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ARCHITECTURAL IRON PRESERVATION USING THE SUBCRITICAL FLUID TREATMENT METHOD: A CASE STUDY USING DRAYTON HALL'S ARCHAEOLOGICAL IRON COLLECTION

A Terminal Project
Presented to
The Graduate Schools of
Clemson University
and the College of Charleston

In Partial Fulfillment
of the Requirements for the Degree
Master Historic Preservation

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by
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May 2008

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Author's Introduction:

The following thesis project began in the summer of 2007. After several months of trial and error, the goals were refined. During the first months of a summer internship at the Clemson Conservation Center, I worked with an experimental device testing chloride levels on cast ironwork at Magnolia Cemetery in Charleston South Carolina. The purpose of the research was to determine if this portable and non-destructive device could accurately gauge the amount of chloride in a given iron sample. The hope of the staff was to use the device in the conservation and long term preservation of the Hunley Submarine, a Civil War marine archaeological artifact. As the research progressed it was determined to not be effective. As a result the goal of using the device and studying its potential for conservation of architectural ironwork as a thesis project came to an end. During the experimental phase of the summer research the device was additionally used to test iron, stone, and brick samples at Drayton Hall. During this testing the condition of the metal collection became apparent and it was determined that the collection was in immediate need of an evaluation.

The first goal of the project was to assess the early archaeological metal collection at Drayton Hall. This assessment included the cataloging of the artifacts, identification of the corrosion state of the items, and to develop a preservation and storage plan for the collection as a whole. During the first phase of the project all of the metal items were evaluated and documented. While documenting the artifacts, all were

found to be in a state of active corrosion and in great need of new storage conditions.

The second objective of this study included an investigation of the currently available iron conservation methods, and an interpretation, including positives and negatives, of each conservation strategy. In order to complete this goal, the history of metal conservation as a science was analyzed and new research was explored. During this portion of study, the third purpose of this project came to light; the need for a conservation strategy for the entire metal collection at Drayton Hall.

A case study using the subcritical fluid method became the third aspect of this project. This study used archaeological iron samples taken from Drayton Hall. The artifacts were analyzed and treated at the Clemson Conservation Center (CCC), and were the third group of terrestrial archaeological artifacts treated with this method worldwide. The experimental nature of the case study demonstrated remarkable results and analysis is ongoing to determine the future stability of the items.

The report that follows summarizes the information from all three objectives and begins with a short introduction to the history of Drayton Hall as a historic site. Following the report, a detailed set of appendices is available. These include photographic documentation of the case study, artifact documentation sheets, and the complete archaeological metal catalogue. Not only is this report a case study and preservation plan for the Drayton Hall metal collection; it is in addition an early evaluation of the subcritical treatment method on architectural ironwork. As each of the artifacts treated were once architectural elements

this research opens the door to the possibilities of using this method for the preservation of historic buildings in the near future. The report will also help those unfamiliar with iron corrosion to have a basic understanding of its principles and to have references for additional information. As this is a highly technical and often confusing field, having a concise reference will be invaluable.

The final, and personal, goal of this project was to produce a detailed report that would bring new information to the field of historic preservation and to produce documentation of the metal collection for research and study.

Introduction to Drayton Hall-

The Property, Family, and Historic Value:

Drayton Hall is a house that has the ability to transport the visitor back into the history of the Low Country of South Carolina, and into the future of historic preservation as a science. By describing the surroundings, the family, and the craftsmen that produced this National Historic Landmark; the value of preserving the extant buildings and all the available resources will be seen. Conservation plans are being developed so future generations will have opportunities for research and reinterpretation of the site, and its occupants as additional information becomes available.

The property lies along the Ashley River and was purchased in 1738 by John Drayton (1715-1779). At the time of sale, the plantation consisted of 350 acres with 200 cleared acres and several buildings, and was owned by Mr. Greene.[1] The property stayed within the Drayton family for 236 years, or seven generations, until 1974 when the National Trust for Historic Preservation purchased the property. There are several references to the land in newspapers in the early 1700s, indicating a

Master Context List of Structures

No.	Description	Location
1	Main House	Historic Core
2	Brick Privy	Historic Core
3	South Flanker	Historic Core
4	North Flanker	Historic Core
5	Garden House	Historic Core
8	Pre-Drayton Structure	Historic Core
9	Possible Barn	Historic Core

Chart 1

1 South Carolina Gazette, January 12, 1738, Advertisement of Sale. Mr. Roche owned the property prior to the Greene family.

house on the property.[2] However, the first mention of the house occurs on April 18, 1748 in the *South Carolina Gazette.* The main house is Palladian in style and composed of two floors on a raised basement, with a two-story portico. John also constructed several out buildings, including two flankers, a brick privy, and a garden house. (Chart 1) [3] It is thought that all of these buildings were completed by 1747.[4] References to the property as "Drayton Hall" began in 1774.[5] While John orchestrated the construction of the main buildings, many changes occurred after his death in 1779.

His son, Charles I (1743-1820), gained possession of the property through an agreement with his stepmother in 1784.[6] During the beginning years of his occupation he repaired many of the existing features of the house. In approximately 1800 he began a building and remodeling campaign.[7] While written documentation of building and decoration from John's time period is sparse, there is evidence of the changes and craftsmen during Charles' time. His changes included the construction of multiple outbuildings and the redecoration of several of the interior spaces. The interior woodwork was allowed to remain in place, while the fireplaces and mantels were replaced. A local stone carver, Robert Walker, created the mantels using compositional moldings.[8] As little is known of the Walker family of carvers, this remaining evidence is extremely important. There is little documentation of the original wood carvers and brick makers who helped to build and shape the house. However, notes concerning Toby, a slave carpenter and woodworker, remain, as do notations of

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2 South Carolina Gazette, May 28, 1744, Request for the return of run away horses.

3 Chart 1 lists the structure numbers and locations of a selection of buildings. Courtesy of Drayton Hall.

4 Date is taken from a replicated drawing (1840) of an engraving from that year.

5 South Carolina Gazette, May 13, 1774. Reference to a slave rebellion where supplies are taken.

6 Details of the changes to the house and craftsmen were obtained through interviews with Matthew Webster, Director of Preservation and Carter Hudgins, Archaeologist and Manager of Preservation Programs at Drayton Hall. Interviews were conducted from October 2007 to February 2008. Also referenced National Trust for Historic Preservation, "Drayton Hall Pamphlet," (National Trust for Historic Preservation, 2005).

7 Ibid.

8 Ibid.

John Phailey, a brick mason.[9] Another craftsman who worked on ironwork at Drayton Hall is Henry Whitney Gardner, whose maker's mark can be seen on an iron picket on the stairway leading to the house. Gardner resided in the Charleston area from 1816-1822.[10] The use of local craftsmen in the construction of Drayton Hall exemplifies an early American labor practice.

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9 Ibid.

10 Ibid.

Changes over the centuries and Preservation Projects:

Much of the main house remained unchanged over the next century. Damage inflicted on the structure, by the numerous natural disasters of the nineteenth century, were minor. However, multiple outbuildings were destroyed or severely damaged by the disasters. The house withstood the American Revolution, the Civil War, several hurricanes, and the infamous 1886 earthquake, which caused extensive damage to Charleston and the surrounding areas. Phosphate deposits were discovered on the property, and mining began in the 1860s.[11] This new industry brought much needed financial resources back to Drayton Hall, allowing for repairs. During this time the privy building was turned into an office and "Victorian Era" decorative details were added to the house. The decorative changes included the repainting of the interior woodwork blue and the addition of a new roof. The roof was changed from a treble roof with single hips to a modified mansard design.[12] This change also affected the internal gutter system of the house, which was modified into an exterior arrangement. The changes from this time period are still present in the house. Many of the outbuildings were demolished just prior to the turn of the 20th century, such as the two flanker buildings, which are seen in images after the earthquake of 1886.

The house was used as a retreat for the Drayton family until 1974 when the National Trust for Historic Preservation took possession, at which point numerous stabilization efforts were initiated. Public tours began in 1977.[13] The first preservation projects occurred in 1979 with the stabilization of walls, floorboards, plaster, and steps. Following that effort, bricks were replaced in the privy building in 1980. From 2001 to 2003, repairs were made to the ceiling and windows. Susan Buck conducted paint analysis during this time. A ceiling restoration

11 Drayton Hall, 20.

12 Webster, "Interview".

13 Webster and Hudgins, "Interview".

campaign was undertaken because the original summer beam failed. The beam was repaired historically. However, those interventions were also unsuccessful; and repairs to the ceiling were still needed. An acrylic injection treatment was devised and implemented for the ceiling restoration, and was surveyed and managed by Frank Matero in conjunction with engineer, Eric Johansen.[14] The following year Christine Thompson undertook paint consolidation treatments; which reattached the paint to the wood paneling on the interior of the house.

Numerous projects began in 2007, many of which are ongoing. They include: repairs to the roof, masonry, stone steps, cornice, main door; new gutters; painting; and the reattaching of decorative woodwork elements. In addition to the historic building preservation treatments, a Landscape Master Plan was implemented in 2006.[15] The historic buildings and site have received routine maintenance. Unfortunately, the storage conditions and conservation of the archaeological collections was not addressed until December 2007.

14 Frank Matero is the Director and founder of the Architectural Conservation Laboratory at the University of Pennsylvania.

15 Details of the stabilization efforts to the house and Master Plans were obtained through interviews with Matthew Webster, Director of Preservation. Interviews were conducted from October 2007 to February 2008.

The Problem:

Since the mid-1970s, multiple archaeological excavations have been undertaken at Drayton Hall, including summer field schools. All of these activities have led to a collection of archaeological material being amassed by the National Trust for Historic Preservation (Chart 2). As is often the case, storage and care of these artifacts is becoming a pressing issue. The archaeological collection is stored onsite at Drayton Hall. Without proper storage, adequate room, and control over the environmental conditions inside the facility, the longevity of the artifacts is being threatened. The loss of this historic fabric will prevent future generations from utilizing the collection for research.

Archaeological Campaigns

Year	Investigation Area	Researcher	Conclusions
1974	Main House, South Flanker, and Ornamental Mound	Lynn Lewis, NTHP	Recovered large number of artifacts; obtained preliminary use data for flanker
1980	East Lawn and Garden Area	NYU Field School	Limited testing and survey of area
1981	North Flanker and Privy	Lynn Lewis, NTHP	Multiple artifacts recovered; use data for flanker
1989	Waterfront Area	Thomas Wheaton	Located the garden house; dated to 1747
1990	115 acres surveyed	Brockington and Associates, Charleston SC	Post Hurricane Hugo investigation; shovel testing at 20m intervals
2003/2005	Wooded Area near Privy location	Martha Zierden, Charleston Museum	Located possible barn; recovered artifacts

Chart 2

The existing storage facility for Drayton Hall's archeological artifacts consists of an onsite building, which is part of a larger storage facility for the site. The building, measuring approximately 20' x 15', has electricity, but no climate controls. Relative humidity fluctuates from approximately 70% to 90% with temperature swings up to 40 degrees, which have proven detrimental to the artifacts. These extreme changes in humidity and temperature have caused significant harm. The building is being used to store all types of artifacts, including pottery, metals, papers, and textiles. This study is concerned with the storage of the metal artifacts at

the site, though it should be mentioned that these uncontrolled storage conditions are not ideal for any type of artifact. This room was also used to store equipment belonging to the education and maintenance departments. By allowing equipment storage from different departments the archaeological collection is at risk of damage.

The condition inside the storage room consists of metal shelving, a worktable, and a photographer's table. The artifacts are stored inside more than 250 cardboard storage boxes, which vary from proper archival boxes to simple cardboard storage boxes that are available for purchase at retail supply stores. Inside each box, artifacts are packaged in plastic storage "Ziploc" style bags. Like the boxes, the bags vary in their age as well as archival quality. In most cases artifacts from older excavations have had harsher storage conditions than newly excavated artifacts. Conservation standards have changed over time and what was common practice 20 or 30 years ago is not considered the best standard today. Many of the plastic storage bags are degraded and must be opened with scissors, the bags having to be cut away from the artifacts inside. Within each bag are tags with the archaeological provenience data, these tags and papers do not appear to be archival quality but this is not possible to verify. The use of incorrect papers and tags leads to artifact degradation caused by acids and ink. In addition, some artifacts have been written on with permanent markers.

At the end of 2007 many of these storage conditions were rectified. Other departments no longer store items in the archaeological room. As a result of this study, all metal artifacts have been relocated to a building with air conditioning, and have been propertly rebagged and placed within archival storage boxes. In most cases older paper tags have been removed and the provenience data has been written on the exterior of the bags.

The Project:

The goals of this project, broadly stated, were to document and assess the needs of the archaeological metal collection and to determine possible conservation strategies; then to implement the subcritical fluid treatment method on a selection of items. The collection consists of approximately 15 boxes of artifacts and dates to the mid-1970s and 1980s. Metal collections require specialized handling and storage conditions, which other forms of archaeological material do not. By re-bagging and sorting the entire metal artifact collection, documentation and a searchable catalog of the items was created. The documentation included photographs and x-rays of selected items. Individual artifact identification numbers were assigned to each item. Once catalogued and documented, several items were chosen for subcritical treatment at the Clemson Conservation Center, an offsite branch of Clemson University.[16] Criteria for the artifacts chosen and the results of the experiment are detailed in the Case Study Section of this report. The subcritical research completed by the Clemson Conservation Center is groundbreaking in its implications for metal conservation. At this time, the Clemson Conservation Center is the only laboratory in the world that is experimenting with the subcritical process and patents are currently being sought.

16 The Clemson Conservation Center, previously known as the Warren Lasch Conservation Center, is an integral part of the Clemson University Restoration Institute located in Charleston, South Carolina.

Procedures for the Project:

To address the conservation issues listed above, a methodology was devised to re-bag all of the metal artifacts from the early archaeological investigations and to sort these items. The sorting was completed in two phases. The first sorting was completed based on the criteria of importance. Low-level artifacts included any items dated post-1974. Medium-level artifacts were those dating from the twentieth century, unidentifiable metal fragments, and nails. High-level artifacts were required to meet one of the following criteria: a significant example of "type" or an association with the Drayton Family.

The second level of sorting was based on the level of instability of the items and their need for conservation. As all of the metal artifacts were in an active state of corrosion, this was challenging, but three levels of need were determined. Low-level items were defined as those that fell into the category of "low-level of importance" in the first sorting phase, or any item that was corroded past the point of recognition. Medium-level artifacts had to be recognizable in form and in the medium-level of importance. High-level designation was given to artifacts in the high-level of importance category or items of medium importance if the active corrosion was extreme.

Once the collection was re-bagged and sorted, cataloging of each item was undertaken and is reproduced in Appendix A. The catalog was created in a spreadsheet format with several fields of identification. The choices of data to be recorded were based on the Digital Archaeological Archive of Comparative Slavery database (DAACS). This web-based system was designed to allow comparative research on slavery, with regional concentration in the Chesapeake, the Carolinas, and the Caribbean.[17] DAACS was designed by the Archaeological Department of Monticello, a branch of the research wing of the International Center for Jefferson Studies under the Thomas Jefferson Foundation and in conjunction with

17 Thomas Jefferson Foundation, About DAACS - Research Context, 2004, http://www.daacs.org/aboutDAACS/researchContext.html (accessed 02 07, 2008).

other institutions.[18] It is currently being used for comparative studies of all forms of plantation life. The focus period is colonial through antebellum (1700-1850). Drayton Hall is applying for grants to fund the purchase of this software, which will allow comparisons to be made between their collections and other around the country. This database is accessible to the public via the web, allowing for broader research potential, and for Drayton Hall's collection to be available worldwide.[19]

After cataloging was completed, several artifacts were chosen as candidates for subcritical treatment. The staff of the Clemson Conservation Center and Drayton Hall, along with the author, determined the final choice of artifacts for the experiment. These artifacts were digitally scanned and x-rayed. Documentation is located in the Case Study Section and in Appendices B - E. In addition, several other artifacts were also x-rayed at the Clemson Conservation Center, and available for reference in Appendix F.[20] Once the subcritical experiments were concluded, all artifacts were documented a second time to determine changes in the artifacts and to see if the treatment was successful. Once completed, the potential for the procedure to be used on a routine basis was evaluated.

18 Ibid.

19 Future study and research of the archaeological collection will begin during the summer of 2008, undertaken by a doctoral candidate, and will include further cataloging and detailed anaylsis of the flanker buildings.

20 The digital x-ray equipment used for documentation included the FUJI FCR AC-3, the printer was FUJIFILM FM-DP 2636, and the lead cabinet was a NEWCO, INC. #9910. This type of digital equipment is common in the medical field, however it is not often found in conservation.

Preventative Conservation:

Storage solutions that implement preventative conservation should consistently be used as the best practice for metals conservation. These storage options can be used as a pretreatment or as an alternative to the treatment of artifacts in select cases. This type of conservation consists of proper storage for the artifacts. Storage conditions vary based on the material composition of the artifact. When dealing with metals, specifically iron, low relative humidity and oxygen content are essential. Other factors include temperature swings and the build up of particulates on the surface of artifacts.[21] By controlling these factors it is possible to slow the corrosion rate of iron artifacts, allowing for additional time to work on the items. This additional time provides a chance for new conservation methods to be established in a rapidly changing field.

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21 L. Green and S. Bradley, "An Investigation of Strategies for the Long-term Storage of Archaeological Iron," in Proceedings of the International Conference on Metals Conservation (Semur En Auxois: James and James, 1995), 306.

The two broad categories for storage are: whole buildings designed to house a specific collection or individual storage containers designed for a particular artifact. Obtaining optimal conditions inside a large building is difficult and costly. For a storage facility to adequately protect metal artifacts the building must be climate controlled, not allow for temperature swings, have a relative humidity of approximately 10%, and an oxygen depleted environment. The storage of artifacts in individual containers, which are sealed from the outside environment, is considered a preventative conservation alternative to the whole building approach. When using the whole building approach the design must include temperature and humidity regulations, but must also consider window placement, the amount of light entering the storage areas, flood plains, and terrain of the location.

When an item is located in a sealed envelope, humidity and oxygen levels are controlled through the use of chemicals. The sealed envelopes create microclimates, which can be designed individually to

protect each artifact. One commonly used additive is silica gel. This gel promotes a very dry environment, thereby lessening the amount of water available to the corrosion cycle.[22] The benefits of using silica gel have been studied since the early 1960s and are well established. Corrosion rates decrease when water is removed from the artifact's atmosphere. However, further measures should be taken to ensure the stability of the item.

One proprietary system, the Revolutionary Preservation from Mitsubishi Gas Chemical Company, is effective in producing protective microclimates. The system has three components: a gas barrier plastic film (ESCAL), an oxygen indicator, and an oxygen scavenger or absorber (RP-A).[23] The precursor to this system was an oxygen absorber, Ageless, which was first used in the food service industry in Japan as an alternative to vacuum packaging or other additives.[24] Ageless is produced in several varieties. The choice of Z, S, FX, E, or G is determined by the type of food being preserved. A plastic barrier and an oxygen indicator are required with the Ageless system. Only Ageless Z has been shown useful for the preservation of museum collections.[25] This form of Ageless is composed of iron powder covered in sea salt; which is then placed into an air permeable sachet.[26] This mixture acts as a sacrificial iron surface for the oxygen to consume. By allowing for sacrificial corrosion to occur inside the package, and with the addition of salt into the mixture of iron, the artifact is less threatened by the corrosion cycle.

There are drawbacks to this system including the reduction of air volume, temperature increases, and an increase in relative humidity, all of which occur inside the

22 Kenzo Toishi, "Relative Humidity in a Closed Package." Studies in Conservation, 1961: 111.

23 In addition to RP-A for metals, RP-K was designed for organic conservation.

24 David W. Grattan and Mark Gilberg, "Ageless Oxygen Absorber: Chemical and Physical Properties," Studies in Conservation, 1994: 210.

25 Ibid.

26 Ibid

closed package.[27] The increase in temperature is a result of an exothermic reaction occurring during the sacrificial corrosion of the iron within the sachet. The reduction in air volume occurs as a result of the removal of the oxygen in the air.[28] Since air contains approximately 20% oxygen, removing this volume causes the package to constrict in toward the artifact. This can be alleviated with proper packaging techniques. The exact cause of the relative humidity increase is unknown however; it is linked to the removal of the oxygen. Using a buffering agent, such as silica gel, within the package can mitigate this effect.

The Revolutionary Preservation system has eliminated several of the concerns associated with Ageless. By using a new proprietary formula for the oxygen scavenger, the resulting exothermic reaction does not occur. This new formula is available in grades similar to the Ageless system. RP-A is the desired grade for metals because the relative humidity within the package falls to approximately 10%.[29] The control over the moisture in the package was not obtainable with the Ageless system. The 20% reduction of air volume occurs with the Revolutionary Preservation system. Mitigation of the reduced volume is a matter of packaging the artifact to allow for shrinkage.

An additional positive aspect to the Revolutionary Preservation system is its ease of use.[30] The first step in packaging an artifact is to determine which type of gas barrier plastic is most suitable for the item. The plastic film is available in large rolls, in varying widths, and in gussets. The gussets are shaped similar to a paper grocery bag and sealed on all sides, with the exception of the top. They are typically used for very large items. In addition, there are short-term storage bags, which provide protection for approximately one year. The ESCAL

27 Ibid, 212.

28 Ibid.

29 Mitsubishi Gas Chemical Company, Inc., Revolutionary Preservation System, Booklet (Mitsubishi Gas Chemical Company, Inc., 2007), 4.

30 Johanna Rivera, Conservator, interview by Brooke Helen G. Moore, (Feb 2008).

films provide protection from oxygen and other gases in the air for approximately five years.[31]

Once the correct film is determined it is cut to the correct size for each individual artifact and the RP agent is inserted into the bag along with oxygen indicators. The indicators will turn blue to purple when exposed to air. Once the bag is sealed they will return to their natural pink color, indicating that the oxygen has been removed from the package. The amount of RP agent and indicators is determined by a formula supplied by the manufacturer.[32] It is based on the volume of air in the container and the size of the artifact. The packages are sealed with reusable clips or heat-sealed. Heat sealing provides protection for items, which do not need to be removed from the packages, while the clips are typically used for items still undergoing research or that need to be accessible. The gas barrier films used with the system are transparent, allowing for viewing of the object.

The Revolutionary Preservation system has several reasons for its success. The clear packaging allows for monitoring of the objects and further research. Only the environment surrounding the artifact is being "treated" not the artifact itself. This is the ultimate in reversibility.[33] The film, by providing a barrier, creates an object that is easily handled. Once trained, a person can easily seal many artifacts quickly. The 20% reduction of air gives a clear indication that the system is closed properly. Moreover, the reduction of oxygen and a low relative humidity inside the package will suppress biological growth and reduce the corrosion rate.[34]

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31 Mitsubishi Gas Chemcial Company, Inc., 4.

32 Air volume (ml)= Total volume of the bag with the content (ml) – weight of the content (g)/Specific gravity of the content.

33 C. Mathias, K. Ramsdale and D. Nixon, "Saving archaeological iron using the Revolutionary Preservation System," in Proceedings of the International Conference on Metals Conservation (Canberra: National Museum of Australia, 2004), 38.

34 Shin Maekawa, Oxygen-free museum cases, Booklet (J. Paul Getty Trust, 1998). 3.

The main drawback to this system is its price. In comparison to the Ageless system, the cost is doubled.[35] Also, the Ageless system has been thoroughly researched and documented; while the Revolutionary Preservation system is still undergoing testing as to its long-term effectiveness. Recent studies indicate that the Revolutionary Preservation system is durable and the claims of the manufacturer are accurate.[36]

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35 Laramie Hickey-Friedman, "Study of the Revolutionary Preservation System (RP System) for Anoxia Storage," American Institute for Conservation News, May 2002: 27.

36 C. Mathias, K. Ramsdale and D. Nixon, 39.

Introduction to Corrosion and Treatment Methods:

For those working in house museums with decorative architectural metal details, or if the museum's collection contains metal artifacts, understanding the symptoms of corrosion and the available treatment possibilities is essential. By understanding the nature of the corrosion cycle these preservation staff members can positively affect the lifespan of the collection. The condition of metal artifacts left to weather in the outside environment, buried in the ground or as architectural elements, varies dramatically from piece to piece. Size is often a factor in treatment possibilities. Smaller objects are easier to transport and require less laboratory space. Current research using small movable metal artifacts will result in knowledge that could be applied to larger architectural items in the future. In order to stabilize these artifacts, a conservator must understand the processes under which the artifact came to be in a state of instability. Characteristics of unstable corroding artifacts include cracking, cratering (pitting), and weeping (liquid forming on the exterior surface). surface. Figure 1 shows surface pitting, cracking, and sulfur.

Figure 1

The second law of thermodynamics states, in general terms, that matter in a closed system will tend to move toward a state of higher entropy or disorder. Particularly vulnerable to this law is iron, which is rarely found in a pure state in nature but predominantly appears as an oxide. An oxide contains at least one oxygen atom with iron atoms. Once iron has been hand forged or machine worked into decorative details or

tools, it will begin to oxidize, returning to its original, less stable, state.

Figure 2

This reaction is seen in early stages as flash rusting and later as layers of corrosion products. These corrosion products may contain environmental elements, such as sand or organic matter, as well as the disintegrating iron elements. While there are numerous environmental factors that play a role in the amount of corrosion and length of time required for those corrosion products to form on an artifact; moisture and oxygen are the two most defining elements. For iron, chloride (salt) is the other crucial element that accelerates the corrosion process. Chloride ions can be found in numerous forms. Concerning architectural metals, ironwork specifically, salts coming from environmental contamination are the most destructive. *It should be noted that the corrosion process will stop only when there is no metal core left or when the salts have been removed from an artifact.*

The simplest form of iron corrosion is rusting, an electrochemical process, the first sign of which is an orange to red thin film appearing on the surface of the artifact. The red film is comprised of iron hydroxides that over time will increase in complexity and damage the artifact significantly.[37] As decay progresses, the corrosion film becomes thicker. The three indicative signs of active

37 H. J. Plenderleith and A. E. A. Werner, the Conservation of Antiquitifes and Works of Art: Treatment, Repair, and Restoration (London: Oxford University Press, 1979), 281.

corrosion: cratering, cracking, and weeping, can be viewed easily under a microscope, and are observable in Figure 2. Cratering and cracking are also typically visible with the naked eye. A byproduct of the corrosion process is sulfur, which often presents itself as a yellow powder-like substance on the surface of an artifact. Sulfides can also present as black stains on an artifact's surface. Weeping droplets begin in a liquid state, containing water and salt, and are acidic. They dry over time, forming a thin fragile shell. This shell is similar to an exoskeleton on an insect and will crack and fracture easily. When broken, the shell appears on the artifact as a shiny, reflective surface. The droplet and reflective surface is viewable in Figure 3. In the case of buried artifacts, other organic materials can become attached and cemented within a silica matrix to the corrosion products, forming a thick, heavily incrusted exterior layer. These corrosion films will expand over time. This expansion, which can be up to three times its original size, causes severe damage and distortion to the original surface. The interior layer contains corrosion products that are in a lower state of oxidation.[38] The interior core contains less corroded iron and is more stable than the exterior layers. Thin rust films or thick corrosion layers are required to be removed in order to discontinue the corrosion cycle.

Other forms of corrosion that occur are galvanic

Figure 3

38 L. S. Selwyn, "Overview of archaeological iron: the corrosion problem, key factors affecting treatment, and gaps in current knowledge," in Proceedings of the International Conference on Metals Conservation, 301.

corrosion, uniform corrosion, selective corrosion, and stress corrosion. Galvanic corrosion occurs when metals of differing electrode potentials are placed in contact with one another. Negatively charged metals are often termed base metals, while positively charged metals are called noble metals. Typically the higher, or more noble metal will corrode the base metal. Uniform corrosion occurs when corrosion products produce an evenly distributed film of corrosion on the surface of an artifact, frequently referred to as patina. Selective corrosion occurs in alloys when one of the metals is selectively removed from the compounded metals. Extreme stress on a metal and localized deterioration cause stress corrosion to occur.

Another corrosion facilitator seen in buried iron is the attack of sulphate-reducing bacteria, which can be found in anaerobic environments, such as under water. The bacteria attack the iron and remove protective layers. With the removal of the defensive film, corrosion begins.[39] This form of corrosion has a distinctive odor of decaying eggs, and stains the surface of the artifact black. The surrounding soil will also be stained during this process. The introduction of salts into the corrosion cycle of any artifact will accelerate the effects of the corrosion. Removal of these salts is one of the critical objectives to ensure the long-term stability of archaeological iron.

Historically there have been many differing attempts at the removal of corrosion products. In 1898, Dr. Friedrich Rathgen published the first book devoted to materials conservation, *The Conservation of Antiquities*.[40] Rathgen advocated the use of mechanical cleaning, heat treatments, reduction methods, and steeping items in

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39 Plenderleith and Werner, 282.

40 Friedrich Rathgen, The Preservation of Antiquities: A handbook for curators (Cambridge: University Press, 1905).

warm water.[41] Many of these methods, in slightly varied form, are still in use today.

There are three main forms of cleaning techniques for corroded metal artifacts currently used: mechanical, chemical, and electrochemical.[42] Mechanical cleaning includes abrasion methods, soaking, and washing. Abrasion can include micro-abrasion particles, sanding, and shot blasting. Chemical methods use a combination of chemicals and water solutions to facilitate the removal of corrosion. Electrochemical methods use the application of electricity in conjunction with soaking solutions. All of these techniques require a complete and extensive knowledge of the artifact that is to be conserved and the method being used. This is difficult to gain outside of a laboratory setting. It is challenging for small institutions, such as house museums or historic properties, to financially support the staff and equipment required. A small house museum should consider using

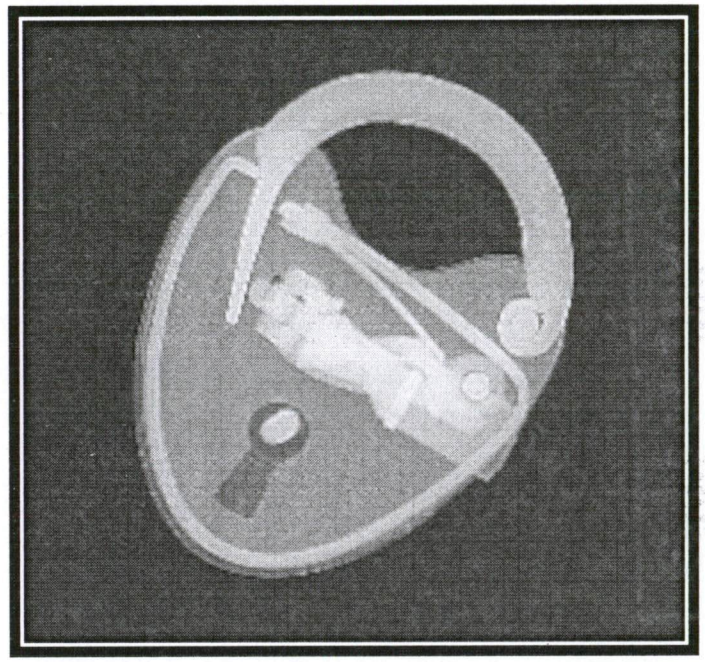

Figure 4

41 B. Knight, "The Stabilization of Archaeoloigcal Iron: Past, Present, and Furture," in Proceedings of the International Conference on Metals Conservation (Semur En Auxois: James and James, 1995). 36.

42 Plenderleith and Werner, 190.

a laboratory on a consulting basis to determine what their collection's specific needs are.

These repair methods are not mutually exclusive, and may be used in conjunction with one another. Before any treatment type is attempted, all artifacts should undergo extensive examination to determine the corrosion status of the artifact, the technique used to manufacture the artifact, and the presence of, or lack of, the "original surface" of the artifact. The initial examination should also include written documentation and photographs of the artifact. The first step of the documentation process is within reach of the preservation staff. Preliminary descriptions and photographing can occur prior to the laboratory work, thereby maximizing the conservation staff's expertise. X-ray testing of metal artifacts should be carried out to determine how much of the metal core remains inside the encrustations. (Figure 4) The x-rays are able to locate the original surface of the item, which can be found in inscriptions, grooves, and threads. (Figure 5) Once the amount of metal core remaining is determined, the treatments appropriate to that artifact become more distinguishable, as several of the methods described below can be harmful to fragile items.

