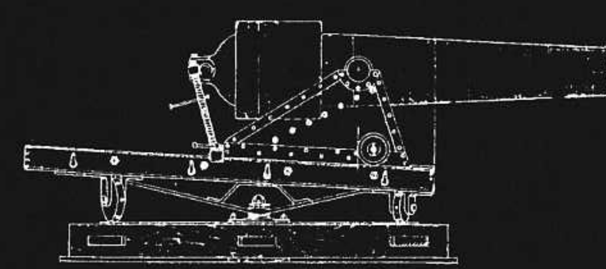
LOOK TO THE EARTH

Historical Archaeology and the American Civil War

Edited by Clarence R. Geier, Jr. and Susan E. Winter



THE UNIVERSITY OF TENNESSEE PRESS / KNOXVILLE

First Edition.

The paper in this book meets the minimum requirements of the American National Standard for Permanence of Paper for Printed Library Materials.
♾
The binding materials have been chosen for strength and durability.

Library of Congress Cataloging-in-Publication Data

Look to the earth: historical archaeology and the American Civil War / edited by Clarence R. Geier, Jr. and Susan E. Winter.
p. cm.
Includes bibliographical references and index.
ISBN 0-87049-857-6 (cloth: alk. paper)
1. United States—History—Civil War, 1861–1865—Antiquities. I. Geier, Clarence. R. II. Winter, Susan E.
E646.5.L66 1994 94-15587
973.7—dc20 CIP

CONTENTS

FIGURES

TABLES

Discussion

The high level of site integrity and the existence of detailed background historical data together suggest that these sites hold great research potential. More than 150 separate reminiscences, diaries, or letters, and a total of over 500 sources were located. These sources, along with the more than 125 archaeological features recorded during the mapping project, may guide further research. As domestic sites, Camp Allegheny and Cheat Summit Fort present opportunities to address a broader range of research topics than do pure battle sites. Additionally, these two fortified camps were scenes of battle.

Camp Allegheny and Cheat Summit Fort exist as sites of nearly equal duration, time period, and setting, from opposite sides of the Civil War struggle. They present an opportunity for controlled comparison of Federal and Confederate domestic and military conditions. Discrete areas of Camp Allegheny also are known to have been occupied by regiments from different parts of the Confederacy, providing opportunities for additional controlled comparisons. The same possibly holds true for Cheat Summit Fort. Future research topics likely will focus on military lifeways and material provisioning. These might have been affected by such factors as length of occupation, Confederate versus Union allegiance, temporal placement, military rank, and ethnicity.

The preliminary archaeological test excavations, intensive site mapping, and detailed bibliographical research for Cheat Summit Fort and Camp Allegheny have provided solid baseline data to guide future research at the sites. Additional archaeological research questions may be addressed effectively from the corpus of historic documentation. Site preservation and stabilization issues have also been identified through this work. Interpretive opportunities revealed by the archaeological and historical data have resulted in brochures, signing, and a plan to foster public appreciation for these superbly preserved Civil War sites.

Part IV.

Other Directions

The primary goal of this book is to draw attention to the broad range of topics related to the Civil War, to whose study historical archaeology can contribute significantly. The following four chapters illustrate this diversity of application. Charles Orser offers an exploratory work that looks at broad, regional changes in northern agriculture, specifically that of the Midwest corn belt, during and following the Civil War period. He proposes a strategy for studying this complex subject which encompasses both archaeological field work and extensive research into primary historical documentation. By considering an area of the United States which experienced little military action, Orser illustrates the significant secondary impacts that the war had on the nation as a whole.

Following Orser's focus on the agricultural economy of a region, Clarence Geier illustrates the impact of the war on a specific family. The chapter introduces the family of Thomas Cheatham, who lived between Richmond and Petersburg, Virginia, just prior to the onset of the Civil War. In 1864, their farm came to lie in a "no-man's land" between Confederate fortifications protecting the southern perimeter of Richmond, and the advancing Union Army of the James.

The chapter documents a Union attack on the Richmond defenses on May 6–16, 1864, and considers the impact the military occupation of the Cheatham home had on the farm, its dwellings, and the family.

Joel W. Grossman takes the reader into the realms of espionage and artillery manufacture. His chapter reviews important excavations conducted at the site of the West Point Foundry, in Cold Spring, New York. Not only do the excavations provide important insight into gun testing facilities and the housing of laborers, but also they illustrate how historical interpretation sometimes can create false or misleading perceptions of past reality.

Paul Shackel studies the use of landscapes in establishing and reinforcing dominant ideologies. He uses Harpers Ferry, West Virginia, as a case study to show how northern industrialists used industrial ruins created by the Civil War to reinforce an industrial ideology during the latter half of the nineteenth century.

9

Charles E. Orser, Jr.

CORN-BELT AGRICULTURE DURING THE CIVIL WAR PERIOD, 1850–70

A Research Prospectus for Historical Archaeology

The impact of the American Civil War on the rural South was immediate and significant. Rich, normally productive agricultural fields were burned, huge mansions were ransacked and destroyed, livestock were set free or slaughtered, some four million enslaved African Americans—many of them agricultural laborers—were emancipated, and as many as 62 percent of white farmers served in the Confederate Army (Wiley 1959: 7). In the South's agricultural world, slave plantations gave way to tenant plantations, and small-scale farmers returning from the war—some of whom once owned one or two slaves and some of whom owned none—found themselves competing with a new labor force: the freedman farmer.

Numerous researchers have focused on the social nature of Southern agriculture, both before and after the American Civil War. Historians have explored various aspects of Southern agriculture in both the antebellum and the postbellum periods (see, for example, Fite 1984; Gray 1933; Wayne 1983; Wiener 1978). Rural sociologists have commented on postwar south-

Acknowledgments

The research of certain persons contributed significantly to preparation of this chapter. Martha McCartney provided the archival analysis and background on the Cheatham residence. Further, artifact analyses and interpretations provided by Rita Buchanon (clothing parts), James Cromwell (military and metal artifacts), and Paul Mullins and Susan Andrews (glasswares) were critical to the discussion.

11

Joel W. Grossman

THE ROLE OF ESPIONAGE AND FOREIGN INTELLIGENCE IN THE DEVELOPMENT OF HEAVY ORDNANCE AT THE WEST POINT FOUNDRY, COLD SPRING, NEW YORK

Over a three-year period between 1989 and 1992, the first major federally mandated archaeological investigation of a Superfund site took place at the West Point Foundry in New York. This work led to the discovery of the well-preserved subsurface remains of R. P. Parrott's Civil War era cannon testing facilities and the otherwise unrecorded housing complex of the workers who helped produce and refine a new generation of large-caliber rifled ordnance. In addition to shedding new light on Union military research and development activities in heavy-weapons technology prior to and during the Civil War, these archaeological findings precipitated the archival discovery of a previously unrecognized aspect of Northern military history. This discovery in turn revealed the existence of a carefully orchestrated and highly effective capability in international military espionage and industrial intelligence on the part of Lincoln's executive branch and the U.S. Army and U.S. Navy ordnance bureaus which had not been addressed in past treatments of Northern Civil War history.

At times, the archaeological study of past events is consistent with available documents and published accounts of the past. When this is the case, the archaeological records provided by the surviving material remains can help augment and "flesh out" the perspectives of documented history. However, as this study has shown, the archaeological evidence also can be found to conflict with, and on occasion pointedly to contradict, the written record, in both detail and general implications. This was the case with the archaeological discoveries at West Point Foundry. Taken together, the combined archaeological and archival evidence from this first major archaeological study of Civil War era military facilities north of the Mason-Dixon Line has provided significant and unanticipated insights into the unwritten record of the Civil War and of American military and intelligence history.

This federally mandated compliance and mitigation program was performed under the jurisdiction of the U.S. Environmental Protection Agency and Army Corps of Engineers, and under contract with the lead engineering and design firm of Malcolm Pirnie, Incorporated. This large-scale, multistage site definition and data recovery effort demonstrated the feasibility of undertaking in-depth archaeological investigations within the context of potentially contaminated sites. From an archaeological and methodological standpoint alone, this effort, performed with the assistance of a range of applied-technology solutions to issues of site discovery, definition, and documentation, also clearly established that the discipline of archaeology has the ability to maintain the high standards of current federal compliance guidelines in a feasible and practical manner and time frame which do justice to both the resource and the primary mission of the Superfund environmental cleanup effort.

The West Point Foundry operated in Cold Spring, New York, across the Hudson River from the U.S. Military Academy at West Point. The archaeological remains of this significant Civil War era cannon foundry had lain dormant for the past 130 years under a nineteenth-century industrial landfill capped by modern, potentially toxic waste. This area, identified as the Marathon Battery Superfund Site, had been targeted by the U.S. Environmental Protection Agency for a major environmental cleanup effort. As part of a federally mandated planning and site evaluation conducted between 1989 and 1992, the first large-scale archaeological investigation and mitigation of a Superfund site resulted in the discovery of R. P. Parrott's Civil War era gun-testing or proofing facilities.

In addition to the exposure and documentation of the Foundry's Civil War era gun-testing facilities, computer-assisted historic map surveys also led to the discovery and excavation of an isolated cluster of unique workers' housing. These houses were located on a bluff above the foundry ruins, apart from the majority of the workers' housing situated within the town of Cold Spring. The large-scale excavation of these household remains yielded over 145,000 Civil War era artifacts, including a range of high status and technologically sophisticated artifacts. As socioeconomic and ethnic indicators, these exotic items simply did not concur with, or support, previously published historical characterizations of the workers who lived there.

The apparent inconsistencies between the material remains and the written record triggered an intensive reorientation in the ongoing archival research effort, away from a focus on the technological history of West Point Foundry proper and toward the role of foreign influences in the history of the military developments which took place there. The research then revealed the existence of a tightly controlled military research and development effort, as well as a Civil War intelligence and espionage operation, that focused on the development of large-caliber rifled cannon. This operation was funded by the Navy Ordnance Bureau and was run by some of the leading military and civilian figures of American science and technology of the time, all with direct lines of communication to President Abraham Lincoln.

Early History of the Foundry Operations

The Kemble Era: 1817–37

West Point Foundry began in 1817 as a private, but government-financed, establishment on the Hudson River, immediately upriver from the protective gun emplacements at West Point (figs. 11.1 and 11.2). It was one of four foundries established after the War of 1812 to produce cannon for national defense (Kemble 1916: 191–92). Save for the civilian proprietor of West Point Foundry, Gouverneur Kemble, the appointed directors of these four establishments were military officers of high standing. Kemble, however, was well connected politically, economically, and socially within New York and Washington circles. Moreover, he had proven his dedication to his country and his expertise in the area of cannon technology through his participation in "industrial espionage," first as a commercial and later as a government attaché to the Spanish court (Kemble 1916: 192–201; Raoul 1936: 463).

During his tenure in industrial and military intelligence gathering, Kemble, like many other military attachés similarly posted in foreign missions, participated in a tradition by which former attachés continued to benefit from the fruits of foreign intelligence gathering. They did so especially in the area of heavy cannon technology and manufacture. Kemble was director and proprietor of the West Point Foundry until 1837, at which time he entered the U.S. Congress, a move which induced him to invite Parrott to resign from the U.S. military and take over as director of the foundry (Raoul 1936: 466; Kemble 1916: 199–200).

