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Cover Page Footnote

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Bricks and an Evolving Industrial Landscape: The West Point Foundry and New York's Hudson River Valley

Timothy James Scarlett, Jeremy Rahn, and Daniel Scott

Ongoing archaeological research at Scenic Hudson's West Point Foundry Preserve in Cold Spring, New York, has permitted systematic collection of data related to fire and common brick brands that appear throughout the foundry's campus. Archaeologists have begun to correlate the varied ceramic building material with periods in the evolution of this 19th-century industrial landscape. Hudson River Valley brick making provides an interesting comparison to the foundry's history since both industries were tied to the overall development of New York City's urban fabric.

Des recherches archéologiques en cours dans l'aire de conservation de la fonderie de West Point (West Point Foundry Preserve) de la société Scenic Hudson à Cold Springs dans l'état de New York ont permis la collecte systématique de données liées aux marques de briques communes et de briques à feu que l'on retrouve sur tout le territoire de la propriété de la fonderie. Les archéologues ont débuté la corrélation entre les divers matériaux de construction en céramique et les périodes dans l'évolution de ce paysage industriel du XIXè siècle. La production de briques dans la vallée de la rivière d'Hudson permet une comparaison intéressante avec l'histoire de la fonderie puisque les deux industries étaient liées au développement d'ensemble du tissu urbain de la ville de New York.

Introduction

On June 7, 1817, Mr. William Young and Mr. Muirhead began laying out the first buildings at the site of the new West Point Foundry. Their workers built the site's core and began operations before the following year was out. The foundry was a very early industrial concern set among pastoral, agricultural, and wilderness lands at the opening to the Hudson River Highlands. The West Point Foundry site has now become The Scenic Hudson Land Trust's first Heritage Preserve. Scenic Hudson partnered with Michigan Technological University's Industrial Heritage and Archaeology program, initially to assess the site's conditions and help prepare needed consolidation, conservation, and restoration plans. After several seasons of work addressing site-specific needs, the research effort has begun to assess wider issues, including the role of the foundry in the cultural, economic, and technological changes in Hudson River communities during the early-19th century. This paper uses some of the data generated by analyzing bricks found at the site to explore the development of the foundry landscape. We further suggest that the connections between the workers who molded the bricks and those pouring the iron ran deeper than superficial reading might indicate.

The West Point Foundry

The West Point Foundry (1818–1912) began operating as a munitions contractor making cannon and shot. The foundry grew to employ hundreds of workers manufacturing a wide array of weaponry and ordinance, steam engines, water wheels, iron clad sailing ships, architectural elements, domestic stoves and ovens, and innumerable other cast iron objects. The foundry's prominent owners were among the first industrialists to employ "vertically integrated" production, where they controlled every aspect of manufacture from extracting raw ore to delivering their finished products (Norris 2002).

The topic of archaeological study several times in the past few decades (Grossman et al. 1991; Rutsch et al. 1979), the West Point Foundry has recently been the subject of study by archaeologists from Michigan Technological University. This study has resulted in a series of Master's Theses (Deegan 2006; Finch 2004; Herzberg 2005; Norris 2002; Timms 2005; Valentino 2003), a forthcoming issue of *IA: The Journal of the Society for Industrial Archaeology*, as well as a dedicated session of papers and tours during the 2006 Annual Meeting of the Council for Northeast Historical Archaeology in Tarrytown, New York.

The West Point Foundry was one of four national armories established following the War of 1812 and enjoyed numerous government contracts for cannon, shot, and shell. During the Civil War, the foundry manufactured much of the Union Army's artillery. These products included the famous Parrott gun, a refined rifled cannon developed by the foundry's Superintendent, Robert Parrott. Guns produced in Cold Spring included both brass and iron cannons that ranged from ten to four hundred pounders. The foundry staff became so famous for their work that Jules Verne critically immortalized them in his 1865 book *From The Earth to the Moon*.

Foundry workers also manufactured a variety of non-military cast iron products that were marketed throughout the United States and abroad. For example, they made machinery for cotton mills in America's southern states and sugar mills in Austria, Nova Scotia, and the Caribbean. Some of America's earliest steam engines were made in Cold Spring, as well as several of the first locomotives manufactured on this continent. The company cast and constructed the *Best Friend* (1830), the *West Point* (1831), the *DeWitt Clinton* (1831), the *South Carolina* (1832), the *Phoenix* (1832), and the *Experiment* (1832). The foundry also cast both cannon and structural parts for iron clad ships that transformed nautical technology. Workers cast the marine engines and boilers for the horizontal side-wheel steam frigates *USS Mississippi* (1841) and *USS Missouri* (1843) and the steamships *Victory* (1827), *Erie* (1832), *Champlain* (1832), *Lexington* (1834), *Highlander* (1835), *Rochester* (1836), *Swallow* (1836), *Utica* (1837), and *Tray* (1840), as well as iron hulls for the catamaran-type *United States* (1832) and the screw-driven revenue-cutter *Spencer* (1844). When at peak production, the foundry produced a dizzying array of objects, including high- and low-pressure stationary steam engines and boilers, a variety of mill equipment and machinery, sugar cane presses, kettles, box stoves and ovens, wheels, plummer blocks, gudgeons, shafts, cranks, flanges, building facades, and even the water pipes, hydraulic cylinders, and elbows for the Croton water supply system in New York City.

Workers began building the site's physical plant in 1817. Earth-moving over the next several decades, particularly the first twenty years, transformed 88 acres surrounding Margaret's Brook (now Foundry Brook) into a rationalized landscape dedicated to power generation and transmission and the manufacture and movement of large, heavy iron products. Workers built the building complexes and landscape with assorted materials, including masses of slag, slabs of iron, courses of undressed and finished stone, and hundreds of thousands of bricks. Builders constructed most of the buildings and the site's main subterranean tailrace, at least in large part, using ceramic building materials.

The site's bricks are important artifacts. Ceramic building materials help to answer focused questions at the West Point Foundry site, such as helping to correlate building episodes or identifying sequences of, or modifications to, the construction of the physical plant. The bricks also point to stories about the common connections between clay and ironworkers, how the heavy iron and heavy clay industries interconnected with each other up and down the Hudson River. The bricks are emblematic of the relations people built amongst themselves in their communities and those complex technological and ecological systems that interconnect them. Bricks are the humble and often ubiquitous artifacts with which individuals built social and economic relations upon a landscape, connecting urban dwellers in what became the fastest growing city on earth with the iron and clay workers upriver.

Wheat, Iron, and Clay: The Rise of Market Capitalism in the Hudson River Valley

When the West Point Foundry was established, Hudson River Valley communities were undergoing a series of complex transformations as market capitalism slowly completed its rise into the dominant mode of social interaction; a social change with roots in both urban and rural America (Clark 1996: 223–225). Unlike the rest of early Federal-period America, much of the land in the Hudson Valley was controlled by large landowners in a manorial system, yet tenant/landlord conflicts were not unique to this part of 19th-century America (Bruegel 1996; Henretta 1998). While the mid- and uplands grew, artisans, tradespeople, and merchants in the burgeoning metropolis of New York City debated the political and social forms that capitalism produced in this region (Wilentz 1984).