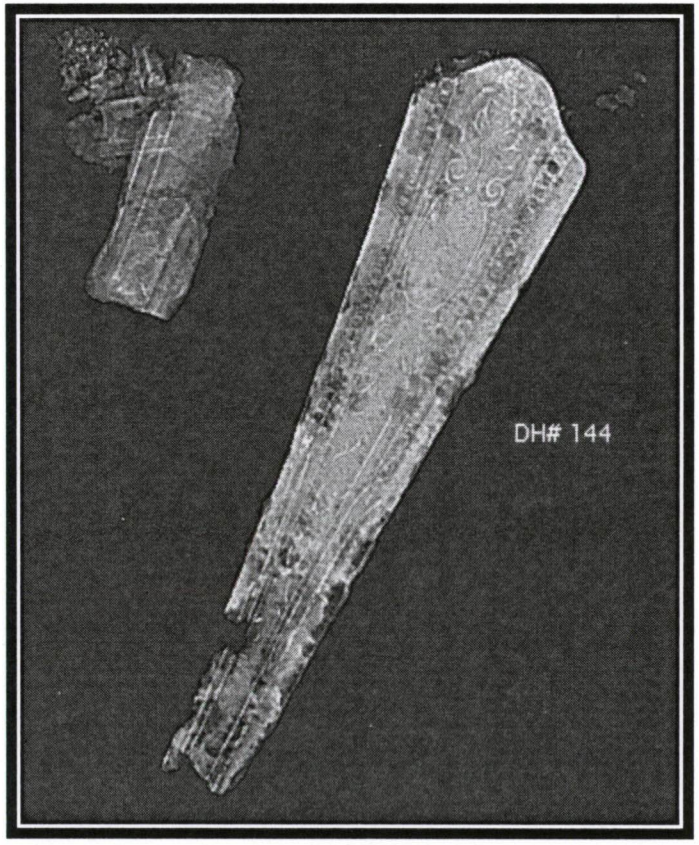

Figure 5

The notion of "original surface" is significant when discussing archaeological artifacts. The hope when conserving an item is that the original surface is still intact under the layers of corrosion products. In some cases the surface is still extant, while in others it has been completely corroded. Often the surface is only being held together by sand acting as a cement-like product, and therefore will dissolve during treatment. It is difficult to determine where the original surface is located when covered with corrosion. All of the techniques below are attempting to find this surface and restore the artifact.

There are many limitations that are important to understand before beginning treatment, the most significant is the unpredictability of any of these methods. The methods described produce satisfactory results on some artifacts; however, there is not a definite way to determine which artifacts react well with which treatments. Nor is there an assessment to ascertain which treatments perform superior and which ones only moderately until observing the artifact post treatment. At this time this key problem of selecting the most effective treatment has no satisfactory answers, as each artifact is different. These differences include manufacturing technique, age of item, burial environment, and previous conservation attempts.

Mechanical Methods - General Cleaning:

The mechanical cleaning methods are the simplest to perform, the least expensive, and the most time consuming. They often cause damage to fragile artifacts, such as removing detailed engravings or maker's marks. Mechanical methods may be employed in different ways, such as scraping, cutting, brushing, and polishing; all are examples of different types of abrasion. More gentle methods of abrasion include the use of dental cleaning tools to micro-abrade the surface of the object, and scalpels used under microscope magnification to remove very small amounts of encrustation. Care should be taken to ensure that only the corrosion layer, not the metal core, is removed.

Cleaning an artifact by these means will not ensure its survival over time. By mechanically removing the exterior corrosion layers, the artifact becomes more likely to corrode further, as a fresh layer of iron has been exposed to the oxygen and water in the atmosphere. While the corrosion layer provides a barrier, it does not stop further corrosion from taking place. Mechanical cleaning does not take into account the amount of chloride in the artifact. As high chloride content is the main cause of active corrosion, these types of cleaning alone are not considered acceptable means of inhibiting corrosion in the future. Cleaning can be used following treatment methods that have removed the chloride from an item.

Mechanical Methods - Soaking and Washing:

The soaking of an artifact in water containing less salt than the artifact is the simplest form of removing soluble salt. This method requires soaking tanks large enough for each item to be immersed in, allowing the salt to diffuse out of the artifact into the water bath. By continuously monitoring and changing the water, the salt is able to continue to diffuse out until equilibrium has been reached. At this state of balance, the amount of salt within the artifact is lower, however not completely removed.

Simple soaking methods in water alone have been proven ineffective in completely removing the chloride. This is a result of the complicated lattice structure of the corrosion products. The products form a crystalline structure, which can be viewed under magnification.[43] Heat has been shown to slightly increase the diffusion rates. However, the amount of salt that is removed from the artifact will not increase with agitation or a continuous flow of water (washing). Various chemicals added to the bath solution are another variation. Soaking treatment lengths vary by the artifact. Treatment length variables include weight and size of artifact, amount of corrosion present, and the burial conditions prior to excavation. If an artifact is too large to be immersed inside a tank, wet paper poultices can be used in a similar way to facilitate salt removal.[44] Poultices remove salts through capillary action: as the moisture evaporates the salts are pulled from the pores of the item and deposited into the poultice material.

Sodium hydroxide combined with water increases the porosity of the corrosion products, allowing for more rapid diffusion rates of chloride.[45] Alkaline sulphite can be added to solutions for freshly excavated artifacts, as a pretreatment. By applying this solution early in the corrosion cycle, it is thought that the oxides are not able to transform into more complex and insoluble corrosion products.[46] The use of liquid ammonia has been found to be successful due to its lower viscosity and surface tension in comparison to water.[47] Another advantage to its use lies in the fact that it will not attack the surface of the iron causing further deterioration.[48] During research on liquid ammonia, experiments were conducted

43 Mark R. Gilberg, "The Identity of Compounds Containing Chloride Ions in Marine Iron Corrosion Products: A Critical Review," Studies in Conservation, 1981: 54.

44 J. M. Cronyn, The Elements of Archaeological Conservation (London: Routledge, 1990) 83.

45 L. S. Selwyn, 301.

46 Mark R. Gilberg and Nigel J Seeley, "The Alkaline Sodium Sulphite Reduction Process for Archaeological Iron: A Closer Look," Studies in Conservation, 1982: 183.

47 Mark R. Gilberg, "Liquid Ammonia as a Solvent and Reagent in Conservation," Studies in Conservation, 1982: 39.

48 Ibid, 42.

in which the ammonia was used as a pretreatment and then the artifacts were washed with water. This form of pretreatment was found to be superior to other washing methods with an increase in chloride diffusion levels.[49]

An alternative technique is the Soxhlet extractor washing method.[50] Using the extractor, oxygen is removed from the soaking tank and replaced with nitrogen. This replacement creates an inert atmosphere in which the artifact is then washed with distilled water. The removal of oxygen from the washing reservoir has been shown to reduce corrosion rates or even eliminate them. This method is particularly useful for artifacts that are extremely fragile and cannot be cleaned by reducing methods.

While simple soaking methods have been shown ineffective in the total removal of chloride from artifacts, this method is the least expensive. It also requires less expertise and monitoring. The drawbacks to this process include: very long periods of time needed for completion, the unpredictability of results, large quantities of waste water produced, which contain chemicals and result in environmental concerns. Lastly, soaking can be difficult for large and composite artifacts, due to size limitations and multiple material types.

The testing of chloride levels is required in all iron treatment methods. Chloride reduction levels can be obtained from testing the solution during treatments. By this the conservator is able to verify that salts are being removed from the artifact. By tracking this information over time a "release" pattern can be seen and when no more chlorides are diffusing out of the artifact, treatment can be discontinued. There are several ways to test for chloride. Test strips are the least complicated method (tirators for chloride). These strips are inserted into the solution and produce a line along the test strip. By comparing this line to a chart attached to the test strip container the conservator reads the amount of chloride

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49 Ibid, 41.

50 David A. Scott and Nigel J. Seeley, "The Washing of Fragile Iron Artifacts," Studies in Conservation, 1987: 73.

in the solution.[51] More complicated testing procedures are available in laboratory settings, such as ion specific electrodes and ion chromatography. These however are costly and require trained and experienced technicians.

51 Quantab brand Titrators for Chloride are used at WLCC. These strips come in high and low test levels. They can be used by almost anyone and are easy to read with a margin of error of +5 to -5ppm. There ease of use is critical in an environment with low funding, which may not have highly trained staff.

Electrochemical Methods:

Electrochemical methods should only be undertaken if the artifact has a substantial metal core. If the core is thin, discontinuous, or absent, reduction treatments should not be considered.[52] The procedure requires soaking tanks, chemical ingredients, power supplies, anodes, and a chloride level analysis system. The first step in the standard method of electrolytic reduction for iron artifacts is to connect the artifact to an electrical current. An electrical contact must be made on an area of the artifact that is not covered by encrustation; this is often hard to obtain through the corrosion layers on the metal. To acquire a clear space, the artifact is often scraped to remove the corrosion layer. When larger artifacts undergo this procedure several electrical contacts are placed, resulting in multiple areas being scraped for clear connections. An anode of iron or stainless steel is then connected to the positive terminal and the artifact becomes the negative electrode. The artifact and anode are then placed in a solution. This method is dependent on the electrical current being activated. The corrosion layers will begin to be removed through hydrogen gas, which creates bubbles on the surface of the artifact below the corrosion layers. These bubbles then force the crust from the artifact, in what amounts to mechanical cleaning. The bubbles may also cause the original surface to be removed from the artifact.

During the procedure, the anodes need to be periodically cleaned of the incrustations that form on their surfaces. The electrolytic solution will need to be monitored for chloride levels and to remain as clean and free from impurities as possible during the process. Following treatment, the artifacts are washed to remove the electrolyte solution, and the remaining corrosion products cleaned away. A technique for the removal of localized corrosion by electrolytic action has also been devised, which can be used on objects too large to

52 Plenderleith and Werner, 285.

immerse in solution or for artifacts that do not need extensive corrosion removal. [53]

The treatment method uses a plastic cylinder containing the electrolyte solution. Inside this cylinder a bar of carbon is placed which acts as the anode. A porous separator tip is placed on the end of the cylinder. The tip can be made of a glass frit, polyvinyl chloride, or battery separator. A small amount of electrolyte solution is then placed on the artifact's corroded area and the tip is placed on top, completing the electrical circuit needed. This technique is just one of several devised for localized corrosion.

By reducing (removing) corrosion layers, the underlying artifact is once again visible. The problem with this method occurs during the removal of the corrosion layers. Oftentimes there is valuable information that only exists in these layers, such as detailed inlays or engravings that once were on the surface of the artifact. Electrolytic reduction does not test for the amount of chloride remaining in the artifact and therefore does not guarantee success or the stability of the artifact. This method is predominantly a cleaning method, not a stabilization one, since these forms of reduction remove material from the artifact's surface. When only a thin layer of metal remains, the artifact often does not remain intact through the reduction treatment. When this occurs, the artifact may also fall apart once lifted from the bath.

Another drawback of this type of reduction is the long time period required to complete the total removal of encrustations. Cast iron can require up to three years to conserve, while wrought iron can take a year and a half, depending on the size and provenance of the artifact.[54] These figures are estimates for terrestrial artifacts; marine archaeological items can take more than

53 A Aldaz, T Espana, V Montiel and M Lopez-Segura, "A Simple Toll for the Electrolytic Restoration of Archaeological Metallic Objects with Localized Corrosion," Studies in Conservation, 1986: 175.

54 Paul Mardikian, Senior Conservator, interview by Brooke Helen G. Moore, (Oct 2007 – Feb 2008).

five years. This investment of time is also an investment of finances and space. Treatments such as these need to be conducted under laboratory conditions with trained personnel. Other concerns associated with electrolysis methods are similar to ones for soaking. They include: the large amount of wastewater that is chemically contaminated; more expense due to the need for an electrical current supply; and the unpredictability of the final results.

Recent research has shown that a portion of the financial considerations could be alleviated during the electrolysis process by using a lower voltage current resulting in lower energy costs.[55] In addition to lower currents, also hypothesized in this study was the theory that the hydrogen gas bubbles that form during the electrolysis process might be, in fact, lessening its effectiveness. By masking the surface of the artifact, the bubbles are not allowing diffusion of chloride out of the pores.[56] The bubbles can be reduced in size and quantity by using lower voltages. This study also showed that longer treatment periods are not required when lowering the voltage.

55 Worth Carlin, Donald Keith and Juan Rodriguez, "Less is More: Measure of Chloride Removal Rate from Wrought Iron Artifacts during Electrolysis," Studies in Conservation, 2001: 69.

56 Ibid, 73-74.

Chemical Methods - Thermal and Plasma:

The use of thermal treatment for iron artifacts has been considered in conservation literature since 1858, when Mauritz Rasmussen authored articles while at the Danish Defense Museum.[57] However the method has been criticized due to changes in the microstructure of the metal, which can occur in the iron at high temperatures. Thermal treatments can create temperatures up to 1600°C. These treatments can result in annealing: a change in the structure of the treated material. These changes of structure include transforming the strength and hardness of artifacts. The heating of iron in nitrogen above temperatures of 500°C can also cause the iron to harden. This is a result of the nitrogen forming a compound, nitride, which is a hardening agent.[58] Hydrogen plasma treatments are criticized for similar reasons. However, if the temperature is kept below 200°C then changes will not occur.[59]

Plasma treatments use hydrogen plasma, which is a highly reactive gas. The gas alters the corrosion products, reducing them to a lower oxidation state.[60] Once in the lowered state, the chloride is able to diffuse out of the iron artifact. This treatment can create small cracks in the artifact; which can quicken diffusion of chloride once immersed in soaking solutions.[61] The positive aspects of this method are a decrease in treatment time length and the strengthening of metal artifacts. However, this method does require expensive high temperature furnaces or plasma generators, along with the gases used in treatment. Safety equipment is required for this treatment, increasing the expense. In addition, if the temperatures are not well controlled the changes to the metal are irreversible.

57 Paul Mardikian, Nestor G. Gonzalez, Michael J. Drews, and Philippe de Vivies. "New Perspectives Regarding the Stabilization of Terrestrial and Marine Archaeological Iron." Iron, Steel, Steam, unpublished article, 3.

58 R. F. Tylecote and J. W. B. Black, "The Effect of Hydrogen Reduction on the Properties of Ferrous Materials," Studies in Conservation, 1980: 88.

59 D. Perlik, "The influence of low-pressure hydrogen plasma on changes in metallographic structure of iron objects," unpublished article. 7.

60 L. S. Selwyn, 302.

61 Ibid.

Subcritical Fluid Treatment Method:

The two principles of the subcritical fluid method for the treatment of iron artifacts are: an increase in the temperature of the water solution will result in an increase in the diffusion rates of chloride out of the artifact and a decrease in viscosity and density of the water will facilitate diffusion.[62] Changes in water properties, including lowered viscosity, have been shown to increase diffusion rates in simple washing methods.[63] During the treatment process, the water solution is held under pressure, between 500 to 700 psi.[64] The water temperatures must stay within the subcritical region, 100°C to 374°C, and cannot exceed the critical point (374°C), which would result in changes to the composition of the metal artifacts under treatment. The higher pressure is necessary to keep the water solution in a liquid state, when normally it would boil. Pressures of 100 psi are able to keep the water from boiling; however the additional pressures are added as a safety allowance in the case of a loss in pressure or mechanical failures.[65]

During subcritical treatment, an artifact is immersed in a dilute solution of sodium hydroxide and water, and then placed under pressure.[66] The sodium hydroxide is used to change the pH of the water. During the immersion, chloride ions diffuse out of the artifact. The treatments in the subcritical chamber last only five to ten days in comparison to treatment cycles lasting six months to even years with traditional methods. This treatment has been shown effective in chloride removal from metal shavings obtained from rivets from the *Hunley* submarine.[67] During this study the shavings were given two treatments: sodium hydroxide combined with water, and the subcritical method. The sodium hydroxide

62 Mardikian, et al., 7.

63 N. A. North and C. Pearson, "Washing Methods for Chloride Removal from Marine Iron Artifacts" Studies in Conservation, 1978: 182.

64 Mardikian, et al., 7.

65 Interview with Nestor Gonzalez, Research Conservator, February 4, 2008, during subcritical experiment.

66 Mardikian, et al., 7.

67 Ibid.

treatment did not remove all of the chloride from the sample, all of which was removed with the subcritical method. The shavings were allowed to dry, after which new corrosion products did not form on the shavings treated with the subcritical method, indicating a successful treatment.

Since this method is still in the development phase, the financial investment is high. However, if proven effective for numerous types of artifacts, large treatment chambers could be built. Due to the shortness of treatment length and the reduction of man-hours spent on each item, this method has the potential to be cost effective. Another positive aspect is the reduction of wastewater and the higher rate of chloride removal. The experiment conducted with iron artifacts from Drayton Hall will be detailed, along with the final results, below.

Conclusions for Archaeological Ironwork:

Many of the traditional forms of iron corrosion treatments are currently being applied to archaeological iron artifacts. No one treatment will work for all artifacts, as each has its own characteristics. As a result of the differences in composition, archaeological site, environmental pollution, and pretreatment storage conditions, each artifact must be considered individually. The choice of method of treatment for each artifact should be based on the stability of the artifact and the long-range goals of display or storage. Many researchers in this specialty have determined that each of the above treatment options is usable under specific conditions and that each method can be detrimental if used inappropriately. As early as the 1950s there were disagreements on the conservation practices of lead and iron artifacts.[68] The actual processes of corrosion and the way the layers are formed are also subjects of debate, as is how these corrosion products react to each individual treatment type. Each artifact should therefore be treated independently and thoroughly researched before any treatment method is chosen.

68 Earle R. Caley, "Coatings and Incrustations on Lead Objects from the Agora and the Method Used for Their Removal," Studies in Conservation, 1955: 49-54.

Architectural Ironwork - Treatment Possibilities:

When deciding on appropriate treatments for historic architectural ironwork there are several questions: Can the piece be removed from the building for treatment? Will the possible loss of original surface cause irreparable harm? Will the treated surface receive a protective coating? If the ironwork can be removed from the building or site then many treatment options are possible. If removal would cause damage or is simply not a possibility then the only available treatment type would be mechanical or chemical cleaning. These forms of cleaning used in conjunction with a protective coating will improve the lifespan of the ironwork. They are not guaranteed to remove all corrosion or to stop the corrosion cycle. In the past, sandblasting was most often

prescribed for corrosion removal. This is a form of mechanical cleaning and should not be undertaken in normal circumstances, as it will remove much of the original surface of the ironwork. A similar method is microabrasion. This method allows for more control over the treatment and would be considered safe for architectural ironwork.

If small amounts of the original surface can be removed without rendering the ironwork unreadable, and therefore no longer crisp in detail, then several of the above options may be used. When using any technique, removal of the least amount of original surface is the best practice. The least amount of removal would occur with the subcritical method. If a protective coating of paint or wax will be applied post treatment, then many of the treatments available to archaeological iron could be used, as the treatments change the appearance of the surface of the ironwork. The changes to the surface include color changes, which are often detrimental to archaeological interpretation of artifacts post treatment. These color changes are not as important to architectural pieces, which will be painted and placed back onto the building. In the case where none of the available treatments are considered safe for use, the ironwork may in fact need to be removed from the building and placed in preventative conservation storage. By protecting the item and slowing the corrosion process, the preservation team can wait until more effective treatment methods are devised and then implement those options.

Case Study - The Use of the Subcritical Method on Terrestrial Archaeological Iron Samples from Drayton Hall:

The subcritical reactor at the Clemson Conservation Center is comprised of a stainless steel chamber, heating element, pressurizing device, and multiple pumps and lines to transport the fluid solution. The reactor is similar to a supercritical reactor. Supercritical fluids have, for the past 50 years, been used for a variety of purposes. One of the many uses is as a cleaning agent to purify wastewater and to remove heavy metal pollution from soils. They have also been used as a solventless cleaning method for metals.[69] By adapting the supercritical method protocols, the subcritical method can be used for the stabilization of metals instead of their removal.

The treatment chamber is composed of stainless steel 304 with a capacity of 600mL. The walls of the chamber are 5 cm thick.[70] The fluid lines are made of stainless steel 316 and are very rigid. The heat required for treatment is provided by a sand filled fluidized bath. The sand is aluminum oxide, which is nonflammable, will not emit toxic fumes, and will not corrode the chamber.[71] This sand is constantly rotated to produce uniform heat over the chamber. While the rotating sand appears to be boiling, due to the fineness of the sand, the bubbles are not abrasive to the touch. The pumps and pressurizing device allow for fluids to be transported throughout the system and to keep those fluids in a liquid state during treatment.

69 Dr. Michael Drews, Director, Clemson Conservation Center, Interview by Brooke Helen G. Moore (Oct 2007- Feb 2008). Other uses include: decaffeinated coffee, extraction of essential oils and fragrances, dry cleaning, and production of dyes.

70 The chamber lid is made of stainless steel 316.

71 Nestor Gonzalez, Research & Conservator, interview by Brooke Helen G. Moore, (Feb 4, 2008).

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An Example of a Subcritical Experiment:

Documentation of the chosen artifacts was the first step in the experiment. This documentation was evaluated to determine which artifacts would be good candidates for the procedure. The characteristics needed were: a substantial metal core remaining, no large amounts of encrustation, small size, and signs of active corrosion. These characteristics were decided upon based on a need to place multiple artifacts in the treatment chamber during one treatment cycle and safety precautions. The lack of encrustation helps to prevent clogs in the solution lines. To prevent the artifacts from dissolving during treatment a large metal core is needed. To determine which artifacts fell into the acceptable set the staff at Clemson Conservation Center examined each item and its x-rays. Following the determination of subcritical samples, the artifacts were x-rayed, weighed, photographed, and measured for a second time. Each treatment cycle typically lasts five days.

The treatment began at 9:30 am on Monday, February 4, 2008 at which point fresh solution was introduced into the system and allowed to circulate to ensure thorough cleaning. The items were placed into the chamber inside mesh bags of stainless steel 316. The inlet fluid line was turned on and the chamber filled with water and a .05% caustic solution of sodium hydroxide. This process took approximately 30 minutes. The outlet line was connected upon the completion of filling the chamber and all lines were checked for leaks. The chamber was then placed into the sand filled heating element while cool. Pressure was placed on the chamber and the heating element was turned on. The tests were conducted at 580 psi.

At approximately two-hour intervals the fluid was checked for chloride levels. The test was allowed to run for two days, at which time the chamber was flushed with clean solution twice, and then allowed to equalize. Chloride testing continued throughout the week. On Friday afternoon the chloride levels were at 2 ppb, and it was determined that the testing would continue through

Saturday and Sunday. Over the weekend the solution was changed and the lines cleaned.

On the following Monday, at 10:30 am, the chamber was removed from the heating element and cool water was poured over the chamber to cool the exterior and to decrease thermal stress on the artifacts. This process took approximately 30 minutes. At this point, the artifacts were removed from the chamber and their mesh bags. All items survived the treatment cycle intact with no visible damage. At 11:20 am the artifacts were washed in a flow of deionized water from the tap for ten seconds to remove the sodium hydroxide. They were dried with approximately 10 psi air, to remove surface water. The artifacts were then allowed to thoroughly air dry overnight.

With the exception of the hinge (DH 10,000-258), the samples were not rinsed post treatment. This rinsing is an important step in preventing carbonate efflorescence at a later date. The hinge was rinsed in heated deionized water three times, at which point the pH level was 8.5. A rinsing protocol has not been implemented in the subcritical treatment design. For the longevity of the artifacts, this should be considered.[72] The caustic solution has a low concentration of sodium hydroxide, .5%, but the artifact's physical condition at a later point could deteriorate without complete washing. At this time it is unknown what changes could occur to the artifacts.

After drying completely, the artifacts were photographed, weighed, and Munsell color matches were determined. Two weeks after completion of the experiment; the samples were cleaned with a microabrasion system using aluminum oxide powder and glass beads. The artifacts were also cleaned using a microtool, similar to a drill with small sanding tips. The key (DH 10,000-255) and pintle (DH 10,000-262) were placed into a consolidant of acetone and resin to adhere

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72 Mardikian, "Interview".

loose and flaking pieces of the artifacts.[73] The handle of the key was damaged during cleaning and repaired using a reversible adhesive.

To further the research of the subcritical method on terrestrial archaeological artifacts, one nail was placed inside a humidity chamber. This chamber was set at 100% humidity. The nail will not be sprayed with water or contaminated with chlorides. As museum collections will not return to an outside environment, it was unnecessary to add these additional stresses to the nail. Untreated items typically show corrosion symptoms within four days of placement in the humidity chamber.[74] The nail will remain in the chamber for several months to allow for further evaluation to occur.

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73 Consolidant used was Paraloid B48N, 10% in Acetone.

74 Gonzalez, "Interview".

Results and Implications:

All of the artifacts chosen for subcritical treatment were intact at the conclusion of the treatment cycle. As the use of this method is new for terrestrial artifacts, this is encouraging. Each item's weight was reduced slightly, approximately 1 gram, which appears to be a result of the cemented silica products being removed during treatment. There was no new visible damage to the artifacts post treatment or on review of each x-ray.

After documenting each item, all were cleaned of corrosion products. Upon completion, each of the artifacts presented the original surface, which could previously not be seen. The ability to remove the reddish color on the surface of each item is a positive result. Current archaeological treatments cause color change and most often become darker, which can present aesthetic problems for display. With the subcritical method the items can be displayed with a metallic surface showing instead of encrustation or corrosion.

Each artifact will continue to be observed at the Clemson Conservation Center for signs of new corrosion or physical changes. The nail placed into the humidity chamber will also continue to be monitored. The early results are promising; after a six-week stay inside the chamber the nail has not begun to re-corrode.

This procedure has been shown effective for marine artifacts and not appears to be promising for the future of terrestrial artifact treatment. A new enlarged reactor is currently being designed, which will include a 40L chamber allowing for mass treatments of small items and the possibility to treat larger artifacts. This increase in size will allow further research to be undertaken. At this time, the subcritical method appears to be the most promising treatment type for iron artifacts and the Drayton Hall samples appear stable.[75]

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75 Mardikian, "Interview".

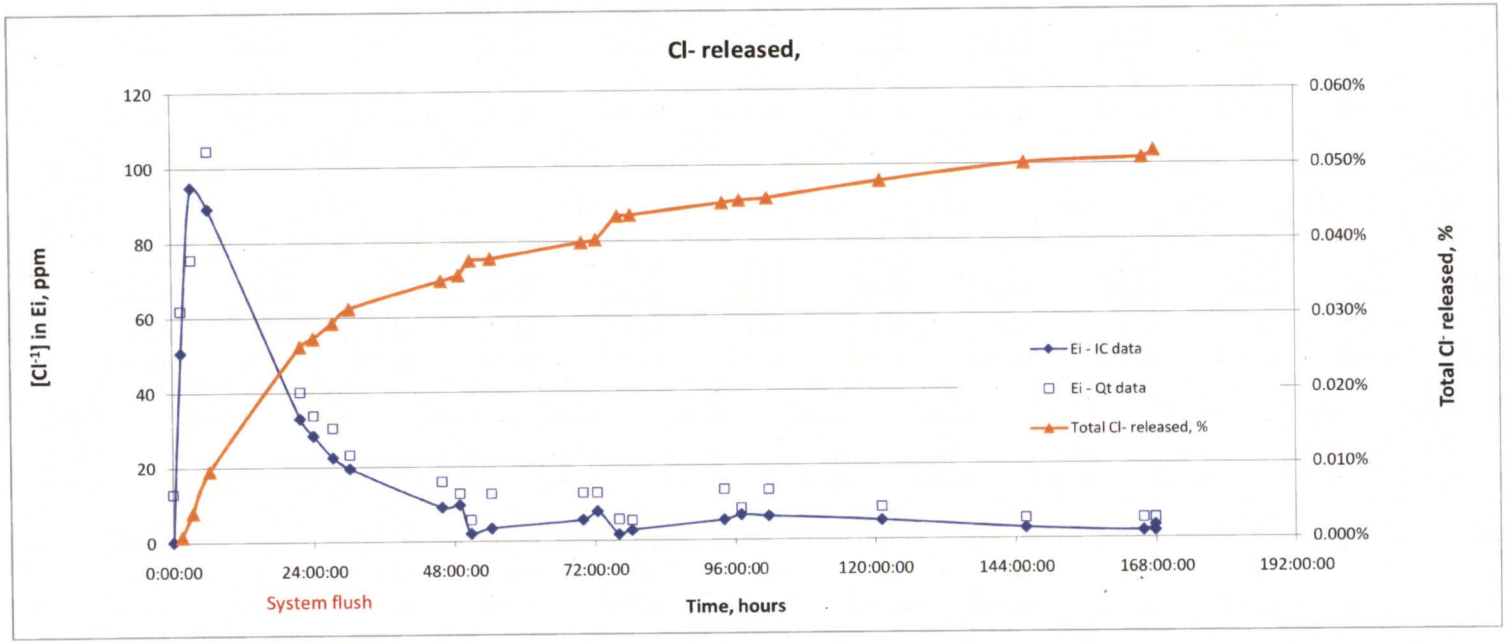


Chart 3 Documents the chloride release over the experiment.

Courtesy of the Clemson Conservation Center.

Recommendations:

Individual museums should evaluate their collections and their ability to store and conserve the artifacts in their care. Each museum has an ethical obligation to preserve their collections to the best of their ability.[76] As stated above, proper storage conditions are essential to the protection of artifacts and require an investment of funds and time. The storage options available to each museum will vary depending on the size and scope of the collection. In addition to storage solutions, artifacts must be maintained and conservation treatments applied when needed. The work of maintaining a collection involves cooperation between several academic disciplines including conservators, archaeologists, and researchers. By working cooperatively, the collections will receive superior care. Moreover, with specialists from each discipline working in conjunction, redundant research efforts are minimized, thereby maximizing the staff's time and budget.

The creation of collection policies and management plans is essential to artifact conservation, as is a detailed and thorough catalogue. With these policies in place, museum staff members are given strict standards to follow. Once these policies are devised the museum should then consider all available conservation methods in consultation with a conservator or laboratory.

Upon completion of the Drayton Hall catalogue, 315 of the 1067 artifacts, or 29.5%, were determined to be unidentifiable or only lumps of corrosion products. In addition, these figures need to be evaluated with the knowledge that approximately 40% of the original metal collection was discarded during the rebagging phase of the project. Therefore 69.5% of the collection remains unidentifiable. The metal conservation issues detailed throughout this report are not unique to Drayton Hall, nor are the storage problems. Consequently, storage and conservation plans, along with budgets, need to be in

76 The International Council of Museums' Code of Ethics are guidelines that explain these obligations and can be found at http://www.icom.museum/ethics.html.

place prior to archaeological excavations being undertaken. As a result of the Drayton Hall experiment, the subcritical method should be viewed as a viable treatment method for archaeological iron, with future possibilities for treatment of architectural elements, and as a way for museums to safeguard their collections for future generations.

Introduction to Appendices:

This project required an extensive amount of documentation, which was reproduced in Appendices A through I. Appendix A is a detailed catalogue of the metal collection of Drayton Hall. It consists of a spreadsheet modeled on the DAACS database. The set of information for each column was decided upon by using the DAACS system categories, and when needed altering those labels to fit the collection at Drayton Hall. The format of the database is a Microsoft Excel spreadsheet. This format was chosen based on its ease of use and its commonality. It is hoped that in the future this information will be placed directly into the web based DAACS system, thereby allowing the collection to be accessible to researchers worldwide.

Appendices B – D are a photographic collection of the subcritical fluid treatment experiment, artifact documentation sheets for each item treated, and the microabrasion cleaning of the artifacts. Previous to treating the chosen items several levels of documentation and observation were compiled on the metal collection as a whole. This documentation can be found in Appendix E, while Appendix F contains X-ray documentation of a selection of the metal artifacts.

As a result of the numerous archaeological campaigns conducted at Drayton Hall a color coded graphic was included in Appendix G. This map indicates the different areas of excavation by year or season. During the research of this project, the metal collection on the interior of the Drayton house was also assessed and a treatment recommendation was incorporated and supplied for review in Appendix H.

Appendix I is an overview of the currently available iron conservation techniques. This chart includes the equipment needed for each form of treatment, in addition to a positive and negative comparison.