While the financing, site selection, and initial construction of the foundry appears to have been adequately addressed through a combination of local resources and guarantees of government contracts, the actual technology and expertise required to develop and operate a specialized heavy-gun foundry were not available locally. The lack of skilled labor during the 1820s was both a reflection of the incipient state of industry in America and the result of explicit efforts on the part of the advanced nations of Europe to maintain their strategic technological superiority (Raoul 1936: 464–65; Kemble 1916: 195). In England as well as other European countries, export restrictions were explicitly applied to the products, plans, and technology of artillery manufacture and testing. Further, restraints limited access to workers (founders, molders, mechanics, and ordnance specialists) who were involved in the manufacture and testing of heavy ordnance.

Although the terms may have varied, the skills of iron making in general, and heavy-cannon manufacturing in particular, then were viewed as proprietary areas of national security which were tightly controlled;

Fig. 11.1. Detail of Civil War–era navigation map of the Hudson River, showing West Point Academy and West Point Foundry. Courtesy of Grossman and Associates, Inc.

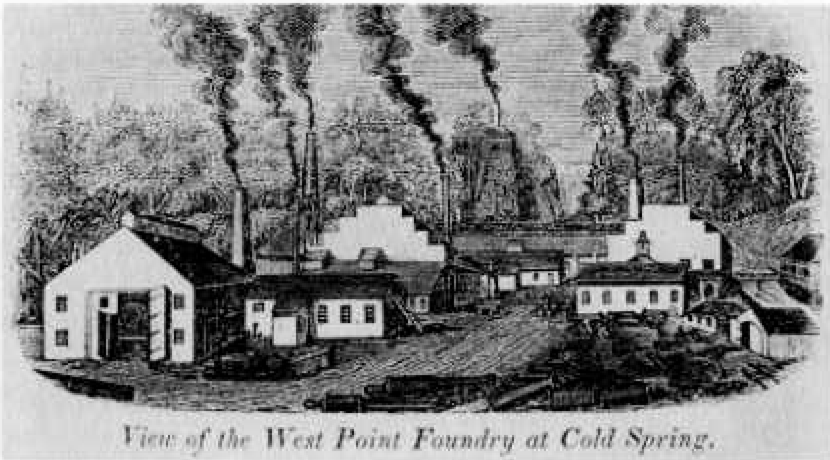


Fig. 11.2. *Pre–Civil War Currier and Ives lithograph of the West Point Foundry, showing area immediately to the north of the Superfund Remediation Zone (Area 1). The inclusion of the elevated iron furnace at the rear suggests a pre-1837 date for the illustration. Courtesy of the Putnam County Historical Society.*

transgressors were subject to severe punishment. Thus, in violating these laws, either an Englishman or a foreigner knowingly embarked on what was defined and clearly understood as a crime against England. Such a transgression was something not to be undertaken lightly as a private commercial venture.

Against this backdrop, what Kemble and his foundry partners subsequently undertook reads as a carefully coordinated subterfuge, with all the flair of a modern spy novel. Kemble, apparently with the assistance of the U.S. military, addressed the problem of an insufficient number of foundry workers and ordnance technicians with a simple but dangerous tactic. Despite the legal and diplomatic barriers, he stole them away from England, and possibly other European countries, with a carefully formulated series of international operations, undertaken with subterfuge and with naval logistical support. According to Kemble's later account, transatlantic trips to secure British and Irish iron founders, molders, and craftsmen occurred on at least two occasions. This pattern of "borrowing" men and technology from Europe, and from England in particular, appears to have been a long-standing tradition in the technological development of both the West Point Foundry and the American military throughout the nineteenth century (Raoul 1936: 465–66).

The first such documented voyage took place between 1818 and 1825 and the second, on or about 1825. On the first trip, a Captain Graham of New York docked at Liverpool and announced that he was sailing with a work force of unskilled laborers. After setting sail, he then docked at Queenstown and, with the help of Mr. Young (a skilled ironmaster and brother of an Irish foundry owner who served under Kemble as the first superintendent at the West Point Foundry), replaced the laborers with a group of passengers who turned out to be skilled mechanics, most probably including iron founders and molders. The British got wind of the subterfuge and sent a warship in pursuit, but Captain Graham escaped, and a half-dozen men arrived in New York (Raoul 1936: 466).

The second trip, in 1825, involved an even more elaborate example of international subterfuge. Captain Graham and Mr. Young returned to the British Isles, presumably on normal business. However, upon sailing from Liverpool, they reportedly experienced a mutiny which forced them to dock at a small Irish port to unload the rebellious crew. When they returned to New York, the new crew members were found to consist of foundry specialists and "first class molders" (Kemble 1916: 195–96; Raoul 1936: 465–66). Aside from this documentary footnote to history, these special immigrants, brought to Cold Spring as part of a surreptitious quasimilitary operation, essentially disappeared from the historical record. Their existence, and the significance of their role in the development of armaments for the American Civil War, came to light only in 1990, as a result of the West Point Foundry archaeological investigations.

The Parrott Era: 1837–67

Robert Parrott, an ordnance officer at West Point Academy, became director of the West Point Foundry in 1837. With his arrival, the establishment both consolidated and expanded its production facilities to enhance its regional security and self-sufficiency. At its peak, the West Point Foundry employed seven hundred workers and had the capacity to produce ten thousand tons of cast iron per year. The production of cast iron in turn required support facilities, which included six mines and eleven thousand acres of timberland. The latter utilized fifteen hundred workers, who produced ten thousand cords of wood for fuel per annum (Naylor 1961: 14–15; Parrott 1921; Raoul 1936: 469; Tyrell 1962; M. Wilson 1886).

Under Parrott's tenure, the foundry was a major research and development center. In addition, as a regional center of heavy cannon production, and as the sole source supplier of the Parrott rifled cannon, the West Point Foundry played a central role in establishing the military superiority of the Union land and naval forces during the Civil War. By the second and third year of the war, Parrott's facility had developed several sizes of large reinforced cast-iron rifled cannon, capable of repeatedly hitting targets at a distance of five miles or more and with an armor-piercing velocity of 1,200 feet per second (Bruce 1989: 230; Holley 1865: 487). This combined accuracy, range, and throw weight not only rendered traditional masonry fortifications and wooden ships obsolete, but also brought a new element of large-scale warfare to urban centers by providing reliable mechanisms for accurate long-distance explosive and incendiary bombardment (Bruce 1989). By the end of the war, Parrott's foundry had produced nearly two thousand cannon of various calibers, and in excess of three million shells (U.S. 40th Congress, 2d Session, 1868, volume 99: 915; Naylor 1961: 14–15).

Traditional accounts of the foundry's history have highlighted Parrott's singular role in developing his version of the rifled cannon. The picture presented by these accounts suggests that Parrott developed his version of the rifled cannon in relative technical and intellectual isolation. They also imply that he received little financial support or involvement from the government in general, or from the army and navy ordnance bureaus in particular (Kemble 1916: 199; Raoul 1936: 467; Parrott 1865; Tyrell 1962: 6). Archaeological discoveries at the West Point Foundry, however, combined with the detailed archival investigation that followed, suggest otherwise. In fact, the independent lines of archaeological and documentary evidence come together to create a very different characterization of the history of the foundry, the course of heavy-cannon development there, and Parrott's status as the "inventor" of the "Parrott" cannon. Furthermore, this evidence suggests that the Union military's role in weapons development before and during the Civil War was heavily influenced by foreign intelligence sources and was tightly controlled as an aspect of federal military policy. Finally, the combined research reveals that the military, particularly the U.S. Navy Ordnance Bureau in Washington, D.C., heavily financed and monitored Parrott's research and development activities throughout the war.

In contrast to previous portrayals, this investigation strongly indicated that the origin and development of Parrott's cast-iron rifled cannon were heavily influenced by, if not the direct result of, an elaborate government-sponsored program of foreign intelligence gathering and military and industrial espionage, both before and during the Civil War. Furthermore, archival records and congressional testimony suggested a high probability that key elements of Parrott's rifled gun actually were derived from confidential European designs and prototypes, which the American ordnance officers knew about long before Parrott's announced "invention" in 1860–61.

The Archaeological Discovery of Parrott's Gun-Testing Facility and Workers' Housing

Beginning in 1989, the archaeological investigation of the West Point Foundry National Register District evolved over a three-year period, as a multistage identification, definition, and documentation effort performed in compliance with the National Historic Preservation Act, as amended. A combined approach of historic map analysis, subsurface testing, and remote sensing was applied to document the presence and extent of buried historic remains within the project impact areas that could not be avoided through construction redesign (Grossman et al. 1991). Based on the discovery of deeply stratified and otherwise undocumented nineteenth-century remains, the U.S. Environmental Protection Agency mandated a concentrated data recovery program aimed at the exposure and scientific documentation of the buried Civil War era remains located within the Superfund cleanup area.

The level of potential heavy-metal contamination within the historic shoreline landfill, as well as deep-winter conditions at the site, dictated that the field team work in protective gear, under inflated and heated domes, with all essential laboratory activities incorporated into on-site facilities outfitted with the appropriate decontamination equipment. Heavy dewatering pumps operated on a twenty-four-hour basis to maintain the excavation site in a dry, workable condition. All field personnel worked in sealed protective suits which were decontaminated and disposed of daily. All crew members were trained and certified for Hazardous Waste Material Handling (HAZMAT), and all were medically monitored before, during, and after the field effort.

The site testing and data recovery program used an assortment of applied technology procedures to expedite the excavation and recording process, and to limit the field crew's exposure to potentially toxic conditions. These tools included computer-integrated, total-station survey and mapping equipment which facilitated rapid, computer-based historic map correlations and site survey. In addition to the installation of on-site processing, inventory, decontamination, and conservation procedures, portable X-ray equipment was used to expedite the evaluation and selection of often heavily corroded metallic diagnostic artifacts. Once exposed through controlled natural stratigraphic excavation, the Civil War era gun-testing facilities also were rapidly recorded using the recently developed Rolleimetric photogrammetric three-dimensional camera system, which reduced the time and labor of the documentation effort of the exposed features and profiles by a factor as much as ten to one.

The field program was conducted in three stages between 1989 and 1992, covering three distinct areas of the site complex (fig. 11.3). The first stage consisted of a Phase I–II site identification and evaluation study of the historic foundry "Rail Spur," which ran out of the foundry along East Foundry Cove. These initial tests were important because they revealed a deep stratigraphic sequence of nineteenth-century fill layers which suggested the potential presence of deeply buried Civil War era deposits elsewhere on the site.

