the Harmony Society took the opportunity of upgrading the plant's infrastructure and installed a more efficient brick drying system, the steam drier tunnel. Many references were found to this system in the contemporary literature. (These references are listed above in the discussion of the steam-heated hot floor.)

The literature review revealed that the Harmony Society purchased a drier from the Wolff Dryer Company of Chicago, Illinois, in June 1897 (Hampton et al 2003:53). The only extant photograph of the brickworks from the 1898 issue of *Brick* (Figure 5.148) clearly illustrates the drier tunnel, which can then be compared to descriptions of drier tunnels in the contemporary professional literature. Two articles about steam drier tunnels from Indiana companies appeared in 1902 in the journal *Brick* and described nearly identical facilities. The illustrations accompanying these two articles show a drier tunnel almost identical in form to that of the tunnel in the 1898 *Brick* photograph (Figure 5.149). The dimensions given in both articles for this type of steam drier tunnel only mention a length of 116 ft (35.35 m) and do not indicate a width. The illustrations indicate a brick construction for the tunnel with frame roofing.

The chimney stack's manner of construction is more difficult to determine from these illustrations, and could be either frame or brick. The stack was located at the "receiving" end of the tunnel, where the newly molded bricks would enter the tunnel on wheeled cars. The opposite end where the cars exited the tunnel was called the "discharging" end. A truss support for the stack similar to that shown in the 1898 *Brick* photograph is depicted in the illustration accompanying the article for the Standard Drier in the April 1902 *Brick* article. The subfloor layout of a drier tunnel is well illustrated by the March 1902 *Brick* article. The layout would include a series of brick foundations laid perpendicular to the long axis of the tunnel, upon which rested the steam pipe coils. The boiler was located at the discharging end of the tunnel, where also the condensation from the steam pipes was channeled back to a reservoir, to be re-used in the boiler. The floor would likely be wooden with one or more sets of track laid on top of it.

The excavation uncovered little architectural evidence for the steam drier and its attendant wing as seen in the 1898 photograph from *Brick*. Structural features from this final phase of the brick industry are few due to the demolition of buildings after the factory closed in 1901.

Eighteen features could be identified as definite components of this phase of the site, while eight features may have been components of either this or the earlier phase of the Harmony Brickworks (Figure 5.150).

Steam Drier Tunnel

Fewer features were found relating to the steam drier tunnel than to the earlier hot floors. Recovered features include the brick pillars with the brick-walled enclosure to the north of them (exposed in Block A) that represented the stack base and the "receiving end" of the steam drier, and examples of the interior brick foundations for the steam piping. Other evidence for the steam drier comes from the line of demolition across features in Block Q and the truncation of a wall just to the south of Block Q, near where the estimated southern end of the tunnel drier would have been. This evidence is based on the known lengths of this type of steam tunnel drier, 35 m (116 ft). The drier was determined through excavation to be 6.6 m (21 ft 6 in) wide.

Evidence for the steam drier tunnel is scarce because the site was leveled after the factory closed, in preparation for an abortive attempt to develop a residential block. The iron sub-floor steam piping and boiler for this building were probably sold as scrap immediately after the factory closed. No evidence was found for the superstructure of the tunnel drier, which may have been a frame construction. The chimney stack as it appears in the 1898 *Brick* photograph seems to be at least 15 m (50 ft) tall. The stack may have been of wood, since nothing resembling the remains of a massive chimney fall was discovered at the site. A historic diagram of the same type of steam tunnel drier seems to indicate that such stacks were made of wood (Figure 5.151). Other remnants include the brick floor on the surface of Block Q, and a gas line.

Chimney Supports (Feature 116)

The three brick pillars that supported the large chimney stack for the steam drier tunnel were labeled Feature 116. This feature was examined by Block A and fully exposed in Block T. Excavations determined that each of the pillars measured 90 cm x 72 cm x 72 cm (3 ft x 2 ft 3 in x 2 ft 3 in), and that they were set on a highly compact crushed brick surface, which in turn overlay the subsoil. The relatively small size of these pillars in comparison to the size of the stack in the 1898 photograph supports the interpretation that the stack was constructed of wood, not brick. A brick stack would have required a larger support base than that found at the Harmony Brickworks steam drier tunnel. The stack base uncovered in Block V for one of the smaller chimney stacks in the tunnel's attendant wing was by comparison much larger, at 5 m (16 ft 3 in) square. This feature was also labeled as part of Feature 40 in the field, but was later assigned its own feature number.

North Foundation Wall, Receiving End (Feature 40)

This feature was the rear of the stack for the steam drier tunnel, and it also may have served as part of the "receiving end" of the tunnel, where the dried bricks emerged. This feature included the portions of the brick foundations for the steam drier tunnel exposed in Block T, which revealed that the structure was 6.6 m (21 ft 6 in) wide. The foundations were 32 cm (1 ft) thick, and three courses of brick wide. The small size of the foundation walls indicates a light superstructure for the steam drier tunnel, which was probably of frame construction. A

sample brick from this feature was 22.2 cm x 10.2 cm x 6.3 cm (8 ¾ in x 4 in x 2 ½ in) in size.

West Foundation Wall, Steam Drier Tunnel (Feature 16)

This feature was first uncovered in STU N320 E 120 and later in Block T, and was a brick foundation wall for the steam drier tunnel, labeled Feature 16. The foundation was 40 cm (1 ft 4 in) thick at the point where it paralleled Feature 116 (the stack supports), and then narrowed to 32 cm (1 ft) thick thereafter with three courses of brick present.

Crushed Brick Floor (Feature 50)

Feature 50 was a part of a hard-packed, crushed-brick/cement floor for the steam drier tunnel. The feature was encountered only near the northern end of the steam drier tunnel, north of Feature 49.

Steam Pipe Support Wall (Feature 10)

Feature 10 was a brick wall, associated with the interior of the steam drier tunnel (Figure 5.152). This wall was first encountered in Trench 4 and further investigated by Block J, and was 40 cm (1 ft 4 in) wide. A total length could not be determined for the wall as it was not fully uncovered, but an estimate of approximately 6 m (20 ft) can be proposed, based on the width of the tunnel and the fact that the east end of the wall was uncovered in Trench 4. The wall was three courses of brick in width, and it aligned perpendicular to the long axis of the steam drier tunnel. Examination of a plan of a similar steam drier tunnel published in the March 1902 edition of *Brick* helped to identify a likely purpose of this wall as a steam pipe support wall. This wall was also assigned feature number 51 in the field. The wall extends out from the projected interior dimensions of the steam tunnel. It is possible that the tunnel became wider as it extended from the receiving end. Any projection of form must be speculative due to lack of firm data.

Steam Pipe Support Wall (Feature 52)

This feature was the end of a brick wall, about 40 cm (1 ft 4 in) wide, associated with the steam drier tunnel (Figure 5.153). The feature was three brick courses wide. This wall was located approximately 1 m to the southeast of similary constructed Feature 10 in Trench 4 and was parallel to that feature, which indicates that it had a similar function as a support for the steam piping.

Water Pipe (Feature 48)

This feature was a ceramic water pipe that measured 20 cm (8 in) in diameter and ran underneath the steam drier tunnel. The pipe, uncovered by Trench 5, seemed to be oriented to direct the flow of water to the east. The pipe was covered with a brick pavement (Feature 49) for 7 m (23 ft), which ended approximately where the east wall of the tunnel would have been. The pipe may have served to evacuate steam condensation from the steam drier tunnel, or it could have served as a general water dispersal system, such as was encountered with Feature 63 for the earlier hot floor complex.