In the 18th century, the international market's high price for wheat in Europe and the Caribbean drove the Hudson's up-river

growth. People found colonization attractive because initial settlers benefited from the high yield produced by the rich, virgin topsoil. Large landowners could attract settlers to their lands by offering them good land and subsidizing the initial time needed to clear it. Settlers often had credit through the landlord's local store and they could get needed additional credit or goods by converting acres of timberland into potash, which the large landlords often organized to trade downriver in exchange for cash or commodities. Landlords sometimes offered similar arrangements for maple sugar or beef cattle (Taylor 1995: 86–138, 386–392). The landlords also initiated or facilitated some infrastructural investment, such as building grist or lumber mills, but the residents of the Hudson's mid- and uplands approached the "market revolution" with some skepticism (Bruegel 1996:1398–1399).

The region's soils became increasingly exhausted by the turn of the century while the growing rush of westward expansion created competing farms that filled the market with grain grown in new virgin fields with higher yield per acre. As roads and canals began to crisscross the region, the rural farmers throughout the valley joined the market economy in complex and highly localized ways. Households adopted strategies that ranged from pursuing of market advantage in some areas, such as taking winter put-out work, cutting timber, harvesting ice, or laboring in brick-yards, to avoiding direct market involvement in others, including ongoing participation in community-based systems of barter and neighboring (Harris and Pickman 2000: 49–50; Wermuth 1998: 179–182). Most large farming communities along the Hudson increasingly turned to more intensive agricultural production or gradually shifted toward other, non-agricultural enterprises. The heterogeneous development of industrial and market-oriented capitalist labor relations and the market economy shared roots in the textile, metallurgy, mining, cattle, tanning, clothing manufacture (particularly boots, shoes, and hats), and machine tools industries (Lewis 2005: 33–35; Weil 1998: 1335–1336). This shift also heralded an increased rate of landscape modifications along the Hudson River, including transportation improvements (Harris and Pickman 1996).

The Hudson River iron industry's growth was somewhat retarded by the manorial system's large landowners who favored agricultural development. New England's Yankee mechanics, by comparison, had developed the Salisbury District in northwestern Connecticut, southwestern Massachusetts, and a slice of eastern New York by 1790. Iron mines and charcoal-smelting furnaces dotted the Hudson River landscape before 1800, but their number expanded dramatically during the 19th century along with new forges, coke-smelting furnaces, foundries, and rolling mills. Concentrations of iron production grew up around quality ore lodes, particularly those areas with magnetite ores low in phosphorous. Clusters of production sites included the region that trended southwest from West Point and Newburgh in Green County, in Putnam and Dutchess Counties, at Troy, and spread widely over the lands west of Lake Champlain, as well as northwest Connecticut. The same canal that created problems for farming communities along the river provided inexpensive anthracite coke to the Hudson market starting in 1831, and capacity expanded with the completion of the Erie Railroad in 1843 (Gordon 1996: 64–73).

As the iron market developed in the 19th century, and quite dramatically so during the Civil War, the demand for diverse product with wide ranging characteristics meant that ironmasters and workers engaged with the relations of market capitalism in ways equally complex as the owners of the nearby large and small farm communities. While skilled workers often had to be imported in the late-17th and early-18th centuries, both skilled staff and general laborers increasingly received their training on-site as the industry took root in the 19th century (Gordon 1996: 118–119). Immigrant labor remained important to Hudson River iron works. Consumers' steadily demanded diverse types of iron for different products while furnace technology underwent an explosion in technological innovation. This meant that one large furnace might profitably use cutting edge technology driven by heavily capitalized investment while a neighboring furnace could still profitably use 18th-century methods and make only judicious expenditures on equipment and improvements, since a single consumer might seek iron produced using both methods (Gordon 1996: 55–59).

European immigrant brick makers, by comparison, also worked clay yards in the Hudson River Valley as early as the 17th century (O'Conner 1987: 43–43). Much of the Hudson's shores consist of glacially emplaced beds of Cretaceous sediments on top of layers of Pleistocene clays. While these clays were

originally deposited in lakes, isostatic rebound raised the ground after the glaciers retreated and erosion exposed the clay beds along the river's banks (Gilbert, Harbottle, and deNoyelles 1993: 23–25). The brick industry grew explosively, however, during the 19th century at the same time that workers built the West Point Foundry's infrastructure. The 19th-century growth was such that by 1910 one American trade journal proclaimed the Hudson River Valley's brick industry to be the world's largest center for that trade (O'Conner 1987: 1). George V. Hutton asserted that if one picked any random brick building in New York City, the odds were three to one that it contained Hudson River bricks (Hutton 2003: 11). Brick making along the Hudson rose to a dominant national position due to the producers' easy access to moderate quality clay, coal for fuel, laborers (particularly immigrants) who would work for low wages, and especially because of market access to New York City. The voracious demand for brick in New York City during the 19th century fed this developing sector of the valley's economy (Gilbert, Harbottle, and deNoyelles 1993: 35). The city's growth, indeed the fastest growth of any city in the world by century's end, provided an enormous market of consumers for both the regional brickyards and the West Point Foundry, since the shops of the latter started producing fashionable iron building facades in the 1870s.

The common and fire brick used in construction at the foundry site provide archaeologists with an important tool to understanding the evolution of the foundry's 88-acre factory campus. Researchers can also use the bricks to pose a number of interesting questions about the development of the heavy clay industry in New York, the clay yards' connections to the Hudson River market, and larger process of social and economic change in the region. Archaeologists, students, and volunteers began creating a comprehensive database of bricks identified on the site in 2002. The database continued to mature after each season of fieldwork and analysis. This is the first interim report from this effort.

Fieldwork at the West Point Foundry

Michigan Technological University's Industrial Archaeologists concentrated their initial research efforts on identifying the site's features and remains, supporting the Scenic Hudson Land Trust's needs for conservation, stabilization, and preliminary interpretation. When fieldwork commenced in the summer of 2002, the archaeology crew began a thorough digital survey of the site. During the mapping process, the survey crew initially relied upon a composite base map created by archaeologist Edward Rutsch in 1979. Rutsch had superimposed all the Sanborn fire insurance maps of the facility to create a working base map for his study. The 2002 survey crew divided the foundry's acreage into operations based upon commonsense, although arbitrary, decisions. Each operation was to contain a manageable volume of space where the features could be drawn during the digital mapping process. The operation boundaries, the crew hoped, would also fall upon divisions in the work process at the foundry so that the molding shop, for example, would fall into a different operation than the boring mill. The surveyors assigned numeric identifiers to the operations sequentially, establishing dividing lines where visible features and topography seemed to correlate with boundaries between buildings on Rutsch's composite map.

During the 2002 survey (Valentino 2003), and in the 2003, 2004, and 2005, seasons that followed, researchers identified variation in the locations of branded and unbranded bricks throughout the foundry site. Some brands appeared to cluster in certain smaller areas of the site. In 2003, the field researchers studied the foundry's extensive waterpower network and thus excavation was directed at ground-truthing geophysical data (Finch 2004). Whenever the crew spotted a unique brick brand in the course of their other tasks during fieldwork, they marked the brick of interest. One of the research team would periodically move about the site, collecting those bricks and recording their provenience. During the 2004 and 2005 seasons, excavations focused on detailed explorations of smaller areas within the complex of buildings. These provided the first opportunity to study bricks *in situ*, set in courses of foundation structure in Operation 9 at the blast furnace (Kotlensky 2006) and its associated blowing engine (Timms 2005), Operation 4 at the cannon boring mill complex and the head of the tailrace (Herzberg 2005), and in Operation 16 at the East Bank House (Deegan 2006) and the 1865 office building (Scarlett and Deegan 2005).