The second phase, and the main focus of the 1989–90 investigation, took place within what was referred to as the Area 1 remediation zone. This work consisted of a broader site definition, evaluation, and data recovery program within the former marsh and shoreline area forming the core of the Superfund cleanup zone. The deep-winter excavation utilized computer-scaled historic map projections and area-wide remote sensing survey procedures to identify and delimit the location and ex-

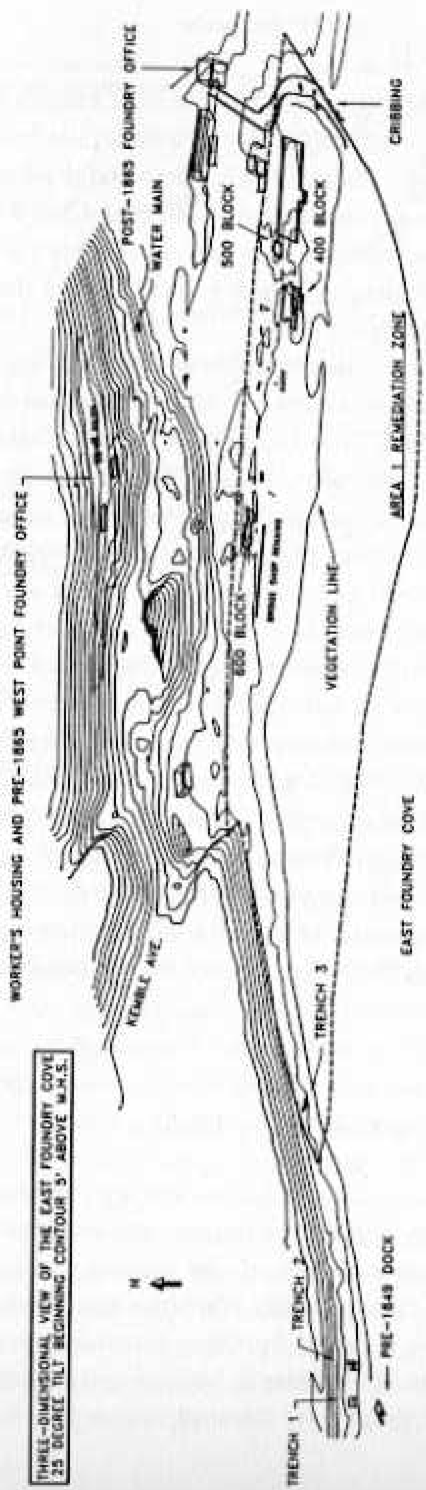


Fig. 11.3. Three-dimensional perspective of the historic West Point Foundry shoreline, showing the project limits of the Area 1 Superfund Remediation Zone and locus of 1989–92 archaeological investigations. This bird's-eye view also depicts the historic rail spur bordering East Foundry Cove, the area of the gun platform and tower excavation (block 400), and the historic workers' housing on the bluff overlooking the foundry. Courtesy of Grossman and Associates, Inc.

tent of the buried and preserved remains of R. P. Parrot's Civil War–era gun-testing facilities. These facilities lay sealed five feet below the modern surface, and three feet below the modern water table, sandwiched within a ten-foot-deep sequence of pre– and post–Civil War historic fill deposits of foundry slag and ash which had been dumped along the shore of the former marsh beginning at least a decade before the onset of the Civil War (Grossman et al. 1991).

Finally, the third phase of the investigation began with the initial identification in 1990 of historic masonry foundation depressions adjacent to a modern dirt utility road, "The Haul Road," which overlooked and led down to the foundry in the valley below. Upon closer examination, these depressions were found to contain the well-preserved structural remains of the Civil War era complex of foundry workers' housing (fig. 11.3). This housing complex formed a group of six duplex structures which were separate and apart from the majority of the workers' housing located outside the foundry proper in Cold Spring. Initial testing revealed evidence of a buried stone foundation two to four feet thick, associated with undisturbed interior and exterior living floors, together with well-preserved hearths, artifact-filled refuse pits, and cisterns. The excavation of the naturally stratified occupation and destruction layers yielded in excess of 140,000 historic artifacts, with large proportions of diagnostic, high-status, imported, and domestic specimens. Below the historic deposits, the excavation also documented the well-preserved living surfaces, hearths, and pits of prehistoric occupants of the site (Grossman et al. 1991).

The Shoreline Civil War Gun-Testing Facilities

The discovery of the gun-testing facilities was accomplished through the combined use of computer-assisted historic map correlation studies and grid-based magnetometer remote sensing across a rectangular shoreline area (designated Area 1), two hundred feet by seven hundred feet, where heavy disturbance was to occur from construction associated with the Superfund remediation effort. Prior to beginning the field investigations, the historic map analysis involved the compilation and digitized transfer

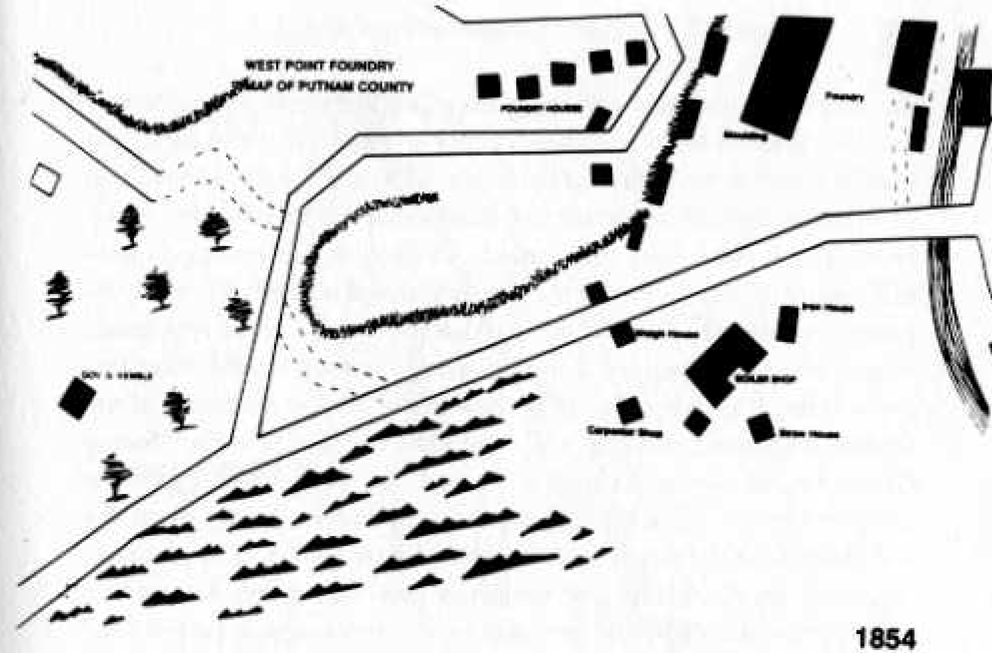


Fig. 11.4. Detail of 1854 Bevan Map of Putnam County, showing West Point Foundry prior to development of the shoreline gun-testing facilities. Courtesy of Grossman and Associates, Inc.

of all pertinent historic maps as scaled overlays onto the most current engineering site plans. Using these scaled historic map overlays, an attempt was made to locate specific structures and activity areas, as a basis for selecting zones for focused archaeological testing. Three mid-nineteenth-century maps were utilized, dating from 1854, 1867, and 1876, which showed sufficient detail to project the approximate location, relative to modern features, of earlier structures and foundry-related activity areas. The earliest of these, the 1854 Bevan map, showed six pre–Civil War structures in the shoreline impact zone of East Foundry Cove (fig. 11.4). Though detailed in its depictions, the 1854 map proved impossible to enlarge and scale accurately relative to any current topographic or structural remains. Nevertheless, despite these problems of scale and correlation, this prewar map was significant because it provided evidence that the shoreline area facing the cove (west of the core of the foundry complex further inland) was being used for secondary storage structures at least as early as 1854, and, by implication, that this former cove area had been partially landfilled by this date.

In contrast to the ambiguities of the 1854 Bevan map, two maps from the decade immediately following the Civil War proved considerably more accurate in scale and detail. When overlaid on the modern site map, the 1867 Beers, Ellis, and Soule (fig. 11.5) and the 1876 Reed (fig. 11.6) maps provided important new clues about the Civil War era activities that took place along the marsh. In addition to documenting a general pattern of expansion for the foundry complex itself, the maps depicted the removal of previously recorded structures, and the appearance of new structures along the shoreline zone of historic landfill. Most important, the 1867 map (fig. 11.5) showed the earliest rendering of the location, alignment, and extent of what had been labeled as the "Testing Guns" area, which was depicted at the end of a rail line used to roll out and test-fire new cannon being produced by Parrott. Jointly, given the wide latitude in the precision and consistency of the historic map coverage, these studies placed the projected gun-testing area somewhere within a corridor 80 to 100 feet wide by 200 feet long and perpendicular to the modern shoreline of East Foundry Cove.

The level of definition provided by the map data was refined through the use of a grid-based magnetometer survey of the entire 700-foot-long shoreline Superfund Remediation Zone. The actual magnetic survey of the historic industrial landfill area was conducted using two EG&G 860 magnetometers linked to portable data collectors, one to survey the site and the other as a control station to measure diurnal variations in the earth's magnetic field. A total of 4,884 data points were sampled at ten-foot intervals across the site. At the completion of the magnetic survey, the entire data set was electronically transferred into a desktop system equipped with two- and three-dimensional surface modeling programs that scaled the averaged, and coordinate-based, magnetic values relative to the site grid, to create contour or "terrain" maps. These maps illustrated the relative highs and lows in the recorded magnetic readings as color-coded peaks and valleys, each color representing a specific range of magnetic values. A total of thirty-five magnetic anomalies, or significant "dipolar" highs and lows, were rendered by the color-coded magnetic contour and mesh-surface maps (fig. 11.7). The buried Civil War era facilities were located as two major areas of extreme dipolar magnetic variation in the southeast corner of the site, and both fell

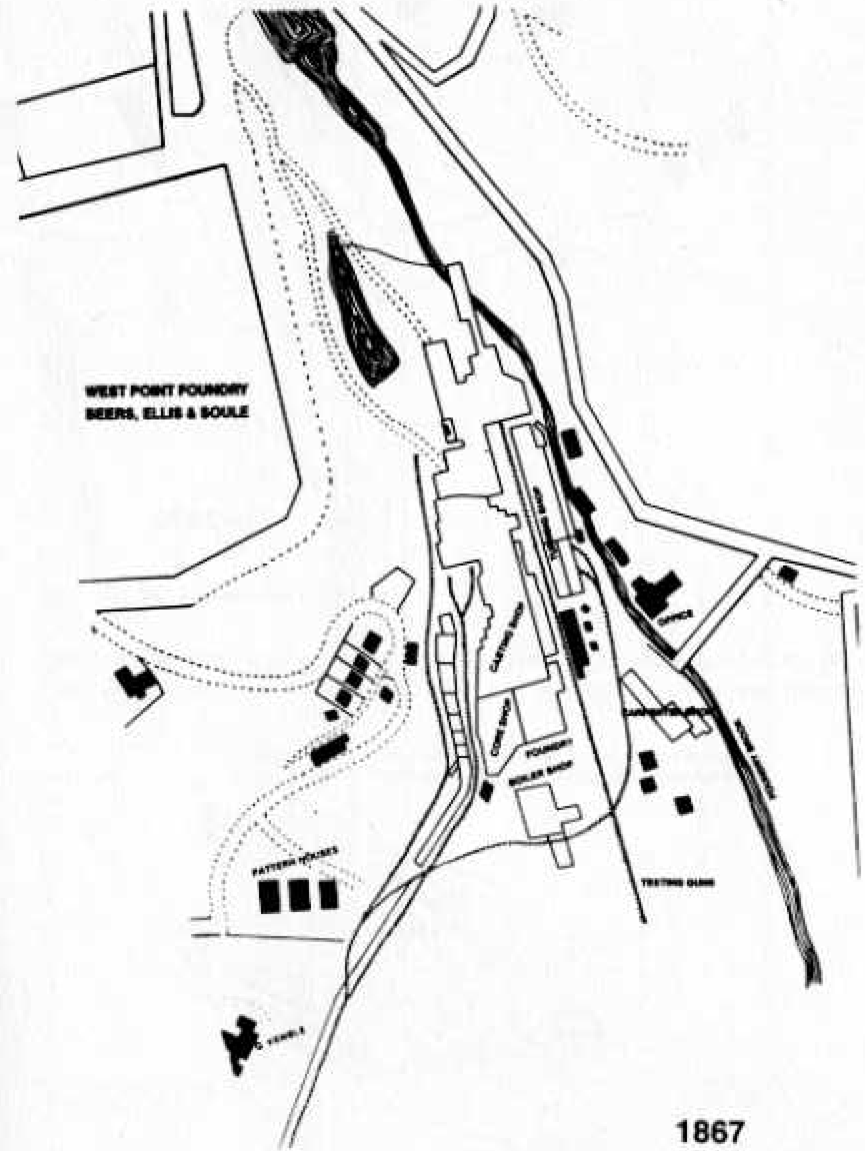


Fig. 11.5. Detail of 1867 Beers, Ellis, & Soule Map showing the "testing guns" rail line leading out of the gun casting and turning shops of the foundry and down to the shoreline area of the cannon-testing facility. Courtesy of Grossman and Associates, Inc.