Brick Pavement (Feature 49)

Feature 49 was a brick pavement that measured 40 cm (1 ft 4 in) wide (Figure 5.154). It covered Feature 48, a ceramic water pipe. This feature was three courses of brick wide and one course thick, and extended for 7 m (23 ft) from the west end of Trench 5 to a point where the trench intersected Trench 4, where it abruptly terminated, although Feature 48 continued underneath for 5 m further.

Brick Alignment (Feature 30)

This feature was uncovered in STU N310 E 125, and was a brick structural feature that was not oriented to the long axis of the brick factory complex. No further exploration was made of this feature, which from its location, would have been a component of the steam drier tunnel.

Attendant Wing of the Steam Drier Tunnel

As seen in the 1898 *Brick* photograph, there was one attendant wing on the main steam drier tunnel at the Harmony Brickworks. This wing likely housed all the plant machinery, including the brick machines and the steam engine and boiler that powered them. The wing's structure (as can be determined through examination of the photograph) was a frame structure that was attached to the main tunnel at a point approximately 6 m (20 ft) from the discharging (southeast) end of the tunnel. The wing was two stories tall with a gable roof that shows in the photograph as about a half-story taller than the tunnel, with a window overlooking the main kiln bank. The wing extended out to the northeast for perhaps 20 m (65 ft 6 in) before turning 90º to the southeast and terminating in a pair of small chimney stacks. The features associated with this structure are described in the following sections.

Stack Foundation (Feature 24)

Feature 24 was a brick foundation associated with the attendant wing for the steam drier tunnel. The foundation was for one of the two chimney stacks visible in the 1898 photograph. These stacks were likely used for venting fuel gases from the operation of the steam engine and brick machines. These were the only foundation walls that could be definitely assigned to the attendant wing. The foundation was 5 m x 4 m (16 ft 5 in x 13 m) and divided into four compartments. The stack base was strengthened with an iron tie rod 5m (16 ft 5 in) long. The base was built overlying Feature 6, the cylindrical brick feature discussed above, which, in order to support the weight of the stack was partially disassembled and rebuilt with reinforced mortaring. Two brick samples were taken from Feature 24. One (cat. # 110.2) measured 22.2 cm x 10.2 cm x 6.3 cm (8 ¾ in x 4 in x 2 ½ in), while the other (cat. # 109.1) measured 21 cm x 10.2 cm x 6.3 cm (8 1/4 in x 4 in x 2 ½ in). Both were made in a soft-mud brick press.

Brick Pavement (Feature 94)

Feature 94 was a rough laid brick pavement found just below the ground surface. This pavement, located in Block Q, overlays features from the 1890-1897 floor (Feature 60 and Feature 100), and was buried during the demolition of the old hot floor complex and the construction of the new steam drier tunnel. The pavement also seemed to be associated with Feature 86, a hard-packed soil stratum, which it partially overlays. A brick sampled from Feature 94 (cat. # 115.1) measured 20.3 cm x 10.2 cm x 6.3 cm (8 in x 4 in x 2 ½ in). The

feature would have lain inside the attendant wing of the steam drier tunnel, but any function beyond flooring is uncertain.

Hard-Packed Soil Stratum (Feature 86)

This was a hard-packed, thermally altered layer of soil encountered in Trench 12 and Block Q. The feature was noted beginning at approximately grid coordinates N 297.00 E 141.00 in Trench 12, and extended to the location of Feature 60 in Block Q. This soil layer partially overlay features from the earlier period of operation for the Harmony Brickworks. It is unknown if the thermal alteration of the soils took place in situ or if the soils were thermally altered before being used as fill. The soils were very compacted, and perhaps reflect use as a floor, or the use of Feature 94, which partially overlays this soil, as a floor. This feature was also labeled Feature 99 in the field.

Steam Engine Base (Feature 127)

Feature 127 was a brick support base for a steam engine, with eight iron anchor bolts, located north of the stack base (Feature 24). The base was partially exposed in Block V and measured 2 m x 1 m (6 ft 8 in x 3 ft 4 in) in the block. The elevation and grid coordinate data was corrupted, so no elevation data was available. The feature was not fully excavated, but was likely very thick in order to support the weight of a steam engine. Adjacent to the main base with the anchor bolts was a smaller brick wall or support that was 100 cm x 40 cm (3 ft 4 in x 1 ft 4 in), as exposed in Block V. The anchor bolts were twisted and bent, likely caused by the removal of the steam engine after the brickworks closed. The bolts were each about 4 cm (1 ½ in) in diameter and roughly 60-80 cm (2 ft – 2 ft 7 in) in length. The bolts were arranged in two sets of four. This feature was aligned parallel to Feature 128 and Feature 129.

Steam Engine Base (Feature 128)

This feature was another brick support base for the steam engine, with two iron anchor bolts. The base would have helped support the flywheel for the steam engine, which would have been located between this feature and Feature 127, 60 cm (2 ft) to the southeast. The feature measured 100 cm x 50 cm (3 ft 4 in x 1 ft 7 in), and was likely as thick as Feature 127. The thickness of the exposed portion was not recorded in the field, per instructions from the COE archaeologist that photodocumentation would suffice. The bolts were of similar size to those in Feature 127. This feature was aligned parallel to Feature 127 and Feature 129.

Boiler Base (Feature 129)

This feature was a brick support base for the steam engine boiler. As exposed in Block V, the edges of the feature measured 2 m x 2 m (6 ft 7 in x 6 ft 7 in) with three iron anchor bolts, as exposed in the block. The anchor bolts were of similar size to those in Features 127 and 128. This feature was aligned parallel to Feature 127 and Feature 128. The thickness of the exposed portion was not recorded in the field, per instructions from the COE archaeologist that photodocumentation would suffice.

Stone Flooring (Feature 27)

This feature was a section of a cut sandstone pavement associated with the attendant wing of the steam drier tunnel (Figure 5.155). The pavement was located in Block V adjacent to the

location of the boiler and steam engine. The reason stone was used instead of brick remains unclear. The stones may be related to Feature 23, below.

Stone Slabs (Feature 23)

This feature was a concentration of sandstone slabs located in STU N315 E150. The stones were 5 m (16 ft 5 in) north of the stone pavement located in Block V (Feature 27). The stones would probably have been in the interior of the attendant wing when it was standing, but it is uncertain what function they held.

Utilities

Gas Pipe (Feature 47)

Feature 47 was an iron gas pipe located in Trench 6, running perpendicular to the long axis of the factory. The gas line may have been part of the feed system supplying the steam drier tunnel.

Gas Pipe (Feature 89)

Feature 89 was an iron gas pipe located in Block G, set in the vacant builders trench for Feature 56 (the east foundation of the southern coal/gas hot floors for the pre-1897 complex). The gas line may have been part of the feed system supplying the steam drier tunnel, or connected to the southern kilns.

After the factory closed in 1901, the complex was scrapped and almost completely razed. This fact explains the seeming contradiction that more of the pre-1897 structure is intact than the post-1897 structure. While the operators simply buried the pre-existing parts of the site before reuse, the act of salvaging the factory after it shut down destroyed most of the infrastructure. For example, the sub-floor iron piping was removed from the steam drier tunnel. Piping is still present in the pre-1897 components of the factory, while none is found in the post-1897 sections. Demolition crews further obliterated the post-1897 factory in the early 1900s.

Brickwork Features, Uncertain Affiliation

This section includes certain features found in Area 1 that can be associated definitely with the brickworks, but not with a certain period.