The bricks were all initially identified as part of surface deposits. Bricks sitting on the modern ground surface have potentially been moved from their original context. These

bricks therefore provided examples of brands used in foundry construction *at some time* during the site's history. Since the foundry's closure, a series of anthropogenic processes have contributed to the movement of bricks around on the site's surface. These transformations included the "robbing" of brick and stone for recycled use in local architecture, the collapse and erosion of buildings and sediments, and the construction of a long pedestrian walking path of assorted bricks that ran along Foundry Brook through the sites of the machine shop to the eastern side of the blacksmith shop.

While the presence of surface-find bricks was important, the field crew recorded only the operation in which they were found. Precise map coordinates were not considered meaningful on surface rubble. Crew members have entered an increasing number of bricks into the database which they removed from foundations and structural remains uncovered during excavations, in direct contrast to surface finds, and for which they recorded precise chronological and spatial information.

Mapping the Evolution of the Physical Plant

While the surface finds provided information about brands and makers for whom the field crews should be "on the lookout," the bricks taken directly from architectural foundations should provide the most information about the evolution of the West Point Foundry's physical plant. In two detailed studies of the historic maps and documents that illustrate or describe the foundry's growth and change, both Alicia Valentino (2003) and Kimberly Finch (2004) determined that historic documents aptly represent the authors' impression of various building outlines at discrete moments in time. All of the documents depicted things that varied to some degree from the archaeological survey map. Valentino used all the known maps that show details of the West Point Foundry site to build a series of comparative images showing the physical changes over time. She used assorted local and regional maps that were made in ca. 1840, 1853, 1867, 1872, 1876, and 1887; a set of Sanborn Company fire insurance maps from 1897, 1900, 1912, 1927, and 1965; Ed Rutsch's archaeological map from 1979, and MTU's survey of surface remains from 2002 (Valentino 2003: 68).

Valentino's systematic comparison showed the utility of the maps to illustrate the structure of the foundry at moments in time, but she also found their limitations. She noted that the historic maps typically only captured the outlines of each building's footprint, and especially for the earlier maps, often without illustrating details of internal walls or the division of space. The older maps neglected to distinguish between additions and the building's primary exterior walls. Because the drafters did not intend the maps to record historic information, they generally did not indicate which portions of buildings had been torn down, modified, or where a wooden structure had been replaced with brick or iron framing.

Valentino completed a detailed comparison of individual complexes and activity areas at the foundry in her study of the overall site development. The most detailed of these investigations, for the boring mill complex (Operation 4), guided portions of the fieldwork in 2003 and 2004. The first map to show the boring mill dated to 1853, although other documents confidently indicated that the complex was among the first structures built at the site in 1817. Adding to the site's uncertainty, the first two maps of the boring mill showed an inconsistent footprint. Changes and additions to the building's outline showed that workers had linked the structure to the blacksmith and casting house complexes on the northern and southern sides. Another addition had been built to the east between the complex and the foundry's central rail line. The first map that showed any internal organization or subdivision was the 1872 Scofield Map. The documents provided no genuine clues about the early phases of construction and modification of the building.

When research team members compared Valentino's analysis of the maps to the actual remains underfoot, the importance of studying ceramic building materials became immediately apparent. In 2003, preliminary testing in the boring mill complex sought to identify the major components of the foundry's waterpower network. Excavations during that wetter-than-average summer showed that the foundation and walls were of stone. The mill's 36-foot diameter wheel was fed by a wooden flume from above and then drained through a large tailrace, which was exposed through excavation and geophysical prospection (Finch 2004: 43–45, 77–93). In 2004, archaeologists used pumps to lower the water level in the channel at the head of the tailrace and continued excavation. This further excavation revealed that while the tailrace was faced with

stone, the inner vault had been built using brick. A submersible Remote Operated Vehicle from Michigan Technological University's Isle Royale Institute confirmed that the brick vaulted passage remained intact as it curved southward under the foundry's infrastructure (Herzberg 2005). The race's brick vault remained full of water and crewmembers could not remove any bricks for analysis without significant risk of destabilizing the structure. This analysis will go forward after consultation with a structural engineer or preservation mason.

Herzberg's detailed attention to the boring mill area showed how the footprint of the building evolved. The western brick addition may have been added as early as 1849–1850. William Blake described the site in his book, *A History of Putnam County* (1849). He explained that during his visit to the site, workers were erecting another boring mill that would contain machines for slotting, planing, drilling, and a large face lathe (Blake 1849: 244; Herzberg 2005: 16). Blake did not say if the new mill was freestanding or with which materials workers planned to construct it. On later maps, the western addition is labeled "Iron Turning and Planing." Herzberg's excavations in the brick addition located a wheel lathe in the northern corner that had also been recorded in an 1890s photograph (Herzberg 2005: 26–30). This lathe may have been the "large faced lathe" mentioned by Blake in 1849. These excavations also provided an opportunity to examine the bricks used in construction of these additions.

Common Red Bricks: Boring Mill Complex

The bricks from different areas of the boring mill complex can help archaeologists to determine a more detailed sequence of construction and modification. During excavation, archaeologists removed a single brick from the northern wall of the brick addition (Feature 48, Brick/Brand #29), a separately built section of that wall (Feature 55, Brick/Brand #34), the western wall of the wheel lathe pit (Feature 47, Brick/Brand #35), and a course of bricks laid into the iron floor next to the water wheel inside the original stone boring mill building (Feature 30, Brick/Brand #18). While none of these bricks bear a brand, they are nearly identical in size, color, and manufacture. They all measure nearly the same 20 × 9 × 6 (cm) or 8 × $3^1/_2$ × $2^3/_4$ (in). None of the bricks' manufacturers used culm (coal dust added to improve firing) in the mixture for the bricks, indicating that they could have been made before 1828 when this practice was introduced to the Hudson River brickyards (Hutton 2003: 21).

It does not follow that because the bricks are physically similar to one another the structures from which they came were built simultaneously. The similarity of the bricks, however, can contribute evidence regarding the sequence of construction that can lend support to a larger argument. Since the addition walls and the machine pad seem to be built of the same type of brick, it suggests that the structures were built at the same time. It seems likely that the machine footer was not significantly modified or rebuilt at some later date. This interpretation is further supported by the excavators' observations that while the brick courses only abut the original building's stone foundation, the north and east addition walls were keyed together at the corner, as are the different parts of the machine footer and pad. The section of the northern wall which appears different from the rest (Feature 55) was built using the same brick, suggesting that the difference in course pattern followed from the plan to sit the wheel lathe pit at that location, complete with a deep pit and belt drive wheel attachments bolted to the wall north of the machine itself.

The argument becomes weaker, however, when one considers that Brick #18 is also nearly identical to those from the addition. At some point, someone laid this brick in a foundation course next to the water wheel pit (Feature 30 in Grid 4M). The bricks became embedded into the iron sub floor of the mill as the boring waste built up under the wooden floor. The stone building is purportedly several decades older than the brick addition, which makes it unlikely that someone installed the course of bricks while the building was first built. If this brick was contemporary with the others, then this wall was built at about the same time as the addition and the machine base. It also follows that the construction or formation of the iron flooring postdates the addition, which we have suggested in this article was built around 1849–1850.

All of this must be contextualized by the fact that the technology used to manufacture these bricks is perhaps the single most common production method of the first half of the 19th century. Any of these construction sequences could also represent re-use of old brick stock on the site. Nineteenth-century

mortar was much easier to clean from bricks than the modern equivalent, so they could be reused more easily. More study of the bricks and the architecture of the boring mill complex is required to resolve these questions, but the promise of studying the bricks in detail is clearly evident.