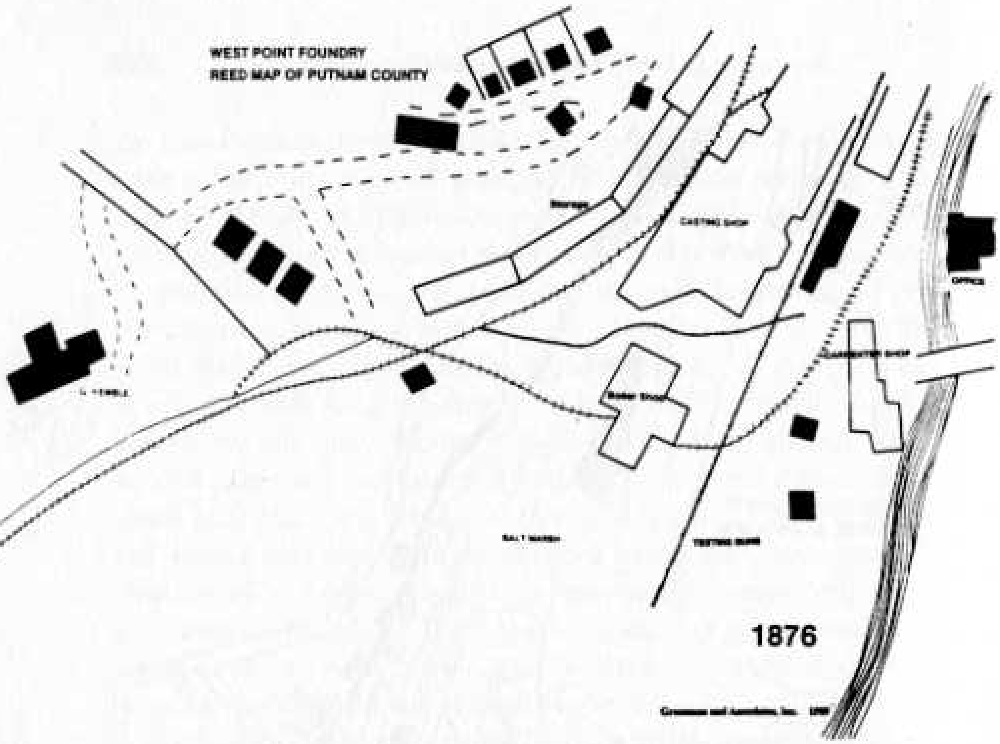


Fig. 11.6. Detail of 1876 Reed Map of Putnam County, showing continued presence of the "testing guns" area a decade after the Civil War. Courtesy of Grossman and Associates, Inc.

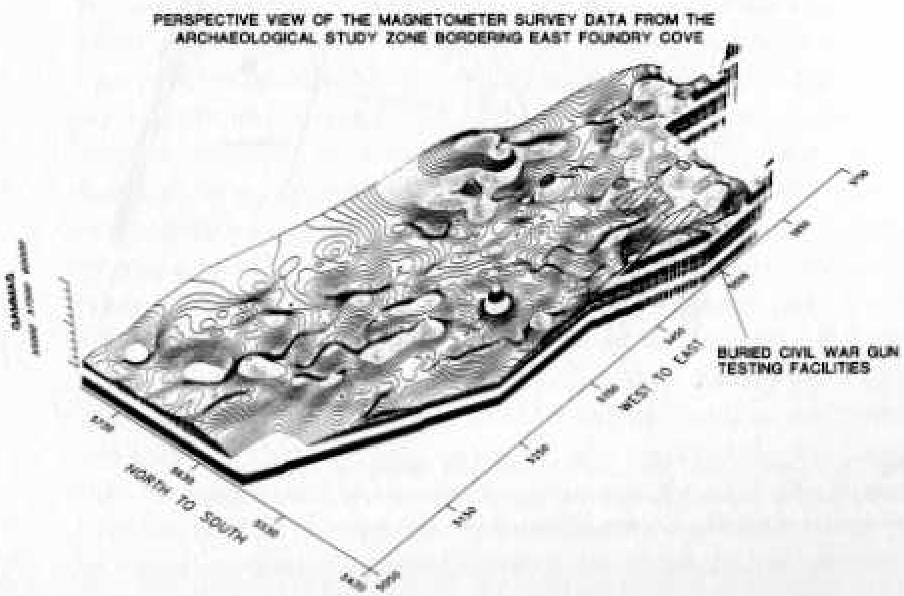
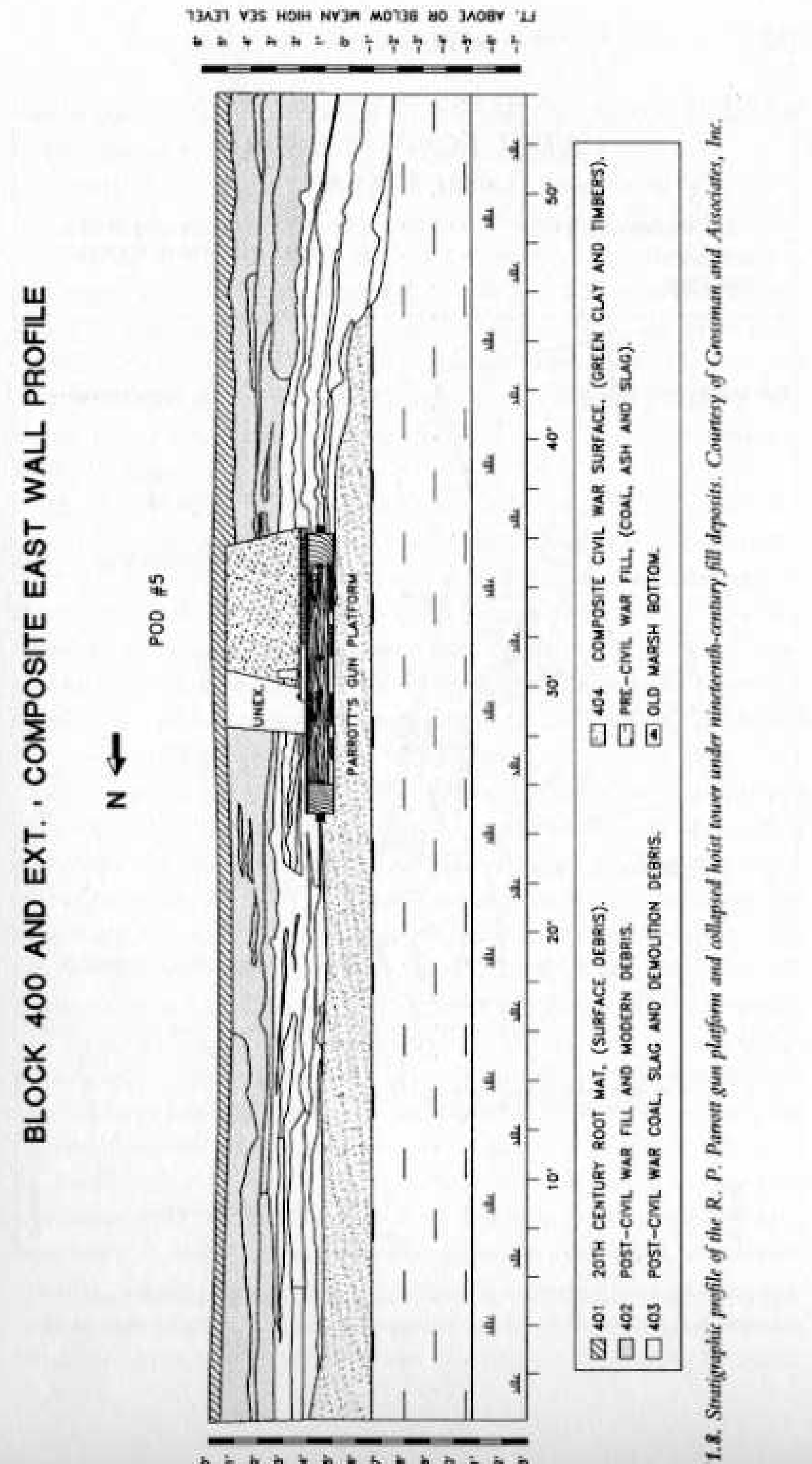


Fig. 11.7. Three-dimensional perspective of topographic map showing the location and magnetic range (gammas) of all identified magnetometer anomalies. The creation of this map led to dis-



1.8. Stratigraphic profile of the R. P. Parrott gun platform and collapsed hoist tower under nineteenth-century fill deposits. Courtesy of Grossman and Associates, Inc.

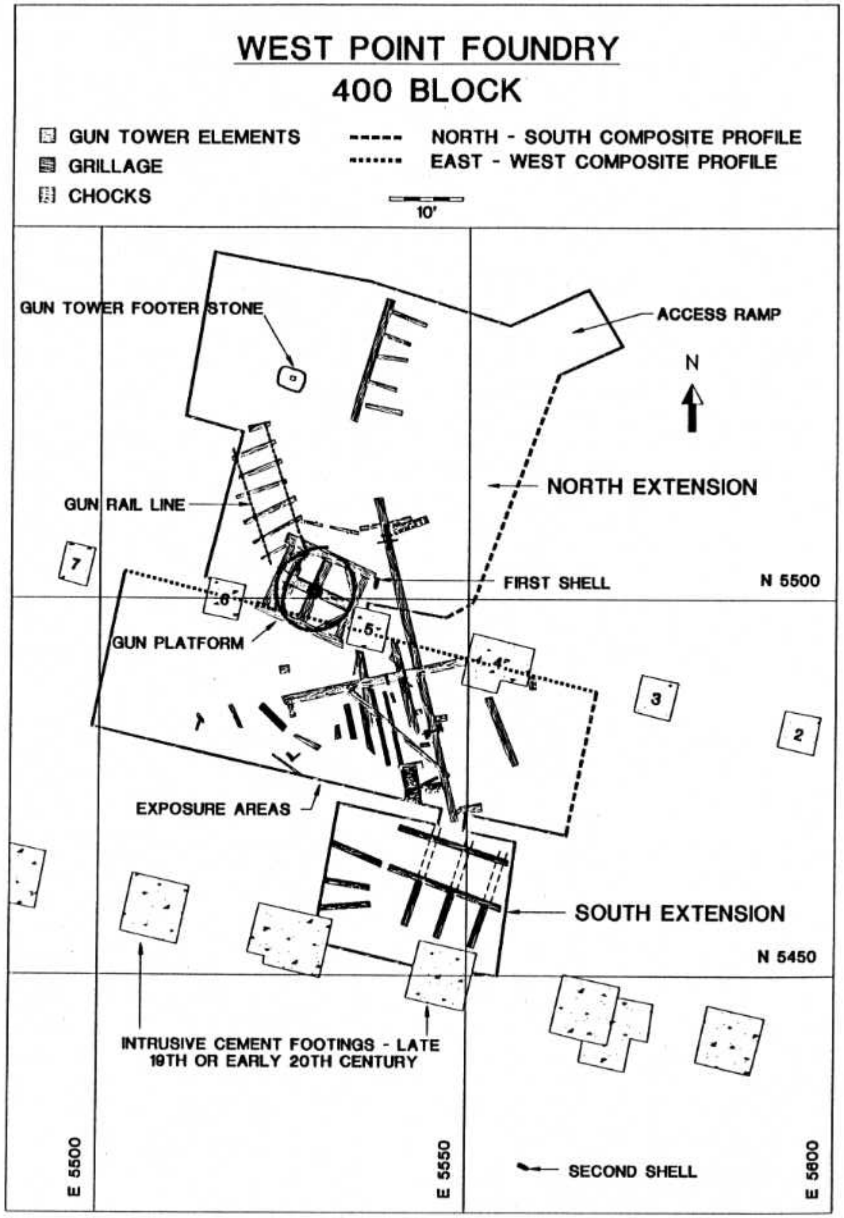


Fig. 11.9. *Plan of excavated Civil War gun-testing platform, tower hoist, rail line, and underlying grillage elements (Block 400). Courtesy of Grossman and Associates, Inc.*

within the sensitivity corridor defined by the computer-based historic map projections.