Appendix A: Drayton Hall Archaeological Collection Artifact Catalog-General Artifacts

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-001	1	DH79A	Iron	Wrought	Unid.		Incomplete	18	2	2.5	10	Uniform	Y
10000-002	1	DH79A	Iron	Wrought	Unid.		Incomplete	2.5	1	7.6	5	Uniform	Y
10000-003	1	DH51	Iron	Wrought	Slide Bolt		Incomplete	16	1	12.7	156	Uniform	Y
10000-003	1	DH51	Iron	Wrought	Slide Bolt Casement		Incomplete		2	2.5		Uniform	Y
10000-004	1	DH9E	Iron	Wrought	Unid.: hardware		Incomplete	4.5	2.5	2.5	19	Uniform	Y
10000-005	7	DH9E	Iron	Wrought	Corrosion/Rust		Incomplete				18	Uniform	Y
10000-006	2	DH78B	Iron	Wrought	Cramp		Incomplete	11.5	2.5	5.0	36	Uniform	Y
10000-007	10	DH70Z	Iron	Wrought	Corrosion/Rust		Incomplete				61	Uniform	Y
10000-008	1	DH70Z	Iron	Wrought	Corrosion/Rust		Incomplete	6.75	1.5	10.2	19	Uniform	Y
10000-009	1	DH70Z	Iron	Wrought	Corrosion/Rust		Incomplete	4	3	2.5	15	Uniform	Y
10000-013	1	DH70K	Iron	Wrought	Unid:hardware		Incomplete	1.7	0.6	5.0	1	Uniform	Y
10000-014	1	DH70B	Iron	Wrought	Unid:hardware		Incomplete	2.4	1.5	12.7	12	Uniform	Y
10000-015	2	DH75B	Iron	Wrought	Corrosion/Rust		Incomplete				7	Uniform	Y
10000-016	1	DH81Q	Iron	Wrought	Unid:hardware		Incomplete	2.3	1.5	5.0	2	Uniform	Y
10000-017	1	DH81Q	Iron	Wrought	Unid:hardware		Incomplete	3.5	1	5.0	6	Uniform	Y
10000-018	7	DH81Q	Iron	Wrought	Corrosion/Rust		Incomplete				12	Uniform	Y
10000-020	2	DH75C	Iron	Wrought	Corrosion/Rust		Incomplete				5	Uniform	Y
10000-021	1	DH79C	Iron	Wrought	Unid:hardware		Incomplete	5.5	4.5	5.0	23	Uniform	Y
10000-022	2	DH79C	Iron	Wrought	Unid:hardware		Incomplete	4	2.5	2.5	19	Uniform	Y
10000-023	3	DH70E	Iron	Wrought	Corrosion/Rust		Incomplete				9	Uniform	Y
10000-025	2	DH70X	Iron	Wrought	Corrosion/Rust		Incomplete				3	Uniform	Y
10000-026	1	DH20F	Iron	Wrought	Corrosion/Rust		Incomplete				66	Uniform	Y
10000-027	1	DH52Z	Iron	Wrought	Corrosion/Rust		Incomplete				16	Uniform	Y
10000-028	1	DH74C	Iron	Wrought	Corrosion/Rust		Incomplete				3	Uniform	Y
10000-029	1	DH70GG1	Iron	Wrought	Corrosion/Rust		Incomplete				3	Uniform	Y
10000-030	1	DH70J	Iron	Wrought	Corrosion/Rust		Incomplete				26	Uniform	Y
10000-031	1	DH70B	Iron	Wrought	Unid:hardware		Incomplete				12	Uniform	Y
10000-032	2	DH74B	Iron	Wrought	Unid:hardware		Incomplete				16	Uniform	Y
10000-033	6	DH28B	Iron	Wrought	Unid:hardware		Incomplete				25	Uniform	Y
10000-038	1	DH52D	Iron	Wrought	Unid:hardware		Incomplete				23	Uniform	Y
10000-039	1	DH67B	Iron	Wrought	Unid:hardware		Incomplete				16	Uniform	Y
10000-042	1	DH70AA	Iron	Wrought	Corrosion/Rust		Incomplete				8	Uniform	Y
10000-043	1	DH70BB	Iron	Wrought	Corrosion/Rust		Incomplete				13	Uniform	Y
10000-045	4	DH70DD	Iron	Wrought	Corrosion/Rust		Incomplete				44	Uniform	Y
10000-046	4	DH70D	Iron	Wrought	Unid:hardware		Incomplete				33	Uniform	Y
10000-047	2	DH51E	Iron	Wrought	Unid:hardware		Incomplete				21	Uniform	Y
10000-048	7	DH28QQ	Cooper Alloy	Wrought	Corrosion/Rust		Incomplete				3	Selective/ specific	Y
10000-052	1	DH18C	Iron	Wrought	Unid:hardware		Incomplete	2.4	0.7	5.0	4	Uniform	Y
10000-055	1	DH70F	Iron	Wrought	Unid:hardware		Incomplete				8	Uniform	Y
10000-056	1	DH70CC	Iron	Wrought	Corrosion/Rust		Incomplete				5	Uniform	Y
10000-057	1	DH17B	Iron	Wrought	Unid:hardware		Incomplete				16	Uniform	Y
10000-060	1	DH70G	Iron	Wrought	Corrosion/Rust		Incomplete				47	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-061	1	DH81C	Iron	Wrought	Corrosion/Rust		Incomplete				8	Uniform	Y
10000-066	1	DH28Q	Iron	Wrought	Unid:hardware		Incomplete	7	0.7	5.0	23	Uniform	Y
10000-071	1	DH50B	Iron	Wrought	Unid:hardware		Incomplete	2.7	0.8	7.6	10	Uniform	Y
10000-079	1	DH38BIII	Iron	Cut	Unid:hardware		Incomplete	9.8	0.9	8.5	40	Uniform	Y
10000-081	1	DH37A	Iron	Wrought	Unid:hardware		Incomplete	7.2	1	8.5	45	Uniform	Y
10000-090	1	DH39A	Iron	Wrought	Corrosion/Rust		Incomplete				25	Uniform	Y
10000-091	1	DH28Q	Iron	Wrought	Unid:hardware		Incomplete	3.2	0.9	10.0	15	Uniform	Y
10000-094	1	DH73B	Iron	Wrought	Corrosion/Rust		Incomplete				7	Uniform	Y
10000-106	2	DH22A	Iron	Wrought	Corrosion/Rust		Incomplete				70	Uniform	Y
10000-125	5	DH71B	Iron	Wrought	Fleam Blade		Incomplete					n/a	Y
10000-125	5	DH71B	Cooper Alloy	Cast	Fleam Case		Complete	9.5			39	Uniform	Y
10000-126	1	DH46J	Iron	Wrought	Fleam Blade		Complete					Uniform	Y
10000-126	1	DH46J	Cooper Alloy	Cast	Fleam Case		Complete	9			38	Specific	Y
10000-127	1	DH22N	Iron	Wrought	Unid:hardware	Ring	Complete	6	0.6	7.5	29	Uniform	Y
10000-128	1	DH42B	Iron	Wrought	Unid:hardware	Ring	Complete	6.5	1.2	5.1	50	Uniform	Y
10000-129	1	DH72C	Iron	Wrought	Unid:hardware	Ring	Complete	6.3	0.7	7.6	47	Uniform	Y
10000-130	1	DH73B	Iron	Wrought	Unid:hardware	Ring	Complete	6.6	1.8	5.0	47	Uniform	Y
10000-131	1	DH10B	Iron	Wrought	Unid:hardware		Incomplete	16.5	2.5	7.6	77	Uniform	Y
10000-132	1	DH73B	Iron	Wrought	Unid:hardware	Hook	Incomplete	12	1	10.1	60	Uniform	Y
10000-133	2	DH28G	Iron	Wrought	Unid:hardware	Triangle shape	Incomplete	12	0.8	7.6	116	Uniform	Y
10000-134	1	DH73C	Iron	Wrought	Pliers		Incomplete	20	1.2	10.1	219	Uniform	Y
10000-135	1	DH46B	Iron	Wrought	Unid:hardware		Incomplete	11.5	6.5	16.5	173	Uniform	Y
10000-136	1	DH73B	Iron	Wrought	Hook		Complete	13	0.8	3	48	Uniform	Y
10000-137	1	DH28PPP	Iron	Wire	Mesh		Incomplete				8	Uniform	Y
10000-138	1	DH10B	Iron	Cast	Pot Handle	Hollow	Incomplete	16	1.3	5	209	Uniform	Y
10000-139	3	DHPU	Iron	Cast	Stove Grate		Complete	15.5	9.5	2.5	203	Uniform	Y
10000-140	1	DH94 DELTA	Iron	Cast	Pot		Incomplete	24		4	1587	Uniform	Y
10000-141	1	DH72B	Iron	Cast	Wrench	Threaded	Incomplete	13.2	5	3.6	141	Uniform	Y
10000-148	1	DH51B	Iron	Wrought	Unid:hardware	Ring like	Incomplete	2.3	0.3	2	4	Uniform	Y
10000-152	1	BP4	Iron	Wrought	Unid:hardware	Strap	Incomplete	30	3.5	2.5	208	Uniform	Y
10000-156	1	DH28QQ	Iron	Wrought	Unid:hardware	Strap	Incomplete	36	3	2.5	138	Uniform	Y
10000-159	1	DH28G	Iron	Cast	Pot fragments		Incomplete				540	Uniform	Y
10000-160	1	DH28QQ	Iron	??	Lid like		Incomplete	10.5		2.4	164	Uniform	Y
10000-161	1	DH73B	Iron	Wrought	Unid:hardware	round, Handle?	Incomplete	40		4.4	225	Uniform	Y
10000-162	1	DH51B	Iron	Wrought	Unid:hardware	Hook on end	Incomplete	38	2	2	204	Uniform	Y
10000-163	1	DH71B	Iron	Cast	Iron Body	No Handle	Incomplete	14.5	9.5	12	1695	Uniform	Y
10000-164	1	DH54B	Iron	Wrought	Unid:hardware		Incomplete	13	1.5	2	92	Uniform	Y
10000-165	1	DH70B	Iron	Wrought	Unid:hardware		Incomplete	3.75	2.5	5.8	43	Uniform	Y
10000-166	1	22B	Iron	Wrought	Unid:hardware	Oval with hole in center of one end	Incomplete	5.5	3	4	98	Uniform	Y
10000-167	1	DH73C	Iron	Wrought	Unid:hardware	Possible sliding bolt	Incomplete	18	3.25	2.7	276	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-170	1	DH70N	Iron	Wrought	Unid:hardware	Handle fragment	Incomplete	13	2	4.2	210	Uniform	Y
10000-171	1	DH72B	Iron	Wrought	Unid:hardware		Incomplete	13	1.4	2	41	Uniform	Y
10000-172	2	DH72B	Iron	Wrought	Unid:hardware	Lock fragment	Incomplete	7.5	3.5		230	Uniform	Y
10000-173	1	DH73B	Iron	Wrought	Unid:hardware	Swivel	Incomplete	9.3	5.5	2.4	77	Uniform	Y
10000-174	1	DH73C	Iron	Wrought	Shackle	2 pieces	Incomplete	13	2.5		175	Uniform	Y
10000-175	1	DH38L	Iron	Wrought	Unid:hardware	Screw like	Incomplete	8.6	1.5		36	Uniform	Y
10000-176	1	DH93DELTA	Iron	Wrought	Lock		Complete	8.5	6	2	151	Uniform	Y
10000-226	9	DH71B	Iron	Wrought	Slide bolt	4 nails still attached	Incomplete	14	4.5	5	139	Uniform	Y
10000-231	1	DH36B	Iron	Wrought	Hinge fragment		Incomplete	6	5.5	3.2	52	Uniform	Y
10000-232	1	DH28E	Iron	Wrought	Lock		Incomplete	4	4.5	5.6	72	Uniform	Y
10000-249	1	DH34B	Iron	Wrought	Unid:hardware		Incomplete	8.2	4.5	7	51	Uniform	Y
10000-251	1	DH71B	Iron	Wrought	Unid:hardware	Twisted	Incomplete	4.8	0.6	6.8	3	Uniform	Y
10000-252	1	DH8A	Leather		"Spacer"		Incomplete	2	1.6	2	5	Uniform	Y
10000-253	1	DH73C	Iron	Wrought	Unid:hardware	Pull/Handle	Incomplete	8.5	3.2	6.5	24	Uniform	Y
10000-257	1	DH70B	Iron	Wrought	Hinge fragment		Incomplete	5.2	3.8	10	59	Uniform	Y
10000-258	1	DH72B	Iron	Wrought	Hinge fragment		Incomplete	6.3	3	5	67	Uniform	Y
10000-259	1	DH28QQ	Iron	Wrought	Unid:hardware	"U" shaped	Incomplete	6.5	3	4.5	26	Uniform	Y
10000-260	1	DH38B5	Iron	Wrought	Screw & bolt	Bolt attached	Complete	7	0.8	6.6	28	Uniform	Y
10000-261	1	DH73D	Iron	Wrought	Handle		Incomplete	18.5	2	10	123	Uniform	Y
10000-262	1	DH71B	Iron	Wrought	Unid.: hardware		Incomplete	11.5	3	10.5	105	Uniform	Y
10000-263	1	DH70B	Iron	Wrought	Unid.: hardware		Incomplete	10.5	1	9	70	Uniform	Y
10000-266	1	DH73D	Iron	Wrought	Hinge fragment		Incomplete	16.5	4	3	82	Uniform	Y
10000-267	1	DH28NNN	Iron	Wrought	Hinge fragment		Incomplete	13.5	2.5	2.5	28	Uniform	Y
10000-268	2	DH57	Iron	Wrought	Unid:hardware	Button-like; 3cm diameter	Incomplete				8	Uniform	Y
10000-269	1	DH73G	Iron	Wrought	Unid:hardware	Umbrella frame	Incomplete	22	0.3	3.2	21	Uniform	Y
10000-270	1	DH71B	Iron	Wrought	Unid:hardware	Umbrella frame	Incomplete	20	0.3	3.5	18	Uniform	Y
10000-271	1	DH28QQ	Iron	Wrought	Unid:hardware	Awl?	Incomplete	7.8	0.4	3.5	5	Uniform	Y
10000-272	1	DH72B	Iron	Wrought	Unid:hardware		Incomplete	7.6	0.5	2.5	5	Uniform	Y
10000-273	1	DH73A	Iron	Wrought	Unid:hardware		Incomplete	9	0.7	2	6	Uniform	Y
10000-274	2	DH72B	Iron	Wrought	Unid:hardware		Incomplete	8	1	3	7	Uniform	Y
10000-275	1	DH72B	Iron	Wrought	Unid:hardware	Round	Incomplete	9.7	1	10.5	26	Uniform	Y
10000-276	1	DH68A	Iron	Wrought	Unid:hardware	Washer-like; 4cm diameter	Incomplete			10.6	41	Uniform	Y
10000-277	1	DH72B	Iron	Wrought	Unid:hardware	round; 3.5 cm diameter	Incomplete			3	4	Uniform	Y
10000-278	1	DH11B	Iron	Wrought	Hinge fragment		Incomplete	6.5	4	9.2	42	Uniform	Y
10000-279	10	DH72C	Iron	Wrought	Hinge fragments	Multi frags	Incomplete				57	Uniform	Y
10000-280	1	DH79C	Iron	Wrought	Hinge fragment	Corrosion products in bag	Incomplete	6	2	3.2	14	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-281	1	DH28G	Iron	Wrought	Hinge fragment	Corrosion products in bag	Incomplete	9	2.2	2.3	22	Uniform	Y
10000-282	1	DH70EE	Iron	Wrought	Unid:hardware		Incomplete	6.5	3.5	10	35	Uniform	Y
10000-283	1	DH34B	Iron	Wrought	Strap		Incomplete	15	2.2	2.5	44	Uniform	Y
10000-284	1	DH51B	Iron	Wrought	Strap		Incomplete	17	1.8	2.2	36	Uniform	Y
10000-285	1	DH10B	Iron	Wrought	Strap		Incomplete	12.7	2.5	3.5	54	Uniform	Y
10000-286	2	DH59	Iron	Wrought	Hinge fragments		Incomplete	10		3.5	95	Uniform	Y
10000-287	1	DH35B	Iron	Wrought	Strap		Incomplete	13.5	2.5	1.4	40	Uniform	Y
10000-288	1	DH10B	Iron	Wrought	Strap		Incomplete	11.5	3.3	4.6	43	Uniform	Y
10000-289	8	DH71C	Iron	Wrought	Hinge fragments	8 frags & corrosion products	Incomplete				179	Uniform	Y
10000-290	4	DH71B	Iron	Wrought	Hinge fragments	4 frags & corrosion products	Incomplete				152	Uniform	Y
10000-291	3	DH71K	Iron	Wrought	Hinge fragments	3 frags & corrosion products	Incomplete				262	Uniform	Y
10000-292	1	DH82B	Iron	Wrought	Hinge fragments	1 frag & corrosion products	Incomplete				111	Uniform	Y
10000-293	2	DH71K	Iron	Wrought	Unid:hardware		Incomplete				15	Uniform	Y
10000-294	1	DH28G	Iron	Wrought	Hinge fragments	1 frag & corrosion products	Incomplete	9	4	1.3	73	Uniform	Y
10000-295	1	DH72B	Iron	Wrought	Washer		Incomplete		2.7	1.8	4	Uniform	Y
10000-296	2	DH72B	Iron	Wrought	Washer	2 pieces	Incomplete		4		37	Uniform	Y
10000-297	1	DH11C	Iron	Wrought	Unid:hardware	1 frag & corrosion products	Incomplete				32	Uniform	Y
10000-298	1	DH73G	Iron	Wrought	Horseshoe	1 corrosion piece in bag	Incomplete	15	2	6.5	250	Uniform	Y
10000-299	1	DH10B	Iron	Wrought	Corrosion/Rust		Incomplete				9	Uniform	Y
10000-300	1	DH28NNN	Iron	Wrought	Hinge frag	heavy corrosion	Incomplete	5	3.2	12.5	29	Uniform	Y
10000-301	1	DH70AA	Iron	Wrought	Hinge frag	heavy corrosion	Incomplete	4	2.2	2.4	10	Uniform	Y
10000-302	1	DH73B	Iron	Wrought	Unid:hardware		Incomplete	4.2	1	2.5	6	Uniform	Y
10000-303	1	DH28G	Iron	Wrought	Unid:hardware		Incomplete	3	2.5	2.8	7	Uniform	Y
10000-304	1	DH82B	Iron	Wrought	Hinge frag		Incomplete	11	2.7	4	42	Uniform	Y
10000-305	1	DH52C	Iron	Wrought	Hinge frag		Incomplete	3.4	2	1.6	6	Uniform	Y
10000-306	1	DH56A	Iron	Wrought	Corrosion/Rust		Incomplete				9	Uniform	Y
10000-307	1	DH28NNN	Iron	Wrought	Corrosion/Rust		Incomplete				35	Uniform	Y
10000-308	1	DH22B	Iron	Wrought	Strip with 1 hole		Incomplete	4.6	2.5	1	8	Uniform	Y
10000-309	2	DH28C	Iron	Wrought	Unid:hardware		Incomplete	8.3	1.5	1.4	7	Uniform	Y
10000-310	1	DH20C	Iron	Wrought	Corrosion/Rust		Incomplete				42	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-311	1	DH10A	Iron	Wrought	Corrosion/Rust		Incomplete				5	Uniform	Y
10000-312	1	DH28PPP	Iron	Wrought	Hinge frag	heavy corrosion	Incomplete	17	2.8	3	246	Uniform	Y
10000-313	1	DH10B	Iron	Wrought	Corrosion/Rust		Incomplete				4	Uniform	Y
10000-314	1	DH52G	Iron	Wrought	Corrosion/Rust		Incomplete				8	Uniform	Y
10000-315	1	DH32A	Iron	Wrought	Corrosion/Rust		Incomplete				8	Uniform	Y
10000-316	1	DH10B	Iron	Wrought	Hinge frag		Incomplete	5.5	3.3	2.4	8	Uniform	Y
10000-317	1	DH16B	Iron	Wrought	Hinge frag		Incomplete	3.2	2.5	3.5	11	Uniform	Y
10000-318	1	DH72C	Iron	Wrought	Unid:hardware		Incomplete	1.6	1	7.5	7	Uniform	Y
10000-319	1	DH28G	Iron	Wrought	Unid:hardware		Incomplete	3	2.5	1.2	5	Uniform	Y
10000-320	1	DH10B	Iron	Wrought	Unid:hardware		Incomplete	4.2	2	5	7	Uniform	Y
10000-321	2	DH72L	Iron	Wrought	Hinge frags		Incomplete				29	Uniform	Y
10000-322	1	DH28PPP	Iron	Wrought	Strap		Incomplete	5.5	2.2	6.5	16	Uniform	Y
10000-323	1	DH56A	Iron	Wrought	Hinge frag	Curved	Incomplete	2.5	2.5	3.9	10	Uniform	Y
10000-324	1	DH28QQ	Iron	Wrought	Unid:hardware		Incomplete	4.6	1.8	2.3	16	Uniform	Y
10000-325	1	DH28QQQ	Iron	Wrought	Corrosion/Rust		Incomplete				11	Uniform	Y
10000-326	1	DH56A	Iron	Wrought	Unid:hardware		Incomplete	3	2.5	2.5	5	Uniform	Y
10000-327	1	DH51B	Iron	Wrought	Unid:hardware	Curved	Incomplete	5	1.8	1.1	6	Uniform	Y
10000-328	1	DH28G	Iron	Wrought	Unid:hardware	Slight curve	Incomplete	5	2	1.5	14	Uniform	Y
10000-329	1	DH28E	Iron	Wrought	Hinge frag	Corrosion products in bag	Incomplete	3	2.5	2.5	11	Uniform	Y
10000-330	2	DH82C	Iron	Wrought	Hinge frags	Corrosion products in bag	Incomplete	6	2	1	18	Uniform	Y
10000-331	1	DH71R	Iron	Wrought	Corrosion/Rust		Incomplete				93	Uniform	Y
10000-332	1	DH22B	Iron	Wrought	Corrosion/Rust		Incomplete				102	Uniform	Y
10000-333	1	DH20B	Iron	Wrought	Corrosion/Rust		Incomplete				40	Uniform	Y
10000-334	1	DH38L	Iron	Wrought	Corrosion/Rust		Incomplete				54	Uniform	Y
10000-335	1	DH70D	Iron	Wrought	Hinge frag	Broken, corrosion products in bag	Incomplete				28	Uniform	Y
10000-336	1	DH46B	Iron	Wrought	Hinge frag		Incomplete	8.7	2.4	6.5	23	Uniform	Y
10000-337	1	DH80C	Iron	Wrought	Hinge frag	Broken, corrosion products in bag	Incomplete				36	Uniform	Y
10000-338	1	DH36B	Iron	Wrought	Hinge frag		Incomplete	7.5	2.5	2.6	32	Uniform	Y
10000-339	1	DH42B	Iron	Wrought	Hinge frag		Incomplete	10.6	1.8	3	28	Uniform	Y
10000-340	1	DH10A	Iron	Wrought	Hinge frag		Incomplete	6.5	2.6	4	38	Uniform	Y
10000-341	1	DH28NNN	Iron	Wrought	Hinge frag	Multi frags, from 1 piece; corrosion products in bag	Incomplete				78	Uniform	Y
10000-342	1	DH51E	Iron	Wrought	Pintel		Incomplete	8	1	6.2	41	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-343	1	DH70B	Iron	Wrought	Pintel		Incomplete	8.5	0.8	6.4	32	Uniform	Y
10000-344	1	DH72B	Iron	Wrought	Pintel		Incomplete	13.5	2	18	227	Uniform	Y
10000-345	1	DH72B	Iron	Wrought	Pintel		Incomplete	11.5	1.2	10.5	101	Uniform	Y
10000-346	1	DH72B	Iron	Wrought	Pintel		Incomplete	11.5	1	9.2	75	Uniform	Y
10000-347	1	DH72B	Iron	Wrought	Pintel		Incomplete	10.2	1.2	8.6	142	Uniform	Y
10000-348	1	DH72B	Iron	Wrought	Stirrup		Incomplete	19	0.8	8	62	Uniform	Y
10000-349	1	DH66B	Iron	Wrought	Hinge frag		Incomplete	11	3.1	9.4	92	Uniform	Y
10000-350	1	DH11B	Iron	Wrought	Hinge frags	multi frags, corrosion products	Incomplete				98	Uniform	Y
10000-351	1	DH73G	Iron	Wrought	Hinge frag		Incomplete	8.5	2.4	3	26	Uniform	Y
10000-352	1	DH53DY	Iron	Wrought	Hinge frag		Incomplete	13.5	5	8	163	Uniform	Y
10000-353	2	DH73C	Iron	Wrought	Hinge frags		Incomplete				91	Uniform	Y
10000-354	1	DH28PPP	Iron	Wrought	Hinge frag		Incomplete	12	2	5.1	48	Uniform	Y
10000-355	1	DH35E	Iron	Wrought			Incomplete	15	5	9	222	Uniform	Y
10000-356	1	DH72B	Iron	Wrought	Hinge frags	multi frags, corrosion products	Incomplete				231	Uniform	Y
10000-357	1	DH71E	Iron	Wrought	Hinge frags	multi frags, corrosion products	Incomplete				287	Uniform	Y
10000-358	1	DH52E	Iron	Wrought	Hinge frags	multi frags, corrosion products	Incomplete				81	Uniform	Y
10000-359	1	DH10B	Iron	Wrought	Hinge frag		Incomplete	15	2.7	5.8	100	Uniform	Y
10000-360	1	DH80D	Iron	Wrought	Hinge frag		Incomplete	12	2	5.6	76	Uniform	Y
10000-361	1	DH71B	Iron	Wrought	Hinge frag	Corrosion products in bag	Incomplete	13	4.5	3.5	73	Uniform	Y
10000-362	3	DH72C	Iron	Wrought	Hinge frags		Incomplete				155	Uniform	Y
10000-363	1	DH5A	Iron	Wrought	Horseshoe	frag	Incomplete	12.5	2.2	9.5	116	Uniform	Y
10000-365	1	DH72L	Iron	Wrought	Hinge		Incomplete	17.1	4	2.6	151	Uniform	Y
10000-366	1	DH73C	Iron	Wrought	Hinge		Incomplete	30	4.3	4.5	432	Uniform	Y
10000-367	1	DH72B	Iron	Wrought	Hinge		Incomplete	12.6	3.2	5	123	Uniform	Y
10000-368	1	DH72B	Iron	Wrought	Hinge		Incomplete	4.5	3	2.8	23	Uniform	Y
10000-369	1	DH72B	Iron	Wrought	Hinge		Incomplete	38	5	10.8	814	Uniform	Y
10000-370	1	DH72L	Iron	Wrought	Hinge		Incomplete	30.5	6.5	8	669	Uniform	Y
10000-371	1	DH28QQ	Iron	Wrought	Hinge		Incomplete	14.5	3.8	6.8	109	Uniform	Y
10000-372	3	DH28QQ	Iron	Wrought	Hinge	1 large, 2 small corroded pieces	Incomplete	24	4.5	6	232	Uniform	Y
10000-373	1	DH73C	Iron	Wrought	Strap		Incomplete	32.5	2.5	2.5	143	Uniform	Y
10000-374	1	DHPU	Iron	Wrought	Unid:hardware		Incomplete	18	1.4	3.5	45	Uniform	Y
10000-375	1	DH28Q	Iron	Wrought	Hinge		Incomplete	47	4.5	5	430	Uniform	Y
10000-376	1	DH72C	Iron	Wrought	Hinge		Incomplete	46	4	8	606	Uniform	Y
10000-377	1	DH72C	Iron	Wrought	Machine handle	crank	Incomplete				1052	Uniform	Y
10000-378	1	DH28BB	Iron	Wrought	Hinge		Incomplete	26.3	4.3	7	612	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-379	1	DH28QQ	Iron	Wrought	Iron Body		Incomplete	13.2	8.5	27.5	1310	Uniform	Y
10000-380	1	DH28QQ	Iron	Wrought	Handle		Incomplete	9.5	9	8.5	109	Uniform	Y
10000-381	1	DH28Q	Iron	Wrought	Unid:hardware		Incomplete	13	6	6.5	129	Uniform	Y
10000-382	1	DH28B	Iron	Wrought	Strap		Incomplete	2.8	0.8	0.3		Uniform	Y
10000-383	1	DH28Q	Iron	Wrought	Unid:hardware		Incomplete	7.5	1	9.8	59	Uniform	Y
10000-384	1	DH81D	Iron	Wrought	Bolt		Incomplete	6	2	7.9	108	Uniform	Y
10000-385	1	DH28QQ	Iron	Wrought	Handle		Incomplete	7.5	5.5	7	160	Uniform	Y
10000-386	1	DH57	Iron	Wrought	Washer		Incomplete	5.6		3	66	Uniform	Y
10000-387	1	DH71B	Iron	Cast	Kettle frag		Incomplete	12	8.5	3.8	154	Uniform	Y
10000-388	1	DH71B	Iron	Cast	Kettle frag		Incomplete	7	7	6.5	74	Uniform	Y
10000-389	1	DH81D	Iron	Cast	Kettle frag		Incomplete	7	3	3.1	26	Uniform	Y
10000-390	1	DH71C	Iron	Cast	Kettle frag		Incomplete	4.5	4	3.1	25	Uniform	Y
10000-391	1	DH53GG	Iron	Cast	Kettle frag		Incomplete	9	7.5	8	117	Uniform	Y
10000-392	1	DH73C	Iron	Cast	Kettle frag		Incomplete	6.5	6.5	4	50	Uniform	Y
10000-393	1	DH28A	Iron	Cast	Kettle frag		Incomplete	5.5	3.5	2.8	36	Uniform	Y
10000-394	1	DH11B	Iron	Cast	Kettle frag		Incomplete	7.5	3.5	7.1	52	Uniform	Y
10000-395	1	DH28Q	Iron	Cast	Kettle frag		Incomplete	7	2.5	4.5	31	Uniform	Y
10000-396	1	DH5A	Iron	Cast	Kettle frag		Incomplete	4.5	4	3.6	20	Uniform	Y
10000-397	1	DH50B	Iron	Cast	Kettle frag	7in dia	Incomplete	5.8	4.2	2.5	20	Uniform	Y
10000-398	1	DH50B	Iron	Cast	Kettle frag		Incomplete	8	4.2	6	67	Uniform	Y
10000-399	1	DH52C	Iron	Cast	Kettle frag		Incomplete	2.5	2	4.3	4	Uniform	Y
10000-400	1	DH52C	Iron	Cast	Kettle frag		Incomplete	4	2.5	2.8	9	Uniform	Y
10000-401	1	DH52C	Iron	Cast	Kettle frag		Incomplete	3	2.3	3.3	13	Uniform	Y
10000-402	1	DH52C	Iron	Cast	Kettle frag		Incomplete	4.2	3	3.7	21	Uniform	Y
10000-403	1	DH72B	Iron	Wrought	Chain		Incomplete				34	Uniform	Y
10000-404	1	DH61C	Iron	Wrought	Corrosion/Rust		Incomplete				59	Uniform	Y
10000-405	1	DH67B	Iron	Wrought	Bolt w/ nut		Incomplete	8.5	1.5	6.7	44	Uniform	Y
10000-406	1	DH28C	Iron	Wrought	Unid:hardware		Incomplete	8	8.2	5	45	Uniform	Y
10000-407	1	DH71B	Iron	Wrought	Staple		Incomplete	7	5.5	4.5	35	Uniform	Y
10000-408	1	DH57	Iron	Wrought	Staple		Incomplete	11	4	7.5	89	Uniform	Y
10000-409	1	DH52C	Iron	Wrought	Corrosion/Rust		Incomplete				23	Uniform	Y
10000-410	1	DH41C	Iron	Wrought	Nut		Incomplete	5	5	20.8	288	Uniform	Y
10000-411	1	DH49Delta	Iron	Wrought	Staple		Incomplete	7.2	7.1	10.5	59	Uniform	Y
10000-412	1	DH70D	Iron	Wrought	Staple		Incomplete	10	2.5	8.5	117	Uniform	Y
10000-413	1	DH79B	Iron	Wrought	Bolt w/ nut		Incomplete	6.5	1	11	41	Uniform	Y
10000-414	1	DH73C	Iron	Wrought	Unid:hardware	Round; 1.5 cm dia	Incomplete		1.2	2	6	Uniform	Y
10000-415	1	DH72B	Iron	Wrought	Square Bolt		Incomplete	1.8	1.8	7.8	14	Uniform	Y
10000-416	1	DH32B	Iron	Wrought	Screw		Incomplete	2.1	0.6	5	3	Uniform	Y
10000-417	1	DH74B	Iron	Wrought	Screw		Incomplete	2.1	0.8	6.8	2	Uniform	Y
10000-418	1	DH28C	Iron	Wrought	Screw		Incomplete	2	0.7	6.2	3	Uniform	Y
10000-419	1	DH51B	Iron	Wrought	Unid:hardware	Blade?	Incomplete	7.3	1.5	2.6	13	Uniform	Y
10000-420	1	DH73C	Iron	Wrought	Unid:hardware		Incomplete	10	0.8	4.5	33	Uniform	Y
10000-421	1	DH71C	Iron	Wrought	Unid:hardware	Wedge shape	Incomplete	23	4	40.5	1242	Uniform	Y
10000-422	1	DH18C	Iron	Wrought	Bolt		Incomplete	29	3.5	22.5	885	Uniform	Y
10000-423	1	DH23B	Iron	Wrought	Bolt		Incomplete	16.7	2.7	16.4	305	Uniform	Y
10000-424	1	DH73C	Iron	Wrought	Wing Nut		Complete	5.6	1.5	15	46	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-425	1	DH72B	Iron	Wrought	Bolt		Incomplete	6.5	1.3	13.5	81	Uniform	Y
10000-426	1	DH70B	Iron	Wrought	Unid:hardware	Metal bent strip w/ 3 screws attached	Incomplete	18	4.1	5	218	Uniform	Y