Brick Alignment (Feature 3)

This feature was a possible brick floor found in STU N265 E150. The location of the STU is between Kiln 6 and the south foundation of the southern coal/gas hot floor, and it is possible that the feature is actually only demolition debris from either of the above structures. No information that could place a date to this feature was recovered, and it was not excavated further.

Charcoal Concentration (Feature 20)

This charcoal concentration was located in STU N290 E150, which would place it between the two wings of the hot floor complex, or south of the attendant wing of the steam drier

tunnel. The feature was not identified in any adjacent excavations. No information that could place a date to this feature was recovered, and it was not excavated further.

Circular Brick Feature (Feature 31)

Feature 31 was a small circular brick feature 50 cm (1 ft 7 in) in diameter, found in STU N300 E145, and was located roughly adjacent to the location of Feature 100, a square brick pillar. Although the ground in this location had been stripped back in order to cross-section Feature 5, a cylindrical brick feature, no evidence of this feature was relocated and its function remains uncertain. The feature was not identified in any adjacent excavations. No information that could place a date to this feature was recovered, and it was not excavated further.

Ash/Rubble Deposit (Feature 33)

This feature was a thick deposit of ash and rubble found in STU N315 E145, which would have been located on the exteriors of both the steam-heated hot floor and the attendant wing of the steam drier tunnel. The feature was not identified in any adjacent excavations. No information that could place a date to this feature was recovered, and it was not excavated further.

Gas Pipe (Feature 34)

This feature was an iron gas pipe located in STU N320 E140, running parallel to the long axis of the factory. The gas line may have been part of the feed system supplying either the hot floor furnaces or the steam drier tunnel. The feature was not identified in any adjacent excavations.

Post-Industrial Activity at 36AL480

Although there were plans to develop the site of the brickworks into residential property, the site was functionally abandoned after the factory closed. The demolition of the factory was most likely related to the development effort, which never advanced past the removal of much of the rubble from the surface of Area 1 and the removal of most of the plant's equipment. The excavations uncovered no structural features post-dating the factory, except for the post set into the southernmost excavated ash box of Kiln 6 (Feature 125).

Local children used the site as a play area. Glass marbles were found in the fill around the kilns, and a pitcher from a child's toy dinner set was recovered from the northern set of furnaces in Block R (Figure 5.156). Further evidence for this and other post-factory uses of the site comes from a discussion with a former area resident, John Kisio. Mr. Kisio was born and lived as a boy just east of the site, on what was called Monroe Way, in the 1920s and 1930s. Mr. Kisio recalled that he and his friends used to play in the ruins of the brick factory, hiding in what they called the "ovens," which were almost certainly the fireboxes for the kilns. Mr. Kisio recalled these features having arched roofs, which is consistent with the results of the February 2000 kiln investigations. Mr. Kisio also remembered that the site area was a cornfield at the time of his residency, although it is difficult to understand how a field filled with bricks could have been plowed. He did not recall that his family ever used the area for the disposal of household waste, but he did mention that the "Leetsdale Town Dump" was located somewhere in the immediate area. Mr. Kisio stated that the area was subject to floods

that would fill the low area to the north and east of the site. A particularly severe flood forced his family to move in 1936, after the first floor of their house filled with mud (John Kisio personal communication, March 22, 2001).

Numerous artifacts related to household rubbish were common throughout the fill layers on site. Common artifacts included condiment bottles, medicine bottles and vials, stoneware jugs, ironstone and porcelain cups, saucers, and plates, porcelain lamp shades, pieces of leather shoes and gloves, buttons, children's toys, and animal bone with butcher marks (Figures 5.157-5.161). Contrary to Mr. Kisio's recollections, the site seems to have been used for dumping since shortly after the shutdown of the factory until at least the 1940s. One especially dense deposit of this fill was located in STU N320 E115 and labeled Feature 13. It seems likely that agricultural activity remembered by Mr. Kisio may have been located south and west of Area 1. There were no signs of plowing in soil profiles, and no furrows were visible on the ground surface. The soil in some locations consisted entirely of solid brick rubble. The prevalence of brick in the soil and the relative shallowness of some features have rendered the immediate site area unsuitable for agriculture. The lack of plow scars or other disturbance on the shallow subsurface features, such as the southern kilns, also indicates that the site has not been cultivated.

Large Conical Mound with Central Pit (Feature 7)

Feature 7 was a large pit, the removed fill of which was mounded around the edges. Some brickworks-era artifacts were observed in this feature, but trenching revealed that the hole was of recent origin, which contained twentieth-century artifacts such as car parts. The feature may possibly be a looter pit dug by people looking for historic bottles.

Deep Trench (Feature 114)

Feature 114 was a recent trench feature that had been refilled. The feature was identified and investigated in Block L, which revealed a maximum depth of 2 m (6 ft 7 in) below surface. Modern artifacts were found in the feature matrix, including a plastic two-liter soda pop bottle, which indicates that the trench was dug and refilled within the last 30 years.

Wooden Post (Feature 125)

This wooden post was found set into a posthole excavated into the northeast corner of the southernmost ash box of Kiln 6 (Feature 2), in Block S. Although no diagnostic artifacts were found in the fill of the posthole, the fact that the post had been set into what had been part of a furnace clearly gives a date for the feature postdating the abandonment of the brick factory. While no identical feature was located in Kiln 7 in the ash box immediately opposite, a section of the top course of bricks in roughly the same location had been removed, leaving a gap of the same approximate shape as the posthole in Kiln 6. There was no evidence to explain these features.

Possible Cesspit (Feature 83)

This feature was located in the southwestern corner of Area 1, just south of Kiln 7, and was identified in Trench 17 as a black, highly organic and foul-smelling soil concentration. The intensity of the smell was such that it prevented crew members from working in that part of

Area 1 for the rest of the day after it was first exposed to air. While no definite boundary was found for the feature, it is likely a somewhat recent cesspit or privy feature.

Artifact Analysis

This section covers the assemblage of artifacts recovered from excavations in Area 1, and is subdivided into artifacts related to the Harmony Brickworks (including a brick typology) and artifacts related to the use of Area 1 as a refuse deposit for local residents.

Harmony Brickworks Artifacts

Few artifacts were found that could be directly associated with the Harmony Brickworks, in comparison with the relatively dense deposits of domestic artifacts later dumped in Area 1 after the factory was shut down and demolished. Artifacts that could be associated with the brickworks included fuel and fuel waste products, such as coal and coal slag (or clinker); cut and wire nails; elements of steam pipes used in the steam-heated hot floor; elements of the gas feeds and nozzles for the hot floor furnaces; an iron furnace door; an iron grate with slag caked onto it that had been recycled to serve as a drain cover for Feature 63; spikes that may have come from the light-gauge railroad on site; sheet metal roofing; and of course bricks, which are discussed in detail below.

Brick Typology

Several different types of brick were found at 36AL480. The following typology is based on that of Harley's, as presented by Gurcke (1987:97). This typology classifies bricks according to eight categories: method of manufacture, shape and size, surface treatment (including maker's marks and repressing), weight, color, texture (raw material), hardness, and provenance. For the typology used to classify bricks from 36AL480, the categories of hardness and texture were dropped after an initial analysis determined that these categories were not helpful in studying the bricks from this site. The category of shape was also dropped, after it was determined that a useful analysis would only focus on the rectangular bricks. The category of surface treatment was added to distinguish sand-struck bricks from water-struck bricks with the red brick, and to distinguish wire-cut bricks from stiff-mud machine molded bricks with the firebricks. Size outliers were also dropped from the firebrick sample.