Parrott's Civil War era gun-testing facilities were found buried five feet below modern grade. Dated historic artifacts from the lowest level of fill below the buried Civil War surface indicated that the fill process had begun in this portion of the site at least a decade prior to the Civil War. The actual Civil War surface appears to have been laid down as an artificial layer sometime after 1857 and used throughout the war and possibly as late as the 1870s. The overlying fill consisted primarily of a four-foot accumulation of postwar ash and debris deposited between about 1880 and 1903.

In winter 1989–90, research teams identified, exposed, and recorded the well-preserved wartime cannon-testing facilities. These features included the wooden structural remains of R. P. Parrott's gun-testing platform, a rail delivery line used to move the cannon from the foundry, and the base and structural elements of a large cannon-hoisting crane topped by an observation tower. This cannon hoist tower had been used to lift the new class of heavy rifled cannons to the platform for testing, or "proofing" (Grossman et al. 1991: 58; figs. 11.8, 11.9, 11.10).

The wooden gun platform, about twelve feet square, with a cast-iron center pintle to hold the heavy cannon in place, was used in proofing the durability, accuracy, range, and shell velocity of Parrott's larger, eight- and ten-inch rifled cannon and projectiles. The identification and function of the gun-testing platform were confirmed by the archival discovery (after the excavation had been completed) of two original hand-colored plans and profiles rendered by Parrott of his ten-inch, 300-pounder, rifled cannon (fig. 11.11). This same platform was shown in a wartime photograph of the foundry's civilian gun "proofing" crew standing beside a 300-pounder rifled cannon and chassis (figs. 11.12). Another photograph from this era depicted the cannon hoist tower (fig. 11.13).

Once the buried Civil War surface had been defined, it was exposed horizontally with an area-wide control system of five-foot grid excavation units (fig. 11.10). This controlled excavation resulted in the recovery of 4,184 historical artifacts, of which 70.2 percent were stratigraphically associated with the surface supporting the gun-testing platform. Of these, 897, or nearly 25 percent, were associated with military activities.

Fig. 11.10. Excavated gun platform and stone base of hoist tower, looking north. Courtesy of Grossman and Associates, Inc.

They consisted of friction primer pins, tubes, safeties, iron pintle shear pins, vent picks, reamers for loading the shells, lead ammunition seals, and a variety of shells and exploded shell parts. The shells included two 100-pounders. One of these was a standard exploding piece, while the other appears to have been an example of Parrott's little-discussed binary incendiary shell, deployed in 1863, on the orders of President Lincoln, to burn Charleston, South Carolina (Bruce 1989).

The generation of computer-based density plots of each artifact class across this buried Civil War surface permitted the reconstruction of the former location and distribution of gun-crew positions. These plots, particularly the large numbers of friction primers found to the side and rear of the platform, could be correlated with historic Civil War era photographs of the gun crews at work testing and "proofing" a rifled cannon (fig. 11.14).

The artificial floor on which the cannon platform and hoist tower rested was built over a waterlogged historic landfill of ash and slag. The gun-testing or proofing surface was composed of a crisscrossed grillage of oak beams, which in turn was packed with a matrix of brown and green clay. When these structural details were compared with surviving

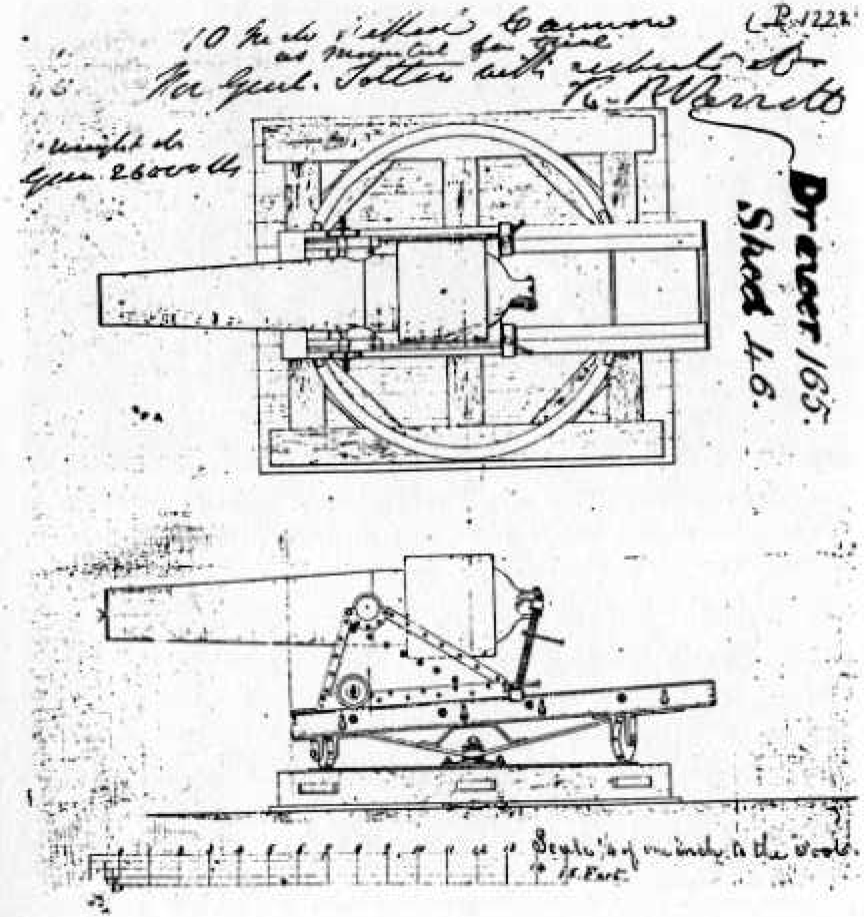


Fig. 11.11. Sketch plan and profile of platform support system for R. P. Parrott's rifled 300-pounder, sent by Parrott to General Totten at the Washington Arsenal. Courtesy of the National Archives.

military engineering reports on the construction of batteries from the Battle of Charleston, South Carolina, it became apparent that this West Point Foundry structure was similar to the famous Marsh Angel gun battery, built far out into the tidal flats of Charleston Harbor. The field records and engineering plans from this battle illustrate the use of a horizontal wooden platform supported by deep vertical pylons. These reports also documented that Alfred Mordeccai, the engineer in charge of

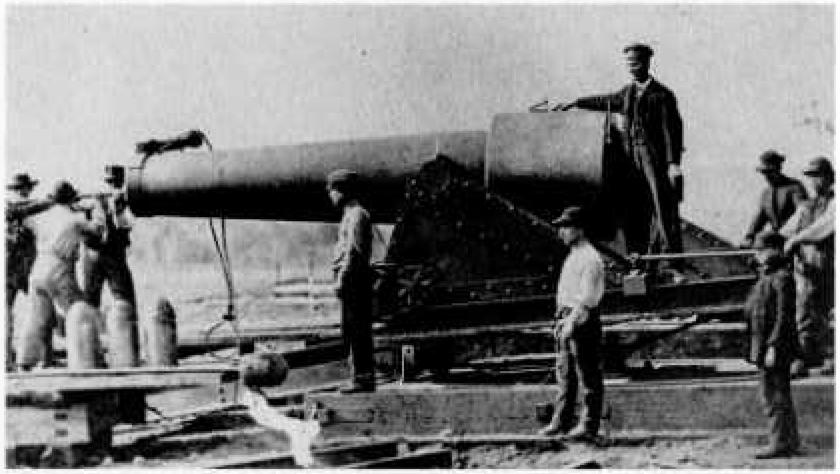


Fig. 11.12. Post-1863 Civil War era photograph of gun-testing crew around a Parrott 300-pounder rifled cannon at the West Point Foundry gun-testing site. Courtesy of the Putnam County Historical Society, Cold Spring.

constructing the Union gun batteries on Morris Island in Charleston Harbor, also had been stationed as an ordnance officer at West Point Foundry before and during the war. The parallels in construction and the presence of the same officer in both posts suggest that this engineering capability for the support of long-distance, heavy-cannon emplacements in bog or marsh environments may have been developed first at West Point Foundry.

The Foundry Workers' Housing Complex

Following the excavation and photogrammetric recording of the gun proofing area, the field investigation shifted to the evaluation of the proposed haul road alignment along the flank of the bluff. Archaeological evidence uncovered here indicated that the composition of the workers' community was more economically complex, technically sophisticated, and ethnically distinct than had been suggested by traditional historical accounts. Previously the workers had been described as predominantly poor Irish and English laborers. However, analysis of the Civil War era artifacts from the workers' homes suggested instead the presence of

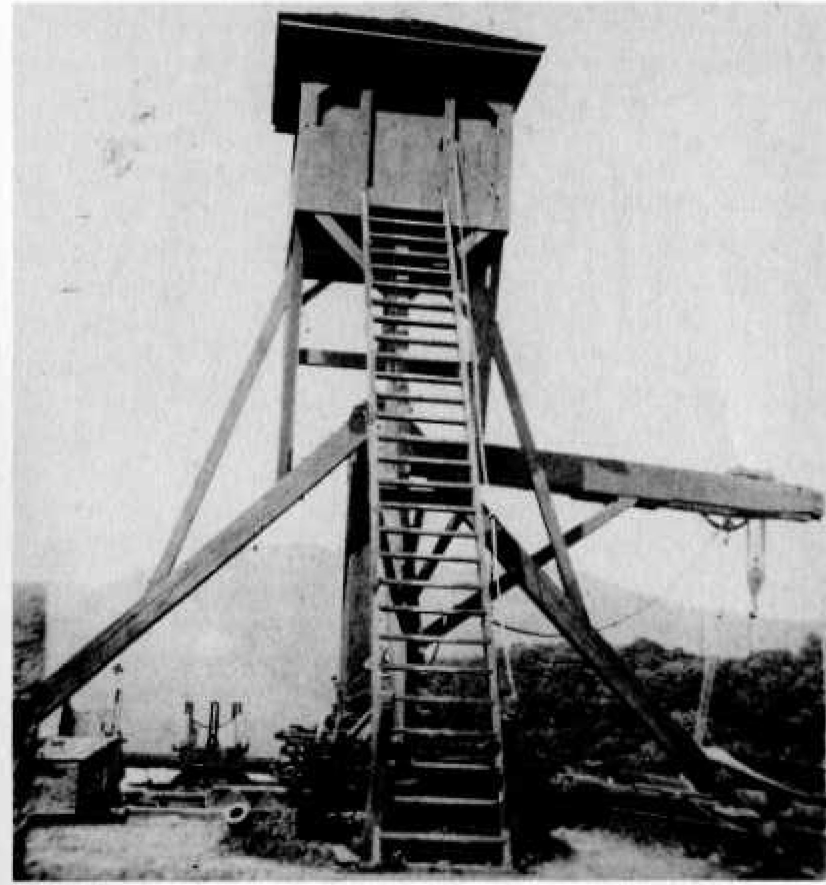


Fig. 11.13. Enlarged half of a Civil War era stereograph of the West Point Foundry cannon hoist tower, observation cupola, and gun hoist crane. Courtesy of the Putnam County Historical Society, Cold Spring.

skilled and materially well-off workers from England, France, Germany, and Austria—countries that then were actively involved with the research and development of heavy rifled ordnance (Grossman et al. 1990: 6–7; Grossman et al. 1993; Raoul 1936: 464–65; Kemble 1916: 195).