Common Red Brick: 1865 Office Building

Identified brick brands also help correlate construction sequences and landscape evolution throughout the site. Among the seven brands discovered on common red bricks (TAB. 1, FIG. 1), three deserve specific mention here. The "OB&V" brand (#13) appears on bricks used to build the 1865 office building. Preservation masons removed several bricks with this brand from the office building's chimneys during stabilization efforts in 2004. The O'Brien and Vaughey Company is likely the match to this brand. These two partners ran a brickyard in Brockway, N.Y., about 10 miles north of the foundry on the Hudson's eastern shore. O'Brien and Vaughey's factory sat adjacent to the Edwin Brockway brickyard (Hutton 2003: 87). According to George Hutton's research, Brockway opened his brickyard in 1886 and founded the town that also bore his name for the factory workers. O'Brien and Vaughey operated their adjoining yard at an undetermined time thereafter. However, since foundry workers built the office building in 1865, and the preservation masons think the chimneys were not rebuilt, the attribution of this brand to that particular yard is suspect. O'Brien and Vaughey may have started earlier than Hutton believes, or may have operated a different yard somewhere else before moving to their Brockway facility. Our current assumption is that the office building chimneys were part of the original brick construction, and that the OB&V brand therefore provides a time marker for foundry buildings constructed during the Civil War-era building expansion.

Other companies may also have used the OB&V mark, though none have been identified. There were many O'Briens making brick in different companies throughout the region (deNoyelles 1982: 253), and other companies were using an "O&B" or "OB" brand in the 1880s (Gurcke 1987: 274). Richard O'Conner provides perhaps the best insight into the ambiguities of this region's brick identification in his 1987 dissertation, although he does not explicitly discuss the challenge of attributing a brand to a particular yard. Through his analysis of the brick industries' history, O'Conner describes the prominence of Irish workers in the 19th-century labor pool and the relative ease with which someone who had gathered some modest capital and experience in the factory could sublet a yard and enter into production during a given year.

Common Red Brick: Turbine Flume Pylons

Many of the bricks used in the modern construction of a brick pedestrian path through the site's ruins bear the "BUDD" mark (Brick/Brand #2). W. D. Budd Brick Co of Duchess Junction, NY, used this brand. Daniel deNoyelles found reference to this brand in 1899 (deNoyelles 1982: 227). The "BUDD" mark appears ubiquitously among the rubble used by volunteers to build a walking path through the current ruins, but also *in situ* in the brick pylons that supported a flume pipe that brought water to the machine shop's power house. Kimberly Finch argued that workers built those pylons during the 1890s when the Cornell Brothers enhanced the foundry's physical plant. They added a turbine and a generator in a powerhouse at the north end of the machine shop complex. The flume and the generator appear on maps and in photographs from that period (Finch 2004: 136–140) and their installation probably correlated with the installation of porcelain knob-and-tube fixtures during the electrification of the 1865 office building once electricity was made on site.

While the pylons seem to date the BUDD brand to the last decade of the 19th century, William D. Budd is listed in the 1850 census as a brickmaker (Ancestry.com 2005), and his family continued to operate the yard after his death. George V. Hutton mentioned the Budd yard when he recorded that, "the two daughters of the deceased owner inherited the William Budd yard at Fishkill Landing [Beacon, NY]. 'The Misses Budd' not only increased the plant's output but reputedly made the first use of electric power for the operation of Hudson River brick machines" (Hutton 2003: 87). The foundry workers could also have used old, existing brick stock when constructing the pylons. William D. Budd's yard may have also produced brick bearing the "WDB" brand that was also found at Operation 1 in the foundry's molding shop complex (Brick/Brand #39). This brand, if it was a product of the Budd yard, could date to a different period.

Table 1. Common brick brands identified at the West Point Foundry Site. These bricks appear on the map in Figure 1.

Brand [WPF Brick #]	*WPF Operation*	*Companies*	*Known Dates*	*References*
DPBW [#01]	Brick Path, Machine & Blacksmith Shop	Dennings Point Brick Works, Beacon, NY	1881–1899, 1926	Hutton 2003: 86–87; Gurcke 1987: 228
BUDD [#02]	Flume Pylons, Brick Path Op 16, Surface	William D. Budd Co., Dutchess Junction, NY; Fishkill Landing (Beacon, NY)	1850?–1899	deNoyelles 1982: 227; Hutton: 2003: 87
OB&V [#13]	Op 16 Office Building Chimney	O'Brien and Vaughey?, Brockway, Beacon, NY	1865	deNoyelles 1982: 246, 253–254; Hutton 2003: 87
STILES [#26]	Boring Mill Op 4, Surface	Stiles Brick; Isaac L. and Frank L. Stiles; Geirge Stiles of North Haven CT / Camden NJ	1880–1940	1880 United States Census; 1932, 1942–43, & 1940 New Haven, CT City Directory (ancestryplus.com)
HAMMOND [#37]	Brick Path, Machine & Blacksmith Shop	William K. Hammond Dutchess Junction, N.Y. Hammond Fire Brick Co. West Virginia	1905–1910 1921–42	deNoyelles 1982: 240, 271 Gurcke 1987: 242
WDB [#39]	OP 1, Surface	William D. Budd Company Dutchess Junction, NY; Fishkill Landing (Beacon, NY)	1850–?1899	deNoyelles 1982: 227; Hutton: 2003: 87
NICHOLSON [#48]	OP 16 Boiler house Surface	J. Nicholson Haverstraw, NY Nicholson Brothers Dutchess Junction, NY Nicholson and Reilly Haverstraw, NY	1905	deNoyelles 1982: 252 deNoyelles 1987: 270 Hutton 2003: 119

Table 3: Assorted fire bricks from the West Point Foundry Site. These bricks appear on the map in Figures 3 and 4.

Brand [WPF Brick #]	*WPF Operation*	*Companies*	*Known Dates*	*References*
W.H.BERRY&Co No.1 WOODBRIDGE N J [#21, #21b]	OP 1, Surface	William H. Berry and Company, Woodbridge N.J.	1845–1896	Ries & Kümmel 1904:324
BERRY Ø EXTRA Ø WOODBRIDGE. N.J. [#23]	OP 1, Surface	William H. Berry and Company, Woodbridge N.J.	1845–1896	Clayton 1882: 582; Ries & Kümmel 1904: 324
RUFFORD STOURBRIDGE [#25, #25b, #30]	OP 9, Surface, 04-04-04-4N-10, 04-04-04-Surface Rubble	Rufford Brick, Francis T. Rufford, Hungary Hill, Stourbridge, England	ca.1800–1936	Gurcke 1987: 68–69
HUGHES & EA… STOURBRID…[#31]	04-03-9-Surface	Five Hughes identified as brickmakers in Stourbridge, England	ca. 1880?	AncestryPlus.com

Table 2: Fire Bricks from Operation 16, including the Pattern Complex Boiler House and the Office Building. These bricks appear on the map in Figure 2.