Forty-one nearly intact bricks were analyzed from the Harmony Brickworks using this typology. To guide the analysis, bricks in the collection were divided into four groups: firebricks, bricks from structural features, factory product, and hand made bricks. Firebricks were self-evident as an individual group, as were hand-made bricks, but it was difficult to distinguish bricks used in Harmony Brickworks structures from the bricks produced at the factory—it became evident that bricks from both these groups had been made using the same process. The analyst decided that the presence or absence of mortar on a soft-mud machine molded brick not collected from a feature would be the defining factor for identifying a factory product. According to the documentary record, there were three grades of brick quality produced at the Harmony Brickworks: "stock," "filler," and "chimney" brick. However, there was insufficient information from the documentary record to determine which bricks from this collection would fit those grades. The results of a basic physical analysis of the brick collection are summarized below.

Of the 41 bricks examined, nine were firebricks (Table 5.23), 25 were red bricks from Harmony Brickworks structural features (Table 5.24), three were factory products (Table 5.25), and four were hand-made bricks (Table 5.26). The manufacturing method of most bricks in the collection was identified through distinguishing marks, such as the pattern of marks left when the excess clay is struck from the surface of a mold (Figure 5.162), or by a pattern distinctive of a certain type of machine. Furthermore, many of the building bricks exhibited features that allowed the identification of the type of lubricant used in the molds, as demonstrated by Gurcke (1987:105). Gurcke (1987: 117) stated that in 1886, the National Brick Manufacturers Association [N. B. M. A.], after an extensive survey of numerous brickyards all over the United States, adopted 8 ½ in x 4 in x 2 ½ in (20.96 cm x 10.16 cm x 6.3 cm) as the standard size for common brick. In 1889, this organization issued a standard for face brick, 8 3/8 in x 4 in x 2 3/8 in (21.27 x 10.16 x 6.03 cm). The standard size for firebrick was larger, at 9 in x 4 ½ in x 2 ½ in (22.9 cm x 11.4 cm x 6.3 cm) (Gurcke 1987:117*)*.

Firebricks

Of the nine firebricks used in the analysis, three were manufactured using the wire cutting process. This procedure involved cutting the brick to shape with a machine, instead of molding the clay, leaving distinct marks such as that seen in Figure 5.163. The other bricks were made using the stiff-mud process. Firebricks were the only bricks in the collection to bear any stamped initials or numbers. Five of these bricks bore identifying marks, three of which were "SB" bricks manufactured by the S. Barnes Company of Pittsburgh (Figure 5.163), a supplier for the Harmony Brickworks identified through the literature review (Chapter 4, pp. 4-36). One brick in the collection was marked "P&B" from a still unidentified company (Figure 5.164). One brick was marked "H B," which may be a mark associated with the Harmony Brickworks, but it may also be associated with Hugh Bevington, owner of an earlier brickworks on the site. The mark could also designate a completely different, unknown company (Figure 5.165). Firebrick was only present in features that related either to the hot floors or to the kilns, as firebrick is specifically made to resist higher temperatures than normal red brick. Firebricks were components of features 2, 9, 76, 81, 121, and 126; and were also present in all the kilns.

The firebricks ranged in length from 21.6 cm to 23.5 cm (8 ½ in to 9 ¼ in), in width from 10.2 cm to 11.2 cm (4 in to 4 ½ in), in depth from 5.7 cm to 6.5 cm (2 ¼ in to 2 ½ in), and in weight from 5.47 lbs to 7.5 lbs. The mean size of the firebricks was 23.4 cm x 10.6 cm x 6.1 cm (9 ¼ in x 4 in x 2 ½ in), with a median size of 22.8 cm x 10.2 cm x 6.3 cm (9 in x 4 in x 2 ½ in). This is slightly smaller than the standard. The mean weight was 6.80 lbs and the median weight was 6.74 lbs. None of the firebricks identified as having been manufactured using the wire-cut process weighed more than seven pounds. According to Munsell values, the firebricks ranged in color from 5YR 5/6, Yellowish Red, to 10YR7/4, Very Pale Brown.

Table 5.23. Firebrick Analysis Collection.

Provenience	Length (cm)	Width (cm)	Depth (cm)	Cat #	Surface	Weight (lb)	Color	Other
Surface	21.6	10.2	6.3	85.9	Stiff	6.37	Reddish Yellow	"HB"
Surface	21.6	10.2	5.7	85.11	Stiff	6.24	Pale Brown	"P&B"
Fea 9	22.8	11	6.1	89.4	Stiff	7.5	Light Yellowish Brown	--
Block B	22.9	10.9	6	110.1	Stiff	7.41	Light Yellowish Brown	"SB"
Fea 9	23	11.2	5.7	111.1	Stiff	7.44	Reddish Yellow	"SB"
Block F	22.8	10.2	6.3	142.16	Wire	6.74	Strong Brown	--
Trench 5	23	11.1	6.5	327.1	Stiff	7.43	Brownish Yellow	"SB"
Trench 11	21.6	10.2	6.3	330.1	Wire	6.57	Light Yellowish Brown	--
Fea 81	22.2	10.2	6.3	333.1	Wire	5.47	Pink	--

Bricks from Structural Features

Twenty-five out of 41 specimens in the analyzed collection were bricks determined to be associated with Harmony Brickworks structural features (Figure 5.166). All of the bricks were produced on a soft-mud machine, and all but one were sand-struck (the one exception being water-struck). One brick (from Block F) has a palm print impressed on the surface, and one brick from Feature 120 has the number “39” scribed into the surface, which might indicate a batch number from the plant where it was produced. Structural feature bricks ranged in length from 20.3 cm to 22.8 cm (8 in to 9 in), in width from 9.5 cm to 10.8 cm (3 ¾ in to 4 ¼ in), in depth from 5.7 cm to 6.3 cm (2 ¼ in to 2 ½ in), and in weight from 4.23 lbs to 6.34 lbs. The mean size of the sample was 21.8 cm x 10.2 cm x 6.2 cm with a median of 22 cm x 10.2 cm x 6.3 cm (8 ½ in x 4 in x 2 ½ in). The bricks generally fit the 1886 standards issued by the N.B.M.A. The mean weight of the sample was 5.52 lbs and the median weight was 5.58 lbs. According to Munsell values, the bricks in the samples ranged from 2.5YR 4/2, Weak Red, to 7.5YR 5/4, Brown.

Table 5.24. Structural Brick from Harmony Brickworks-Era Features.

Provenience	Length (cm)	Width (cm)	Depth (cm)	Cat.#	Surface	Weight (lbs)	Color	Other
Surface	22.2	10.2	6.3	85.12	Sand	5.89	Brown	--
Surface	22.0	10.3	6.3	85.4	Sand	5.76	Yellowish Red	--
Block A	22.3	10.5	6.3	86.1	Sand	5.76	Reddish Brown	--
Block B	22.2	10.2	6.3	87.1	Sand	6.34	Reddish Brown	--
Block C	21.6	10.2	6.3	88.1	Sand	5.54	Reddish Brown	--
Block C	22.2	10.2	6.2	88.2	Sand	5.55	Reddish Brown	--
Block C	22.2	10.5	6.3	88.3	Sand	5.77	Reddish Brown	--