Analysis of the archaeological data from the large-scale excavation of the structures at the Haul Road revealed the presence of a large assortment of imported high-status technical and scientific tools, many of them associated with military technology. These artifacts did not fit the established characterization of supposedly poor laborers. In addition, a

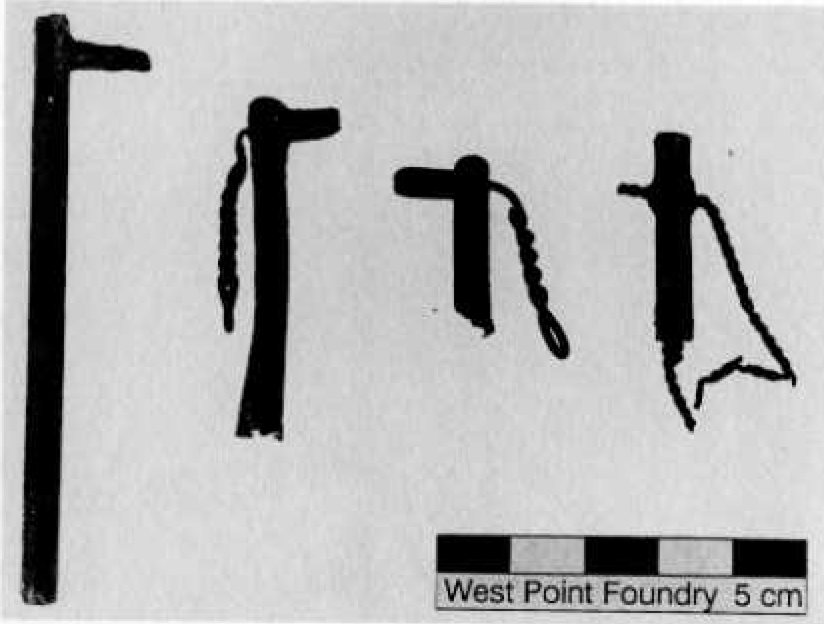


Fig. 11.14. Friction primer tubes, with attached primer wires, which were found concentrated in an oval area about ten feet at its widest point, located southwest of the gun platform. Courtesy of Grossman and Associates, Inc.

variety of children's toys, "collector's" china figurines, miniature dollhouse furnishings, utensils, and jewelry (a cufflink stud, a watch chain, and several crosses: one gold and one with a Celtic motif) were recovered, many of these are luxury items by any standard. Identified ceramics included exotic imported types from China and Europe (including specimens from England, France, and Austria), many of which can be viewed only as high-status items, both today and during the Civil War period. This diversity in ceramic origins was paralleled by the presence of identifiable coins and tokens from France, England, and Venezuela, as well as several specimens of Spanish imperial *reales* minted in Mexico. Furthermore, the excavation revealed a diverse assortment of gentlemen's smoking pipes from England, France (Paris), Ireland, Scotland (Glasgow), Austria, and Germany, and glass artifacts from France, England, Hungary, and Bohemia (Grossman et al. 1993).

Military items specifically associated with the testing and manufacture of large-caliber guns and shells were recovered from the interior floors and features associated with the houses. These military-related items included friction primers, fuses, fuse strikers, fuse adapters, fuse caps, gun sight pendulums, and examples of shot from large-caliber shells, many of which were identical to examples from the previously excavated gun-testing facilities in the marsh. This archaeological evidence strongly suggests that at least some of the Civil War era inhabitants were involved specifically in the testing of 100- to 300-pounder rifled cannon, instead of simply doing general work at the foundry.

Finally, in addition to imported domestic household items of ceramic, glass, and metal, the artifact analysis revealed a number of unique scientific tools and instruments, including microscopes, gauges, a thermometer, calipers, battery jars, electrical contacts, carbon arcs, and timing devices. These artifacts in turn suggest that this group of residents very possibly was involved not only in the testing, but also in research and laboratory activities associated with testing the materials which went into the manufacture of the rifled guns.

Foreign Influences and Antecedents

Based on the archaeological discoveries outlined above, the archival research was expanded and redirected to include sources relating to foreign gun technology, foreign workers, and foreign influences on Parrott's operations. This change in direction yielded unanticipated results. The research (primarily in the National Archives in Washington, D.C.) indicated that the origin and development of Parrott's cast-iron rifled cannon was heavily influenced by, if it was not the result of, an elaborate government-sponsored program of foreign military and industrial espionage before and during the Civil War. This interpretation, supported by private correspondence, records of the Navy Ordnance Bureau, and Civil War era congressional testimony, suggests the probability that key elements of Parrott's rifled gun actually were derived from confidential European designs and antecedents.

In fact, the 1862 date of Parrott's first patent was preceded by an 1860 visit from a Russian officer, or agent, who supplied Parrott with covertly obtained copies of the secret, and tightly guarded, plans for the production of the banded reinforced British Armstrong rifled cannon (Paulding 1879: 265–66). In 1879, Parrott's successor wrote that, in January 1860, twenty-two months before the date of Parrott's first patent, a Captain Schwartz of the Imperial Russian Navy had appeared at West Point Foundry and asked Parrott to make him a British Armstrong cannon. When Parrott said he was unable to because the designs were secret, Schwartz responded by providing detailed plans and specifications of the British gun. The Russian's gun was completed in March 1860, and a few weeks later Parrott produced what was described as "the first experimental gun on his own system" (Paulding 1879: 265–66).

What stands out from the archival research is that the visit of the Russian agent to Parrott's facility was not an isolated event, nor one inconsistent with broader policy and actions by the Russians toward the beleaguered Union cause. In contrast to the pro-Confederate and often pro-interventionist attitudes and actions of Britain and France during the Civil War, the special assistance provided by Captain Schwartz to Parrott was entirely consistent with Russian foreign policy in the mid-nineteenth century. This policy subsequently was manifested openly by the 1863 supportive appearance of the Russian fleet at Northern ports, in a show of force.

The Russian Czar wanted friendly relations with the U.S. for a variety of reasons. At the most mundane level, both countries consisted of large, isolated land masses; both were ethnic melting pots; both had, almost at the same time, emancipated large blocks of minorities, the slaves in America and the serfs in Russia; and, significantly, as the Czar stated in 1866, "The two peoples have no injuries to remember" (Bailey 1958: 363). Another, more immediately pressing, reason existed for a Russian officer to breach British security to help the American defense efforts. As T. A. Bailey pointed out in his *Diplomatic History of the American People,* "The overwhelming sea power of Britain had proved highly offensive to both nations. From an early date the Czar's government had deliberately undertaken to cultivate the U.S. in the hope of building up a New World rival that would curb England's power and pride" (Bailey 1958: 364).

In addition to the Czar's favorable attitude towards Lincoln's domestic policies, the Russian emperor viewed a strong, unified U.S. as a much-needed political, economic, and military counterweight to Russia's recent enemies in the Crimean War. During that war, England and France had thrown their combined military might behind the Turks against Russia (Adamov 1930; Tyrner-Tyrnauer 1962; Woldman 1952).

In actuality, "Russia's pro-Union sentiment prevented participation in any policy alien to the Lincoln administration's wishes" (Howard Jones 1992: 229). Against this larger Russian policy, Captain Schwartz's contribution can be seen as simply representing a clandestine military manifestation of a larger pattern of Russian diplomatic largesse to the North. In addition, this initial input provided by the Russian officer appears to have represented only the smallest tip of what apparently was a much larger pattern of information flow on the state of British and European cannon technology and metallurgy that continued even after the Civil War ended (Wise to Parrott, Dec. 12, 1865, National Archives RG74 E4; Mission 1865; Martin n.d.).

It is also highly probable, judging from official Ordnance Department records and reports, that both the Union military establishment and Parrott, as a former ordnance officer, had detailed knowledge of the status of European research and development efforts concerning heavy rifled cannon in particular, not only prior to the onset of the Civil War, but as much as three years before the visit of the Russian officer in 1860. One early key source was provided in an official report by Major Alfred Mordeccai of the Ordnance Department on the field observations of the U.S. Military Commission to Europe during the Crimean War between 1855 and 1856, a report written in 1856 and published in 1861. In addition to detailed field observations on the efficiency of various heavy cannon, including the early British Lancaster rifled cannon (which initially was deployed in the battles of Sebastopol), Mordeccai's report included detailed accounts on the layout, workings, and production procedures of armories and foundries in Russia, Prussia, Austria, France, England, and Belgium. Among the primary engineering reports and drawings collected by the commission, Mordeccai highlighted the acquisition, from Colonel Frederix of the Belgian foundry works at Liège, of drawings and plans of cannon produced for thirteen foreign countries under contract by that facility.

Of greatest relevance to the issue of early influences on Parrott's work, the study included a special section (part 5) dedicated specifically to the treatment of rifled cannon and shell technology. In addition to describing early trials of the British (Lancaster), Swedish, and Italian rifled canon and shells of various designs, Mordeccai's report included a summary of Colonel Cavalli's research monograph "Memoire sur Sivers Perfectionnemens Militaires," which had been translated from Italian in 1856 and included the 1854 test results on the accuracy and range of Cavelli's experimental rifled guns and shells. The translation documented that the Italians had developed a heavy rifled cannon capable of firing an 81-pound shell over a distance of between 3,140 and 5,627 yards, or nearly three miles, with an accuracy of fifteen to thirty feet (Mordeccai 1861: 110).

In general outline, the overall report summarized past European accomplishments and failures and weaknesses in the design and manufacture of cast-iron rifled cannon, and of cast- and wrought-iron rifled shells, with special attention to those used for the British Lancaster and Whitworth rifled prototypes (Mordeccai 1861: 111). Finally, Mordeccai's intelligence document also included what appears to represent the first American technical description of the design details and initial failures of Krupp's early cast-steel cannon and rifled shells. The Prussian rifled gun, originally manufactured under contract for the British, fired a 259-pound shell, twenty inches long, which was made to spin in the rifled gun barrel through the application of a wrought-iron expansion ring, or sabot, which was later paralleled in design by the first Parrott shells over the same period (Mordeccai 1861: 115).

The Role of the Navy Ordnance Bureau

It is now apparent that the Russian officer's input was not a unique or isolated event; nor was the flow of information across the Atlantic confined to Russian sources. Reports and correspondence by ordnance bureau officers document that, throughout the war, many technical decisions involving the production of Parrott's cannon were made with the approval and oversight of the Navy Ordnance Bureau stationed both in Washington, D.C., and at West Point Foundry (Brandt 1862). It is also clear that the ordnance officers in Washington, D.C., and at the West Point Foundry had a keen understanding and detailed technical knowledge of the state of British and European arms technology in general, and of the secret British Lancaster, Whitworth, and Armstrong rifled cannon technology in particular (Wise 1866a–c; Padgett 1945: 38–109).