Brand [WPF Brick #]	Companies	Known Dates	References
KING [#50]	King Brick Company, Kingston, NY	n.d.	deNoyelles 1982: 244
	Louisville Fire Brick Works, KY	1942	Gurcke 1987: 256–257
	North American Refractories Co., PA	1930–1942	Gurcke 1987: 256–257
	Queen's Run Fire Brick Co., PA	1904–1927	Gurcke 1987: 256–257
KEYSTONE [#49]	Elk Fire Brick Co.	1919–1931	Gurcke 1987: 256
	North American Refractories Co.	1930–1942	Gurcke 1987: 256
GLOBE [#47]	Globe Brick Company, Haverstraw, NY	1883	deNoyelles 1982: 239
	Globe Brick Company, WV	1921–1930	Gurcke 1987: 240
PEEKSKILL No1 [#53]	Peekskill Fire Brick Co., NY	1921	Gurcke 1987: 278–279
STRASBU… [#27]	Columbia Fire Brick Co, OH	1921–1942	Gurcke 1987: 302
CBM SPEC [#28]	Clearfield Brick Manufacturing Co., PA.	1921–1931	Gurcke 1987: 214

Common Red Brick: Other Surface Finds

The "DPBW" branded bricks are also potential chronological indicators. Karl Gurcke listed the D.P.B.W. brand as used by the Dennings Point Brickworks in 1926 (Gurcke 1987: 228), and Daniel deNoyelles describes Homer Ramsdell of Fishkill, NY, operating the Dennings Point Brick Works with the D.P.B.W. brand in use in 1899 (deNoyelles 1982: 231). Denning's Point is immediately south of Fishkill Landing and was owned by the Verplanck family until William Denning purchased it sometime after the Revolutionary War, giving it his name. In the late-19th century, Homer Ramsdell took possession of the property as part of a larger business deal of land and property exchanges with the Hartford and Erie Railroad. Ramsdell opened the Dennings Point Brick Works in 1881 (Hutton 2003: 86–87). The raw clay came from the yard grounds at first, then was supplemented by river dredge clay until the clays were totally exhausted in the 1930s. The workers ground the property's red shale and used it as a coloring agent (Hutton 2003: 86–87). The factory, including the large Dennings Point yards at Dutchess Junction and Fishkill Landing, shut down for a year in 1894 while market prices bottomed out (Hutton 2003: 97).

The D.P.B.W. (Brick/Brand #1) brick recovered at the West Point Foundry Preserve was made in a five-part mold using sand as a lubricant. It included fine red gravel mixed in with the ceramic fabric, clearly the ground red shale mentioned by Hutton. The strike marks on the backside of the brick are just uneven enough that the initial inspection in the laboratory suggested that it could have been hand struck. Since the "D.P.B.W." was known to employ brick making machines powered by a sixty-horsepower steam engine (Hutton 2003: 86–87), Brick #1 may be an early product of the yard or perhaps an experiment with river clays. This brick was also found in the jumbled rubble construction of the brick path through the machine shop complex. Archaeologists can now use the "D.P.B.W." brand, however, as a marker for architecture constructed after 1881 and perhaps as late as the final expansion of buildings in the 1890s. Further research may narrow these bracketing dates.

The Foundry's Firebrick

Firebricks are used for different purposes than common brick because they can be exposed to higher heat and for extended periods of time. They are made using particular clays that are often processed more intensively than common brick. The earliest firebrick were made using soft-clay molds and then were repressed during their green phase before firing to create their required sharp edges. Even after the introduction of extruded brick machines, most firebrick was still repressed. All these additional processing steps made firebrick more expensive than common brick. Firebrick became essential to the construction and operation of a furnace because they replaced the older sandstone and clay lining, which was more expensive to build and burned out quickly.

Most brickyards in the Hudson River Valley could not make firebrick during the early- or mid-19th century because the region's clays contain high levels of calcium. Calcium lowers the bricks' vitrification point, causing

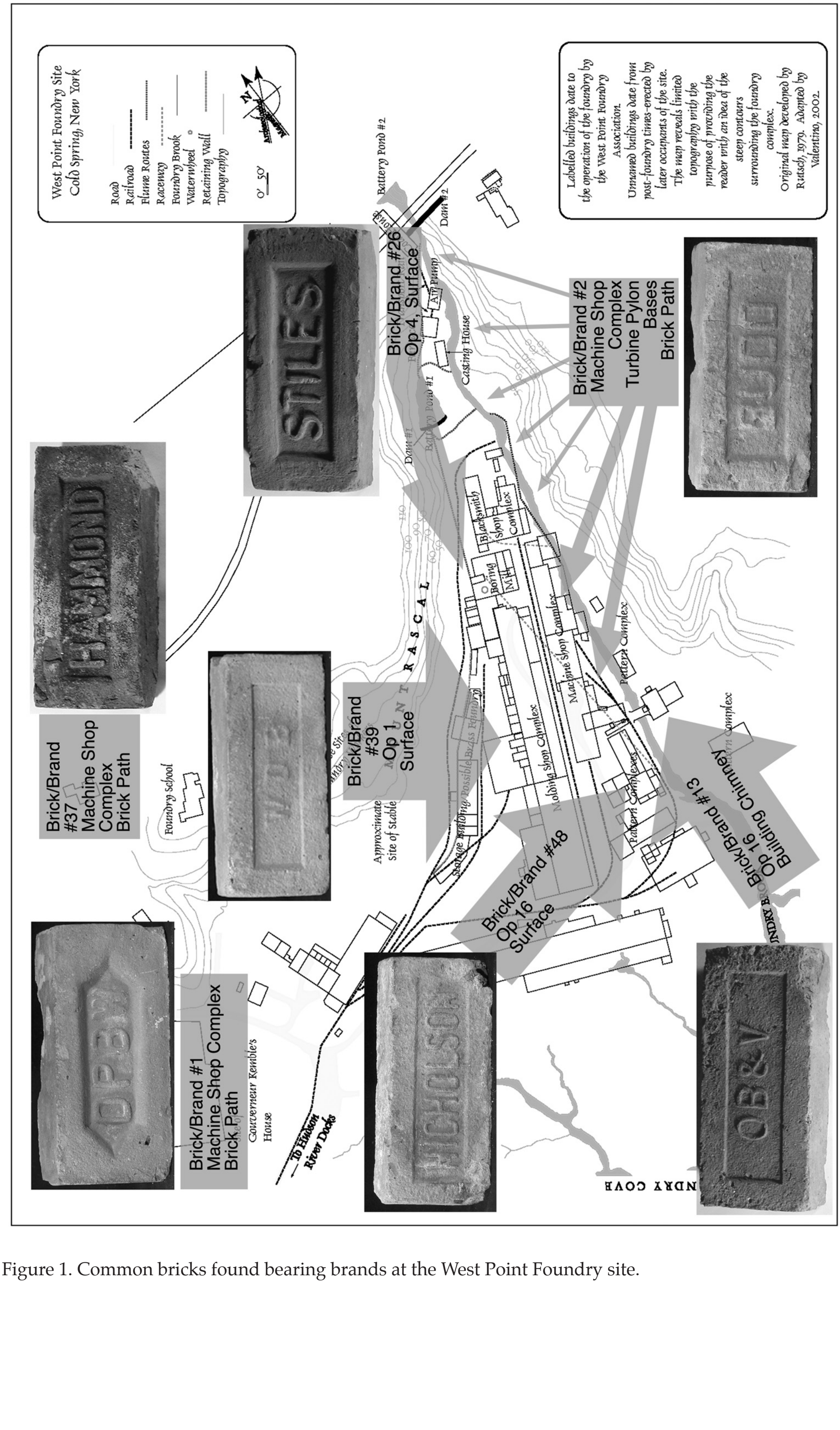

Figure 1. Common bricks found bearing brands at the West Point Foundry site.