Provenience	Length (cm)	Width (cm)	Depth (cm)	Cat.#	Surface	Weight (lbs)	Color	Other
Block D	22.5	10.6	6.3	89.2	Sand	5.82	Yellowish Red	--
Fea 55	22.8	10.8	6.3	91.1	Sand	5.95	Reddish Brown	--
Fea 2	21.6	10.2	6.3	92.2	Sand	5.63	Brown	--
Fea 10	22.5	10.2	5.7	93.1	Sand	5.58	Yellowish Red	--
Fea 120	21.0	10.2	6.3	99.5	Sand	5.26	Reddish Brown	"39"
Fea 40	22.2	10.2	6.3	108.1	Sand	5.91	Brown	--
Fea 24	21.0	10.2	6.3	109.1	Sand	5.12	Red	--
Fea 24	22.2	10.2	6.3	110.2	Sand	6.14	Reddish Brown	--
Fea 24	21.9	10	6.3	110.3	Smooth	5.31	Reddish Brown	Waterstruck
Fea 5	21.6	10.2	5.7	112.1	Sand	4.95	Reddish Brown	--
Fea 64	21.6	10.2	6.3	114.1	Sand	5.47	Weak Red	--
Fea 94	20.3	10.2	6.3	115.1	Sand	5.19	Reddish Brown	--
Block F	21.6	10.2	5.7	150.11	Sand	4.23	Reddish Yellow	Palm print
Trench 10	22.2	9.5	6.2	329.1	Sand	5.79	Brown	--
Fea 56	21.0	10.2	5.7	332.1	Sand	4.75	Reddish Brown	--
Fea 55	20.7	10.2	5.7	335.1	Sand	4.86	Brown	--
Fea 9	21.6	10.2	6.3	336.1	Sand	5.87	Brown	--
Fea 9	22.5	10.2	6.3	337.1	Sand	5.57	Reddish Brown	--

Handmade Bricks

Four bricks in the sample were identified as handmade (Figure 5.167). All were sand-struck. Two of these bricks were recovered from a feature identified as a probably component of the Hugh Bevington Brickworks, which operated on the site in the 1870s. The hand made bricks ranged in length from 19.4 cm to 20.3 cm (7 ½ in to 8 in), in width from 8.2 cm to 9.5 cm (3 ¼ in to 3 ¾ in), in depth from 4.5 cm to 5.5 cm (1 ¾ in to 2 1/8 in), and in weight from 3.32 lbs to 3.95 lbs. The mean brick size of this sample was 19.7 cm x 8.8 cm x 4.95 cm (7 ¾ in x 3 ½ in x 2 in) and the median size was 19.5 cm x 8.8 cm x 5.1 cm (7 ¾ in x 3 ½ in x 2 in). The mean weight was 3.79 lbs and the median weight was 3.95 lbs. The bricks in the sample ranged in color by Munsell value from 5YR 4/3, Reddish Brown, to 7.5YR 5/4, Brown.

These handmade bricks are probably either products or components of the 1870s Hugh Bevington Brickworks, since they seem to conform to the earlier standard set by the N.B.M.A., as stated above. The Bevington factory, however, was no longer operating by 1878, ten years prior to the adoption of the standards.

Table 5.25. Handmade-Brick Analysis Collection.

Provenience	Length (cm)	Width (cm)	Depth (cm)	Cat. #	Surface	Weight (lbs)	Color
Surface	19.4	8.2	4.5	85.2	Sandy	3.32	Reddish Yellow
Fea 121	20.3	9.5	5.1	99.8	Sandy	3.95	Reddish Brown
Fea 121	19.5	9.2	5.2	99.8	Sandy	3.95	Reddish Brown
Block C	19.5	8.5	5.5	165.1	Sandy	3.95	Brown

Factory Products

Only three bricks from the sample collection could be determined to be products of the Harmony Brickworks. These were all sand-struck soft-mud machine-made bricks. One was a waster that was warped from an impact, probably while stacked in the kiln as it was completely fired, and another bore cat prints on the face opposite the struck side (Figure 5.168). Lengths of the three bricks were 21 cm and 22.2 cm (two bricks) (8 ¼ in and 8 ¾ in). All three bricks had widths of 10.2 cm (4 in) and depths of 6.3 cm (2 ½ in). The mean size for these bricks was 21.8 cm x 10.2 cm x 6.3 cm (8 ½ in x 4 in x 2 ½ in), and the median size was 22.2 cm x 10.2 cm x 6.3 cm (8 ¾ in x 4 in x 2 ½ in). Weights ranged from 5.02 lbs to 5.97 lbs, and colors ranged in Munsell values from 5YR 4/3, Reddish Brown to 7.5YR 5/4, Brown.

The three bricks identified as factory products fall in the size ranges of the bricks used in factory construction, but it cannot be concluded that the factory used self-produced bricks in construction. The Harmony Brickworks produced bricks with a method that was extremely common among other brick factories of the period, and so it is very difficult to determine if any of the bricks used in structural features at the brickworks were also produced there. The likelihood of the brickworks using self-produced bricks is probably greater for the construction of the steam drier tunnel, as the capacity to produce bricks was already in place, unlike when the factory was first constructed. Without a materials analysis to determine the elemental composition of the bricks (such as mass spectrography), no firm conclusion can be made as to the source of bricks used in Harmony Brickworks structures and if they have an origin at the factory itself.

The size of these bricks exactly matches the standard dimensions for common brick set in 1886 by the N.B.M.A., but are smaller than the standards set by the organization for face brick in 1889. This situation is curious, as the operators of the Harmony Brickworks advertised themselves in 1890 as producing larger-than-average bricks, perhaps about 20 per cent larger (Pennsylvania State Archives, Harrisburg: Harmony Society Microfilm 247). The size increase would likely be limited to the dimension of length only, as bricks generally never exceeded widths and depths of much more than 10.2 cm (4 in) and 6.3 cm (2 ½ in); anything larger would have been too unwieldy to handle by bricklayers. A brick with a 20 per cent larger length would have been about 26.6 cm (10 ½ in). No red bricks recovered from Area 1 approached this length. The molds used by the Harmony Brickworks in 1899 were recorded as having dimensions of 24.4 cm x 12 cm x 7 cm (9 5/8 in x 4 ¾ in x 2 ¾ in) (Penn sylvania State Archives, Harrisburg: Harmony Society Microfilm 249:662). As bricks

tend to shrink during the drying and firing processes, the resulting product would have been smaller. It is highly probable that the early boast about the size of Harmony Brickworks products was an example of boosterism rather than an accurate statement of brick size.

Table 5.26. Factory Product Analysis Collection.

Provenience	Length (cm)	Width (cm)	Depth (cm)	Cat. #	Surface	Weight (lbs)	Color	Other
Block C	22.2	10.2	6.3	89.1	Sand	5.97	Reddish Brown	Cat prints
N270 E180	21.0	10.2	6.3	200.19	Sand	5.02	Reddish Brown	Waster
Trench 18	22.2	10.2	6.3	331.1	Sand	5.95	Brown	--

Domestic Artifacts

Almost without exception, the majority of artifacts recovered from excavations at the Harmony Brickworks are from a thick deposit of household waste that had been deposited on the site after the abandonment of the factory in 1901. Datable artifacts were mainly limited to bottles and bottle fragments, and ceramics with maker's marks. The date range for the assemblage runs from the 1840s to the 1960s, but mainly clusters between the 1880s and 1920s. Interestingly, the artifacts that could be tightly dated (those exhibiting a date range of less than ten years) mainly date between the late 1890s and the 1920s-1930s, excluding one sherd of flow-blue pearlware that dates to the 1840s (Table 5.27).

Table 5.27: Tightly Dated Artifacts from Domestic Refuse Fill at 36AL480 (arranged in ascending chronological order).