10000-427	1	DH28F	Iron	Wrought	Clamp		Incomplete	8	3.2	10	169	Uniform	Y
10000-428	1	DH66B	Iron	Wrought	Bolt	Heavy corrosion	Incomplete	5	1.3	13.8	48	Uniform	Y
10000-429	1	DH70B	Iron	Wrought			Incomplete	1.9	0.9	1.9		Uniform	Y
10000-430	1	DH75B	Iron	Cast	Kettle frag		Incomplete	2.3	1.2	1.5	3	Uniform	Y
10000-431	1	DH52B	Iron	Cast	Kettle frag		Incomplete	4.5	3.5	3	23	Uniform	Y
10000-432	1	DH61C	Iron	Wrought	Staple		Incomplete	5.2	3.2	8.2	38	Uniform	Y
10000-433	1	DH50B	Iron	Wrought	Screw		Incomplete	3.1	0.7	6.7	7	Uniform	Y
10000-434	1	DH38B	Iron	Wrought	Screw		Incomplete	2.6	0.8	7.5	4	Uniform	Y
10000-435	2	DH61A	Iron	Wrought	Screws		Incomplete	3.5	0.8	5	9	Uniform	Y
10000-436	1	DH56J	Iron	Wrought	Tongs		Incomplete	9	11	5.5	92	Uniform	Y
10000-437	1	DH33B	Iron	Wrought	Bolt		Incomplete	7.5	1.5	12.5	92	Uniform	Y
10000-438	2	DH67B	Iron	Cast	Kettle frag		Incomplete	6.5	5.5	3.3	49	Uniform	Y
10000-439	2	DH37B	Iron	Wrought	Bolt	2 pieces	Incomplete	10	2.5	11.5	134	Uniform	Y
10000-440	1	DH73B	Iron	Drawn	Chain		Incomplete				141	Uniform	Y
10000-441	1	DH28A	Iron	Drawn	Chain		Incomplete				357	Uniform	Y
10000-442	1	DH73C	Iron	Drawn	Chain		Incomplete				75	Uniform	Y
10000-443	1	DH36B	Iron	Drawn	Chain		Incomplete				139	Uniform	Y
10000-444	1	DH71B	Iron	Drawn	Chain		Incomplete				73	Uniform	Y
10000-445	1	DH72B	Iron	Drawn	Chain Link		Incomplete	8.5	4.5	10.5	111	Uniform	Y
10000-446	1	DH72C	Iron	Drawn	Chain Link		Incomplete	9.7	4	9.6	122	Uniform	Y
10000-447	1	DH72B	Iron	Wrought	Bolt	Square nut & curved	Incomplete	14	1	9.5	99	Uniform	Y
10000-448	1	DH71C	Iron	Wrought	Bolt	Square nut	Incomplete	12.5	1.2	11.1	112	Uniform	Y
10000-449	1	DH28G	Iron	Wrought	Bolt	Square nut & curved & misc hardware	Incomplete	11.5	1	7.6	155	Uniform	Y
10000-450	1	DH71B	Iron	Wrought	Bolt		Incomplete	18	1.4	12.8	203	Uniform	Y
10000-451	1	DH65A	Iron	Cast	Kettle frag	14in dia	Incomplete	7.5	5.5	11	122	Uniform	Y
10000-452	1	DH52B	Iron	Cast	Kettle frag		Incomplete	6.5	4.5	2.5	38	Uniform	Y
10000-453	1	DH38A	Iron		Hook	Misc hardware attached	Incomplete	8.5	2.5	10	47	Uniform	Y
10000-454	1	DH51O	Iron	Wrought	Bolt w/ nut	Curved	Incomplete	10.5	1.2	11.1	111	Uniform	Y
10000-455	1	DH70Z	Iron		Unid:hardware	Kettle frag?	Incomplete	6	6	5	93	Uniform	Y
10000-456	1	DH47F	Iron	Wrought	Staple	Heavy corrosion	Incomplete	7	4	16.5	55	Uniform	Y
10000-457	1	DH71B	Iron	Wrought	Unid:hardware	Flat on 1 side, round on opposite side	Incomplete	8	1.1	7	36	Uniform	Y
10000-458	1	DH56J	Iron	Wrought	Ring/link	5.7 cm dia	Incomplete			6.3	27	Uniform	Y
10000-459	1	DH71B	Iron	Wrought	Ring/link	4.5 cm dia	Incomplete			5	71	Uniform	Y
10000-460	2	DH72C	Iron	Drawn	Chain	2 pieces	Incomplete				54	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-461	1	DH17B	Iron	Wrought	Staple		Incomplete	6.6	3	6.5	32	Uniform	Y
10000-462	1	DH56J	Iron	Wrought	Staple	Curved on end	Incomplete	6	3	6	23	Uniform	Y
10000-463	1	DH10B	Iron	Wrought	Unid:hardware		Incomplete	5	1	7.7	31	Uniform	Y
10000-464	1	DH33A	Iron	Wrought	Unid:hardware	Clamp/bracket?	Incomplete	6.5	5	11.5	152	Uniform	Y
10000-465	1	DH28NNN	Iron	Wrought	Unid:hardware	Kettle frag?	Incomplete	5	2	8.2	23	Uniform	Y
10000-466	1	DH72C	Iron	Wrought	Bar lock catch	"L" shaped	Incomplete		1.3	15.5	187	Uniform	Y
10000-467	1	DH11C	Iron	Wrought	Bar lock catch	"L" shaped	Incomplete		1	11.5	113	Uniform	Y
10000-468	1	DH80A	Iron	Wrought	Screw		Incomplete	1.5	0.7	6.1	6	Uniform	Y
10000-469	1	DH81D	Iron	Wrought	Screw	Mold growth	Incomplete	5.5	0.7	9.5	15	Uniform	Y
10000-470	1	DH75B	Iron	Wrought	Screw	No head	Incomplete	2.1	0.5	2.8	1	Uniform	Y
10000-471	1	DH38B	Iron	Wrought	Screw		Incomplete	2	0.6	5.8	3	Uniform	Y
10000-472	1	DH60D	Iron	Wrought	Screw		Incomplete	2.5	0.6	4.3	3	Uniform	Y
10000-473	1	DH38BFive	Iron	Wrought	Unid:hardware	Kettle frag?	Incomplete	3.5	2	4.1	18	Uniform	Y
10000-474	1	DH72B	Iron	Wrought	Clamp		Incomplete	8.5	3	10.2	181	Uniform	Y
10000-475	3	DH70B	Iron	Wrought	Screws	Heads present	Incomplete	2.5	0.7	5	9	Uniform	Y
10000-476	2	DH70B	Iron	Wrought	Screws	Heads present	Incomplete	3.3	0.9	6.5	13	Uniform	Y
10000-477	3	DH70B	Iron	Wrought	Screws	Heads present	Incomplete	5.1	1.2		38	Uniform	Y
10000-478	2	DH70B	Iron	Wrought	Screws	Heads present	Incomplete		0.5	4.5	4	Uniform	Y
10000-479	5	DH70B	Iron	Wrought	Screws	Shafts only	Incomplete	2.5	0.6	7.5	28	Uniform	Y
10000-480	6	DH70B	Iron	Wrought	Screws	Shafts only	Incomplete	5	0.7	7	83	Uniform	Y
10000-481	2	DH70B	Iron	Wrought	Screws	Heads present	Incomplete	4.3	0.7	5.5	19	Uniform	Y
10000-482	1	DH73B	Iron	Wrought	Cramp		Incomplete	7	5.2	5.5	57	Uniform	Y
10000-483	1	DH73B	Iron	Wrought	Staple		Incomplete	8.5	4	8.2	37	Uniform	Y
10000-484	1	DH73B	Iron	Wrought	Cramp		Incomplete	4.5	4.2	6	32	Uniform	Y
10000-485	1	DH72B	Iron	Wrought	Staple		Incomplete	6.2	4.1	7.7	26	Uniform	Y
10000-486	1	DH72B	Iron	Wrought	Staple		Incomplete	3.2	2	3.4	5	Uniform	Y
10000-487	1	DH72B	Iron	Wrought	Staple		Incomplete	4	2.5	6	11	Uniform	Y
10000-488	1	DH72B	Iron	Wrought	Staple		Incomplete	5.5	2.5	6.1	18	Uniform	Y
10000-489	4	DH72B	Iron	Wrought	Screws	Heads present	Incomplete	5.3	0.8	8	65	Uniform	Y
10000-490	2	DH72B	Iron	Wrought	Screws	Shafts only	Incomplete	1.3	0.6	5	4	Uniform	Y
10000-491	3	DH72B	Iron	Wrought	Screws	Heads present	Incomplete	2.5	0.5	4.5	10	Uniform	Y
10000-492	1	DH72B	Iron	Wrought	Screws	Shaft only	Incomplete	3.8	0.8	5.3	6	Uniform	Y
10000-493	3	DH72B	Iron	Wrought	Screws	Heads present	Incomplete	3	0.7		16	Uniform	Y
10000-494	1	DH72B	Iron	Wrought	Screws	Head present	Incomplete	4.4	2	10	28	Uniform	Y
10000-495	11	DH72B	Iron	Wrought	Screws	Heads present	Incomplete	2			21	Uniform	Y
10000-496	3	DH72B	Iron	Wrought	Screws	Heads present	Incomplete	4	0.8	5.5	20	Uniform	Y
10000-497	2	DH73B	Iron	Wrought	Screws	Heads present	Incomplete				13	Uniform	Y
10000-498	2	DH73B	Iron	Wrought	Screws	Heads present	Incomplete				10	Uniform	Y
10000-499	2	DH73B	Iron	Wrought	Screws	Shafts only	Incomplete				10	Uniform	Y
10000-500	1	DH73B	Iron	Wrought	Screws	Head present	Incomplete	2.5	0.5	5	4	Uniform	Y
10000-501	1	DH73B	Iron	Wrought	Screws	Head present	Incomplete	2	0.5	5	3	Uniform	Y
10000-502	1	DH73B	Iron	Wrought	Screws	Head present	Incomplete	1.5	0.4	4.2	1	Uniform	Y
10000-503	1	DH73B	Iron	Wrought	Screws	Head present	complete	5.3	1	8	17	Uniform	Y
10000-504	2	DH73C	Iron	Wrought	Screws	Head present	Incomplete				16	Uniform	Y
10000-505	1	DH73C	Iron	Wrought	Screws	Head present	Incomplete	3.5	1	7.8	12	Uniform	Y
10000-506	1	DH73C	Iron	Wrought	Screws	Head present	Incomplete	2	0.5	4.4	3	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-507	2	DH70D	Iron	Wrought	Screws	Head present	Incomplete				3	Uniform	Y
10000-508	3	DH70D	Iron	Wrought	Screws	Shaft only	Incomplete				16	Uniform	Y
10000-509	1	DH70D	Iron	Wrought	Screws	Head present	Incomplete	2.6	0.6	4.1	4	Uniform	Y
10000-510	1	DH70D	Iron	Wrought	Screws	Head present	Incomplete	5.2	1	5.5	14	Uniform	Y
10000-511	1	DH70D	Iron	Wrought	Screws	Shaft only	Incomplete	5	0.6	7.3	13	Uniform	Y
10000-512	3	DH38BFive	Iron	Wrought	Unid:hardware	3 frags & corrosion products	Incomplete				10	Uniform	Y
10000-513	1	DH34B	Iron	Wrought	Screws	Head present	Incomplete	4.5	0.8	4.7	11	Uniform	Y
10000-514	1	DH34B	Iron	Wrought	Screws	Head present	Incomplete	1.5	0.5	4.2	3	Uniform	Y
10000-515	3	DH34B	Iron	Wrought	Screws	Head present	Incomplete				12	Uniform	Y
10000-516	2	DH71B	Iron	Wrought	Screws	Shafts only	Incomplete				8	Uniform	Y
10000-517	2	DH71B	Iron	Wrought	Screws	Heads present	Incomplete				4	Uniform	Y
10000-518	2	DH71B	Iron	Wrought	Screws	Heads present	Incomplete				3	Uniform	Y
10000-519	2	DH71B	Iron	Wrought	Screws	Heads present	Incomplete				5	Uniform	Y
10000-520	2	DH71B	Iron	Wrought	Screws	Heads present	Incomplete				7	Uniform	Y
10000-521	1	DH28G	Iron	Wrought	Screws	Head present	Incomplete	5.5	1	6	12	Uniform	Y
10000-522	1	DH28G	Iron	Wrought	Screws	Head present	Incomplete	1.4	0.5	5.4	3	Uniform	Y
10000-523	1	DH28G	Iron	Wrought	Screws	Shaft only	Incomplete	3	0.6	7	6	Uniform	Y
10000-524	1	DH28G	Iron	Wrought	Screws	Shaft only	Incomplete	5	0.8	6.8	13	Uniform	Y
10000-525	1	DH28G	Iron	Wrought	Screws	Shaft only	Incomplete	3.2	0.8	5.1	6	Uniform	Y
10000-526	1	DH79C	Iron	Wrought	Screws	Head present	Incomplete	5.2	1	6	16	Uniform	Y
10000-527	1	DH79C	Iron	Wrought	Screws	Head present	Incomplete	3.2	0.4	3.8	3	Uniform	Y
10000-528	2	DH79C	Iron	Wrought	Screws	Head present	Incomplete				20	Uniform	Y
10000-529	5	DH79C	Iron	Wrought	Screws	Head present	Incomplete				9	Uniform	Y
10000-530	2	DH73D	Iron	Wrought	Square Bolt		Complete	3	2.5	9.2	54	Uniform	Y
10000-531	1	DH70B	Iron	Wrought	Square Bolt		Complete	2	2	9.5	23	Uniform	Y
10000-532	1	DH70B	Iron	Wrought	Square Bolt		Complete	2.7	2.7	15.5	66	Uniform	Y
10000-533	1	DH73B	Iron	Wrought	Square Bolt		Complete	3	3	15.4	78	Uniform	Y
10000-534	1	DH73B	Iron	Wrought	Square Bolt		Complete	2	2	7	12	Uniform	Y
10000-535	1	DH73B	Iron	Wrought	Square Bolt		Complete	2.5	2	5	13	Uniform	Y
10000-536	2	DH73B	Iron	Wrought	Clamp	Screw attached	Incomplete	5.5	2	2	14	Uniform	Y
10000-537	1	DH73B	Iron	Wrought	Clamp		Incomplete	8.2	2.8	8.2	157	Uniform	Y
10000-538	5	DH22B	Iron	Cast	Kettle frag		Incomplete				147	Uniform	Y
10000-539	1	DH22B	Iron	Cast	Kettle frag	10in dia	Incomplete	9.5	6.5	4.1	113	Uniform	Y
10000-540	1	DH28G	Iron	Wrought	Staple		Incomplete	2.2	2.2	4.2	5	Uniform	Y
10000-541	1	DH28G	Iron	Wrought	Staple		Incomplete	1.8	1	1.6	3	Uniform	Y
10000-542	1	DH28G	Iron	Wrought	Staple		Incomplete	6.5	3	6	19	Uniform	Y
10000-543	1	DH28G	Iron	Wrought	Cramp		Incomplete	4.7	6.2	11	40	Uniform	Y
10000-544	1	DH28G	Iron	Wrought	Unid:hardware	Staple??	Incomplete	2.5	1.2	1.9	1	Uniform	Y
10000-545	1	DH72B	Iron	Drawn	Chain Link		Incomplete	14.5	4.6	8	112	Uniform	Y
10000-546	1	DH61E	Iron	Drawn	Chain Link		Incomplete	14.5	3.8	8.5	120	Uniform	Y
10000-578	1	DH28E	Iron	Drawn	Unid: wire	frag	Incomplete			1.4	1	Uniform	Y
10000-579	1	DH46H	Iron	Drawn	Unid: wire	frag	Incomplete			2.8	1	Uniform	Y
10000-580	6	DH50B	Iron	Drawn	Unid: wire	frag	Incomplete			2.7	4	Uniform	Y
10000-581	1	DH18A	Iron	Drawn	Unid: wire	frag	Incomplete			1.1	3	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-582	1	DH73K	Iron	Drawn	Unid: wire	frag	Incomplete			2	1	Uniform	Y
10000-583	1	DH43A	Iron	Drawn	Unid: wire	frag	Incomplete			2.5	6	Uniform	Y
10000-584	1	DH65A	Iron	Drawn	Unid: wire	frag	Incomplete			1	1	Uniform	Y
10000-585	3	DH71C	Iron	Drawn	Unid: wire	frag	Incomplete			1.6	2	Uniform	Y
10000-586	2	DH28QQQ	Iron	Drawn	Unid: wire	frag	Incomplete			2.6	3	Uniform	Y
10000-587	9	DH52B	Iron	Drawn	Unid: wire	frag	Incomplete			1.2	3	Uniform	Y
10000-588	1	DH46G	Iron	Drawn	Unid: wire	frag	Incomplete			2	1	Uniform	Y
10000-589	2	DH28J	Iron	Drawn	Unid: wire	frag	Incomplete			3	3	Uniform	Y
10000-590	4	DH51B	Iron	Drawn	Unid: wire	frag	Incomplete			2.2	3	Uniform	Y
10000-591	1	DH73F	Iron	Drawn	Unid: wire	frag	Incomplete			1.5	1	Uniform	Y
10000-592	1	DH75E	Iron	Drawn	Unid: wire	frag	Incomplete			3	3	Uniform	Y
10000-593	1	DH81B	Iron	Drawn	Unid: wire	frag	Incomplete			2	1	Uniform	Y
10000-594	2	DH70J	Iron	Drawn	Unid: wire	frag	Incomplete			2.1	1	Uniform	Y
10000-595	1	DH76A	Iron	Drawn	Unid: wire	frag	Incomplete			5.5	4	Uniform	Y
10000-596	1	DH74B	Iron	Drawn	Unid: wire	frag	Incomplete			1.5	1	Uniform	Y
10000-597	1	DH70D	Iron	Drawn	Unid: wire	frag	Incomplete			1.9	3	Uniform	Y
10000-598	1	DH52Z	Iron	Drawn	Unid: wire	frag	Incomplete			2.4	1	Uniform	Y
10000-599	1	DH57A	Iron	Drawn	Unid: wire	frag	Incomplete			1.6	4	Uniform	Y
10000-600	1	DH28QQ	Iron	Drawn	Unid: wire	frag	Incomplete			1.8	1	Uniform	Y
10000-601	2	DH2B	Iron	Drawn	Unid: wire	frag	Incomplete			1	1	Uniform	Y
10000-602	2	DH28PPP	Iron	Drawn	Unid: wire	frag	Incomplete			2.3	6	Uniform	Y
10000-603	1	DH33B	Iron	Drawn	Unid: wire	frag	Incomplete			5	8	Uniform	Y
10000-604	1	DH51B	Iron	Drawn	Unid: wire	frag	Incomplete			3.2	2	Uniform	Y
10000-605	5	DH70E	Iron	Drawn	Unid: wire	frag	Incomplete			2	4	Uniform	Y
10000-606	5	DH10B	Iron	Drawn	Unid: wire	frag	Incomplete			2.2	6	Uniform	Y
10000-607	1	DH69B	Iron	Drawn	Unid: wire	frag	Incomplete			1.5	1	Uniform	Y
10000-608	1	DH38BFive	Iron	Drawn	Unid: wire	frag	Incomplete			1.1	1	Uniform	Y
10000-609	1	DH78	Iron	Drawn	Unid: wire	frag	Incomplete			1.7	1	Uniform	Y
10000-610	3	DH73H	Iron	Drawn	Unid: wire	frag	Incomplete			2.2	2	Uniform	Y
10000-611	1	DH51D	Iron	Drawn	Unid: wire	frag	Incomplete			3.9	1	Uniform	Y
10000-612	2	DH73G	Iron	Drawn	Unid: wire	frag	Incomplete			3.5	3	Uniform	Y
10000-613	2	DH28QQ	Iron	Drawn	Unid: wire	frag	Incomplete			1.5	2	Uniform	Y
10000-614	1	DH33A	Iron	Drawn	Unid: wire	frag	Incomplete			2.3	1	Uniform	Y
10000-615	10	DH28Q	Iron	Drawn	Unid: wire	frag	Incomplete			1.6	7	Uniform	Y
10000-616	2	DH52C	Iron	Drawn	Unid: wire	frag	Incomplete			1.2	1	Uniform	Y
10000-617	1	DH10C	Iron	Drawn	Unid: wire	frag	Incomplete			2.5	2	Uniform	Y
10000-618	1	DH35G	Iron	Drawn	Unid: wire	frag	Incomplete			2	2	Uniform	Y
10000-619	3	DH52E	Iron	Drawn	Unid: wire	frag	Incomplete			2.2	3	Uniform	Y
10000-620	1	DH75B	Iron	Drawn	Unid: wire	frag	Incomplete			2.2	2	Uniform	Y
10000-621	19	DH56A	Iron	Drawn	Unid: wire	frag	Incomplete			2.2	16	Uniform	Y
10000-622	2	DH66B	Iron	Drawn	Unid: wire	frag	Incomplete			3.3	10	Uniform	Y
10000-623	5	DH56E	Iron	Drawn	Unid: wire	frag	Incomplete			1.5	4	Uniform	Y
10000-624	1	DH17G	Iron	Drawn	Unid: wire	frag	Incomplete			1.5	1	Uniform	Y
10000-625	1	DH23B	Iron	Drawn	Unid: wire	frag	Incomplete			1.8	2	Uniform	Y
10000-626	6	DH72B	Iron	Drawn	Chain		Incomplete				16	Uniform	Y
10000-627	1	DH19A	Iron	Wrought	Chain		Incomplete	5.6	0.5	1.8	13	Uniform	Y
10000-628	1	DH51B	Iron	Wrought	Latch	frag	Incomplete	2.7	1.2	3.4	3	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
.10000-629	1	DH28G	Iron	Wrought	Latch	frag	Incomplete	6	0.8	6	12	Uniform	Y
10000-630	1	DH28Q	Iron	Wrought	Latch	frag	Incomplete	3	0.4	1	2	Uniform	Y
10000-631	1	DH28QQ	Iron	Wrought	Latch	frag; 2 pieces	Incomplete			2.4	1	Uniform	Y
10000-632	1	DH72C	Iron	Wrought	Latch	frag	Incomplete	3.5	0.5	1.5	3	Uniform	Y
10000-633	1	DH70Z	Iron	Wrought	Latch	frag	Incomplete	3		5.5	4	Uniform	Y
10000-634	1	DH28QQ	Iron	Wrought	Latch	frag	Incomplete	3	0.4	3	2	Uniform	Y
10000-635	1	DH56A	Iron	Wrought	Latch	frag	Incomplete	7	1.2	3.4	18	Uniform	Y
10000-636	1	DH38BI	Iron	Wrought	Latch	frag	Incomplete	5	1	8	9	Uniform	Y
10000-637	1	DH70D	Iron	Wrought	Hinge	frag	Incomplete	2.2	1	0.8	4	Uniform	Y
10000-638	1	DH72C	Iron	Wrought	Hinge	frag	Incomplete	2.3	1	2	5	Uniform	Y
10000-639	1	DH28Q	Iron	Wrought	Unid:hardware		Incomplete	1.6	1.6	2.2	2	Uniform	Y
10000-640	1	DH28QQ	Iron	Wrought	Unid:hardware		Incomplete	3.3	1.5	4.2	4	Uniform	Y
10000-641	1	DH70B	Iron	Wrought	Unid:hardware		Incomplete	3.8	1	5.5	6	Uniform	Y
10000-642	1	DH50D	Iron	Wrought	Unid:hardware		Incomplete	2.7	2.4	3.3	6	Uniform	Y
10000-643	1	DH38B3	Iron	Wrought	Unid:hardware		Incomplete	3.3	2.1	2.2	6	Uniform	Y
10000-644	1	DH70EE	Iron	Wrought	Unid:hardware		Incomplete		1.5	4.4	2	Uniform	Y
10000-645	1	DH22B	Iron	Wrought	Unid:hardware		Incomplete	4	0.2	3.1	4	Uniform	Y
10000-646	1	DH28G	Iron	Wrought	Unid:hardware		Incomplete	4.2	2	0.7	6	Uniform	Y
10000-647	1	DH28G	Iron	Wrought	Unid:hardware		Incomplete	3.7	1.7	2.7	4	Uniform	Y
10000-648	1	DH51B	Iron	Wrought	Unid:hardware		Incomplete	2	1	2	2	Uniform	Y
10000-649	1	DH28QQ	Iron	Wrought	Unid:hardware		Incomplete	5.5	1.2	2.6	6	Uniform	Y
10000-650	1	DH56A	Iron	Wrought	Unid:hardware		Incomplete	4.2	2.6	5.5	11	Uniform	Y
10000-651	1	DH73G	Iron	Wrought	Unid:hardware		Incomplete	3.5	3	2.8	7	Uniform	Y
10000-652	1	DH74B	Iron	Wrought	Unid:hardware		Incomplete	1.5	0.5	2.5	2	Uniform	Y
10000-653	1	DH81B	Iron	Wrought	Unid:hardware		Incomplete	2.5	2	3.5	5	Uniform	Y
10000-654	1	DH28F	Iron	Wrought	Unid:hardware		Incomplete	1.5	1	2.8	1	Uniform	Y
10000-655	1	DH56E	Iron	Wrought	Unid:hardware		Incomplete	1.7	1.2	2.8	2	Uniform	Y
10000-656	1	DH71C	Iron	Wrought	Unid:hardware	Circle	Incomplete		3	1.8	17	Uniform	Y
10000-657	1	DH38BFive	Iron	Wrought	Unid:hardware	Circle	Incomplete		1.6	3.2	3	Uniform	Y
10000-658	3	DH51	Iron	Wrought	Unid:hardware	Once attached	Incomplete	2.6	0.5	1.2	4	Uniform	Y
10000-659	1	DH51	Iron	Wrought	Bolt	frag	Incomplete	6.1	0.5	4.1	9	Uniform	Y
10000-660	1	DH28QQ	Iron	Wrought	Caster		Incomplete	4	2.3	10.2	27	Uniform	Y
10000-661	1	DH82C	Iron	Wrought	Strap	frags	Incomplete				17	Uniform	Y
10000-662	2	DH38BFive	Iron	Wrought	Strap	frags	Incomplete				23	Uniform	Y
10000-663	2	DH38B4	Iron	Wrought	Strap	frags	Incomplete				10	Uniform	Y
10000-664	1	DH33B	Iron	Wrought	Strap	frags	Incomplete	6.4	2	3	9	Uniform	Y
10000-665	12	DH73B	Iron	Wrought	Strap	frags	Incomplete		1.5	1.1	43	Uniform	Y
10000-666	1	DH36B	Iron	Wrought	Strap	frags	Incomplete	7.5	2.1	1.1		Uniform	Y
10000-667	2	DH18C	Iron	Wrought	Strap	frags	Incomplete	7.5	3	2.4	16	Uniform	Y
10000-668	4	DH38BFive	Iron	Wrought	Strap	frags/corrosion products in bag	Incomplete			1	45	Uniform	Y
10000-669	1	DH52B	Iron	Wrought	Strap	frags	Incomplete	8.2	2.2	1.9	24	Uniform	Y
10000-670	1	DH51	Iron	Wrought	Bolt	frag	Incomplete	8.5	0.7	5.4	21	Uniform	Y
10000-671	1	DH70B	Iron	Wrought	Bolt	frag/bent	Incomplete	4.5	1	3	23	Uniform	Y
10000-672	1	DH70E	Iron	Wrought	Bolt	frag/bent	Incomplete	4.8	1.2	4.1	39	Uniform	Y
10000-673	1	DH73G	Iron	Wrought	Bolt	frag/bent	Incomplete	10.7	1.5	8.4	41	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-696	1	DH20C	Iron	Wrought	Unid: hardware	round	Incomplete	0.6	0.7	6.5	2	Uniform	Y
10000-697	3	DH70B	Cooper	Wrought	Hinge	3 frags	Incomplete				7	Uniform	Y
10000-698	2	DH73C	Cooper	Wrought	Hinge		Incomplete	5	2.1	1.4	17	Uniform	Y
10000-699	1	DH20C	Iron	Wrought	Unid: hardware		Incomplete	1.2	1.2	1.2	1	Uniform	Y
10000-700	1	DH19B	Iron	Drawn	Unid: wire	frag	Incomplete			1.7	2	Uniform	Y
10000-701	5	DH28QQ	Iron	Wrought	Slide bolt plate	frags	Incomplete				25	Uniform	Y
10000-702	2	DH28Q	Iron	Wrought	Slide bolt plate	frags	Incomplete	11.5	4.5	1.6	68	Uniform	Y
10000-703	1	DH73A	Iron	Wrought	Lock	frag	Incomplete	5.5	4.2	6.8	55	Uniform	Y
10000-712	2	DH57	Iron	Wrought	Unid: hardware	Strap-like	Incomplete	11	0.8	1.5		Uniform	Y
10000-713	1	DH57	Iron	Wrought	Unid: hardware	Curved	Incomplete	3.7	2.6	2	28	Uniform	Y
10000-714	1	DH3A	Iron	Wrought	Unid: hardware		Incomplete	5	3.2	6.2	71	Uniform	Y
10000-715	1	DH35B	Iron	Wrought	Corrosion/Rust		Incomplete				167	Uniform	Y
10000-716	1	DH70Z	Iron	Wrought	Corrosion/Rust		Incomplete				93	Uniform	Y
10000-717	1	DH72B	Iron	Wrought	Latch		Incomplete	9.2	1.9	5.7	39	Uniform	Y
10000-718	1	DH72B	Cooper	Cast	Lock		Incomplete	9	4.7	1.3	156	Uniform	Y
10000-719	1	DH43B	Iron	Cast	Pipe Phlange		Incomplete	10	5.5	5.7	188	Uniform	Y
10000-720	1	DH43A	Iron	Cast	Pipe Phlange		Incomplete	3.2	2	4.5	37	Uniform	Y
10000-721	1	DH43B	Iron	Cast	Pipe Phlange		Incomplete	5	1.5	4.4	38	Uniform	Y
10000-722	1	DH73C	Iron	Wrought	Hook		Incomplete	7.2	1.5	8	67	Uniform	Y
10000-723	1	DH81B	Iron	Wrought	Latch		Incomplete	9	2.5	12.1	103	Uniform	Y
10000-724	1	DH28J	Iron	Wrought	Lock	Slide Frag	Incomplete	14.2	1.2	4	40	Uniform	Y
10000-725	1	DH79C	Iron	Wrought	Unid: hardware		Incomplete	13.6	1.5	6	40	Uniform	Y
10000-726	2	DH58A	Iron	Wrought	Latch	With U shaped piece attached	Incomplete	11.5	0.7	6.5	64	Uniform	Y
10000-727	1	DH72B	Iron	Wrought	Strap	Multi frags	Incomplete				19	Uniform	Y
10000-728	1	DH28QQ	Iron	Wrought	Strap	Multi frags	Incomplete				356	Uniform	Y
10000-729	1	DH73C	Iron	Wrought	Strap	Multi frags	Incomplete				364	Uniform	Y
10000-730	1	DH73G	Iron	Wrought	Strap	Multi frags	Incomplete				66	Uniform	Y
10000-731	1	DH38L	Iron	Wrought	Strap	Multi frags	Incomplete				40	Uniform	Y
10000-732	1	DH28KK	Iron	Wrought	Strap		Incomplete	6	3.6	4	34	Uniform	Y
10000-733	1	DH28J	Iron	Wrought	Strap		Incomplete	6.5	2.5	7.5	15	Uniform	Y
10000-734	1	DH28K	Iron	Wrought	Strap		Incomplete	6.5	2.2	13.5	36	Uniform	Y
10000-735	1	DH46G	Iron	Wrought	Strap		Incomplete	9	4.5	3.8	43	Uniform	Y
10000-736	1	DH73G	Iron	Wrought	Strap		Incomplete	26.5	4.2	8.2	172	Uniform	Y
10000-737	1	DH71B	Iron	Wrought	Strap		Incomplete	18	1.7	2	24	Uniform	Y
10000-738	6	DH72C	Iron	Wrought	Lock	Frags	Incomplete				162	Uniform	Y
10000-739	1	DH28Q	Iron	Wrought	Unid: hardware		Incomplete	13	11.5	8.5	304	Uniform	Y
10000-740	1	DH20B	Iron	Wrought	Caster	w/ Corrosion products	Incomplete	5.5	3.2	33.2	288	Uniform	Y
10000-741	1	DH72C	Iron	Wrought	Slide bolt plate		Incomplete	21	3.3	5.9	327	Uniform	Y
10000-742	1	DH52C	Iron	Wrought	Caster	w/ Corrosion products	Incomplete	6.2	5.5	5.7	325	Uniform	Y
10000-743	1	DH70B	Iron	Wrought	Latch		Incomplete	14.5	1.5	11	134	Uniform	Y
10000-744	1	DH38A	Iron	Wrought	Bolt		Incomplete	12.7	1.8	7.7	57	Uniform	Y
10000-745	1	DH72L	Iron	Drawn	Unid: wire		Incomplete			4.3	18	Uniform	Y
10000-746	1	DH20A	Iron	Wrought	Unid: hardware		Incomplete	4.3	3.8	1.9	13	Uniform	Y
10000-747	1	DH71B	Iron	Wrought	Unid: wire		Incomplete			5	33	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-748	1	DH21B	Iron	Wrought	Unid: hardware		Incomplete	8.5	1.6	9.5	88	Uniform	Y
10000-749	1	DH72B	Iron	Wrought	Unid: wire		Incomplete			2.9	19	Uniform	Y
10000-750	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	5	1.5	7.3	13	Uniform	Y
10000-751	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	1.7	2.1	5.5	4	Uniform	Y
10000-752	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	3.5	1	3.5	6	Uniform	Y
10000-753	1	DH72B	Iron	Wrought	Unid: hardware		Incomplete	6.5	1.5	5.6	28	Uniform	Y
10000-754	1	DH72L	Iron	Wrought	Unid: hardware	Cone	Incomplete	2	1.7	10	2	Uniform	Y
10000-755	1	DH72L	Iron	Wrought	Unid: hardware		Incomplete	4.5	0.6	1.8	2	Uniform	Y
10000-756	1	DH22B	Iron	Wrought	Corrosion/Rust		Incomplete				3	Uniform	Y
10000-757	1	DH73C	Iron	Wrought	Corrosion/Rust		Incomplete				16	Uniform	Y
10000-758	1	DH61D	Iron	Wrought	Corrosion/Rust		Incomplete				10	Uniform	Y