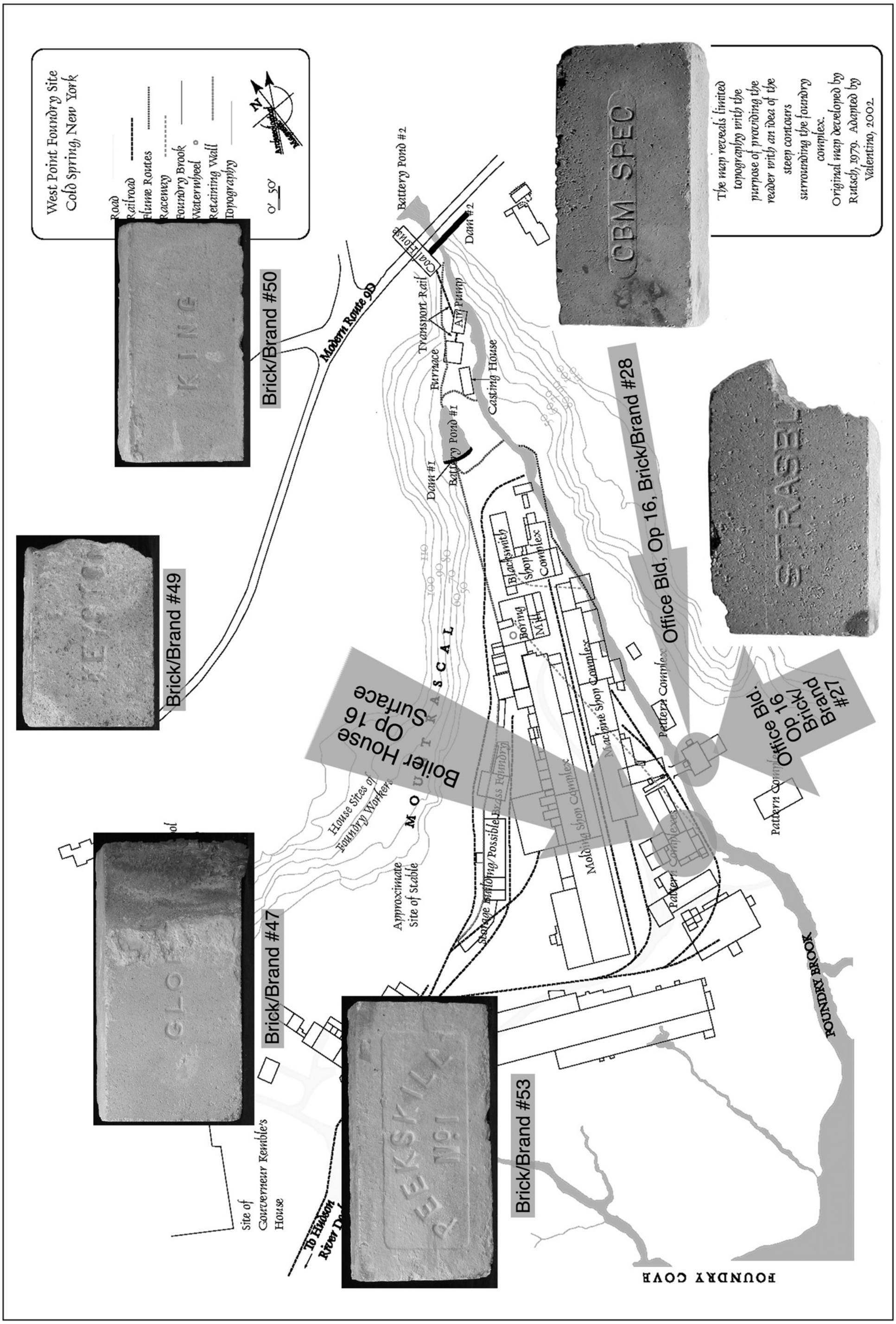

Figure 2. Map of firebrick brands found at the West Point Foundry in Operation 16, including the office building and pattern complexes.

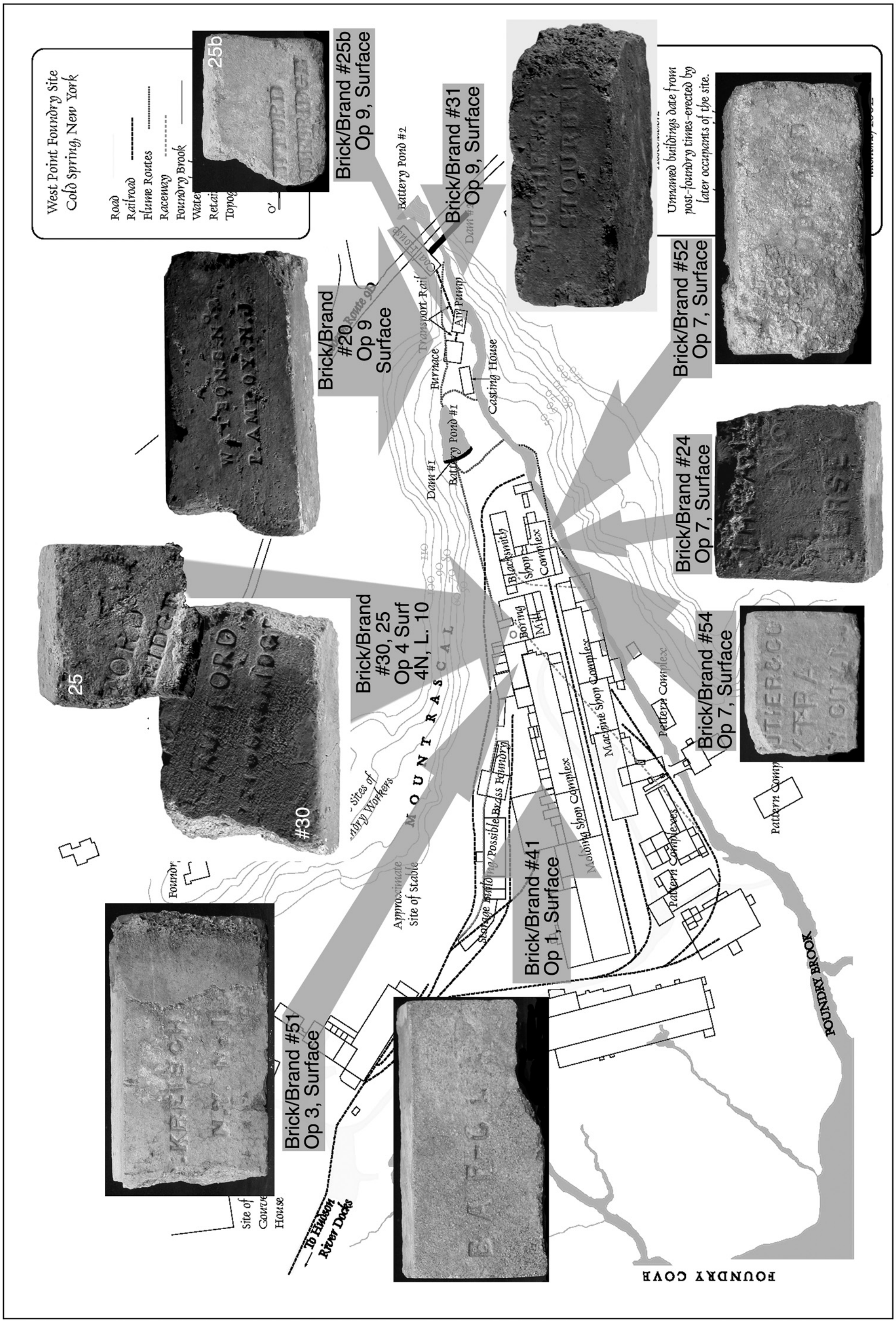

Figure 3. Map of the firebrick brands found at the West Point Foundry site, including bricks from around the entire foundry campus.