Catalog #	Provenience	Artifact type	Date
133.7	Block B	Flow Blue Pearlware rimsherd	Ca. 1840s
102.7	Block R	Ironstone base sherd	1896-1901
102.3	Block R	Whiteware base sherd	Ca. 1900
85.5	Surface	Soda bottle	1905-1913
106.2	Block U	Pill bottles	1911-1920s
105.1	Block U	Liberty Head Dime	1916
134.7	Block C	Pharmaceutical Bottle fragments	Ca. 1920s
305.2	N320 E145	Whiteware base sherd	Ca. 1925
132.2	Block C	Penny	1933

CONCLUSIONS

Excavations at the Harmony Brickworks yielded a wealth of data about the layout and technology of late nineteenth-century brick manufacturing. The state of preservation of the architectural elements below the modern ground surface surpassed expectations. The evidence of different hot floor technologies in use at this site provided valuable evidence about an aspect of brick manufacturing that is often overlooked in favor of a focus on brick kilns.

Nearly all steps of the brick-manufacturing process were represented in the archaeological record in Area 1. The only parts of this process that were not reflected in the archaeological evidence were clay mining, soaking, and the removal of the finished product from the site. Clay was processed into bricks in the eastern wings of the hot floor building, then dried on the hot floors, which were heated by flues running underneath. Coal/gas fired furnaces on the north and south ends of the complex fed the flues in the main section of the building. A steam-heated hot floor was located in the northeastern part of the building. After 1897, drying was accomplished in a more efficient steam drier tunnel, which substituted steam pipes for brick flues. After drying, the bricks were transferred to the kiln banks for firing. The bricks were moved using hand-pushed carts on light-gauge rail lines on the site, as shown in the one extant photograph of the site. Numerous small railroad spikes were also recovered from excavations across the site. Historic maps show that rail spurs connected the five large kilns directly to the local rail line.

The factory's main product was soft-mud pressed brick, although there is some documentary evidence for other types. Because of the two demolition episodes at the site, however, it is impossible to know for certain how many of the loose bricks uncovered in the excavations were waste products and how many were structural elements of the factory. Waster bricks composed only 7 per cent of the bricks analyzed for this report, which could indicate that waste dumps were not located inside Area 1 or that some collection bias occurred.

The Harmony Brickworks site documents brick-manufacturing processes that are not well recorded elsewhere in the literature or other archaeological investigations, specifically the technology of heated dry floors. For this reason alone, the site is important to local and industrial history.

Research Goals

The following section discusses each research goal as stated in the SOW.

Harmony Brickworks Industry – Site-Specific Context

What types of defects were observed on discarded bricks at the site? Where were these defective bricks deposited?

Observed defects included warping, discoloration, and damage seemingly sustained during the drying and/or firing process. Very few bricks exhibited any defects at all. It was impossible to determine whether broken or cracked bricks were results of the firing process or of site demolition. No single location within Area 1 was identified as a dump or waster deposit. As the portion of the factory within Area 1 was the main work area, waster dumps

would likely have been located away from the areas of daily activity, and thus were likely outside of Area 1. A possible location would be behind the main kiln bank, or perhaps in the relict back channel below the factory.

How do the results of the archaeological investigation compare with expectations based on the documentary research?

The literature review presented several predictions as to what might be present in the archaeological record. First, the earliest brick factory on the site belonging to Hugh Bevington would have been completely demolished in order to make way for the Harmony Brickworks, and the Harmony Society would have retained no structures for further use. The first phase of occupation by the Harmony Brickworks would have included a large drying house and seven open-top updraft kilns. A fire in 1897 destroyed the drying house, which was replaced by a steam drier tunnel. Factory-produced bricks should be larger than the standard size, according to plant correspondence, but be made on a soft-mud brick press.

The results of the archaeological investigation tend to confirm the findings of the literature review, with some exceptions. Aside from the hot floors and expected factory product size, the archaeological evidence of the brickworks' technology confirmed the evidence in the documentary record. The kiln types encountered were confirmed to be open-top updraft kilns, and excavation recovered evidence for the Henry Martin Letter "A" soft-mud brick presses in the form of factory-produced bricks made on this machine and machinery components (such as the belt drive shaft and wheel in Block Q and the partial wheel hub from the surface). Artifacts and structures related to the use of coal and gas for fuel was also found, in the form of gas lines and nozzles, and abundant amounts of coal and coal slag, including slag and cinder inside of furnaces and ash boxes. The hot floor remnants were an unanticipated find, since no mention of hot floors was ever encountered during the literature review on the brickworks.

What was the process used to manufacture the bricks? Did the manufacturing process change over time?

The manufacturing process followed the description provided in the historic context report. The bricks were made using a soft-mud machine, and the molded bricks went through an accelerated drying process using artificially generated heat. The bricks were fired in updraft open-top kilns. Although the technology used to dry the bricks changed slightly, the essential manufacturing process remained the same throughout the history of the Harmony Brickworks.

What types of bricks were produced at the site (e. g., pavers, common, fire, etc.)?

The documentary and archaeological investigations have shown that the main product of the Harmony Brickworks was common building brick. The only bricks identified as factory products were all common building brick. The factory produced minor quantities of specialty brick, specifically octagonal shaped bricks. No such bricks were observed or collected during excavations at the Harmony Brickworks.

What was the source of water? Is there evidence of water lines running into any of the identified structures?

The water source for the factory included a water tower, located outside Area 1, as shown on the 1894 map (see Figure 5.4), and also a reservoir located east of the factory past the rail line, atop a hill. The main water source was river water, as noted in the 1898 Brick article. The same article notes that a water tower present on site was there not to supply water for factory use, but rather to serve as part of a firefighting system. The firefighting system was also connected to the hilltop reservoir. The means of delivering the water to the factory is not fully understood, although some of large ceramic drainpipes found on site might have served to transport the water. As both the location of the water tank and the location of the reservoir were outside of Area 1, they were not subjected to archaeological investigation.

Is there evidence of trash and/or waster brick dumps in the data recovery area? Where were trash and/or waster bricks discarded?

As stated above in the answer to the first research question, it was not possible to determine if there was a waste brick dump in Area 1. The location of waster deposits was not determined through the results of fieldwork, and disposal may have occurred outside of the boundaries of Area 1. Bricks were not determined to be wasters until after the firing process, so any waster dumps would likely be in proximity to the end of the kiln used to unload bricks. Since map evidence indicates that bricks were removed from the opposite end of the kilns from that facing the hot floor complex, waster dumps should be near those locations, all of which are outside of Area 1 and therefore unlikely to be encountered during excavations. Only one waster brick was recovered during excavations, and none were observed to have been used in feature construction.

Technology at the Brickworks Component

What were the size, shape, and capacity of the kilns?

Kilns 1-5 were rectangular and had exterior measurements of 23.8 m (78 ft) x 11.6 m (38 ft) and interior measurements of 22.8 m (75 ft) x 10.6 m (35 ft). The furnaces extended at least 1.2 m (4 ft) from the outer kiln walls, giving each kiln a total width of 14 m (46 ft). The capacity of these kilns was approximately 400,000 bricks. Kilns 6 and 7 were smaller, at exterior measurements of 7.5 m (24 ft 7 in) x 5 m (16 ft 5 in) and interior measurements of 6.5 m (21 ft 4 in) x 4 m (13 ft). These two smaller kilns were also rectangular and had a capacity of 125,000 bricks (Hopkins 1897:156-157). The smaller kilns had only 31 per cent of the capacity and 10.7 per cent of the floor area of the larger kilns. Wall heights can be estimated for the larger kilns from the 1898 photograph at roughly 4.57 m (15 ft) tall. The smaller kilns were probably not as tall, most likely one story or about 3 m (10 ft) tall.

What types of kilns were used (periodic or continuous)?

Evidence from both the literature investigation and archeological excavations confirm that the kilns used periodic updraft technology. They often shut down during slowdowns or floods.