10000-759	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	8	1.3	12.2	55	Uniform	Y
10000-760	1	DH73C	Iron	Wrought	Unid: hardware		Incomplete	3	3.5	6.5	35	Uniform	Y
10000-761	1	DH28QQ	Iron	Wrought	Corrosion/Rust		Incomplete				23	Uniform	Y
10000-762	1	DH73C	Iron	Wrought	Unid: hardware	Hook	Incomplete	5.5	4	11	33	Uniform	Y
10000-763	1	DH71N	Iron	Wrought	Corrosion/Rust		Incomplete				51	Uniform	Y
10000-764	1	DH71E	Iron	Wrought	Unid: hardware	w/ Corrosion products	Incomplete	16	1.5	4.5	137	Uniform	Y
10000-765	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	4.5	1	9	21	Uniform	Y
10000-766	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	2	1.8	2	3	Uniform	Y
10000-767	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	2	1.5	9.5	6	Uniform	Y
10000-768	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	1.6	0.8	8.5	3	Uniform	Y
10000-769	1	DH72B	Iron	Wrought	Unid: hardware		Incomplete	4.5	1	2.2	7	Uniform	Y
10000-770	1	DH72B	Iron	Wrought	Unid: hardware		Incomplete	3.5	2	9.7	31	Uniform	Y
10000-771	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	10.7	3.7	6.8	98	Uniform	Y
10000-772	1	DH72B	Iron	Wrought	Unid: hardware		Incomplete	7.5	1	9	49	Uniform	Y
10000-773	3	DH23B	Iron	Wrought	Unid: hardware		Incomplete				34	Uniform	Y
10000-774	1	DH72B	Iron	Wrought	Unid: hardware		Incomplete	5.7	2.2	9.3	70	Uniform	Y
10000-775	1	DH72B	Iron	Wrought	Unid: hardware		Incomplete	13.5	2.5	6.9	135	Uniform	Y
10000-776	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	12.2	5.5	4	114	Uniform	Y
10000-777	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	13.5	0.3	2.5	14	Uniform	Y
10000-778	1	DH73B	Iron	Wrought	Hinge	frags	Incomplete				77	Uniform	Y
10000-779	1	DHPU	Iron	Wrought	Train Turn Buckle		Incomplete	7	16	23.7	2000+	Uniform	Y
10000-780	1	DH71C	Iron	Wrought	Unid: hardware		Incomplete	12	2.2	10.8	208	Uniform	Y
10000-781	1	DH71K	Iron	Wrought	Corrosion/Rust	Scoop frags?	Incomplete				156	Uniform	Y
10000-782	1	DH73C	Iron	Wrought	Unid: hardware		Incomplete	14.5	1.1	5	77	Uniform	Y
10000-783	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	19.5	3	10.9	412	Uniform	Y
10000-784	1	DH73C	Iron	Wrought	Unid: hardware		Incomplete	15	7	22.5	733	Uniform	Y
10000-817	1	DH73B	Iron	Wrought	Umbrella frag		Incomplete	5	0.5	4	4	Uniform	Y
10000-818	1	DH72B	Iron	Wrought	Umbrella frag		Incomplete	2.7	0.3	1.5	1	Uniform	Y
10000-819	1	DH72B	Iron	Wrought	Umbrella frag		Incomplete	3.8	0.3	2.6	1	Uniform	Y
10000-820	1	DH72B	Iron	Wrought	Umbrella frag		Incomplete	2	0.3	2.1	1	Uniform	Y
10000-821	1	DH71D	Iron	Wrought	Corrosion/Rust		Incomplete				2	Uniform	Y
10000-822	1	DH71D	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.5	2	2.5	3	Uniform	Y
10000-823	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.1	1.5	1	2	Uniform	Y
10000-824	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.5	1.1	3.1	3	Uniform	Y
10000-825	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.1	1	5.8	3	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-826	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.6	0.7	6.1	4	Uniform	Y
10000-827	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.1	0.8	2.8	2	Uniform	Y
10000-828	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	1.2	1	2.1	1	Uniform	Y
10000-829	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	3	1.5	3.5	3	Uniform	Y
10000-830	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2	1.6	0.9	2	Uniform	Y
10000-831	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.9	0.8	2.7	2	Uniform	Y
10000-832	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.5	1.5	1.1	2	Uniform	Y
10000-833	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	3.6	1.2	4	4	Uniform	Y
10000-834	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	3.2	1	4.8	3	Uniform	Y
10000-835	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.7	1.3	5.2	3	Uniform	Y
10000-836	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.6	1.2	3.4	3	Uniform	Y
10000-837	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.6	1.2	2.1	2	Uniform	Y
10000-838	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.9	1.9	2.3	3	Uniform	Y
10000-839	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.6	0.8	2.7	2	Uniform	Y
10000-840	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	4.1	1.8	1	6	Uniform	Y
10000-841	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	1.8	0.5	1.6	1	Uniform	Y
10000-842	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	3	0.8	2.8	3	Uniform	Y
10000-843	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	3.5	0.4	1.8	2	Uniform	Y
10000-844	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.2	2	3.4	2	Uniform	Y
10000-845	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2	0.6	2.4	1	Uniform	Y
10000-846	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	2.2	0.5	2.2	2	Uniform	Y
10000-847	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	3	2.8	3.2	10	Uniform	Y
10000-848	1	DH72B	Iron	Wrought	Unid: hardware	Frag: Flat	Incomplete	1.6	0.6	2.3	2	Uniform	Y
10000-849	1	DH72B	Iron	Wrought	Unid: hardware	Frag	Incomplete	2.3	0.8	7	8	Uniform	Y
10000-850	1	DH51B	Iron	Wrought	Screw		Incomplete	3.1	0.5	3.8	3	Uniform	Y
10000-851	1	DH51B	Iron	Wrought	Screw		Incomplete	4	0.5	5.8	8	Uniform	Y
10000-852	2	DH51B	Iron	Wrought	Screw		Incomplete	2.1			8	Uniform	Y
10000-853	1	DH28G	Iron	Wrought	Screw		Incomplete	7.2	0.5	5.4	8	Uniform	Y
10000-854	1	DH28G	Iron	Wrought	Bolt		Incomplete	5.2	2.2	12.7	63	Uniform	Y
10000-855	1	DH71B	Iron	Wrought	Corrosion/Rust		Incomplete				8	Uniform	Y
10000-856	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	7.7	0.5	2.3	6	Uniform	Y
10000-857	1	DH71D	Iron	Wrought	Unid: hardware	Tube-like	Incomplete	3.6	0.8	5.4	2	Uniform	Y
10000-858	1	DH72C	Iron	Wrought	Unid: hardware		Incomplete	2.1	0.6	3	2	Uniform	Y
10000-859	1	DH72C	Iron	Wrought	Tack		Incomplete	2.8	1.5	4.5	11	Uniform	Y
10000-860	1	DH72C	Iron	Wrought	Unid: hardware		Incomplete	2.9	1.1	0.6	1	Uniform	Y
10000-861	1	DH72C	Iron	Wrought	Unid: hardware		Incomplete	3	0.3	2.2	3	Uniform	Y
10000-862	1	DH72C	Iron	Wrought	Unid: hardware		Incomplete	5.6	4.1	3.5	18	Uniform	Y
10000-863	1	DH72C	Iron	Wrought	Unid: hardware		Incomplete	3	2.6	2.1	3	Uniform	Y
10000-864	1	DH72C	Iron	Wrought	Unid: hardware	Bolt-like	Incomplete	3	1.5	8.6	22	Uniform	Y
10000-865	1	DH72C	Iron	Wrought	Unid: hardware		Incomplete	2.5	2	2.3	5	Uniform	Y
10000-866	1	DH72C	Iron	Wrought	Unid: hardware		Incomplete	2.5	1.3	2.2	4	Uniform	Y
10000-867	1	DH72C	Iron	Wrought	Unid: hardware		Incomplete	7.2	1.8	5	28	Uniform	Y
10000-868	1	DH72C	Iron	Wrought	Unid: hardware		Incomplete	5.7	3	6.6	67	Uniform	Y
10000-869	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	3	1.2	1.5	3	Uniform	Y
10000-870	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	3	1.1	3.8	7	Uniform	Y
10000-871	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	3.3	1.6	6.3	5	Uniform	Y
10000-872	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	3.4	0.3	3.7	3	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-873	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	3.2	0.6	0.8	2	Uniform	Y
10000-874	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	5.2	2.3	8	70	Uniform	Y
10000-875	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	5	1.2	10.5	17	Uniform	Y
10000-876	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	9	1.5	3.1	27	Uniform	Y
10000-877	1	DH73B	Iron	Wrought	Unid: hardware	Ring-like	Incomplete	4	3.2	8.1	29	Uniform	Y
10000-878	1	DH73B	Iron	Wrought	Umbrella frag		Incomplete	10.5	0.2	3.6	8	Uniform	Y
10000-879	1	DH72C	Iron	Wrought	Unid: hardware	Flat	Incomplete	7	4.5	13	146	Uniform	Y
10000-880	1	DH72C	Iron	Wrought	Unid: hardware		Incomplete	10.7	3	14.4	167	Uniform	Y
10000-881	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	14.5	0.5	5.2	28	Uniform	Y
10000-882	1	DH61A	Iron	Cast	Stove	Frag	Incomplete	20	20	10	765	Uniform	Y
10000-883	6	DH28QQ	Iron	Wrought	Strap		Incomplete	3		1.6	365	Uniform	Y
10000-884	1	DH70B	Iron	Wrought	Strap		Incomplete				93	Uniform	Y
10000-885	1	DH28QQ	Iron	Wrought	Strap	Corrosion products in bag	Incomplete				219	Uniform	Y
10000-886	1	DH73B	Iron	Wrought	Strap	Corrosion products in bag	Incomplete				183	Uniform	Y
10000-887	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	25.5	0.8	6	113	Uniform	Y
10000-888	1	DH34A	Iron	Wrought	Bolt		Incomplete	12	1.5	12.5	123	Uniform	Y
10000-889	1	DH72L	Iron	Wrought	Unid: hardware		Incomplete	32.5	1	8.1	122	Uniform	Y
10000-890	1	DH72C	Iron	Wrought	Corrosion/Rust		Incomplete				209	Uniform	Y
10000-891	1	DH56A	Iron	Wrought	Unid: hardware	Multi frags	Incomplete				228	Uniform	Y
10000-892	1	DH38A	Iron	Wrought	Chain		Incomplete			3.6	273	Uniform	Y
10000-893	1	DH38A	Iron	Wrought	Chain		Incomplete			4.3	99	Uniform	Y
10000-894	1	DH73C	Iron	Wrought	Chain		Incomplete			3.2	13	Uniform	Y
10000-895	1	DH73C	Iron	Wrought	Chain		Incomplete			2	17	Uniform	Y
10000-896	1	DH43B	Iron	Wrought	Chain		Incomplete			2	25	Uniform	Y
10000-897	1	DH22B	Iron	Wrought	Chain		Incomplete			3.7	18	Uniform	Y
10000-898	1	DH72C	Iron	Wrought	Chain		Incomplete			2.1	31	Uniform	Y
10000-899	1	DH46DELTA	Iron	Wrought	Bolt		Incomplete	10	1.8	11	38	Uniform	Y
10000-900	2	DH46DELTA	Iron	Wrought	Hook & Eye	2 pieces	Incomplete	10.5		5.4	29	Uniform	Y
10000-901	2	DHPU	Iron	Wrought	Staple		Incomplete	1.5	0.8	2.5	3	Uniform	Y
10000-902	2	DH56A	Iron	Wrought	Staple		Incomplete	2	3	3.8	14	Uniform	Y
10000-903	1	DH71D	Iron	Wrought	Unid: hardware	Flat	Incomplete	10.5	4.5	5.4	88	Uniform	Y
10000-904	1	DH61D	Iron	Wrought	Corrosion/Rust		Incomplete				25	Uniform	Y
10000-905	1	DH70E	Iron	Wrought	Corrosion/Rust		Incomplete				88	Uniform	Y
10000-906	1	DH56E	Iron	Wrought	Corrosion/Rust		Incomplete				27	Uniform	Y
10000-907	1	DH28NNN	Iron	Wrought	Corrosion/Rust		Incomplete				69	Uniform	Y
10000-908	1	DH72C	Iron	Wrought	Corrosion/Rust		Incomplete				16	Uniform	Y
10000-909	1	DH58A	Iron	Wrought	Corrosion/Rust		Incomplete				43	Uniform	Y
10000-910	1	DH61D	Iron	Wrought	Corrosion/Rust		Incomplete				40	Uniform	Y
10000-911	1	DH56A	Iron	Wrought	Corrosion/Rust		Incomplete				42	Uniform	Y
10000-912	1	DH17B	Iron	Wrought	Corrosion/Rust		Incomplete				38	Uniform	Y
10000-913	1	DH52B	Iron	Wrought	Corrosion/Rust		Incomplete				37	Uniform	Y
10000-914	1	DH72L	Iron	Wrought	Corrosion/Rust	Blade?	Incomplete				189	Uniform	Y
10000-915	1	DH28QQ	Iron	Wrought	Corrosion/Rust		Incomplete				128	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-916	1	DH58B	Iron	Wrought	Corrosion/Rust		Incomplete				13	Uniform	Y
10000-917	1	DH52H	Iron	Wrought	Corrosion/Rust		Incomplete				16	Uniform	Y
10000-918	1	DH72B	Iron	Wrought	Corrosion/Rust		Incomplete				27	Uniform	Y
10000-919	1	DH70B	Iron	Wrought	Corrosion/Rust		Incomplete				7	Uniform	Y
10000-920	1	DH70AA	Iron	Wrought	Corrosion/Rust		Incomplete				12	Uniform	Y
10000-921	1	DH28Q	Iron	Wrought	Corrosion/Rust		Incomplete				11	Uniform	Y
10000-922	1	DH10B	Iron	Wrought	Corrosion/Rust		Incomplete				9	Uniform	Y
10000-923	1	DH56A	Iron	Wrought	Corrosion/Rust		Incomplete				7	Uniform	Y
10000-924	1	DH48L	Iron	Wrought	Corrosion/Rust		Incomplete				22	Uniform	Y
10000-925	1	DH9A	Iron	Wrought	Corrosion/Rust		Incomplete				49	Uniform	Y
10000-926	1	DH70B	Iron	Wrought	Staple		Incomplete	3	1.2	4.1	9	Uniform	Y
10000-927	1	DH72L	Iron	Wrought	Screw		Incomplete	3.6	0.5	3.5	7	Uniform	Y
10000-928	1	DH28B	Iron	Wrought	Screw		Incomplete	1.7	0.6	4.2	2	Uniform	Y
10000-929	1	DH72L	Iron	Wrought	Screw		Incomplete	2	0.5	4.9	3	Uniform	Y
10000-930	2	DH38B	Iron	Wrought	Screw		Incomplete	2	0.6	5.4	7	Uniform	Y
10000-931	1	DH38B	Iron	Wrought	Screw		Incomplete	3.2	0.8	7.4	8	Uniform	Y
10000-932	2	DH38B	Iron	Wrought	Screw		Incomplete	2	0.5	4.1	6	Uniform	Y
10000-933	2	DH80B	Iron	Wrought	Screw		Incomplete				6	Uniform	Y
10000-934	1	DH28QQ	Iron	Wrought	Screw		Incomplete	2.5	0.7	5.8	4	Uniform	Y
10000-935	2	DH28B	Iron	Wrought	Screw		Incomplete	5	0.8	9	23	Uniform	Y
10000-936	1	DH72C	Iron	Wrought	Screw		Incomplete	2.2	0.6	4.3	2	Uniform	Y
10000-937	2	DH72C	Iron	Wrought	Screw		Incomplete	2.3	0.5	4.5	5	Uniform	Y
10000-938	2	DH72C	Iron	Wrought	Screw		Incomplete	2.6	0.5	5.3	8	Uniform	Y
10000-939	2	DH28QQ	Iron	Wrought	Screw		Incomplete	1.4	0.6	4.2	3	Uniform	Y
10000-940	5	DH38B	Iron	Wrought	Screw		Incomplete				14	Uniform	Y
10000-941	1	DH11C	Iron	Wrought	Staple		Incomplete	2	1	2.2	4	Uniform	Y
10000-942	1	DH81B	Iron	Wrought	Staple		Incomplete	3.6	2.8	8.6	22	Uniform	Y
10000-943	1	DH11C	Iron	Wrought	Unid: hardware		Incomplete	2.7	0.7	6.1	4	Uniform	Y
10000-944	1	DH70F	Iron	Wrought	Chain		Incomplete	6	2	6	19	Uniform	Y
10000-945	1	DH28R	Iron	Wrought	Wire		Incomplete			3	2	Uniform	Y
10000-946	1	DH28L	Iron	Wrought	Wire		Incomplete			1	1	Uniform	Y
10000-947	15	DH28G	Iron	Wrought	Wire		Incomplete			1.3	8	Uniform	Y
10000-948	1	DH28QQ	Iron	Wrought	Wire		Incomplete			0.3	1	Uniform	Y
10000-949	1	DH28D	Iron	Wrought	Wire		Incomplete			2.2	4	Uniform	Y
10000-950	1	DH76A	Iron	Wrought	Wire		Incomplete			2	3	Uniform	Y
10000-951	1	DH46G	Iron	Wrought	Wire		Incomplete			1.6	4	Uniform	Y
10000-952	5	DH56J	Iron	Wrought	Wire		Incomplete			1	2	Uniform	Y
10000-953	14	DH28NNN	Iron	Wrought	Wire		Incomplete			1.7	9	Uniform	Y
10000-954	1	DH70B	Iron	Wrought	Wire	Multi frags	Incomplete			2.5	20	Uniform	Y
10000-955	1	DH70B	Iron	Wrought	Wire		Incomplete			2.5	2	Uniform	Y
10000-956	1	DH62A	Iron	Wrought	Wire		Incomplete			2.6	6	Uniform	Y
10000-957	14	DH73B	Iron	Wrought	Wire		Incomplete			3.4	34	Uniform	Y
10000-958	130	DH28QQ	Iron	Wrought	Wire	Mesh	Incomplete				26	Uniform	Y
10000-959	21	DH71B	Iron	Wrought	Wire		Incomplete			1.9	21	Uniform	Y
10000-960	2	DH38B	Iron	Wrought	Wire		Incomplete			3	6	Uniform	Y
10000-961	3	DH38C	Iron	Wrought	Wire		Incomplete			3.2	12	Uniform	Y
10000-962	1	DH73A	Iron	Wrought	Wire		Incomplete			1.8	4	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-963	5	DH79C	Iron	Wrought	Wire		Incomplete			2	12	Uniform	Y
10000-964	21	DH28Q	Iron	Wrought	Wire		Incomplete			2	17	Uniform	Y
10000-965	23	DH72B	Iron	Wrought	Wire		Incomplete			3.5	91	Uniform	Y
10000-966	19	DH72C	Iron	Wrought	Wire		Incomplete			3.5	58	Uniform	Y
10000-967	153	DH28QQ	Iron	Wrought	Wire		Incomplete			2.5	70	Uniform	Y
10000-968	3	DH72L	Iron	Wrought	Wire		Incomplete			3.3	24	Uniform	Y
10000-969	3	DH64A	Iron	Wrought	Wire		Incomplete			2.6	17	Uniform	Y
10000-970	2	DH28QQ	Iron	Wrought	Wire		Incomplete			2	21	Uniform	Y
10000-971	1	DH1D	Iron	Wrought	Wire		Incomplete			1.8	2	Uniform	Y
10000-972	1	DH1A	Iron	Wrought	Wire		Incomplete			2.4	4	Uniform	Y
10000-973	4	DH57	Iron	Wrought	Wire		Incomplete			1.2	18	Uniform	Y
10000-974	1	DHDD	Iron	Wrought	Wire		Incomplete			2.6	2	Uniform	Y
10000-975	1	DH32B	Iron	Wrought	Staple		Incomplete	4	0.8	3.3	2	Uniform	Y
10000-976	1	DH28QQ	Iron	Wrought	Staple		Incomplete	0.8	0.6	2	2	Uniform	Y
10000-977	1	DH38B	Iron	Wrought	Unid: hardware		Incomplete	3	2.5	10.6	8	Uniform	Y
10000-978	1	DH73C	Iron	Wrought	Staple		Incomplete	3.5	1	7.8	3	Uniform	Y
10000-979	1	DH22B	Iron	Wrought	Staple		Incomplete	2.8	1	5	3	Uniform	Y
10000-980	1	DH70B	Iron	Wrought	Bolt		Incomplete	3.3	0.7	8.3	10	Uniform	Y
10000-981	1	DH82C	Iron	Wrought	Unid: hardware		Incomplete	5.5	1.5	3.2	10	Uniform	Y
10000-982	1	DH73D	Iron	Wrought	Unid: hardware		Incomplete	5.6	3.5	5	36	Uniform	Y
10000-983	1	DH73C	Iron	Wrought	Ring/link		Incomplete		5.2	8	74	Uniform	Y
10000-984	1	DH70D	Iron	Wrought	Kettle frag		Incomplete				21	Uniform	Y
10000-985	1	DH57	Iron	Wrought	Stove dial		Incomplete	6	4.5	6	129	Uniform	Y
10000-986	1	DHPU	Iron	Wrought	Tube		Incomplete	6.6	2.5	3.6	75	Uniform	Y
10000-987	1	DH73G	Iron	Wrought	Screw		Incomplete	3.5	1.2	7.5	9	Uniform	Y
10000-988	1	DH32A	Iron	Wrought	Screw		Incomplete	5.5	1.6	8.5	18	Uniform	Y
10000-989	1	DH28Q	Iron	Wrought	Screw	w/ Corrosion products	Incomplete				6	Uniform	Y
10000-990	1	DH36D	Iron	Wrought	Screw		Incomplete	2	1	5.8	4	Uniform	Y
10000-991	1	D38L	Iron	Wrought	Screw		Incomplete	3	1	5	5	Uniform	Y
10000-992	1	DH33B	Iron	Wrought	Screw		Incomplete	3.5	0.8	6.4	6	Uniform	Y
10000-993	1	DH70E	Iron	Wrought	Screw		Incomplete	1.7	0.6	4	2	Uniform	Y
10000-994	1	DH17B	Iron	Wrought	Screw	w/ Corrosion products	Incomplete				8	Uniform	Y
10000-995	1	DH79A	Iron	Wrought	Screw		Incomplete	2.2	0.5	5.2	4	Uniform	Y
10000-996	1	DH82B	Iron	Wrought	Screw	w/ Corrosion products	Incomplete	5.4	1.7	10	20	Uniform	Y
10000-997	1	DH27A	Iron	Wrought	Screw	W/ Bolt	Incomplete	2.7	1.2	5.2	11	Uniform	Y
10000-998	1	DH38C	Iron	Wrought	Screw		Incomplete	3.5	1.2	9.5	8	Uniform	Y
10000-999	2	DH38B	Iron	Wrought	Screw		Incomplete				4	Uniform	Y
10000-1000	1	DH56A	Iron	Wrought	Screw		Incomplete	2.6	1	5.6	5	Uniform	Y
10000-1001	1	DH22N	Iron	Wrought	Screw		Incomplete	3.2	0.7	4.4	4	Uniform	Y
10000-1002	1	DH81B	Iron	Wrought	Screw		Incomplete	2.2	0.8	6	3	Uniform	Y
10000-1003	1	DH79A	Iron	Wrought	Screw		Incomplete	3.2	0.6	5.8	7	Uniform	Y
10000-1004	1	DH71C	Iron	Wrought	Screw		Incomplete	2	0.6	5.4	3	Uniform	Y
10000-1005	2	DH52B	Iron	Wrought	Screw		Incomplete				8	Uniform	Y
10000-1006	1	DH61B	Iron	Wrought	Unid: hardware		Incomplete	3.2	0.9	2	2	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-1007	1	DH73K	Iron	Wrought	Unid: hardware		Incomplete	5.5	0.6	3.1	4	Uniform	Y
10000-1008	1	DH73G	Iron	Wrought	Unid: hardware		Incomplete	3	0.7	6.4	6	Uniform	Y
10000-1009	1	DH28Q	Iron	Wrought	Unid: hardware		Incomplete	2	0.5	1	1	Uniform	Y
10000-1010	1	DH28QQ	Iron	Wrought	Unid: hardware		Incomplete	2.7	1.2	2.5	3	Uniform	Y
10000-1011	1	DH71B	Iron	Wrought	Unid: hardware		Incomplete	3	0.3	2	2	Uniform	Y
10000-1012	1	DH71B	Iron	Wrought	Unid: hardware	Curved	Incomplete	3.3	1.7	2.5	13	Uniform	Y
10000-1013	1	DH41C	Iron	Wrought	Unid: hardware	Washer-like	Incomplete	2.3	1.5	2.8	2	Uniform	Y
10000-1014	1	DH56E	Iron	Wrought	Unid: hardware		Incomplete	3	1.1	5.8	4	Uniform	Y
10000-1015	1	DH56A	Iron	Wrought	Unid: hardware		Incomplete	3.1	0.4	2	1	Uniform	Y
10000-1016	1	DH52B	Iron	Wrought	Unid: hardware		Incomplete	1.5	1.5	8.7	4	Uniform	Y
10000-1017	1	DH41D	Iron	Wrought	Unid: hardware	Washer-like	Incomplete	2.5	1.5	6.6	4	Uniform	Y
10000-1018	1	DH28G	Iron	Wrought	Unid: hardware		Incomplete	4.5	1	4.5	7	Uniform	Y
10000-1019	1	DH28QQ	Iron	Wrought	Unid: hardware		Incomplete	2.5	0.7	2.5	3	Uniform	Y
10000-1020	1	DH35B	Iron	Wrought	Unid: hardware	Washer-like	Incomplete	1.8	1.6	1.5	4	Uniform	Y
10000-1021	1	DH43C	Iron	Wrought	Unid: hardware		Incomplete	4	1.2	11.8	28	Uniform	Y
10000-1022	1	DH52B	Iron	Wrought	Unid: hardware	Washer-like	Incomplete	2.5	2	1.7	4	Uniform	Y
10000-1023	1	DH11C	Iron	Wrought	Unid: hardware		Incomplete	7.5	1	3	5	Uniform	Y
10000-1024	1	DH73B	Iron	Wrought	Unid: hardware	Washer-like	Incomplete	1.2	0.7	1.3	1	Uniform	Y
10000-1025	1	DH73B	Iron	Wrought	Kettle frag		Incomplete	6.5	2	0.9	10	Uniform	Y
10000-1026	1	DH73B	Iron	Wrought	Unid: hardware		Incomplete	5.7	1.8	12	16	Uniform	Y
10000-1027	1	DH56A	Iron	Wrought	Bolt	Frag	Incomplete	2.5	0.8	7.8	8	Uniform	Y
10000-1028	1	DH28QQ	Iron	Wrought	Unid: hardware	Flat frags	Incomplete				14	Uniform	Y
10000-1029	1	DH28G	Iron	Wrought	Unid: hardware	Flat frags	Incomplete				17	Uniform	Y
10000-1030	1	DH51B	Iron	Wrought	Unid: hardware	Flat frags	Incomplete				16	Uniform	Y
10000-1031	1	DH28QQ	Iron	Wrought	Unid: hardware	Curved	Incomplete	3	2.2	6	53	Uniform	Y
10000-1032	1	DH72B	Iron	Wrought	Unid: hardware		Incomplete	10	1	6	33	Uniform	Y
10000-1033	1	DH34B	Iron	Wrought	Unid: hardware		Incomplete	7.5	1.7	5.8	38	Uniform	Y
10000-1034	1	DHHC	Iron	Wrought	Unid: hardware		Incomplete	6.5	1.6	4.5	13	Uniform	Y
10000-1035	1	DH28G	Iron	Wrought	Unid: hardware		Incomplete	9	0.6	4.8	20	Uniform	Y
10000-1036	1	DH52B	Iron	Wrought	Unid: hardware		Incomplete	6	0.7	7.9	28	Uniform	Y
10000-1037	1	DH51B	Iron	Wrought	Unid: hardware	Curved	Incomplete	5.2	2.2	3.8	18	Uniform	Y
10000-1038	2	DH46B	Iron	Wrought	Washer	Frag	Incomplete	2.1	0.7	1.3	2	Uniform	Y
10000-1039	2	DH73C	Iron	Wrought	Washer	Square	Incomplete	3	2.5	8.2	45	Uniform	Y
10000-1040	1	DH51B	Iron	Wrought	Washer	Frag	Incomplete	2.5	1.2	1.4	3	Uniform	Y
10000-1041	1	DH72C	Iron	Wrought	Washer	Square	Incomplete	1.8	2	9	13	Uniform	Y
10000-1042	1	DH70D	Iron	Wrought	Washer	Frag	Incomplete	2.5	0.7	3.3	4	Uniform	Y
10000-1043	1	DH72B	Iron	Wrought	Washer	Round	Incomplete	1.7	0.7	1.8	3	Uniform	Y
10000-1044	1	DH9E	Iron	Wrought	Washer	Square	Incomplete	1.5	1.5	5.5	8	Uniform	Y
10000-1045	1	DH28G	Iron	Wrought	Washer	Square	Incomplete	2.1	1.7	3.8	7	Uniform	Y
10000-1046	1	DH57C	Iron	Wrought	Washer	Frag	Incomplete	3.1	1	4.2	15	Uniform	Y
10000-1047	1	DH70B	Iron	Wrought	Washer	Frag	Incomplete	2.2	1	2.3	4	Uniform	Y
10000-1048	1	DH70B	Iron	Wrought	Washer	Frag	Incomplete		2.5	4.3	4	Uniform	Y
10000-1049	1	DH71B	Iron	Wrought	Washer	Round	Incomplete		3.2	3.7	10	Uniform	Y
10000-1050	1	DH79C	Iron	Wrought	Washer	Square	Incomplete	2	2	7.5	21	Uniform	Y
10000-1051	1	DH23B	Iron	Wrought	Washer	Square	Incomplete	3	3	15	75	Uniform	Y
10000-1052	1	DH33A	Iron	Wrought	Staple		Incomplete	4.7	2.1	3.2	14	Uniform	Y
10000-1053	1	DH28QQ	Iron	Wrought	Staple		Incomplete	2	0.8	2.6	2	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-1054	1	DH19C	Iron	Wrought	Staple		Incomplete	3.5	2.7	5.5	11	Uniform	Y
10000-1055	1	DH72C	Iron	Wrought	Staple		Incomplete	4.5	2.5	4.1	10	Uniform	Y
10000-1056	1	DH70B	Iron	Wrought	Staple		Incomplete	2	2.8	4.1	13	Uniform	Y
10000-1057	1	DH28QQ	Iron	Wrought	Staple		Incomplete	2.3	2	5.6	2	Uniform	Y
10000-1058	1	DH11C	Iron	Wrought	Staple		Incomplete	2.4	1.8	4.8	6	Uniform	Y
10000-1059	1	DH61D	Iron	Wrought	Staple		Incomplete	2	5	3.1	3	Uniform	Y
10000-1060	1	DH46G	Iron	Wrought	Staple		Incomplete	3.7	1.7	2.5	3	Uniform	Y
10000-1061	1	DH51B	Iron	Wrought	Staple		Incomplete	4	2.5	8.5	16	Uniform	Y
10000-1062	1	DH81D	Iron	Wrought	Staple		Incomplete	6	2.5	7.2	12	Uniform	Y
10000-1063	1	DH7B	Iron	Wrought	Staple		Incomplete	1.5	2	2.3	3	Uniform	Y
10000-1064	1	DH64C	Iron	Wrought	Staple		Incomplete	6	2.5	6.8	14	Uniform	Y