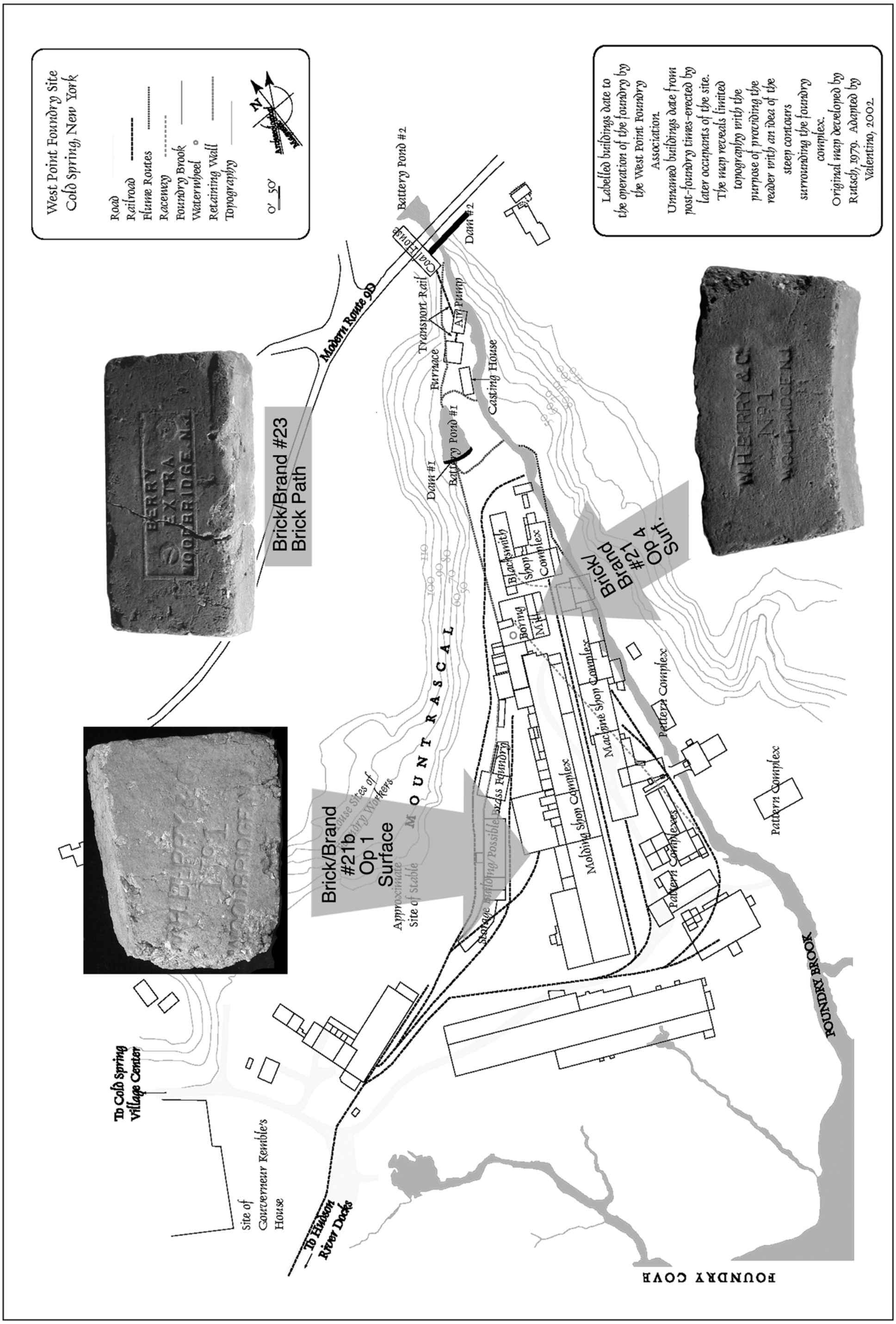

Figure 4. Map of the William H. Berry Company firebricks found at the West Point Foundry site.

them to loose structural integrity at high heat. While a few of the United States' brick-making regions produced firebrick in the early-19th century, many industries imported them from England. Some early imports appeared at the West Point Foundry site, but the majority of identified firebrick originated with American producers. Most of the known brands, however, were identified on surface finds. As a result, the prominence of American manufacturers may reflect the purchasing decisions made at the end of foundry operations and by subsequent businesses that utilized the area surrounding Foundry Cove.

Sixteen firebrick brands representing at least fifteen different companies have appeared on the foundry campus to date. Seven of these brands indicated firebrick installed in the early-20th century, although more research is required to form definitive conclusions about these bricks' date of manufacture. The West Point Foundry had shut down by this time and other industries operated on the site. Four of these seven firebricks appeared either on the ground surface or in the lining of the two boiler house rooms in the pattern complex building in Operation 16, just south of the Office Building (FIG. 2). These brands are listed with possible makers and dates in Table 2, and include the KING (#50), GLOBE (#47), PEEKSKILL (#53) and KEYSTONE (#21) brands. Companies published these brands in trade journals during the 1920s and the bricks were probably installed during the era when the Astoria Silk Works operated on the property.

In addition, two firebrick brands appeared in the rubble inside the nearby office building in Operation 16 (see also FIG. 2 and TAB. 2). These included CBM SPEC (#28) and STRAUSBU[RG] (#27), both brands published by companies during the 1920s through the 1940s in Pennsylvania and Ohio, respectively. One other brand seemed to date from this later time period. The as yet unidentified BARCLAY brand (#41), found in the molding shop complexes in Operation 1, may date to the Cornell-era works (FIG. 3). More research should determine if this brand was also in use during the 20th century.

Several other firebricks scattered over the foundry's surface date from the 19th century (FIG. 3, TAB. 3). In Operation 3, an area identified variously as a molding house, casting shop, and gun foundry, a brick appeared with the mostly-complete brand "… .KREISCH / … NY N° 1" (#51). This partial mark may have been a brand belonging to Balthazar Kreischer, who operated a brickyard just south of Rossville, Staten Island. Kreischer opened his first factory in Manhattan in 1845. In 1855, he opened a second factory on Staten Island. By 1860, he was producing a million firebricks annually. The Manhattan works closed in 1876, but the Staten Island plant continued operation. The firm reached its height of production in the 1890s as B. Kreischer and Sons, employing 300 workers and producing 3,500,000 bricks annually. It closed in the 1930s (Sachs 1988:60–62). This partial brand lacks any reference to Balthazar's sons, so if produced by his company, the yard probably made this brick between 1845 and 1890.

A brand of the similar period may be "WATSON.S.No.2 / P.AMBOY.N.J." (Brick #20). Watson's factory was established in Perth Amboy in 1836 (Ries and Kümmel 1904:324). Daniel deNoyelles listed F. B. Watson still in operation in that town in 1855 (deNoyelles 1982: 267). As the company was not listed in a 1904 directory, it was apparently out of business by then (R. Veit 2005: personal communication). A stiff-paste machine extruded this brick, although it may also have been repressed. A worker stamped this brand by hand, suggesting that it is also probably an earlier product.

Three different brands appeared in Operation 7, the blacksmith shop complex. The first, "…UTIER & CO / …XTRA / …Y CITY, N.J." (#54), remains unidentified. The next brand was highly degraded from heat, but is barely legible as "WOODLAND" (#52). While Karl Gurcke identified a company using that mark in Pennsylvania in the mid-20th century, this brick was hand stamped which indicates that it is likely older. Brick #24 is similarly degraded, is broken, and is very difficult to read. It is stamped "JRLA…" and like brick #54, was made in New Jersey.