Work at West Point Foundry not only was under the control of officers of the Navy Ordnance Bureau, but also was under the direct and immediate control of its chief, Commodore Henry A. Wise. Wise, in turn, was in intimate contact with special assistants to President Lincoln, and he appears to have served on various occasions as an expediter, trouble shooter, and high-level intelligence officer for the U.S. government. As chief of the Navy Ordnance Bureau, Henry Wise often dined with John Hay, Lincoln's personal secretary. As noted in Hay's diaries, the topic of their after-dinner conversations often pertained to intelligence matters and the potential for war with England (Hay in Dennett 1939: 88, 110; Anonymous, *National Cyclopedia of American Biography* 1921: 425; Bruce 1989: 16; Grossman 1991: 148).

Wise appears to have begun his career in espionage during the Mexican-American War, with additional experience gained in Southeast Asia and Japan. He made at least one secret mission to Germany to investigate and report on Krupp's new forged-steel cannon technology (Anonymous, *National Cyclopedia of American Biography* 1921: 425). His access to foreign military secrets was illustrated by the fact that his testimony before Congress often included submission of confidential military documents from other countries, including England. Wise's involvement with issues of foreign intelligence appears to have continued throughout his dealings with the West Point Foundry. He explicitly described them to Congress in his testimony before the Joint Committee Hearings on the Conduct of the War in 1865 (Wise Testimony in U.S. Congress 1865, Joint Committee Hearings on the Conduct of the War: 22–32).

Military correspondence and official reports to and from the Navy Ordnance Bureau revealed multiple references to the status of European capabilities and technology of the period, and allusions to plans and specifications for the products of various British and European munitions centers (Mordeccai 1861; Wise Testimony in U.S. Congress 1865, Joint Committee Hearings on the Conduct of the War: 22–32; Grossman 1991; Grossman et al. 1993). Additionally, explicit references to the "giving" or "exchange" of details of American technology to foreign diplomats, with the hint of reciprocal benefits, cast in a very different light the developments documented as having taken place at Parrott's West Point Foundry. Instead of Parrott's working in isolation, the testimony by ordnance bureau officers stationed there (most with extensive overseas field experience) documented the availability of a wealth of confidential information concerning the status of foreign research and development in rifled cannon technology (Testimonies of Wise, Mordeccai, Benét, and Benton in U.S. Congress 1865, Joint Committee Hearings on the Conduct of the War).

As documented in Senate testimony at the time, the American officers knew, press accounts to the contrary notwithstanding, that the carefully engineered and finely tooled British Armstrong cannon was unreliable and was being withdrawn from service. They knew that the European bronze guns were too soft to withstand the pressures of rifled shells, and that the heavily promoted Prussian forged-steel Krupp cannons were unreliable and tended to explode with grenade-like force (Benton Testimony in U.S. Congress 1865, Joint Committee Hearings on the Conduct of the War: 62). By 1863, after the bombardment of Charleston, these officers knew that the British banded Whitworth guns (one of which was experimentally deployed at a Union battery), the successor to the Armstrong, proved too delicate in combat conditions, and was 20 percent less accurate than the cast-iron Parrott cannon (Parker in Gilmore 1865: 310). In fact, the Americans were in control of information regarding the strengths and weaknesses of almost every competing rifled cannon system, at the same time that they were testing and evaluating Parrott's reinforced cast-iron cannons (Parker in Gilmore 1865: 310; Barry and Benét Testimony in U.S. Congress 1865, Joint Committee Hearings on the Conduct of the War: 47, 62).

As an example, American and foreign officials had detailed knowledge of Krupp's Prussian experiments with cast-steel rifled cannon. Although many early histories of Parrott and the West Point Foundry have alluded repeatedly to Parrott's initial awareness of Krupp's 1849 experiments in Prussia as the impetus for his own research and development efforts in rifled cannon, the weight of surviving archival evidence suggests that this description of his inspiration is inaccurate. Both the British and the Americans, while impressed with the cast-steel technology as a concept, were aware of a pattern of mortal failures of Krupp's steel guns. In addition, as General John G. Barnard, chief engineer for the defense of Washington, D.C., revealed in his Senate testimony, the Americans had developed their own opinion of the Krupp guns through hands-on experimentation, and were not overly impressed:

> In Prussia, Krupp has made rifled guns of 9-inch caliber (about 200 pounders) of cast-steel, which is probably the strongest of all materials, the steel being cast upon a core and later forged. The Russian government have [*sic*] given him extensive orders, and I have recommended the Governor of Massachusetts to import a few of them. It is a very expensive material, and the process of forging large masses seems yet to be uncertain. I have since observed that one of them recently burst at St. Petersburg. (Barnard Testimony in U.S. Congress 1865, Joint Committee Hearings on the Conduct of the War: 173–82)

In addition to well-informed naval ordnance officers, Commodore Wise's network of informants during the Civil War included a number of special civilian agents who had sufficient standing in Europe to gain access to otherwise restricted installations. Two such special agents who played key roles in the acquisition of detailed technical information on the manufacture, performance, and reliability of British and German rifled cannon and shell prototypes were Abram S. Hewitt and Henry S. Sanford, who at the time were publicly perceived as, respectively, an industrialist and a diplomat.

As Lincoln's diplomat-at-large in Europe, Sanford is credited with playing an important role in undermining Confederate maneuvers in France and England (Wriston 1929: 779). Sanford's diplomatic career began with his appointment as attaché to the Russian court in Saint Petersburg, followed by a posting in Paris, and then, with the inauguration of President Lincoln, as minister to Belgium. Sanford has been recognized for his skill in undertaking delicate missions. Of immediate relevance to the Union's weapons development program, he singlehandedly supplied the North with otherwise unavailable stores of saltpeter, the key ingredient of gunpowder, and also played a key role in conducting back-channel negotiations with the British over the Trent Affair (Anonymous, *National Cyclopedia of American Biography* 1921: 140; Axelrod 1992: 194).

Sanford reported directly to Commodore Wise when his activities involved the acquisition of information and hardware relevant to the bureau's weapons development program. His clandestine activities also included acquisition of difficult-to-obtain examples of production prototypes of European ordnance. Unpublished letters from Sanford to Wise in 1863 also document in detail his role in acquiring and sending an example of Krupp's cast-steel cannon to the U.S. for testing. In this instance he was beseeching Wise to help direct the piece to suitable authorities so that it could be tested properly and "given to our Yankee inventors to look at and endeavor to imitate its metal." He went on to say that "Gen. Chazal, the Minister of War here [Belgium], told me that he had tested one by 10,000 discharges in every conceivable form . . . and he considers it indestructible" (Sanford to Wise, Aug. 7, 1863, Wise Papers, LB 5, No. 6.5, New York Historical Society, New York).

In contrast to Henry Sanford, Abram Hewitt's wartime exploits and ties to Wise have not been recognized previously. His firm, Cooper and Hewitt, was the first to produce iron girders and supports to be used in fireproof buildings and bridges in New York. Utilizing the reputation (and access to facilities which may have been closed to others) gained by his innovations in cast-iron structures and molded facades, in 1862 Hewitt "visited England in order to learn the process of making gun-barrel iron, and was enabled to supply the gun-barrel material needed by the U.S. government during the continuance of the civil war" (Anonymous, *National Cyclopedia of American Biography* 1921: 295). This fact, as well as his critical involvement in the production of Union mortars, also under the direction of Wise, became public record after the war (Nevins 1935; Bruce 1989: 159).

What was not known, however, is that, when Abram Hewitt reported back to unnamed members of the U.S. government, he reported directly to Commodore Wise of the Navy Ordnance Bureau, a relationship documented in a series of unpublished letters from Hewitt to Wise. Of immediate pertinence to Parrott's work with rifled cannon development is one particular letter which details the technological history and production techniques of the British precursor to the Armstrong cannon. The description is revealing because it highlights the technical parallels between the British methods of production and those ultimately adopted by Parrott for making the reinforced element around the breach of his cast-iron rifled cannon. Hewitt wrote:

> Capt Blakeley commenced with a wrought iron tube, with wrought iron jackets in rings. His next step was to abandon the rings and substitute a continuous jacket. This was shrunk on hot, while the inner ring was kept cool with a stream of water [the very procedure that Parrot characterized as being a key element of his "invention"]. . . . His next step was to make the initial tube of cast iron, and to shrink on it a jacket of wrought iron. (Hewitt to Wise, Apr. 22, 1862, Wise Papers, LB1, No. 9, New York Historical Society, New York)

This unpublished source suggests that, given his ties to the Ordnance Bureau in general and to men under the command of Wise in particular, it is highly probable that Parrott was well aware of the essential details of ongoing European research.

Lincoln and Executive Branch Involvement

Several newly discovered primary sources document that President Abraham Lincoln was intimately involved with rifled cannon technology early in its developmental history. Perhaps the most overt example of industrial espionage by the Federal defense establishment involved the purchase and trans-shipment of a battery of British Whitworth cannon for testing and combat deployment through private sources during the Civil War. The details of this acquisition and the resulting evaluation of the gun's worthiness were first brought to light in an unpublished letter to Lincoln from his first secretary of war, Simon Cameron, dated July 1, 1861; and in detail later, in 1864, during hearings held by the U.S. Joint Committee on the Conduct of the War.

This unpublished letter documents that President Lincoln knew of the ongoing efforts by the War Department to acquire heavy gun technology and details of rifled shell technology by as early as July 1861, several months after the war had begun. On July 1, 1861, Secretary of War Simon Cameron reported that efforts were being made to acquire and test current models of European heavy ordnance from England and on the continent, including France and Austria:

> Some patriotic American citizens resident in Europe, fearing that the country might not have a sufficient supply, purchased on their own responsibility, through co-operation with the United States Ministers to England and France, a number of improved cannon and muskets, and at your [Lincoln's] insistence, this department accepted the drafts drawn to defray the outlay thus assumed.
>
> A perfect battery of the six Whitworth 12 pounder rifled cannon, with three thousand rounds of ammunition, the magnificent donation of sympathizing friends in Europe, has also been received from England (Cameron to Lincoln, July 1, 1861, National Archives RG107 E5).

The wording and date of this report to the president are important for three reasons. First, the report documents that, early in 1861, Lincoln was aware of the U.S. efforts to acquire and benefit from European research and development accomplishments in large-caliber rifled cannon. Second, this document shows that the U.S. was keenly aware of the superior fire power, accuracy, distance, and penetration capabilities of rifled ordnance as early as 1861, and already was converting its existing 32- and 42-pounder smooth-bore cannon into rifled versions. Third, this report documents that, prior to July 1861, during the first months after the outbreak of the Civil War, Lincoln had sanctioned and paid for the importation and testing not only of British Whitworth rifled cannon, but also of other new systems from England and France.