What was the direction and method used to control the flow of hot air (updraft or downdraft) in the kilns?

Because of the condition of the kilns upon excavation, the exact method used to direct hot air flow is uncertain. It was confirmed, however, that the kilns were periodic updraft kilns, in which case there may not have been any complex method of controlling airflow inside the kilns. The bases of the ash boxes for the kiln furnaces were lower than the floors, but the actual fuel boxes of the furnaces would have been at about floor level. The heat would have flown into the kilns through the air spaces, being drawn up through the stacked green bricks and out the open tops through a natural draft. The exact functioning of the air spaces remains inconclusive, although the open spaces between the kiln and furnaces may have been enclosed when the kilns were still standing and served to direct the heat into the furnaces, acting as a preliminary draft.

Architecture at the Brickworks Component

What are the construction features of the structural remnants examined during the data recovery?

All walls, whether interior or exterior, were made of brick. The exterior walls for the 1890-1897 steam-heated hot floor building were constructed on dry-laid stone foundations, as were the outer walls of the kilns. The northern auxiliary wing of the hot floor building, where machinery was kept, was built similarly to the rest of the structure. The southern auxiliary wing of this building, however, may have been very lightly constructed, since excavation uncovered no evidence of either a brick or stone foundation for this wing. The superstructure for the hot floor complex consisted of wood-frame construction. The 1897-1901 steam drier tunnel also had brick foundations and a frame superstructure, although this structure was not supported on stone footers.

The floors and foundations of five structural remnants of similar size were excavated in February and appear to be intact subsurface archaeological remains. Were these five structural remnants kilns? How were these five structures constructed (materials, builders trenches, size, thickness, etc., of footers, foundations, walls, floorings, etc.)? When were the kilns and other structures built?

The five structural features examined in February 2000 were kilns. Comparison of documentary evidence with the archaeological remnants proved that the kilns were the periodic open-top updraft type. The kilns were rectangular and had exterior measurements of 23.8 m (78 ft) x 11.6 m (38 ft) and interior measurements of 22.8 m (75 ft) x 10.6 m (35 ft), and were heated by a series of furnaces that flanked the exterior long walls. The kiln walls were constructed of brick and set on dry-laid stone footers. The wall fabric consisted of a combination of common building brick and refractory firebrick. The interiors of the kilns were brick-paved. Portions of the main kiln walls survived, and it was clear that the walls were set on a common brick coursing immediately above the massive stone footer. The rest of the wall was composed of a purplish building brick, which was then lined with firebrick on the interior and exterior faces of the wall. The kiln tops were covered by a frame roof structure, as demonstrated in the 1898 *Brick* article photograph (Figure 5.145). The kiln furnaces were brick, with firebrick used in the construction of the barrel vaulted furnace roofs and side walls, and common brick for the ash boxes. These kilns were almost certainly

constructed at the same time as the hot floor structure in the early 1890s. The documentary evidence discussed in the literature review indicates that the kilns were built one at a time, but in short order.

What was the function of the large structure located within Area 1? Was this large structure built at one time, or did it grow through a series of additions? Is there any evidence of structural expansion and/or retrofitting during the use life of the structure? Describe.

The large structure was a multi-room building that housed the hot floors and equipment for clay processing and brick molding. There were three hot floors, two of which where coal- and gas-fired, with hot air flowing toward the center of the building The third hot floor was steam-heated and was located east of the northern coal- and gas-fired floor. The building had two auxiliary wings. The northern wing housed the machinery used to manufacture the bricks, including the steam engine, boiler, and brick machines. The southern auxiliary wing, through which a rail spur was laid, may have been used to receive materials and fuel for the plant. The steam-heated hot floor was likely a later addition, although its presence on the 1894 surveyor's map indicates that it had been built by 1893. No evidence was found of any retrofitting beyond basic maintenance.

How was the large structure in Area 1 constructed? Did it have a basement or cellar? Where was the door(s) for this structure? Was the front of the structure oriented towards the kilns?

According to the historic photograph map and supporting archaeological evidence, the large structure had a frame superstructure supported on brick walls. Dry-laid stone foundations supported the exterior walls, while interior walls were set on brick foundations. The brick in the walls were laid using a variation of common bond. Walls ranged between 30 and 40 cm (1 ft and 1 ft 4 in) thick. The structure had no basement or cellar, although the furnaces on the north and south ends of the structure were excavated into the subsoil and can be considered subfloor rooms. Evidence for door location was not recovered, although logical access points would have been located in the western wall facing the kilns, on the ends of the building, and in the auxiliary wings. Evidence for what would have been considered the front of the building was also not recovered, although it is likely that the perceived front would have been the part of the building closest to Leet Street.

Within Area 1 there is a square hole with linear piles of dirt along each side. Does this represent a structural feature, possibly a cellar? If so, how was it constructed, and what was its function? Is it associated with the large structure shown on the surveyor's map?

Field teams investigated the large hole (Feature 7) through Trench 13 and determined that it was a modern intrusion into the site, likely the result of looting by bottle collectors. Modern material such as automobile body frame parts were present, but no architectural remains were found.

The early surveyor's map shows a small square structure in the southwest corner of Area 1. How was this structure constructed? What was the function of this structure? Where was the entrance and front side of this structure?

The literature investigation suggested that this structure was a kiln (Feature 2), and archaeological fieldwork confirmed this hypothesis. The kiln was one of a pair and was constructed similarly to the larger kilns examined in February 2000. Nothing remained of the

structure above the level of the foundations and the ash boxes for the furnaces. The two smaller kilns had exterior measurements of 7.5 m (24 ft 7 in) x 5 m (16 ft 5 in) and interior measurements of 6.5 m (21 ft 4 in) x 4 m (13 ft). The access points for the kilns would have been on the north and south ends.

Tree clearing and spring rains caused part of what seems to be a brick sidewalk or flooring to collapse into a circular, brick-lined chamber. The chamber measured approximately five feet in diameter. What is the function of this feature (cistern, well, or something else)? Looking at the spatial layout of the site, is it possible to discern why this feature was located near the edge of the T-3 terrace? Why was this feature covered by a brick sidewalk or flooring?

The exact function and age of the feature could not be determined through excavations, since the base of the structure was located below the excavation limits. The feature is located on the exterior edge of the northern auxiliary wing, as shown on the 1894 surveyor's map. The construction of the feature suggests it was not intended to hold water. The most likely function is wastewater dispersal. The feature may have been some type of sump, perhaps used to evacuate water from the soak pits, or even a privy. It is uncertain whether this feature was a component of the Harmony Brickworks or of the earlier Hugh Bevington brickworks. The bricks used in its construction measured 21.6 cm x 10.2 cm x 6.3 cm (8 ½ in x 4 in x 2 ½ in). This fits the range of brick sizes found in features positively associated with the Harmony Brickworks, but is larger than the brick size found in the feature associated with the Bevington Brickworks, the floor under Kilns 6 and 7 (Feature 121). The feature was covered by part of a stack base during construction of the steam drier tunnel and its attendant wing in 1897-1898.

Are there any other features located outside the areas covered by structures in the surveyor's drawing?

Features were located that related to the earlier Hugh Bevington brickworks (1870s) and the 1898-1901 Harmony Brickworks, which had a different plant layout than the 1890-1897 layout shown on the 1894 surveyor's map. Specifically, features 1 (coal stratum), 7 (conical mound), 20 (charcoal concentration), 23 (stone slabs), 27 (stone flooring), 33 (ash/rubble deposit), 36 (sandstone block), 83 (cesspit), 121(Bevington period floor), 128 (steam engine support), 129 (boiler support) and 131(possible hearth) were located outside of the 1894 building footprint. The surveyor's map seems to represent the factory at its largest extent, and most of the earlier and later features were subsumed or superimposed in relation to the building footprint shown on the map.