Drayton Hall Archaeological Collection Artifact Catalog-Nails

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Head Type	End Type	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-010	1	DH75E	Iron	Wrought	Wrought Nail			Incomplete	12.5	1	10.2	56	Uniform	Y
10000-011	1	DH72C	Iron	Wrought	Wrought Nail			Incomplete	9.5	0.8	5.0	24	Uniform	Y
10000-012	1	DH10A	Iron	Wrought	Wrought Nail	Rose	Straight	Complete	8.5	0.5	5.0	14	Uniform	Y
10000-019	1	DH18B	Iron	Cut	Cut Nail	Flat		Incomplete	7.5	0.7	7.6	29	Uniform	Y
10000-024	1	DH36B	Iron	Wrought	Wrought Nail			Incomplete	11.5	0.75	5.0	32	Uniform	Y
10000-034	1	DH72L	Iron	Wrought	Wrought Nail		Spike	Incomplete	17.25	1	7.6	50	Uniform	Y
10000-035	1	DH26A	Iron	Cut	Cut Nail	Flat	Square	Complete	5	0.4	2.5	4	Uniform	Y
10000-036	1	DH80B	Iron	Wrought	Wrought Nail			Incomplete	8.75	0.8	7.6	31	Uniform	Y
10000-037	1	DH51Z	Iron	Cut	Cut Nail	Flat	Square	Incomplete	7.5	0.5	5.0	9	Uniform	Y
10000-040	1	DH26A	Iron	Wrought	Wrought Nail	Flat	Spike	Complete	2.6	0.4	2.5	2	Uniform	Y
10000-041	1	DH73B	Iron	Wrought	Wrought Nail			Incomplete	8.6	0.9	10.0	32	Uniform	Y
10000-044	1	DH70EE	Iron	Wrought	Wrought Nail	Rose	Spike	Complete	5	0.4	5.0	6	Uniform	Y
10000-049	1	DH71C	Iron	Wrought	Wrought Nail			Incomplete	9	1	5.0	28	Uniform	Y
10000-050	1	DH73D	Iron	Wrought	Wrought Nail			Incomplete	5	0.7	8.5	19	Uniform	Y
10000-051	1	DH37A	Iron	Wrought	Wrought Nail			Incomplete	2	1	7.6	10	Uniform	Y
10000-053	1	DH38BIIA	Iron	Wrought	Wrought Nail			Incomplete	9.5	1	5.0	21	Uniform	Y
10000-054	1	DH61E	Iron	Wrought	Wrought Nail			Incomplete	9	1	11.8	41	Uniform	Y
10000-058	1	DH70F	Iron	Wrought	Wrought Nail	Rose	Flat	Incomplete	13	0.8	5.0	30	Uniform	Y
10000-059	1	DH19C	Iron	Wrought	Wrought Nail			Incomplete	8	0.8	8.5	28	Uniform	Y
10000-062	1	DH32A	Iron	Wrought	Wrought Nail			Incomplete	10	0.8	10.1	36	Uniform	Y
10000-063	1	DH19C	Iron	Wrought	Wrought Nail		Flat	Incomplete	8	0.9	10.1	37	Uniform	Y
10000-064	1	DH70E	Iron	Wrought	Wrought Nail	Rose	Flat	Complete	13.5	0.8	7.6	32	Uniform	Y
10000-065	1	DH65A	Iron	Wrought	Wrought Nail			Incomplete	11	0.7	7.7	29	Uniform	Y
10000-067	1	DH18B	Iron	Wrought	Wrought Nail	Flat	Flat	Complete	12	1.2	12.7	148	Uniform	Y
10000-068	1	DH77B	Iron	Wrought	Wrought Nail	Flat	Flat	Complete	12.3	1.2	12.7	155	Uniform	Y
10000-069	1	DH38B	Iron	Cut	Cut Nail	Flat		Incomplete	5.2	1	11.0	41	Uniform	Y
10000-070	1	DH79C	Iron	Cut	Cut Nail	Flat		Incomplete	4.5	1	7.6	23	Uniform	Y
10000-072	1	DH77B	Iron	Wire	Wire Nail	Flat	Spike	Complete	8.5	0.8	8.5	29	Uniform	Y
10000-073	1	DH28J	Iron	Wrought	Wrought Nail	Flat	Flat	Complete	12.2	0.6	6.0	28	Uniform	Y
10000-074	1	DH36C	Iron	Cut	Cut Nail	Flat		Incomplete	12.3	0.6	7.6	39	Uniform	Y
10000-075	1	DH79C	Iron	Wire	Wire Nail	Flat		Incomplete	5	0.6	7.6	13	Uniform	Y
10000-076	1	DH70E	Iron	Cut	Cut Nail			Incomplete	4.8	0.8	7.6	20	Uniform	Y
10000-077	1	DH71C	Iron	Cut	Cut Nail			Incomplete	8.6	0.8	8.5	31	Uniform	Y
10000-078	1	DH38C	Iron	Wrought	Wrought Nail			Incomplete	5.2	0.7	7.6	23	Uniform	Y
10000-080	1	DH51B	Iron	Wrought	Wrought Nail	Rose	Flat	Complete	10.2	0.7	6.0	20	Uniform	Y
10000-082	1	DH28H	Iron	Wrought	Wrought Nail			Incomplete	5	0.8	8.4	23	Uniform	Y
10000-083	1	DH46AD	Iron	Wrought	Wrought Nail			Incomplete	10.6	0.7	7.6	41	Uniform	Y
10000-084	1	DH38B4	Iron	Cut	Cut Nail			Incomplete	6.7	1.2	7.6	34	Uniform	Y
10000-085	1	DH70F	Iron	Cut	Cut Nail			Incomplete	4.5	1	10.0	26	Uniform	Y
10000-086	1	DH28Q	Iron	Wrought	Wrought Nail	Flat		Incomplete	8	1.5	10.0	41	Uniform	Y
10000-087	1	DH20B	Iron	Cut	Cut Nail	Flat		Incomplete	9.9	1	10.2	57	Uniform	Y
10000-088	1	DH28G	Iron	Cut	Cut Nail	Flat		Incomplete	9.6	1.2.	10.1	61	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Head Type	End Type	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-089	1	DH33B	Iron	Cut	Cut Nail	Flat		Incomplete	9.5	1	12.7	54	Uniform	Y
10000-092	1	DH28E	Iron	Cut	Cut Nail	Flat		Incomplete	2.6	0.8	10.0	6	Uniform	Y
10000-093	1	DH28L	Iron	Wrought	Wrought Nail		Flat	Incomplete	11.5	0.7	10.0	36	Uniform	Y
10000-095	1	DH10B	Iron	Wrought	Wrought Nail		Flat	Incomplete	10.5	0.8	10.1	31	Uniform	Y
10000-096	1	DH42A	Iron	Wrought	Wrought Nail		Flat	Incomplete	15	1	10.0	87	Uniform	Y
10000-097	1	DH48N	Iron	Cut	Cut Nail	Flat		Incomplete	8.5	1	12.7	68	Uniform	Y
10000-098	1	DH19C	Iron	Cut	Cut Nail	Flat		Incomplete	13.5	1.3	12.7	158	Uniform	Y
10000-099	1	DH43A	Iron	Wire	Wire Nail	Flat	Spike	Complete	15.5	0.6	7.6	40	Uniform	Y
10000-100	1	DH82	Iron	Wire	Wire Nail	Flat		Incomplete	7.5	0.8	10.2	29	Uniform	Y
10000-101	1	DH28G	Iron	Cut	Cut Nail	Flat	Flat	Complete	12.5	1.3	15.2	169	Uniform	Y
10000-102	1	DH50C	Iron	Wrought	Wrought Nail	Flat		Incomplete	10.3	1.8	17.6	204	Uniform	Y
10000-103	1	DH51B	Iron	Cut	Cut Nail	Flat	Flat	Complete	10.5	0.7	7.6	25	Uniform	Y
10000-104	2	DH51B	Iron	Wrought	Wrought Nail	Rose		Incomplete				34	Uniform	Y
10000-105	7	DH51B	Iron	Cut	Cut Nail			Incomplete				110	Uniform	Y
10000-107	2	DH75B	Iron	Cut	Cut Nail	Flat		Incomplete				81	Uniform	Y
10000-108	5	DH56A	Iron	Wrought	Wrought Nail	Rose		Incomplete				125	Uniform	Y
10000-109	4	DH56A	Iron	Wrought	Wrought Nail			Incomplete				73	Uniform	Y
10000-110	1	DH56A	Iron	Wrought	Wrought Nail	Rose		Incomplete	3	0.8	7.5	9	Uniform	Y
10000-111	1	DH56A	Iron	Wrought	Wrought Nail	Flat	Flat	Complete	9.6	0.7	7.5	20	Uniform	Y
10000-112	1	DH56A	Iron	Wrought	Wrought Nail	Rose	Flat	Complete	10.5	0.8	7.6	29	Uniform	Y
10000-113	1	DH56A	Iron	Wrought	Wrought Nail	Rose	Flat	Complete	13	0.7	5.0	34	Uniform	Y
10000-114	1	DH56A	Iron	Wrought	Wrought Nail	Flat	Flat	Complete	11	0.6	7.5	39	Uniform	Y
10000-115	1	DH56A	Iron	Wrought	Wrought Nail	Flat	Flat	Complete	12	0.7	7.6	33	Uniform	Y
10000-116	1	DH56A	Iron	Wrought	Wrought Nail	Flat	Spike	Complete	4.8	0.5	5.0	10	Uniform	Y
10000-117	1	DH56A	Iron	Wrought	Wrought Nail	Flat	Flat	Complete	7.8	0.7	6.7	30	Uniform	Y
10000-118	8	DH22B	Iron	Wrought	Wrought Nail		Flat	Incomplete				147	Uniform	Y
10000-119	2	DH22B	Iron	Wrought	Wrought Nail	Rose		Incomplete				49	Uniform	Y
10000-120	1	DH22B	Iron	Wrought	Wrought Nail	Rose	Flat	Complete	11.5	0.7	5.0	24	Uniform	Y
10000-121	1	DH22B	Iron	Wrought	Wrought Nail	Flat	Flat	Complete	8	0.5	5.0	21	Uniform	Y
10000-122	1	DH22B	Iron	Wrought	Wrought Nail	Rose	Flat	Complete	11.2	0.8	8.5	33	Uniform	Y
10000-123	1	DH22B	Iron	Wrought	Wrought Nail	Rose	Flat	Complete	11.5	0.7	9.3	25	Uniform	Y
10000-124	1	DH22B	Iron	Wrought	Wrought Nail	Rose		Incomplete	7.5	0.6	5.0	10	Uniform	Y
10000-252	1	DH8A	Iron	Wrought	Wrought Nail			Incomplete	4.5	0.3	3.5	5	Uniform	Y
10000-264	1	DH72C	Iron	Wrought	Wrought Nail, twisted	double struck		Incomplete	6.6	0.5	4	8	Uniform	Y
10000-265	1	DH72C	Iron	Wrought	Wrought nail	double struck		Incomplete	4	0.5	4.4	7	Uniform	Y
10000-364	1	DH56A	Iron	Wrought	Wrought nail/tack	Round		Incomplete	1.3	1.5	6	4	Uniform	Y
10000-694	1	DH34B	Iron	Wrought	Wrought nail/tack	Round		Incomplete	1.1	1.5	3.5	2	Uniform	Y

Drayton Hall Archaeological Collection Artifact Catalog-Utensils

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Shape	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-142	1	DH73C	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	11.5	1	2.5	19	Uniform	Y
10000-143	1	DH70D	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	12.2	1	3.2	23	Uniform	Y
10000-144	2	DH74B	Iron	Wrought	1 piece: unid	Handle	Trefoil hndl	Incomplete	11	1.6	2.5	12	Uniform	Y
10000-145	1	DH41C	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	7.4	1.8	2	13	Uniform	Y
10000-146	1	DH28G	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	13	1.5	5	29	Uniform	Y
10000-147	1	DH62A	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	11.5	2.5	3.5	68	Uniform	Y
10000-177	1	DH28PPP	Iron	Wrought	1 piece: unid	Handle		Incomplete	10	0.8	6	22	Uniform	Y
10000-178	1	DH23B	Iron	Wrought	1 piece	Fork; Handle with tines	2 tines	Incomplete	13.4	1	4	16	Uniform	Y
10000-179	1	DH73C	Iron	Wrought	1 piece: unid	Handle		Incomplete	10	0.8	4.3	27	Uniform	Y
10000-180	1	DH28G	Iron	Wrought	1 piece	Tines		Incomplete	7.5	1.5	3.5	13	Uniform	Y
10000-181	1	DH73B	Iron	Wrought	1 piece	Fork base		Incomplete	3.2	1.5	4	3	Uniform	Y
10000-182	1	DH37A	Iron	Wrought	1 piece	Handle		Incomplete	9	0.5	8.9	16	Uniform	Y
10000-183	1	DH73B	Iron	Wrought	1 piece	Fork base		Incomplete	3	2	6	6	Uniform	Y
10000-184	1	DH37A	Iron	Wrought	1 piece: unid	Handle		Incomplete	7	0.5	5	13	Uniform	Y
10000-185	1	DH28G	Iron	Wrought	1 piece	Tines		Incomplete	5.5	2	3.8	9	Uniform	Y
10000-186	1	DH28G	Iron	Wrought	2 piece: unid	Handle		Incomplete	8	1	7	17	Uniform	Y
10000-187	1	DH71B	Iron	Wrought	2 piece	Fork; Handle with 3 tines		Incomplete	9.5	1.5	3.6	17	Uniform	Y
10000-188	1	DH71B	Iron	Wrought	1 piece	Fork; Handle with 3 tines		Incomplete	8.5	1.7	4.6	9	Uniform	Y
10000-189	1	DH71B	Iron	Wrought	2 piece	Fork	2 tines present	Incomplete	9.7	1.8	7	20	Uniform	Y
10000-190	1	DH72L	Iron	Wrought	1 piece	Spoon		Incomplete	11	3.5	2.5	19	Uniform	Y
10000-191	1	DH4C	Iron	Wrought	1 piece	Spoon		Incomplete	8.5	5	9.6	66	Uniform	Y
10000-192	1	DH60E	Iron	Wrought	1 piece: unid	Handle		Incomplete	10	1	3.6	20	Uniform	Y
10000-193	1	DH73D	Iron	Wrought	1 piece	Spoon bowl		Incomplete	6.5	4	3.3	24	Uniform	Y
10000-194	1	DH71C	Iron	Wrought	1 piece	Knife fragments		Incomplete				28	Uniform	Y
10000-195	1	DH73K	Iron	Wrought	1 piece	Knife fragments		Incomplete				6	Uniform	Y
10000-196	1	DH73B	Iron	Wrought	1 piece	Knife fragments		Incomplete	2.5	1.5	3.4	4	Uniform	Y
10000-197	1	DH3A	Iron	Wrought	1 piece: unid	Handle		Incomplete	6.7	1.7	6.3	20	Uniform	Y
10000-198	1	DH51B	Iron	Wrought	1 piece: unid	Handle		Incomplete				26	Uniform	Y
10000-199	1	DH57	Iron	Wrought	1 piece	Knife		Incomplete	22	1.5	5	51	Uniform	Y
10000-200	1	DH72B	Iron	Wrought	1 piece	Spoon bowl		Incomplete	5.8	4	3	17	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Shape	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-201	3	DH72B	Iron	Wrought	1 piece	Spoon bowl fragments		Incomplete				19	Uniform	Y
10000-202	1	DH72B	Iron	Wrought	1 piece: unid	Handle		Incomplete	2.5	1	3.3	4	Uniform	Y
10000-203	2	DH72B	Iron	Wrought	1 piece: unid	Handle		Incomplete	5	2	5	11	Uniform	Y
10000-204	1	DH72B	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	6	1.5	3	11	Uniform	Y
10000-205	1	DH72B	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	6	1.7	2.5	8	Uniform	Y
10000-206	3	DH72B	Iron	Wrought	1 piece: unid	Handle		Incomplete			6.3	9	Uniform	Y
10000-207	2	DH72B	Iron	Wrought	1 piece: unid	Handle		Incomplete	4	1.3	4.5	6	Uniform	Y
10000-208	1	DH73B	Iron	Wrought	1 piece	Spoon bowl		Incomplete	7	4.5	2.5	36	Uniform	Y
10000-209	1	DH73B	Iron	Wrought	1 piece	Spoon bowl		Incomplete	8.25	4.25	2.5	29	Uniform	Y
10000-210	1	DH73B	Iron	Wrought	1 piece	spoon bowl fragment		Incomplete	10.5	3	3.3	13	Uniform	Y
10000-211	1	DH73B	Iron	Wrought	1 piece	spoon bowl fragment with handle		Incomplete	6.3	2.8	3.8	8	Uniform	Y
10000-212	1	DH73B	Iron	Wrought	1 piece	spoon bowl fragment		Incomplete	3	2.5	3.3	6	Uniform	Y
10000-213	1	DH73B	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	7.5	1.8	4.3	10	Uniform	Y
10000-214	1	DH73B	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	8.5	1.8	2.5	9	Uniform	Y
10000-215	1	DH73B	Iron	Wrought	1 piece: unid	Handle		Incomplete	5.1	1	2.8	5	Uniform	Y
10000-553	1	DH70F	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	5	1.8	2.4	11	Uniform	Y
10000-554	1	DH73B	Iron	Wrought	1 piece: unid	Handle		Incomplete	6.1	3	1.8	21	Uniform	Y
10000-555	6	DH71B	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	13.2	2	3.7	23	Uniform	Y
10000-556	2	DH71C	Iron	Wrought	1 piece: unid	Handle		Incomplete	5.5	0.7	2.5	6	Uniform	Y
10000-557	1	DH71C	Iron	Wrought	1 piece: unid	Handle		Incomplete	3	1	4.6	3	Uniform	Y
10000-695	1	DH71B	Iron	Wrought	1 piece: unid	Knife tip		Incomplete	2.1	1.5	1.5	2	Uniform	Y
10000-789	1	DH71B	Iron	Wrought	1 piece: unid	Handle	Round-end hndl	Incomplete	5.5	1.8	3	10	Uniform	Y

Drayton Hall Archaeological Collection Artifact Catalog-General Tools

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Shape	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-149	1	DH28Q	Iron	Wrought	Unid: Tool	Scythe Blade	Curved	Incomplete	22	1.5	5	82	Uniform	Y
10000-150	1	DH28K	Iron	Wrought	Unid: Tool	Scythe Blade	Curved	Incomplete	28	2	2.5	59	Uniform	Y
10000-151	1	DH60E	Iron	Wrought	Unid: Tool	Straight with rake like prongs		Incomplete	18	4	10	342	Uniform	Y
10000-153	1	DH70Z	Iron	Wrought	Unid: Tool	Hoe blade	Rectangular; 5 pieces	Incomplete	18	16	5	543	Uniform	Y
10000-154	1	DH70Z	Iron	Wrought	Unid: Tool	Hoe haft	connection remains; blade in multi pieces	Incomplete				351	Uniform	Y
10000-155	1	DH10A	Iron	Wrought	Unid: Tool	Blade	rectangular with curved end	Incomplete	26	9.5	8	494	Uniform	Y
10000-157	1	DH73C	Iron	Wrought	Unid: Tool	Blade with Handle like piece; 2pieces		Incomplete	39	5	10	634	Uniform	Y
10000-158	1	DH73B	Iron	Wrought	Unid: Tool	Hoe haft with blade fragments	5 pieces	Incomplete				456	Uniform	Y
10000-168	1	DH38A	Iron	Wrought	Plane	Rectangular		Incomplete	14	5.5	4	170	Uniform	Y
10000-169	1	GG/19	Iron	Wrought	Hoe Blade	With haft		Incomplete	20	15	5	701	Uniform	Y
10000-216	3	DH28QQ	Iron	Wrought	Hook		Curved	Incomplete				1	Uniform	Y
10000-217	2	DH73C	Iron	Wrought	Hook		Curved	Incomplete				1	Uniform	Y
10000-218	1	DH71E	Iron	Wrought	Unid: Tool	Bit		Incomplete	3	0.2	2	1	Uniform	Y
10000-219	1	DH72B	Iron	Wrought	Unid: Tool	Bit		Incomplete	3.3	0.3	2.5	2	Uniform	Y
10000-220	1	DH72B	Iron	Wrought	Unid: Tool	Bit		Incomplete	6	0.4	3.8	5	Uniform	Y
10000-221	1	DH38 FIVE	Iron	Wrought	Key			Complete	12.5	1	8	63	Uniform	Y
10000-222	1	DH73G	Iron	Wrought	Unid: Tool	Toothed, saw like blade		Incomplete	10.5	1.5	5	13	Uniform	Y
10000-223	1	DHPU	Iron	Wrought	Key			Complete	7.5	0.7	7.5	24	Uniform	Y
10000-224	1	DH28QQ	Iron	Wrought	Unid: Tool			Incomplete	11	9	5	94	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Shape	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-225	1	DH56A	Iron	Wrought	Tong			Incomplete	17	1	4	77	Uniform	Y
10000-227	1	DH72C	Iron	Wrought	Saw blade			Incomplete	23	10	2.5	135	Uniform	Y
10000-228	1	DH71B	Iron	Wrought	File			Incomplete	14	3	8.4	134	Uniform	Y
10000-229	1	42B	Iron	Wrought	File			Incomplete	16	1.5	3.8	31	Uniform	Y
10000-230	1	DH73B	Iron	Wrought	File			Incomplete	12.5	1	8.6	30	Uniform	Y
10000-233	1	DH73B	Iron	Wrought	Pocket Knife	Blade		Incomplete	5	1	5.6	7	Uniform	Y
10000-233	1	DH73B			Pocket Knife	Case		Incomplete	5	1	5.6	7	Uniform	Y
10000-233	1	DH73B			Pocket Knife	End		Incomplete	5	1	5.6	7	Uniform	Y
10000-234	1	DH73C	Iron	Wrought	Pocket Knife	Blade		Incomplete	4	1	2	4	Uniform	Y
10000-234	1	DH73C			Pocket Knife	Case		Incomplete	4	1	2	4	Uniform	Y
10000-235	1	DH28QQ	Iron	Wrought	Pocket Knife	Blade		Incomplete	7	0.9	3.8	4	Uniform	Y
10000-235	1	DH28QQ			Pocket Knife	Case		Incomplete	7	0.9	3.8	4	Uniform	Y
10000-235	1	DH28QQ			Pocket Knife	End		Incomplete	7	0.9	3.8	4	Uniform	Y
10000-236	1	DH28Q	Iron	Wrought	Pocket Knife	Blade		Incomplete	7	1	7.6	14	Uniform	Y
10000-236	1	DH28Q			Pocket Knife	Case		Incomplete	7	1	7.6	14	Uniform	Y
10000-237	1	DH70B	Iron	Wrought	Pocket Knife	Hook shape		Incomplete	8	0.75	Too fragile	Too fragile	Uniform	Y
10000-238	1	DH28E	Iron	Wrought	Pocket Knife	Blade in case		Incomplete	10	1.5	Too fragile	Too fragile	Uniform	Y
10000-239	1	DH80B	Iron	Wrought	Pocket Knife	Fragment		Incomplete	5.5	0.8	Too fragile	Too fragile	Uniform	Y
10000-240	1	DH73C	Iron	Wrought	Pocket Knife			Incomplete	5	1	Too fragile	Too fragile	Uniform	Y
10000-241	1	DH28Q	Iron	Wrought	Pocket Knife			Incomplete	8.5	1.8	Too fragile	Too fragile	Uniform	Y
10000-242	1	DH70B	Iron	Wrought	Pocket Knife			Incomplete	8.3	2	Too fragile	Too fragile	Uniform	Y
10000-243	1	DH73C	Iron	Wrought	Pocket Knife			Incomplete	4.5	0.8	Too fragile	Too fragile	Uniform	Y
10000-244	1	DH10A	Iron	Wrought	Pocket Knife			Incomplete	5.2	1	Too fragile	Too fragile	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Shape	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-245	1	DH73B	Iron	Wrought	Pocket Knife			Incomplete	6.5	0.8	Too fragile	Too fragile	Uniform	Y
10000-246	1	DH71B	Iron	Wrought	Pocket Knife			Incomplete	8	0.7	Too fragile	Too fragile	Uniform	Y
10000-247	1	DH71B	Iron	Wrought	Pocket Knife			Incomplete	5.5	1.7	Too fragile	Too fragile	Uniform	Y
10000-248	1	DH71B	Iron	Wrought	Pocket Knife			Incomplete	6	3	Too fragile	Too fragile	Uniform	Y
10000-250	1	DH56A	Iron	Wrought	Pocket Knife	Fragment		Incomplete	3.5	1.5	Too fragile	Too fragile	Uniform	Y
10000-254	1	DH56A	Iron	Wrought	Key			Incomplete	9.5	2.5	6.5	23	Uniform	Y
10000-255	1	DHDelta	Iron	Wrought	Key			Complete	6.2	2	5.5	12	Uniform	Y
10000-256	1	DH28G	Iron	Wrought	File			Incomplete	11.5	1	8.5	33	Uniform	Y
10000-547	1	DH57	Iron		Can opener			Incomplete	13.8	3.5	1.2	38	Uniform	Y
10000-548	1	DH73B	Iron	Wrought	Unid: Tool	Key top	Rounded	Incomplete	4.2	3.7	2.5	13	Uniform	Y
10000-549	1	DH73B	Iron	Wrought	Blade	Knife?		Incomplete	9.5	3.2	2.8	32	Uniform	Y
10000-550	1	DH71C	Iron	Wrought	Blade			Incomplete	6.1	2.2	3.1	12	Uniform	Y
10000-551	1	DH73C	Iron	Wrought	Wrench			Incomplete	6.5	1.5	5	33	Uniform	Y
10000-552	1	DH72L	Iron	Wrought	Wrench			Incomplete	13.5	4.5	11.2	166	Uniform	Y
10000-674	1	DH56A	Iron	Wrought	Key	Fragment		Incomplete	6.5	1.3	5.5	16	Uniform	Y
10000-675	1	DH73B	Iron	Wrought	File		Triangular	Incomplete	9	0.9	7.8	20	Uniform	Y
10000-676	1	DH73B	Iron	Wrought	File			Incomplete	8	2.8	8.3	82	Uniform	Y
10000-677	1	DH73B	Iron	Wrought	Unid: Tool	Shaft		Incomplete	4	1.7	7.7	14	Uniform	Y
10000-678	1	DH70F	Iron	Wrought	Unid: Tool	Shaft		Incomplete	5.3	1.8	3.3	6	Uniform	Y
10000-679	1	DH72B	Iron	Wrought	Unid: Tool	Drill bit?		Incomplete	5.5	0.3	3	4	Uniform	Y
10000-680	1	DH71C	Iron	Wrought	Unid: Tool	Twisted		Incomplete	5	1.2	8.1	17	Uniform	Y
10000-681	1	DH71C	Iron	Wrought	File			Incomplete	5.5	1	7.8	13	Uniform	Y
10000-682	1	DH74B	Iron	Wrought	Unid: Tool	Drill bit?		Incomplete	1.2	0.3	3.2	1	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Shape	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-683	2	DH72C	Iron	Wrought	File			Incomplete	6.7	0.6	4.3	4	Uniform	Y
10000-684	1	DH72C	Iron	Wrought	Unid: Tool	File/Tip?		Incomplete	3.1	2.7	6.2	22	Uniform	Y
10000-685	1	DH81C	Iron	Wrought	Unid: Tool	File/Tip?		Incomplete	4.5	0.6	3.8	6	Uniform	Y
10000-686	2	DH70CC	Iron	Wrought	Unid: Tool			Incomplete	4.2	1.2	10.7	11	Uniform	Y
10000-687	1	DH72B	Iron	Wrought	Unid: Tool	Corrosion products in bag		Incomplete	7.5	0.8	4.8	14	Uniform	Y
10000-688	1	DH32C	Iron	Wrought	Key	Fragment		Incomplete	5.2	2.2	7.7	10	Uniform	Y
10000-689	1	DH10B	Iron	Wrought	Unid: Tool			Incomplete	5.1	0.4	2.9	4	Uniform	Y
10000-690	1	DH52B	Iron	Wrought	Unid: Tool	Punch?		Incomplete	6.2	0.6	5.2	10	Uniform	Y
10000-691	1	DH52B	Iron	Wrought	Unid: Tool	Punch?		Incomplete	7	0.5	6.5	11	Uniform	Y
10000-692	1	DH72B	Iron	Wrought	Unid: Tool	File/Tip?		Incomplete	7.5	1.3	4.2	21	Uniform	Y
10000-693	1	DH70F	Iron	Wrought	Unid: Tool			Incomplete	6	0.5	3.5		Uniform	Y
10000-704	1	DH56A	Iron	Wrought	Scissor	Fragment		Incomplete	5.5	0.8	0.8	14	Uniform	Y
10000-705	3	DH72B	Iron	Wrought	Scissor	Fragment		Incomplete	7.5	1	4.6	14	Uniform	Y
10000-706	1	DH72B	Iron	Wrought	Unid: Tool	Blade		Incomplete	9	3.8	1.8	24	Uniform	Y
10000-707	1	DH61C	Iron	Wrought	Unid: Tool	File		Incomplete	11	2	4.8	97	Uniform	Y
10000-708	1	DH73D			Unid: Tool	Handle		Incomplete	4.5	1.5	7.1	13	Uniform	Y
10000-708	1	DH73D	Iron	Wrought	Unid: Tool	Shaft		Incomplete	10	3	5.4	13	Uniform	Y
10000-709	1	DH10B	Iron	Wrought	Unid: Tool			Incomplete	9.5	0.5	5.4	9	Uniform	Y
10000-710	1	DH72B	Iron	Wrought	Unid: Tool			Incomplete	12.1	1	6.3	26	Uniform	Y
10000-711	1	DH73D	Iron	Wrought	Key	end		Incomplete	7.2	3	9.5	37	Uniform	Y
10000-785	1	DH73B	Iron	Wrought	Unid: Tool	File?		Incomplete	5	1	6.8	9	Uniform	Y
10000-786	1	DH73C	Iron	Wrought	Unid: Tool	File?		Incomplete	7.2	1	5.4	20	Uniform	Y
10000-787	1	DH56A	Iron	Wrought	Unid: Tool			Incomplete	9	0.6	5.4	14	Uniform	Y