Access by the Navy Ordnance Bureau and the executive branch to many of the most carefully guarded secrets of the European arsenals was forcefully illustrated by the discovery in the National Archives of a previously unknown numerical table found folded with an 1863 personal note to President Lincoln from Admiral Dahlgren. This handwritten listing was titled "Tables of Comparative Power of American and European Heavy Rifled Ordnance" (Dahlgren to Lincoln, Jan. 24, 1863, National

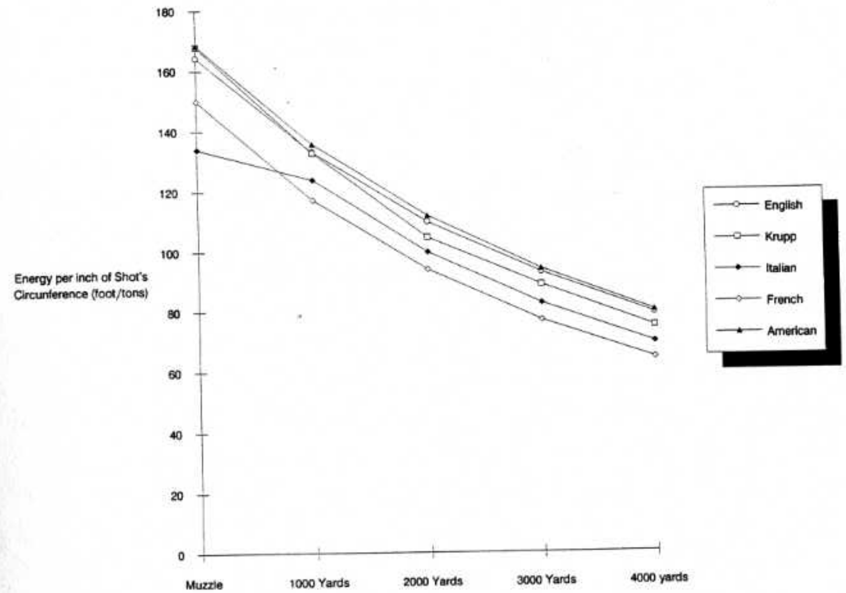


Fig. 11.15. Line graph derived from classified Civil War memo and data table presented to President Lincoln by Admiral Dahlgren. It compares the energy per inch of short circumference (potential penetration in foot/tons), between American and European ten-inch rifled cannon. Despite public misconceptions to the contrary, this confidential briefing document illustrated the superiority of American rifled cannon relative to European heavy ordnance. Derived from Navy Ordnance Department Records, National Archives.

Archives RG156 E200). The comparative table was a detailed technical report, of the most confidential nature, on the relative shell velocity of American versus English, German, Italian, and French rifled shells of various calibers (fig. 11.15).

This data comparing domestic and foreign shell velocity showed Lincoln that the inexpensive American rifled guns produced by Parrott at West Point Foundry were, in fact, 5 to 20 percent superior in velocity and fire power, depending on the caliber and country in question. What the data indicated to the president was that, by 1863, Parrott's rifled cannon and shells, at close range, could outgun a British or French ironclad. This would have been critical information for a commander-in-chief faced with the possibility of a sea-based conflict with foreign ships. The discovery of this document was important because it clearly indicated that both the Union War Department and President Lincoln controlled, and had timely access to, tactically specific hard data on the strengths and weaknesses of European weapons systems of the time. Given the volume of foreign, predominantly British, weapons that were being shipped to and used by the Confederacy, this document indicates that Lincoln and his inner cabinet of military advisors were making wartime decisions based upon intimate knowledge of the tactical and technological capabilities and weaknesses of their adversaries (Hay in Dennett 1939: 76; Anonymous, *National Cyclopedia of American Biography* 1921: 425; Grossman 1991: 147).

While no explicit mandate for the development of a foreign intelligence gathering program was found in any of the surviving archival sources, the existence of such a program was alluded to in an official 1864 report for the U.S. Navy (initially presented before Congress in 1864 but not published until after the War), concerning the status of heavy ordnance. In the report Wise stated, "The bureau has sought in vain among the systems of European nations and the improvements of our own country for a better gun, taken as a whole, than the Parrott rifle" (U.S. Congress 1869: 156–57).

This oblique yet explicit reference and other comments by high-ranking officers and staff of the Navy Ordnance Bureau, speaking before U.S. Senate investigators during and after the war, clearly document that this stream of confidential information flowed through the offices of the Navy Ordnance Bureau, both to the executive branch of President Lincoln and to U.S. producers of heavy ordnance.

Parrott's Accomplishments in Retrospect

Given the fact that Parrott's work during the Civil War was supervised and predominantly funded through contracts with the Ordnance Department, it now appears highly probable that Parrott actively utilized data on the most promising experimental systems and techniques of manufacture coming from Europe. Only when this broader international context of fluid transatlantic information exchange and access to foreign sources is taken into account can we accurately evaluate the details of

Parrott's foundry operations, production procedures, and accomplishments in the area of heavy rifled ordnance.

Parrott's public image was that of a lone inventor who developed his new cannon at his own expense and in isolation, with little government support. He helped to cultivate this impression. In 1862 Parrott wrote, "I was led to the construction of my gun wholly by my own experiments and conclusions." The originality of Parrott's design and patent was officially questioned, however, in 1864 and 1865, during confidential Senate investigations following the repeated occurrence of premature explosions of his shells and cannon in both land and sea combat (Grossman 1991: 222–23; Turner in Gilmore 1865: 151). In 1865, while testifying under oath before the U.S. Joint Committee on the Conduct of the War, Parrott initially reiterated his claim to invention by stating: "In 1860, I made the first of these guns. I made it from my own ideas upon the subject of what would make a gun of moderate cost and of good strength." Chairman Wade pushed the point and asked, "You were the inventor of these guns, were you?" Parrott responded in the affirmative, but with a little more caution: "Yes, sir. I do not pretend to be the inventor of the idea of putting a band on the gun because that thing has been tried before; but I believe my gun is the first banded gun that was ever actually introduced into the service of any country as part of its armament" (Parrott Testimony in U.S. Congress 1865, Joint Committee Hearings on the Conduct of the War: 139). With these words Parrott essentially negated his earlier claims for invention of the gun, and instead emphasized only the production and incorporation of this technology into the American arsenal.

Thus, the idea of a banded or "hooped" rifled cannon was not new, either in Europe or the U.S. It was the details of design and methods of production for the Armstrong cannon that provided the critical technological elements for Parrott at Cold Spring. The proprietary aspect of the Armstrong cannon involved the use of a heavy, steam-powered trip hammer to weld a wrought-iron coil, or band element, and the use of heat and controlled cooling to evenly shrink the band onto the barrel of the gun. If the Russian officer indeed provided Captain Parrott with the details of the British system of making rifled cannon with wrought-iron hoops as reinforcement around the breach, then he had the essential elements to make a highly accurate, high-velocity, long-distance cast-iron gun which would not break apart when fired with a heavy charge and sluggish rifled shell. By adopting this one element of a coiled wrought iron band over the breach of the gun, Parrott would have been able to develop an inexpensive and easily produced rifled cannon, at one-half to one-quarter the cost of contemporary British guns (Grossman 1991). Thus, from an engineering perspective alone, the development of Parrott's rifled ordnance appears to have reflected awareness of, access to, and familiarity with the latest military developments in weapons technology in Europe at the time.

Discussion

The discovery of historically inconsistent high-status and "high-technology" Civil War era artifacts in the isolated complex of "workers housing" above the foundry precipitated the focused archival investigation of formerly confidential primary sources. These sources cast a different light on the status of American heavy weapons technology relative to contemporary developments in England, France, Germany, Belgium, and Russia. They provide new evidence that Parrott was not working in isolation and that the foundry which he administered rather was, from its inception, controlled, supervised, and financially supported by the ordnance bureaus of the military. The developments which took place there were not isolated phenomena, but instead formed part of a concerted effort involving the assimilation of the most current developments in the European arms industry, through extensive borrowing and outright espionage.

Taken together, these data now suggest that the Union was actively and covertly working to gain access to, and to apply, the results of costly European research efforts in heavy rifled cannon development, which had been under way since the 1850s. This policy of industrial and military espionage, and its manifestation in the products of the West Point Foundry, in effect saved the Union millions of dollars and years of development time—time that, at the onset of hostilities in April 1861, the

North did not have. What took the British over a decade and over $12 million dollars to develop, with questionable success, was accomplished at Parrott's facility in a matter of months and at a fraction of the cost (Holley 1865: 80). While the North was five years behind Europe in heavy ordnance technology at the beginning of the war, by 1863 it had matched if not surpassed its European counterparts in what was, in fact, a transatlantic arms race.

This archaeological and archival investigation also highlighted the existence of an effective foreign intelligence gathering capability which operated out of the Navy Ordnance Bureau, with direct lines of communication to both the president and Parrott. This information network appears to have operated under the direct control of Commodore Henry A. Wise, who served first as assistant to Adm. John A. Dahlgren, chief of the Navy Ordnance Bureau, and then, as of 1863, as Dahlgren's successor in the position (Hay in Dennett 1939: 108–10). As the archaeological and archival investigations have documented, Wise directed the flow of ongoing research and testing work for the development of heavy weapons systems for the Navy, at the West Point Foundry and other munitions centers. He did so based on an extensive knowledge of the status of research and development efforts in heavy rifled cannon systems throughout mid-nineteenth-century Europe (U.S. Congress 1865, Joint Committee Hearings on the Conduct of the War: 22–32).

Thus, during the war, the Navy Ordnance Bureau was not limited to merely administering and tracking government purchases and acquisitions. Instead, it also was intimately involved with larger issues surrounding foreign technological advances and ongoing government efforts aimed at benefiting from access to, and utilization of, these European accomplishments in rifled cannon and shell technology. It was in this context, and in direct response to acquired insights into the status of European weapons technology, that the Union military establishment managed its domestic cannon and shell development program in heavy ordnance. Against this backdrop, as chief of the bureau, Wise, and his officers stationed at West Point Foundry, appear to have controlled information on almost every aspect and detail of Parrott's foundry operation, including access to, and flow of, foreign technological and military secrets to the foundry and to Parrott.

In addition, Commodore Wise worked in intimate contact with Lincoln, as well as with members of the president's "kitchen cabinet" which met with little or no public visibility and worked with Lincoln throughout the war (Hay in Dennett 1939: 76; Bruce 1989: 159). Because of the president's 1862 visit to the foundry, his constant association with Wise, and his direct involvement in the first field experiments with rifled incendiary shells, Lincoln was aware of the capabilities and tactical implications of heavy rifled cannon technology for both domestic and transatlantic conflicts at least as early as summer 1862, if not before (Benét in Bruce 1989: 97; Grossman et al 1991). Cameron's letter to the president in 1861 suggests that Lincoln's personal involvement with heavy rifled cannon may have been established by 1861.

Furthermore, American developments in heavy ordnance took place with a dual focus—on preparing for potential threats to the Union not only from the South but from the transatlantic naval powers of England and France. Much of the concern for developing an effective rifled cannon centered on countering, and preparing for conflict with, one of these latter two maritime powers, most urgently during the first half of the war, between 1861 and 1863, when the threat was greatest. It was during this time that Parrott's efforts to develop and produce his 200- and 300-pounder rifled cannon were at their peak.

These insights from the West Point Foundry investigation are presented not to derogate Parrott or detract from his accomplishments, but instead to place the role of Parrott, the West Point Foundry, and the Union military establishment in a new perspective. The archaeological and archival evidence strongly suggests that Parrott, rather than being an example of "Yankee ingenuity" in a regionally and technologically isolated context, was a player in a sophisticated international and national program of military intelligence and espionage. The foundry itself, rather than being an example of fledgling capitalism at its best, rising to meet the technical demands of the government in times of need, in fact functioned as a "proprietary" operation, heavily underwritten by the government, much like the "Flying Tigers" in China during World War II or "Air America" during the Vietnam War era.

This data recovery program, mandated by the U.S. Environmental Protection Agency, has resulted in the discovery of what appears to represent the unique remains of Civil War era military technology not otherwise preserved at any known mid-nineteenth-century site or institutional repository. In terms of its contribution to Civil War history, the physical and archival discoveries which emerged from the West Point Foundry investigation shed new light on the history of Parrott's invention in particular, and on the development of American military technology in general. The documentary investigation of Civil War foreign intelligence efforts triggered by the archaeological discoveries has written a new chapter in Civil War history. What has emerged is a story of nationally- and internationally-based intelligence operations which flourished under the sanction of President Lincoln and his inner circle of military advisors. The historical implications are complimentary to Lincoln's administration and suggest a level of technological and geopolitical sophistication which appears not to have been recognized in past treatments of Lincoln's executive branch structure and operations.