Surveyors and excavators have recovered three examples of bricks bearing the "RUFFORD / STOURBRIDGE" stamp (FIG. 3). Two of these bricks appeared in the surface rubble at the boring mill (Op 4, Brick #30) and the blast furnace and blowing engine (Op 9, Brick #25b). A third example was recovered from a stratigraphic unit in Unit 4N at the boring mill complex (Brick #25b). Francis T. Rufford made glass in Stourbridge, England, and was also manufacturing firebrick by 1800. His company operated until going out of business in 1936. E.J. and J. Pearson Limited continued the brand under the name of Rufford

Firebrick Co. Ltd. until 1963. Stourbridge commercial directories also list a Brettell and Rufford as makers of firebrick in 1828 and 1835 (Gurcke 1987: 68–69). The RUFFORD bricks appear to be the earliest firebrick on the site. The stratigraphic position of Brick #25 suggests that it was deposited during or shortly after the construction of the boring mill complex's brick addition, probably completed in 1849–1850. The three bricks' locations suggest that workers used Rufford company bricks in the blast furnace, but probably also in the cupola furnaces in the casting house. One other English firebrick appeared in the surface rubble at the blast furnace and blowing engine complex (Op 9). Brick #31 was stamped "HUGHES & EA… / STOURBRID…" There were at least five brickmakers named Hughes working in Stourbridge during the latter part of the 19th century alone, so more research needs to be completed before this English brand can be correlated with the RUFFORD mark.

The final three identified firebrick brands were all marks of the William H. Berry Company of Woodbridge, New Jersey (FIG. 4, TAB. 3). The Berry brand appeared on an arc brick from the surface rubble in the boring mill complex (Op 4, Brick #21), a key brick in the molding house complex (Op 1, Brick #21b), and an arch brick used by volunteers to make the pedestrian path through the machine and blacksmith shop complexes (Brick #23). During the 2005 excavation season, BERRY bricks began to appear in some quantity within the rubble layers excavated from the southern side of the blast furnace (Op 9). This rubble formed during sequences of collapse after the furnace had been abandoned (Kotlensky 2005, personal communication). One firebrick fragment, with a small portion of a mark, also appeared in the excavation on the western side of the 1865 office building (Scarlett and Deegan 2005).

Ries and Kümmel wrote "the works of W. H. Berry, at Woodbridge, began operation in 1845, and have continued up to the present day, although in 1896 the name was changed to J. E. Berry" (Ries and Kümmel 1904: 324). The Berry yard apparently produced firebrick from its beginning and by the 1880s could manufacture a million firebricks annually when in full production (Clayton 1882: 582). Since the West Point Foundry blast furnace purportedly operated between 1827 and 1844 (Finch 2004: 114; Norris 2002: 62–63) and was never reused for other purposes, the presence of firebricks made after 1845 presents considerable problems for the interpretation of the site. The current belief that the blast furnace fell out of use after 1844 came from Edward Rutsch's archaeological study (1979: 77), which was in turn based upon Wilson's *Thirty Years of Early History of Cold Spring and Vicinity* (1886: 27).

Wilson began his text by begging forgiveness for a lack of chronological precision and explained that his writing was based upon his recollections of decades previous and had not been thoroughly fact-checked and researched. Ries and Kümmel provide no explanation of how they determined the date when the Berry yard began producing firebrick. Since the company was still in operation in 1904, they presumably worked from company records or oral histories. Given the presence of the BERRY brand in the collapse rubble of the furnace, far up the canyon from any other similar productive structure, the final charge and blast of the furnace appears to have occurred sometime after 1845 (if Ries and Kümmel are correct), or perhaps several years later. Careful attention and research about these bricks will continue to yield substantial refinement of our understanding of the historical evolution of the West Point Foundry.

Summary and Conclusions

A significant amount of information about the brickmakers remains unknown, but a provisional interpretation serves to guide future archaeological and historical research. When the foundry was first laid out, the builders could not find a satisfactory domestic supplier of firebrick for the furnaces that fed their casting. This was still the case nearly a decade later when the workers erected a cold blast furnace in 1827. They ordered their first firebricks from Stourbridge, England. These bricks, which probably came from the yards of Francis T. Rufford and perhaps "Hughes and EA…," were used to line the earliest furnaces built and operated on the site. As those bricks wore out and were replaced, the foundry workers transitioned to domestically produced firebrick, particularly those made by Balthazar Kreischer in New York and William H. Berry in New Jersey. The latter became the dominant brick used around the site by the 1850s. The worn out bricks with Stourbridge marks mixed with other rubble and workers interred them as part of the aggressive earthmoving and building program initiated after the foundry's directors began consolidating and expanding

the Cold Spring works at mid-century. Berry's firebricks, along with others from the period, were also removed from the furnaces as they wore out. They ended up mixed with fill events after mid-century, including the 1865 office building construction and landscaping events.

This study of bricks from archaeological research at Scenic Hudson's West Point Foundry Preserve indicates the important and practical result from careful attention to a humble and ubiquitous type of artifact. The bricks and their brands provide important clues to the construction and evolution of the foundry's landscape, which even at this early stage in the overall study provides two major examples of important potential insights. First among the common red brick, the BUDD and OB&V brands appeared in discrete architectural building periods and thus provide important chronological markers across the site. The firebrick brands, particularly RUFFORD and BERRY marks, proved to be the source of significant questions about the sequence of implementation and abandonment of productive facilities throughout the foundry's campus.

Attempts to correlate brick making with foundry construction in the Hudson River Valley also ties the West Point Foundry and the clay yards to larger issues. George V. Hutton (2003), Richard P. O'Conner (1987), and Alan S. Gilbert et al. (1993) each wrote about the connections between the region's brick industry and New York City's growth downriver. While Americans began producing soft-mud, machine-molded bricks in the 1820s, and machines were introduced in the mid-Hudson by 1855, the trajectory of production in the industry followed the city's needs and population growth. New York City's laws relating to wood construction span the mid-17th through early-20th centuries (c.f. O'Connor 1987: 8–36; Hutton 2003: 17–107). These laws sought to control the risk of fire by mandating that all chimneys not be made of clay-daubed wood, that party walls shared by two different buildings be of masonry construction, that some city blocks be made of all masonry so they acted as firebreaks during disaster, and promoting overall fire-proof or slow-burn construction. Government legislators promoted these laws following a series of actual urban disasters, including New York's Great Fires of 1835 and 1845. The resulting rebuilding booms, under the codes that followed, fired the market for Hudson River Brick.

New York's urban fires did more than stimulate expanded production by increasing the demand for bricks. The evolving needs of the urban environment linked the industries along the Hudson with the downriver landscape. The Croton Reservoir provides an excellent example of that link. The First Great Fire of 1835 inspired a significantly increased commitment to complete and expand the Croton water system. That system included enormous iron pipes cast at the West Point Foundry and miles of vaulted sewers into which workers pointed billions of Hudson Valley bricks throughout New York City's urban fabric. Yet the water system itself also tied both the foundry and brickyards to developments in construction technologies—iron beams, steel frames, tile cladding, Portland cement, and even plastic and concrete piping. When the nephews of the company's original founders took over the West Point Foundry after the Civil War, they gambled their capital on cast iron building façades, trying to open new areas of manufacture as the military demands dried up. These fashionable façades further connected the foundry to the numerous brickyards producing fire-resistant construction materials. The evolution of the urban ecological system thus tied the workers of the different clay yards and the West Point Foundry together more tightly and over a longer period than the direct business interactions of the two companies. A full accounting of either the brickyards or the foundry must explore the larger contextual ties that bound business in the Hudson River Valley and the downriver metropolitan market.

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