Is there evidence of earlier historic structures or features beneath the structures shown on the surveyor's drawing?

Feature 121 is the only definite earlier structure encountered. Feature 121 was a section of brick flooring located between Kilns 6 and 7 and the southern wall of the drying room building. The feature does not conform to the layout and construction of the 1890s Harmony Brickworks. The floor, which at first glance appears built against the south wall of the hot floor complex (Feature 64), was in fact the remains of an earlier structure. Construction of the hot floor's southern furnace room probably destroyed much of the structure that this floor represents. Analysis of the common brick from the floor determined that they were hand

made, not machine made, and are smaller than the bricks used in known Harmony Brickworks features elsewhere on site. Little can be determined about the structure that once contained this feature. The presence of firebrick and scorching on the floor suggests that it may have been associated with a kiln or with drying the green bricks. The former may be more likely, since heated drying floors were uncommon at the time of the Bevington factory's operation.

Site Proxemics

Which of the expected components of a typical brick factory were identified in the archaeological investigations undertaken at this site?

The following components were identified: Seven kilns, three hot floors, fifteen furnaces, evidence for brick manufacture (machinery, strike marks on bricks), and based on interior wall construction, architectural evidence for the separation of factory activities.

Based on knowledge of the steps required for the manufacture of bricks, the movement of raw material and the spatial location of structures, activity areas, and other features, what was the spatial layout of the site? Was the site layout designed for the easy movement of material and products from one step to the next? Was it designed to fit the landscape? Discuss.

The layout of the site had to be designed to facilitate the movement of materials to and from as well as within the factory, and also to fit on the landform of the T-3 terrace. These needs resulted in a compact design with the kilns clustered around the edges of the main hot floor building, with access via rail spurs to the main rail line. Both the northern auxiliary wing of the hot floor complex, where the brick manufacturing equipment was stored, and the wing of the steam drier tunnel, were centrally located on the long axis of the main building. This location was convenient for the movement of freshly molded "green" bricks to the hot floors. After a period of drying, the bricks could then be moved to the kilns immediately adjacent to the hot floors. With the construction of the steam drier tunnel, movement of material was more efficient, with the addition of light rail lines to help transport bricks around the factory.

Economics of the Brickworks Component

What was the size of each structure identified?

The large hot floor complex measured approximately 91.44 m (300 ft) x 38.1 m (125 ft) wide. Each of the large kilns was 23.8 m (78 ft) x 11.6 m (38 ft), and the smaller kilns were 7.5 m (24 ft 7 in) x 5 m (16 ft 5 in. The steam drier tunnel was approximately 35.35 m (116 ft) long and 6.6 m (21 ft 6 in) wide.

Does the size of the brick factory, including kilns and other structures, indicate that this was a large operation compared to other brick factories of a similar date range? Discuss.

The size of the Harmony Brickworks seems to conform to that of contemporary industrialized brickworks. The factory featured multiple dry floors, used a mechanical molding process, and possessed several kilns. Comparisons of this site to contemporary brick factories illustrated in Sanborn Fire Insurance maps, selected from the maps examined for the literature review (Chapter 4), show similarities in layout, such as the main bank of kilns

arranged in a line parallel to the long axis of the dry floor complex. Some of the factories in the Sanborn maps are nearly identical in layout, with steam engines and brick processing both located in a wing perpendicular to the dry floor (Figure 5.169). One factory also had two hot floors side by side (Figure 5.170). Many factories, however, kept processing and engines in one end of the main building, and none of the plants seemed to have the two floors with heat flowing towards the middle of the building, with an additional hot floor off to the side.

One factory, the Diebold Brick Company of Canton, Ohio, seems to have had a similar hot floor design, with five furnaces in one end that are reminiscent of the furnaces at the Harmony Brickworks ca. 1890-1897 (Figure 5.171). It seems that the Harmony Brickworks was slightly larger than many other contemporary brick factories, primarily because of the three hot floors within the same building. However, after the Harmony Brickworks upgraded their operation with the addition of a steam drier tunnel after the 1898 fire, the physical size of the plant decreased dramatically without affecting production. Overall, the layout of the Harmony Brickworks corresponds with that of other contemporary brickworks.

Is there evidence that this brick factory produced inferior bricks? Superior bricks? Specialty bricks for a specific market?

As the literature investigation indicated, the factory apparently experienced difficulties producing a consistent product. Because we were unable to locate a waster dump, however, there is insufficient archaeological evidence to address this question.

Religion at the Brickworks Component

Were any artifacts found that might be considered religious in nature?

No artifacts were found that could be associated with religious activities.

Was there any religious aspects to the design and construction of the buildings? Were the design and/or construction of the structures considered "typically" Harmonist?

At this point, the evidence from the archaeological record is equivocal for any influence of Harmonist values on the physical layout and function of the site. It is possible that the seemingly unique arrangement of hot floors was the result of Harmonist appreciation for efficiency, but it could also be the result of an innovative architect with no connection to the Harmonist value system. A desire for efficiency is not reflected in the choice of kilns, since the more efficient downdraft kilns in use at other contemporary brick factories were readily available, albeit at a higher cost. Also, when the brickworks was constructed and in operation, the Harmony Society was waning and apparently not actively recruiting or promoting their religious values to the outside world. The likelihood that Harmonist values were a major consideration in the construction and operation of the factory is remote.

Transportation Network for the Brickworks Component

How were raw materials brought to the brick factory?

Raw material needed for brick production included water, clay and fuel. A water tower supplied water that may have ultimately come from the Ohio River. Workers mined clay from the riverbank just below the location of the factory, and probably brought the clay to the

factory using carts. There is no evidence that the light rail used at the site extended to the clay pits. Fuel in the form of coal was likely brought in by rail, while gas was pumped to the factory from Harmony Society wells.

What was the transportation system used to move the finished product to market?

The 1894 map suggests that the nearby rail line was the main and perhaps only transportation system used to move finished products. However, no archaeological evidence was found to confirm or deny this supposition.

It appears that a railroad line may have entered the factory, and that separate lines led to each kiln. In order for the road and rail line to enter the brick factory, the relict back channel of the Ohio River was filled in up to present grade for these transportation features?

This scenario is certainly a possibility, although excavation uncovered no evidence for such an activity within Area 1.

Is there any archaeological evidence of a road or railroad bed in Area 1?

There is little archaeological evidence for a road or rail bed in Area 1, although a highly compact section of the coal layer present in Block L in the southern part of Area 1 may be a remnant of a road or rail section. Numerous small railroad spikes were found throughout Area 1, and are likely from the light-rail system depicted in the 1898 photograph of the site. The 1894 map shows rail spurs leading from the rear of Kilns 1-5 and connecting to a main rail spur that led to the nearby rail line. Another possible rail spur is shown on the map as crossing Leet Street from the southeast and entering the two auxiliary wings of the hot floor complex.

How does the elaborate transportation system at this factory compare to that at other brickworks during the same time period?

The Harmony Brickworks seems to have been one of only a few brickworks that depended so heavily on rail transport. Most contemporary factories examined during the literature review were located to take greater advantage of road networks.

Did the river serve as a major transportation corridor for the finished bricks? Did the railroad serve as a major transportation corridor for the products?

No evidence was found to confirm or deny the use of the Ohio River as a transportation corridor. As stated above, the railroad was the main transportation system used by the Harmony Brickworks.

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