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Shape	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-788	1	DH73C	Iron	Wrought	Unid: Tool			Incomplete	10	2	5.8	61	Uniform	Y
10000-1065	1	DH51B	Iron	Wrought	Unid: Tool			Incomplete	8.5	0.6	6.1	14	Uniform	Y
10000-1066	1	DH72C	Iron	Wrought	Unid: Tool			Incomplete	4.5	1.2	12.8	35	Uniform	Y
10000-1067	1	DH52B	Iron	Wrought	Unid: Tool	Punch?		Incomplete	11.5	1.5	14.4	120	Uniform	Y

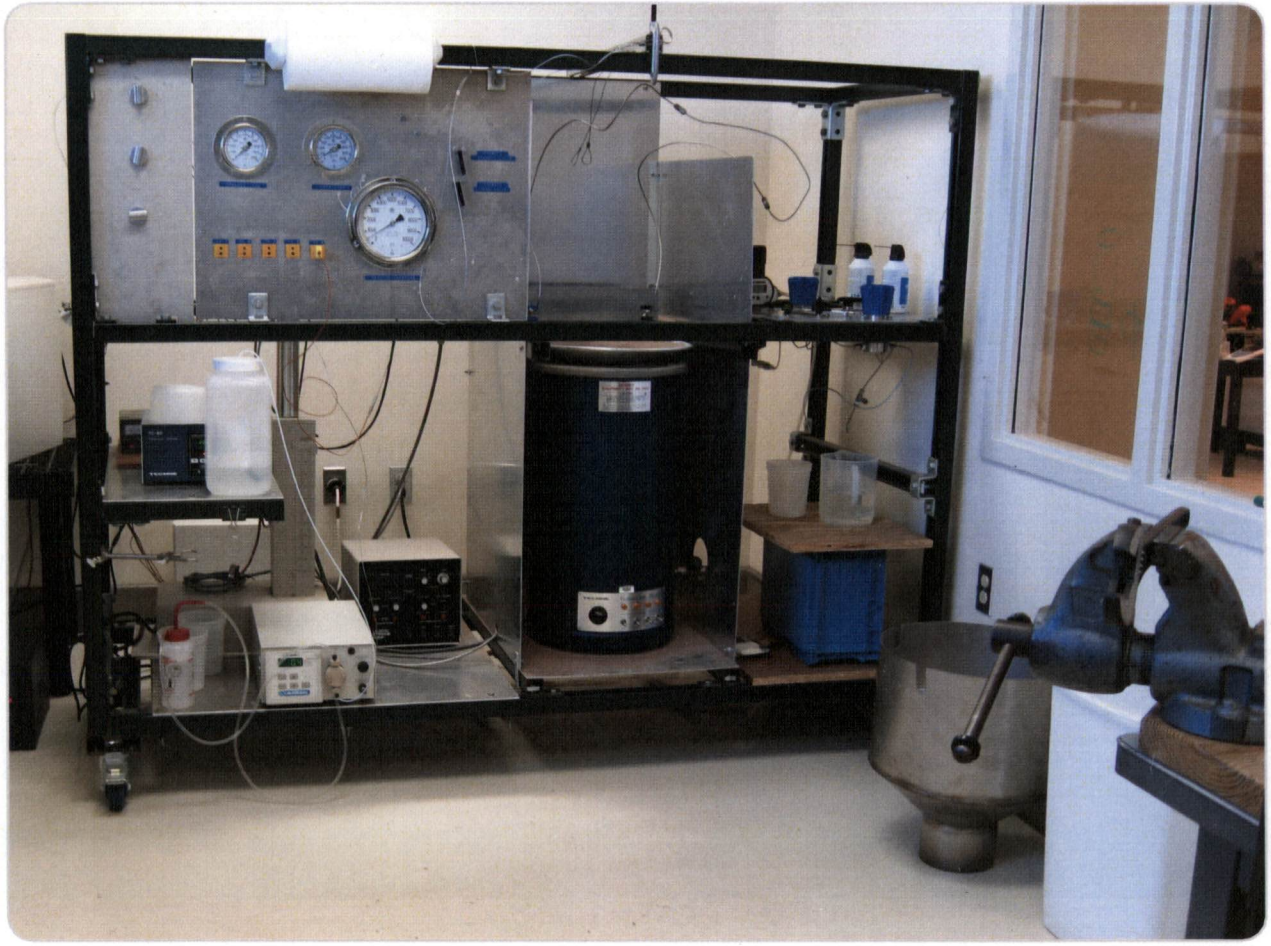
Drayton Hall Archaeological Collection Artifact Catalog-Buckles

Artifact ID #	Artifact Count	Archaeological Provenience	Material Type	Manufacturing Technique	Form (Brief Description)	Description	Shape	Completeness	Length (cm)	Width (cm)	Thickness (mm)	Weight (gm)	Type of Corrosion	Active Corrosion (Y/N)
10000-790	1	DH73B	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	3.5	3.5	4	17	Uniform	Y
10000-791	1	DH73B	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	4	3.7	4.9	25	Uniform	Y
10000-792	1	DH73B	Iron	Wrought	Buckle	Unid: Utilitarian	Rectangle	Incomplete	4.5	3.2	5	23	Uniform	Y
10000-793	1	DH73B	Iron	Wrought	Buckle	Unid: Utilitarian	Frag	Incomplete	3	3	4.8	9	Uniform	Y
10000-794	1	DH73C	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	4	4	6.8	25	Uniform	Y
10000-795	1	DH73C	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	3.8	3.5	4.5	21	Uniform	Y
10000-796	1	DH73C	Iron	Wrought	Buckle	Unid: Utilitarian	Frag	Incomplete			3	6	Uniform	Y
10000-797	1	DH73C	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	2.5	3	4	8	Uniform	Y
10000-798	1	DH73C	Iron	Wrought	Buckle	Unid: Utilitarian	Rounded	Incomplete	6.5	6.5	7.2	92	Uniform	Y
10000-799	1	DH70B	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	3	2.8	3.8	10	Uniform	Y
10000-800	1	DH70B	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	2.5	2	3.4	6	Uniform	Y
10000-801	1	DH72B	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	3.6	3.6	3.6	18	Uniform	Y
10000-802	1	DH72B	Iron	Wrought	Buckle	Unid: Utilitarian	Rectangle	Incomplete	3	2.5	3.5	10	Uniform	Y
10000-803	1	DH72B	Iron	Wrought	Buckle	Unid: Utilitarian	Rectangle	Incomplete	4.2	3	5.8	16	Uniform	Y
10000-804	1	DH17B	Iron	Wrought	Buckle	Unid: Utilitarian	Rectangle	Incomplete	3.5	2.3	7.5	11	Uniform	Y
10000-805	1	DH17G	Iron	Wrought	Buckle	Unid: Utilitarian	Frag	Incomplete	3.1	1.6	6	5	Uniform	Y
10000-806	1	DH18C	Iron	Wrought	Buckle	Unid: Utilitarian	Frag	Incomplete	3	2.5	6.5	6	Uniform	Y
10000-807	1	DHDELTA	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	3.5	3.5	4.1	15	Uniform	Y
10000-808	1	DH19L	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	4	4	12	35	Uniform	Y
10000-809	1	DH60J	Iron	Wrought	Buckle	Unid: Utilitarian	Frag	Incomplete	3	2.5	6.1	22	Uniform	Y
10000-810	1	DH20B	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	4	4	11.5	35	Uniform	Y
10000-811	1	DH22B	Iron	Wrought	Buckle	Unid: Utilitarian	Rounded	Incomplete	5	6	9	64	Uniform	Y
10000-812	1	DH56A	Iron	Wrought	Buckle	Unid: Utilitarian	Square	Incomplete	2.5	2.5	4	7	Uniform	Y
10000-813	1	DH28LL	Iron	Wrought	Buckle	Unid: Utilitarian	Frag	Incomplete	4	3.2	9.2	11	Uniform	Y
10000-814	1	DH51D	Iron	Wrought	Buckle	Unid: Utilitarian	Rectangle	Incomplete	2.2	3	3.8	7	Uniform	Y
10000-815	1	DH70X	Iron	Wrought	Buckle	Unid: Utilitarian	Frag	Incomplete	3.5	2.2	9.2	16	Uniform	Y
10000-816	1	DH28KK	Iron	Wrought	Buckle	Unid: Utilitarian	Frags	Incomplete				21	Uniform	Y

Appendix B: Subcritical Experiment Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

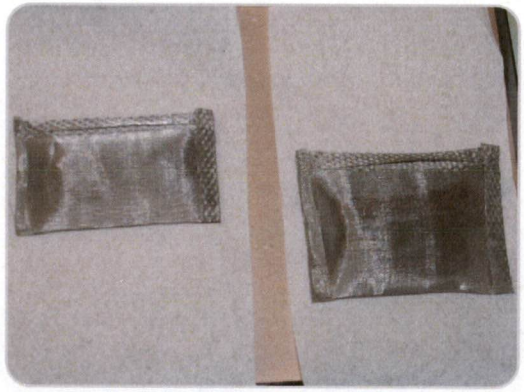
Photograph 1:

Subcritical Reactor

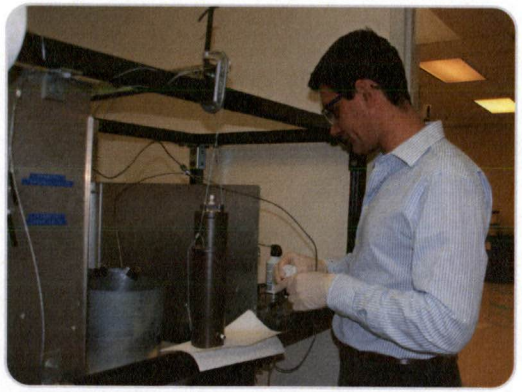


Appendix B: Subcritical Experiment Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

Photograph 1: Subcritical Chamber

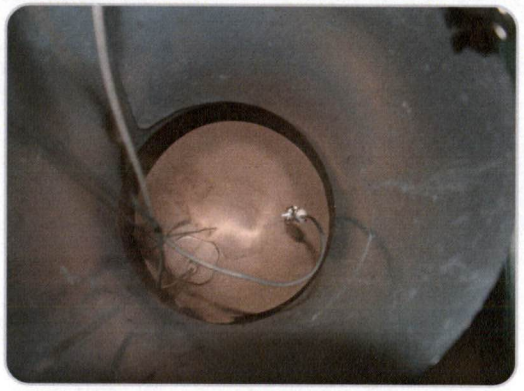


Photograph 2: Stainless steel mesh bags containing artifacts to be placed in chamber for treatment



Photograph 3: Nestor Gonzalez-Pereyra attaching fluid lines to subcritical chamber

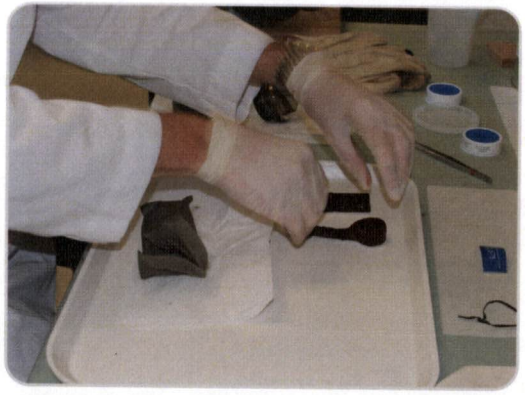
Photograph 4: Loading of subcritical chamber into heating element



Photograph 5: View of chamber immersed in fluidized sand bath

Appendix B: Subcritical Experiment Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

Photograph 6: Nestor removing artifacts from subcritical chamber, post treatment

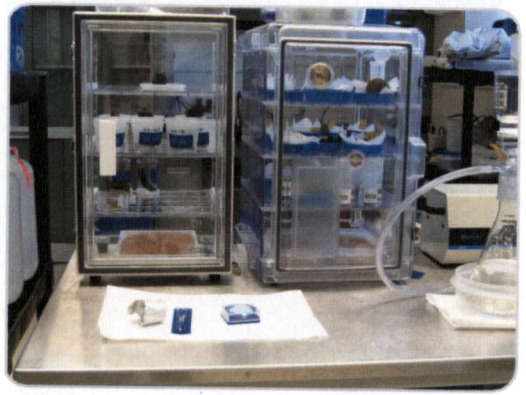


Photograph 7: Artifact removal from mesh bags, post treatment

Photograph 8: Artifact removal from mesh bags, post treatment

Photograph 9: Artifacts inside chamber, post treatment

Photograph 10: Artifacts after removal from mesh bags, post treatment



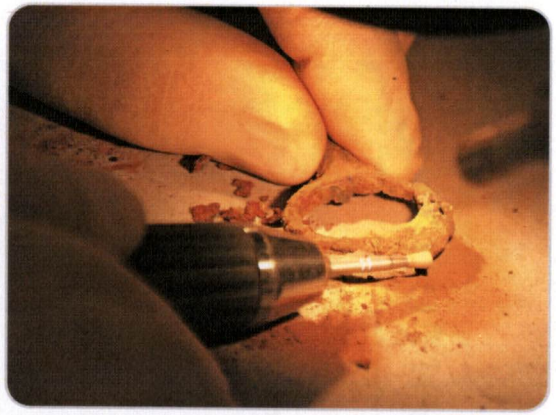
Photograph 11: Humidity chamber

Photograph 12: Subcritical treatment fluids, left container contains solution from the first testing release, following containers contain solutions from each successive release, container on right is the final release.

Appendix C: Subcritical Experiment Artifact Cleaning	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

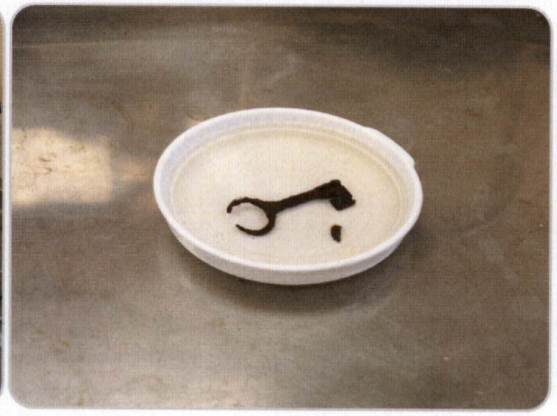
Photograph 1: Microabrasion Chamber

Photograph 2: Microabrasion of key

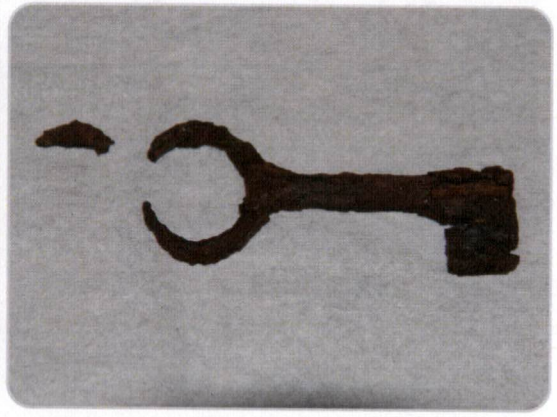


Photograph 3: Mechanical Cleaning of key with microtool

Photograph 4: Consolidation of key with acetone and resin in a vacuum

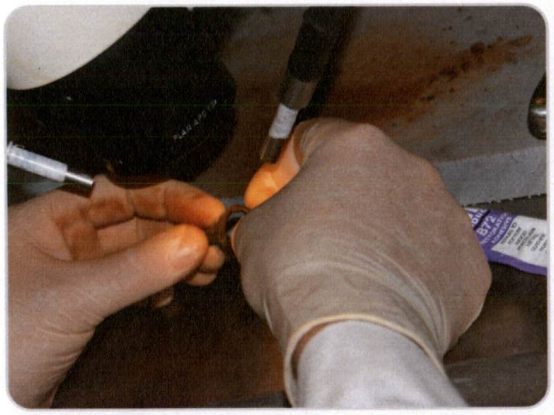


Photograph 5: Key in consolidant



Photograph 6: Key after consolidation treatment

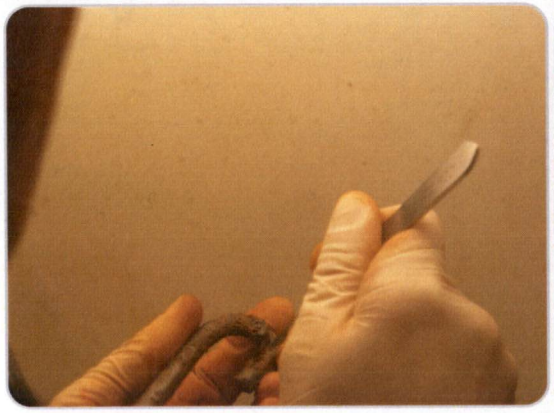
Appendix C: Subcritical Experiment Artifact Cleaning	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



Photograph 7: Repair of key with reversible adhesive

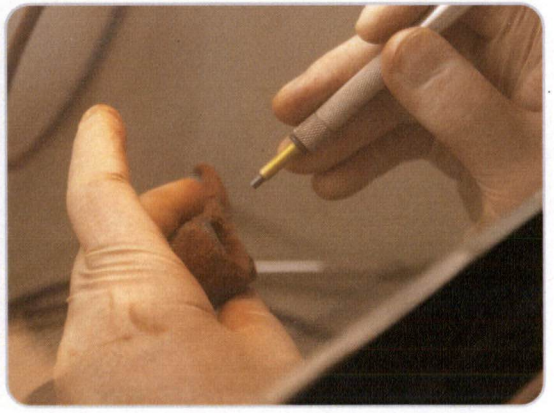
Photograph 8: Mechanical cleaning of nail with microtool

Photograph 9: Microabrasion of bolt



Photograph 10: Mechanical cleaning of threaded hook with scalpel

Photograph 11: Post mechanical treatment view of threaded hook



Photograph 12: Microabrasion of pintle

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

DH 10000-119

Artifact:

2 Wrought Iron Nails

Pretreatment:

Provenience: DH22B

Excavation Date: 1975

Weight: 26.604 g (A)

Munsell Color:

Rust:

10R 3/3 (dusky red)

Encrustation:

10R 4/4 (weak read)

Post Treatment:

Weight: 25.306 g (A)

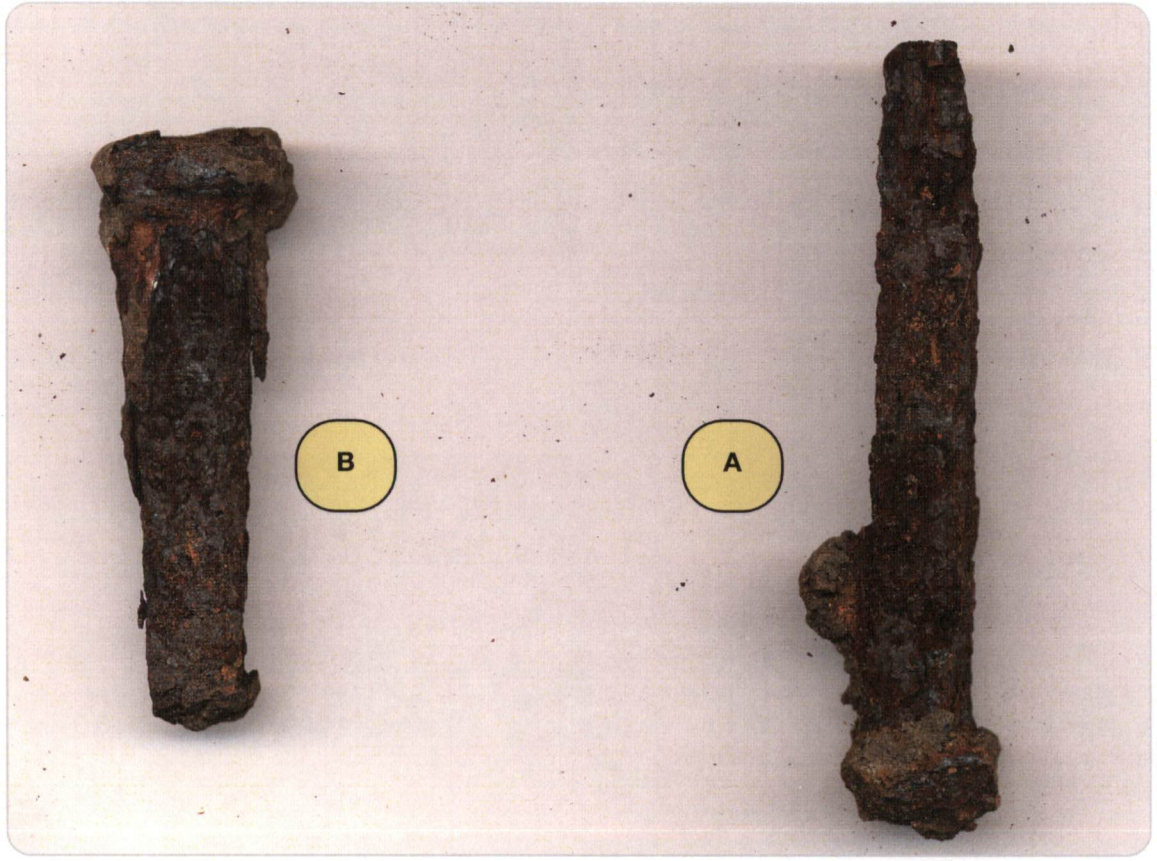
Munsell Color:

Red:

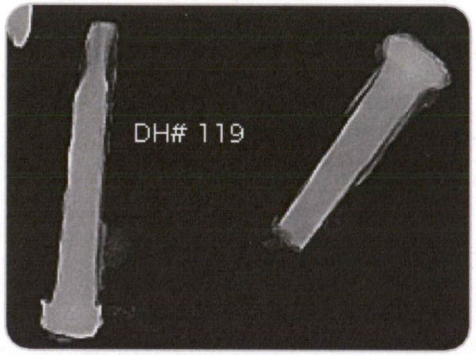
10R 3/4 (dusky red)

Black/Dark Brown:

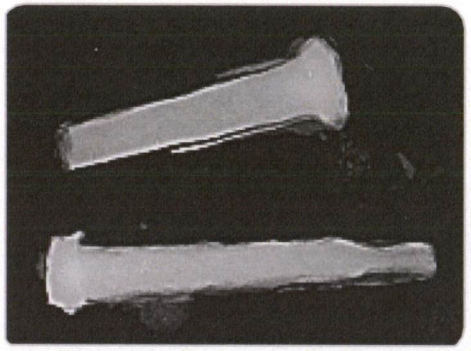
10R 2.5/1 (reddish black)



Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

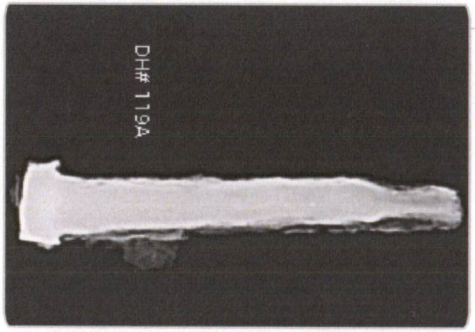


Pretreatment X-ray, View 1

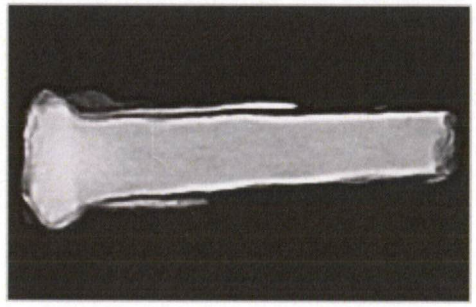


Pretreatment X-ray, View 2

Microscopic View: pitting



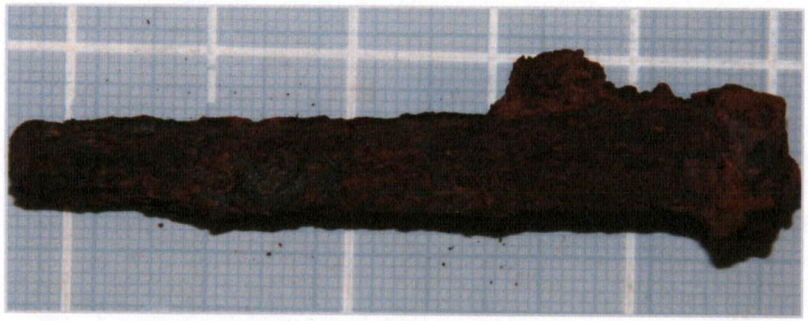
Post Treatment X-ray, View 1



Post Treatment X-ray, View 2

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

Post Treatment View:



Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

Post Cleaning View:

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

DH 10000-255

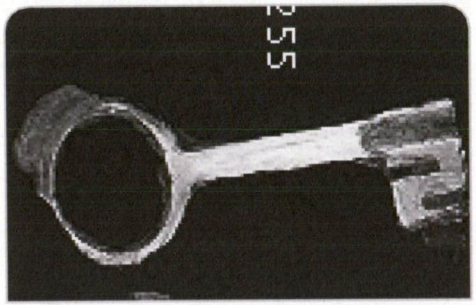
Artifact:

Wrought Iron Key

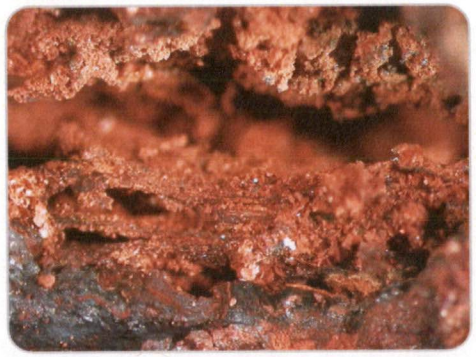
Pretreatment:
Provenience: DHDelta
Excavation Date: Unknown
Weight: 11.175 g
Length: 6.2 cm
Width: 2 cm
Thickness: 5.5 mm
Munsell Color: Rust:
2.5YR 2.5/3 (dark reddish brown)
Encrustation:
7.5 YR 6/4 (light brown)

Post Treatment:
Weight: N/A
Munsell Color: Red:
10R 3/4 (dusky red)
Black/Dark Brown:
10R 2.5/1 (reddish black)

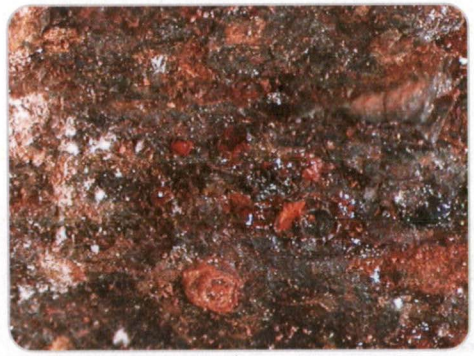
Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



Pretreatment X-ray



Microscopic View: "crystalline" corrosion



Microscopic View: reflective droplets

Post Treatment X-ray

Post Treatment View

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

Post Cleaning View:

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

DH 10000-258

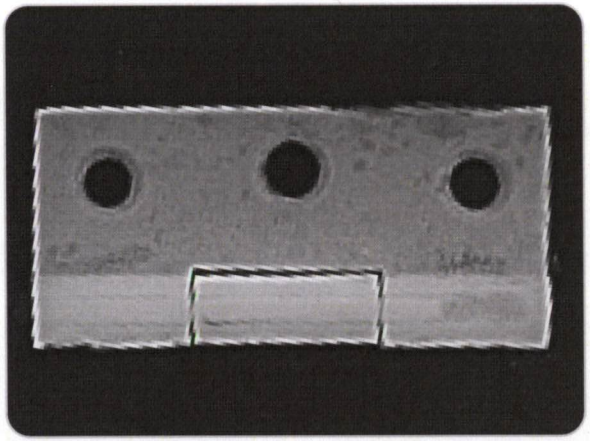
Artifact:

Wrought Iron Hinge

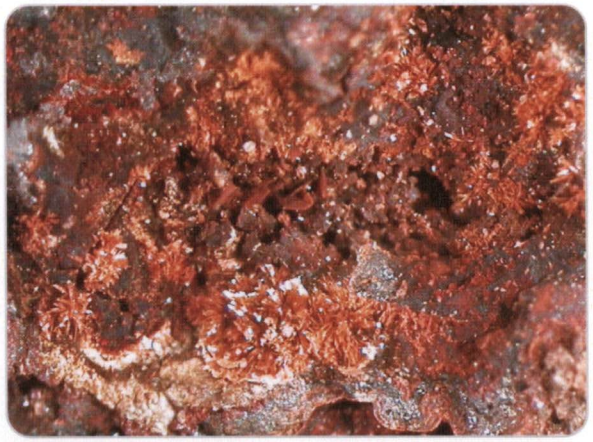
Pretreatment:
Provenience: DH72B
Excavation Date: 1981
Weight: 65.322 g
Length: 6.3 cm
Width: 2 cm
Thickness: 5 mm
Munsell Color: Rust:
7.5YR 2.5/8 (reddish yellow)
Pitted Areas:
7.5 YR 2.5/3 (very dark brown)

Post Treatment:
Weight: 64.024 g
Munsell Color: Red:
10R 3/4 (dusky red)
Black/Dark Brown:
10R 2.5/1 (reddish black)

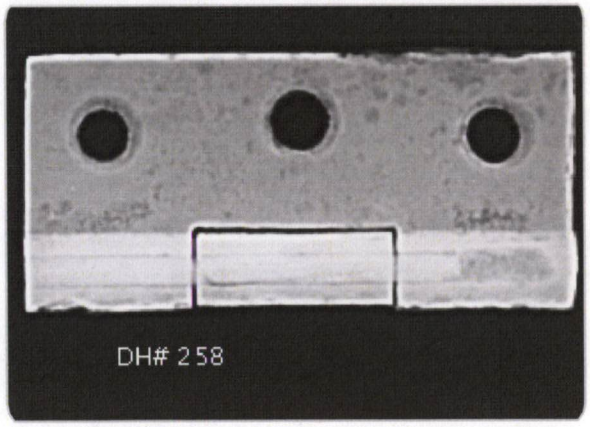
Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



Pretreatment X-ray



Microscopic View: "crystalline" corrosion



Post Treatment X-ray

Post Treatment View

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

Post Cleaning View:

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

DH 10000-260

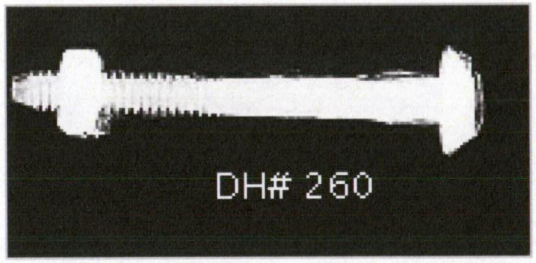
Artifact:

Wrought Iron Screw

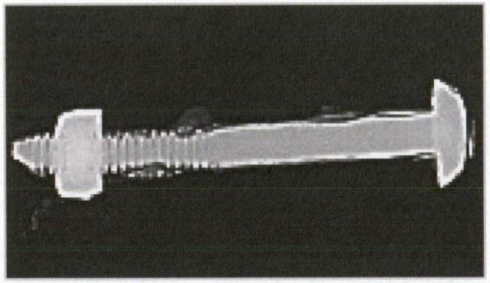
Pretreatment:
Provenience: DH38B
Excavation Date: 1976
Weight: 26.468 g
Length: 7 cm
Width: .8 cm
Thickness: 6.6 mm
Munsell Color: Rust:
7.5YR 6/8 (reddish yellow)
Pitted Areas:
7.5 YR 2.5/3 (very dark brown)

Post Treatment:
Weight: 25.362 g
Munsell Color Red:
10R 3/4 (dusky red)
Black/Dark Brown:
10R 2.5/1 (reddish black)

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

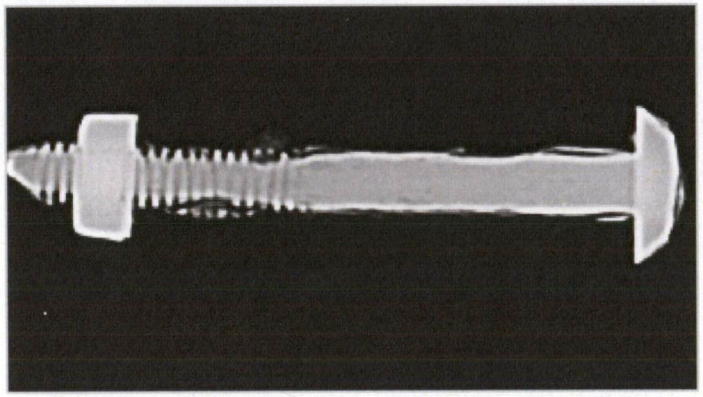


Pretreatment X-ray, View 1



Pretreatment X-ray, View 2

Microscopic View: reflective droplets



Post Treatment X-ray

Post Treatment View

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

Post Cleaning View:

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

DH 10000-262

Artifact:

Wrought Iron Pintle

Pretreatment:

Provenience: DH71B
Excavation Date: 1981
Weight: 97.011 g
Length: 11.5 cm
Width: 3 cm
Thickness: 10.5 mm

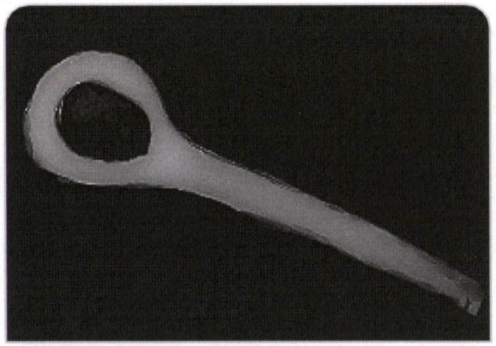
Munsell Color:

Rust: 2.5YR 6/8 (dark red)
Encrustation: 10 YR 6/6 (brownish yellow)

Post Treatment:

Weight: 95.169 g
Munsell Color:
Red: 10R 3/4 (dusky red)
Black/Dark Brown: 10R 2.5/1 (reddish black)

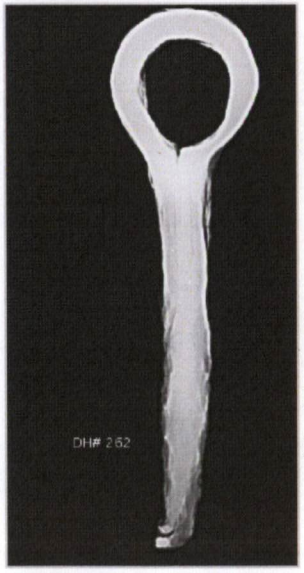
Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



Pretreatment X-ray

Microscopic View: cracking

Microscopic View: pitting



Post Treatment X-ray

Post Treatment View

Post Treatment View: close up pitting

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

Post Cleaning View:

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

DH 10000-263

Artifact:

Wrought Iron Bolt, hooked

Pretreatment:

Provenience: DH70B
Excavation Date: 1981
Weight: 68.380 g
Length: 10.5 cm
Width: 1 cm
Thickness: 9 mm

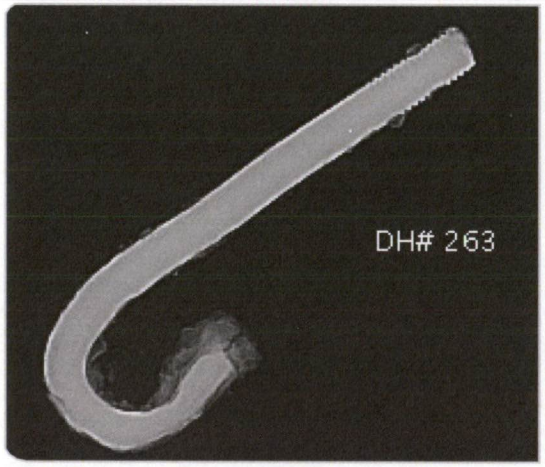
Munsell Color:

Sulphur: 10YR 7/8 (yellow)
Pitted Areas: 5 YR 3/4 (dark reddish brown)

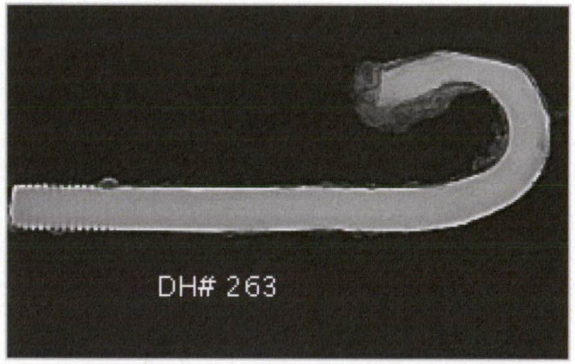
Post Treatment:

Weight: 66.200 g
Munsell Color:
Red: 10R 3/4 (dusky red)
Black/Dark Brown: 10R 2.5/1 (reddish black)

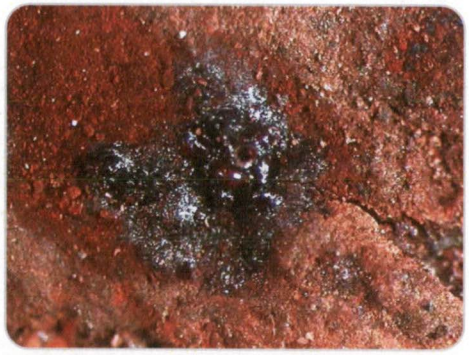
Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



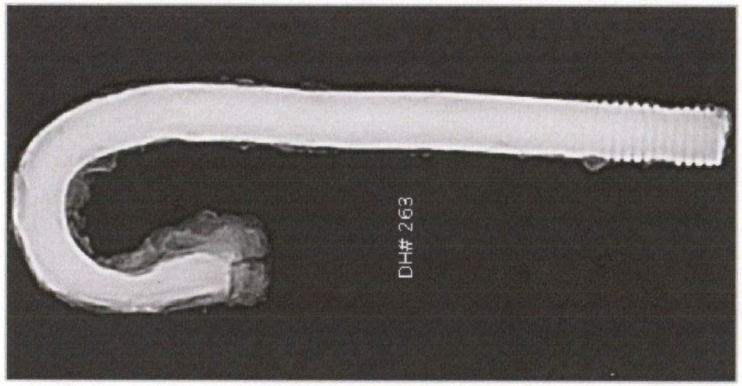
Pretreatment X-ray, View 1



Pretreatment X-ray, View 2



Microscopic View: droplets



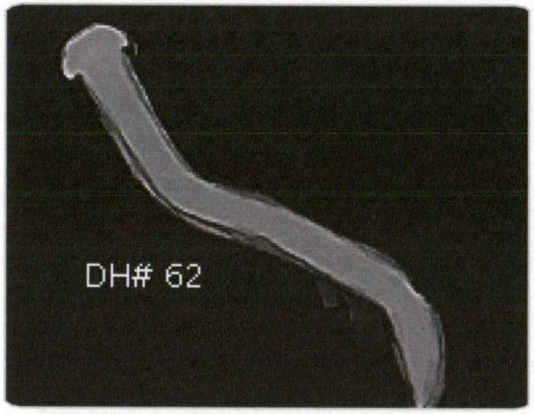
Post Treatment X-ray

Post Treatment View

Appendix D: Subcritical Experiment Artifact Documentation Sheet	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

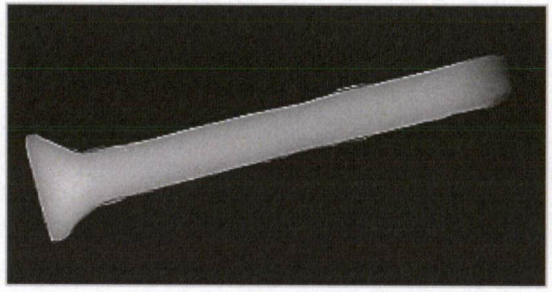
Post Cleaning View:

Appendix E: Supplemental Photographic Documentation X-ray analysis to determine subcritical potential	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



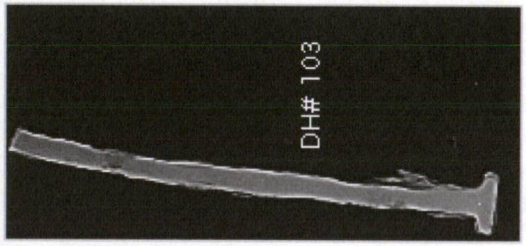
Artifact ID No: DH 10000-062

Description: Ornamental Nail



Artifact ID No: DH 10000-063

Description: Nail



Artifact ID No: DH 10000-103

Description: Nail

Artifact ID No: DH 10000-062

Description: Ornamental Nail

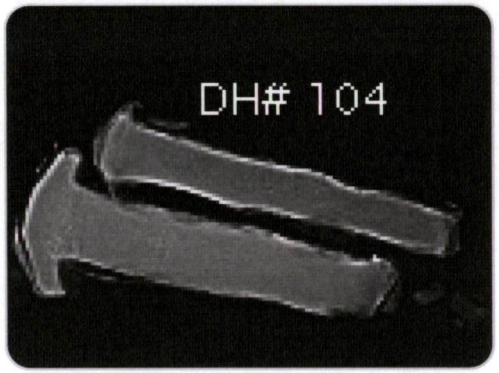
Artifact ID No: DH 10000-063

Description: Nail

Artifact ID No: DH 10000-103

Description: Nail

Appendix E: Supplemental Photographic Documentation X-ray analysis to determine subcritical potential	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

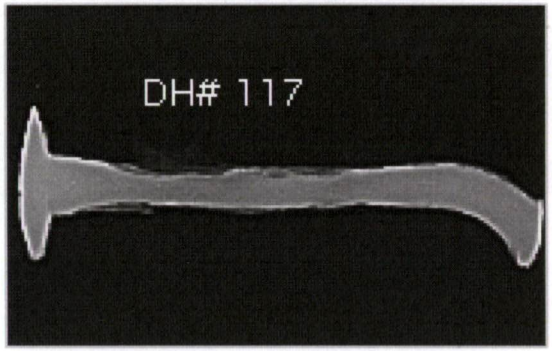


Artifact ID No: DH 10000-104

Description: Nails

Artifact ID No: DH 10000-104

Description: Nails

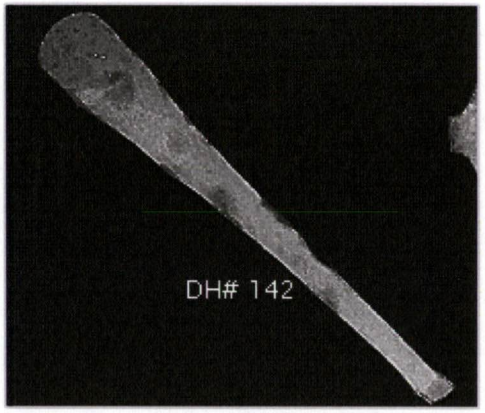


Artifact ID No: DH 10000-117

Description: Nail

Artifact ID No: DH 10000-117

Description: Nail



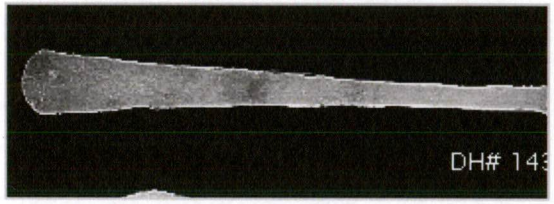
Artifact ID No: DH 10000-142

Description: Utensil Handle

Artifact ID No: DH 10000-142

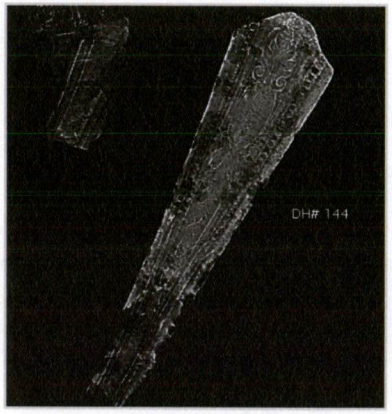
Description: Utensil Handle

Appendix E: Supplemental Photographic Documentation X-ray analysis to determine subcritical potential	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



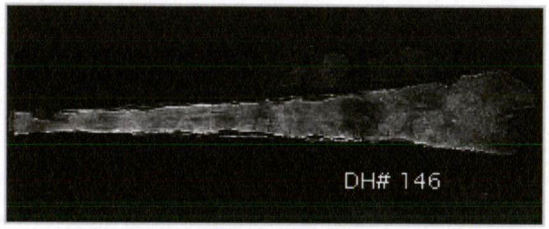
Artifact ID No: DH 10000-143

Description: Utensil Handle



Artifact ID No: DH 10000-144

Description: Utensil Handle, note engraving



Artifact ID No: DH 10000-146

Description: Utensil Handle

Artifact ID No: DH 10000-143

Description: Utensil Handle

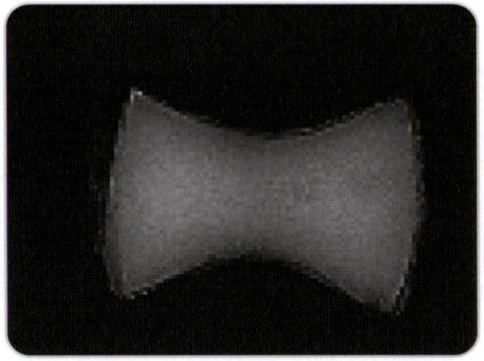
Artifact ID No: DH 10000-144

Description: Utensil Handle

Artifact ID No: DH 10000-146

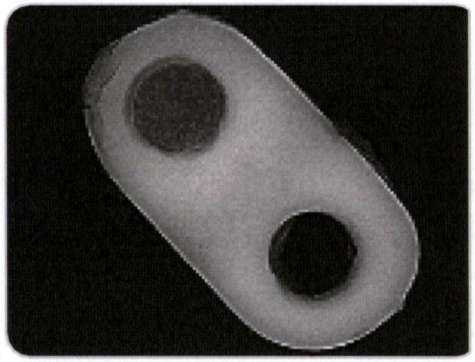
Description: Utensil Handle

Appendix E: Supplemental Photographic Documentation X-ray analysis to determine subcritical potential	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



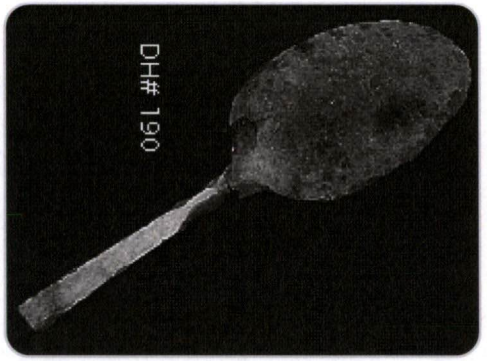
Artifact ID No: DH 10000-165

Description: Weight



Artifact ID No: DH 10000-166

Description: Unknown Use



Artifact ID No: DH 10000-190

Description: Spoon

Artifact ID No: DH 10000-165

Description: Weight

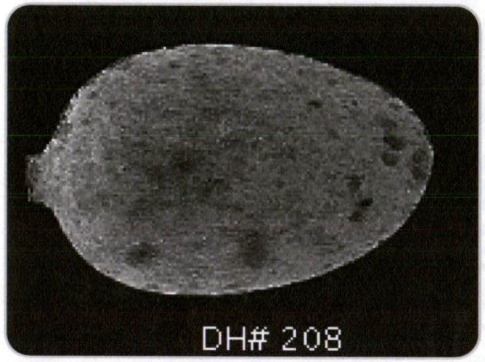
Artifact ID No: DH 10000-166

Description: Unknown Use

Artifact ID No: DH 10000-190

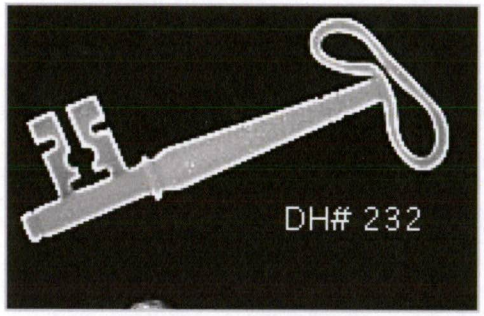
Description: Spoon

Appendix E: Supplemental Photographic Documentation X-ray analysis to determine subcritical potential	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



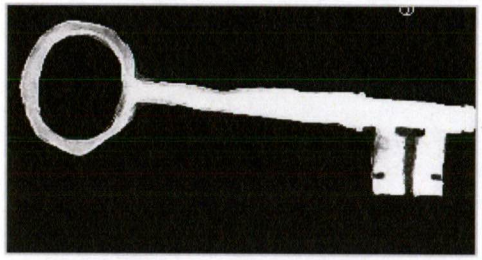
Artifact ID No: DH 10000-208

Description: Spoon Bowl



Artifact ID No: DH 10000-232

Description: Key

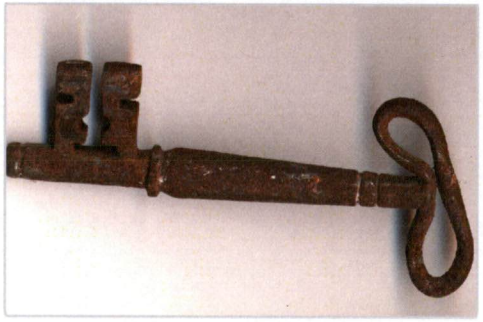


Artifact ID No: DH 10000-229

Description: Key

Artifact ID No: DH 10000-208

Description: Spoon Bowl



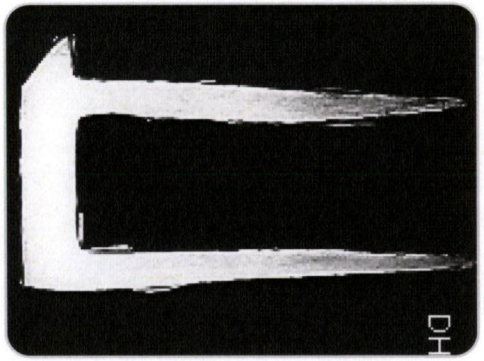
Artifact ID No: DH 10000-232

Description: Key

Artifact ID No: DH 10000-229

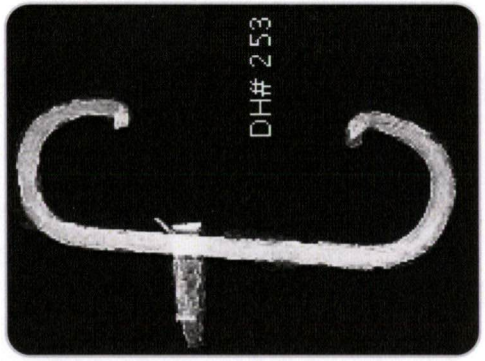
Description: Key

Appendix E: Supplemental Photographic Documentation X-ray analysis to determine subcritical potential	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



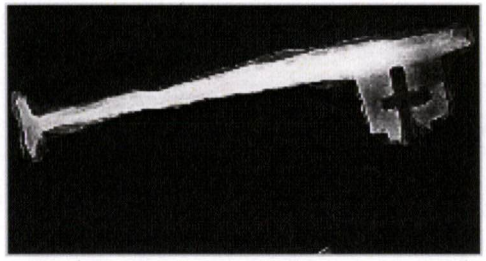
Artifact ID No: DH 10000-249

Description: Tool



Artifact ID No: DH 10000-253

Description: Handle, furniture



Artifact ID No: DH 10000-254

Description: Key

Artifact ID No: DH 10000-249

Description: Tool

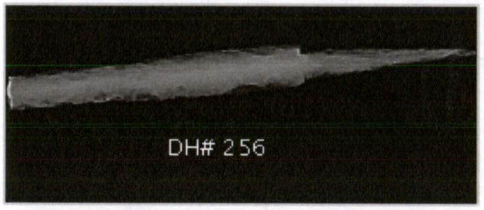
Artifact ID No: DH 10000-253

Description: Handle, furniture

Artifact ID No: DH 10000-254

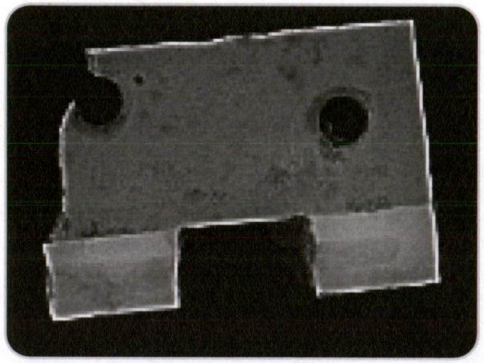
Description: Key

Appendix E: Supplemental Photographic Documentation X-ray analysis to determine subcritical potential	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



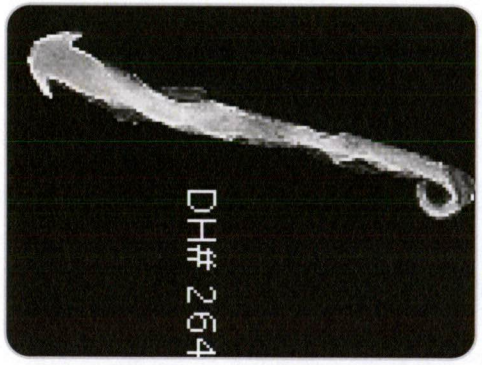
Artifact ID No: DH 10000-256

Description: File, triangular



Artifact ID No: DH 10000-257

Description: Hinge



Artifact ID No: DH 10000-264

Description: Ornamental Nail

Artifact ID No: DH 10000-256

Description: File, triangular

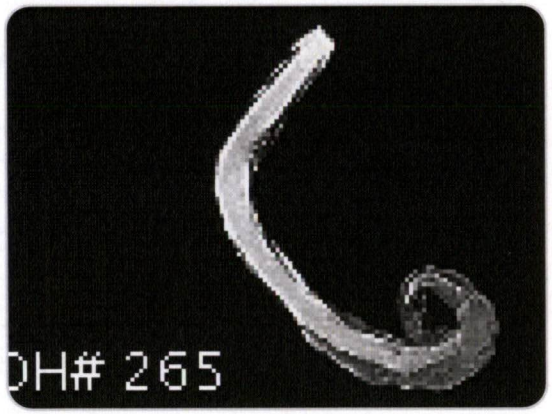
Artifact ID No: DH 10000-257

Description: Hinge

Artifact ID No: DH 10000-264

Description: Ornamental Nail

Appendix E: Supplemental Photographic Documentation X-ray analysis to determine subcritical potential	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



Artifact ID No: DH 10000-265

Description: Ornamental Nail

Artifact ID No: DH 10000-265

Description: Ornamental Nail

Appendix E: Supplemental Photographic Documentation X-ray analysis to determine subcritical potential	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

Artifact ID No: DH 10000-131

Description: Gutter hanger

Artifact ID No: DH 10000-261

Description: Handle, furniture

Artifact ID No: DH 10000-259

Description: Staple

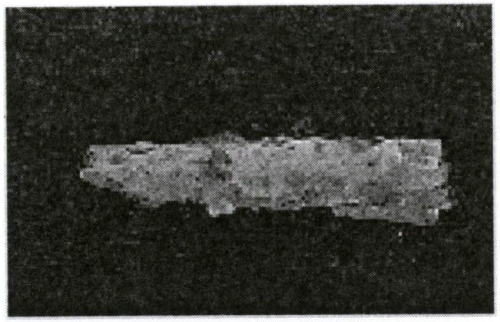
Artifact ID No: DH 10000-147

Description: Cooking Utensil

Artifact ID No: DH 10000-148

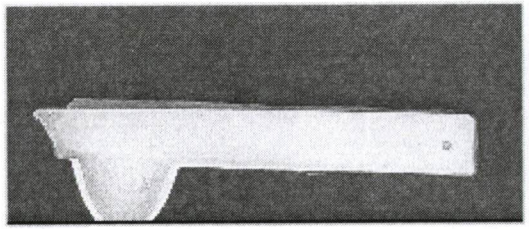
Description: Utensil handle

Appendix F: Supplemental X-ray Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



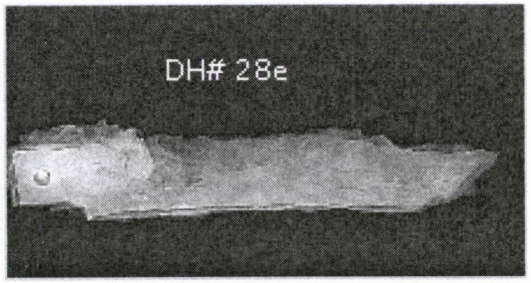
Artifact ID No: 10000-244

Description: Pocket Knife



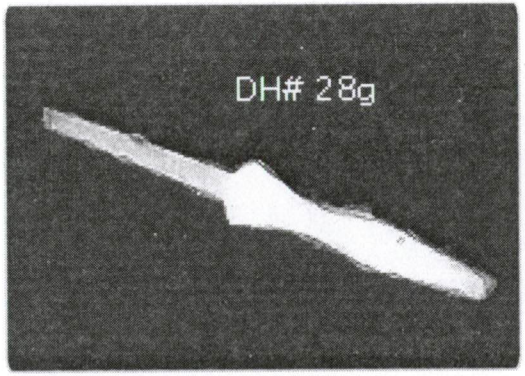
Artifact ID No: 10000-125

Description: Fleam



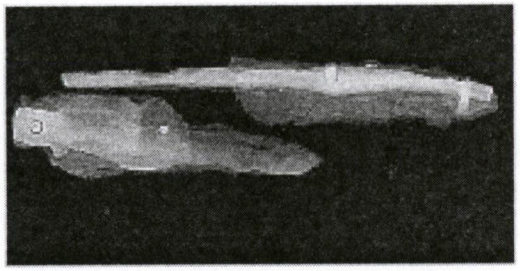
Artifact ID No: 10000-238

Description: Pocket Knife



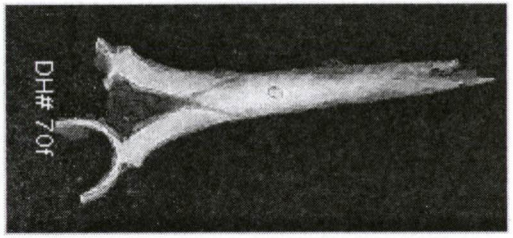
Artifact ID No: 10000-186

Description: Utensil Shaft



Artifact ID No: 10000-241

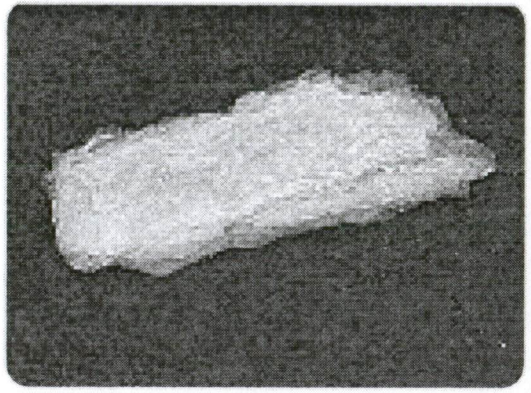
Description: Pocket Knife



Artifact ID No: 10000-705

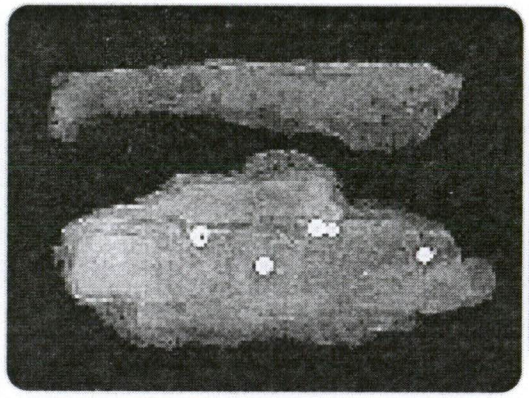
Description: Scissors

Appendix F: Supplemental X-ray Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



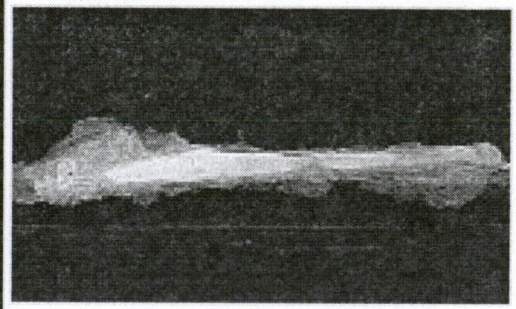
Artifact ID No: 10000-247

Description: Pocket Knife



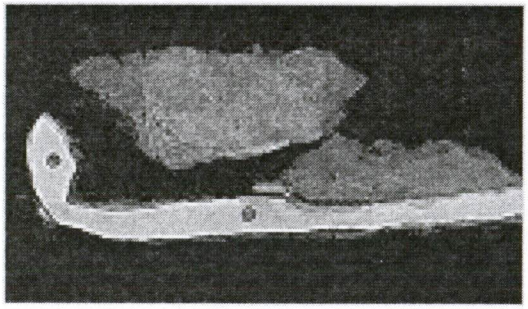
Artifact ID No: 10000-248

Description: Pocket Knife



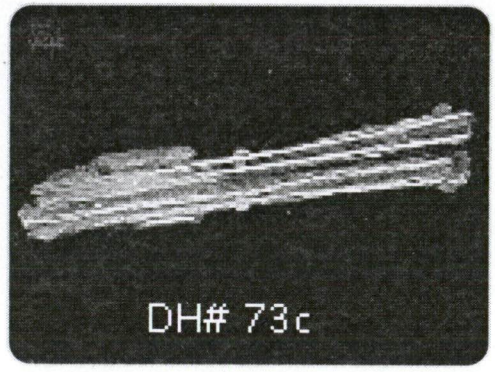
Artifact ID No: 10000-246

Description: Pocket Knife



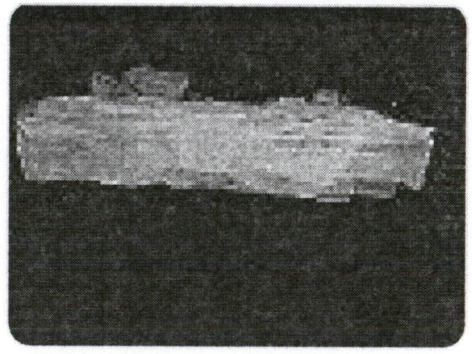
Artifact ID No: 10000-237

Description: Pocket Knife



Artifact ID No: 10000-234

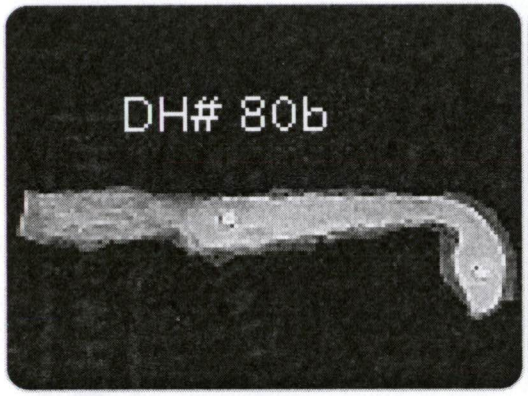
Description: Pocket Knife



Artifact ID No: 10000-240

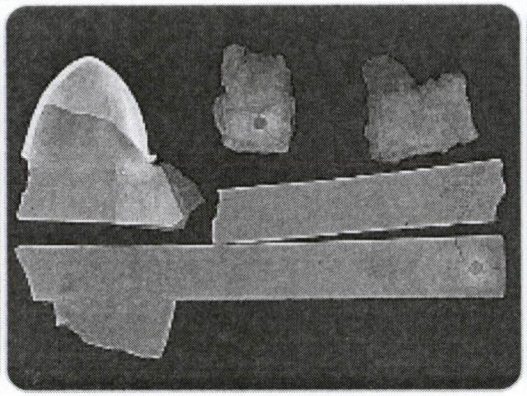
Description: Pocket Knife

Appendix F: Supplemental X-ray Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



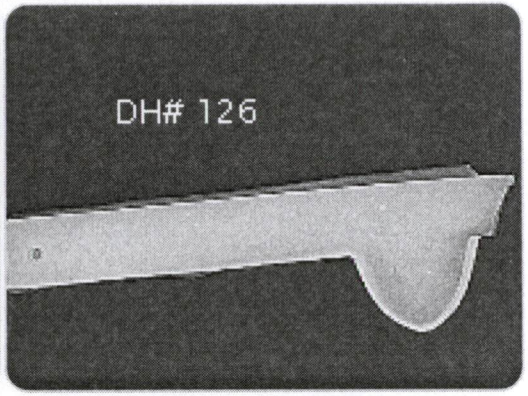
Artifact ID No: 10000-239

Description: Pocket Knife



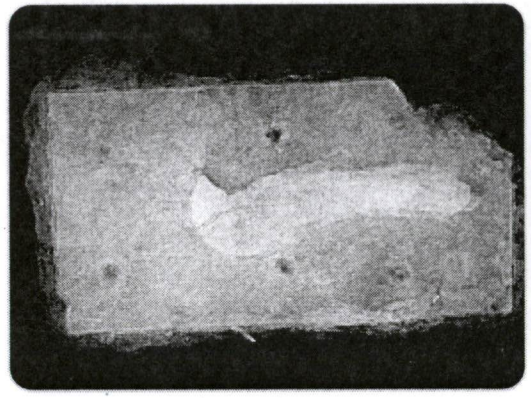
Artifact ID No: DH 10000-125

Description: Fleam



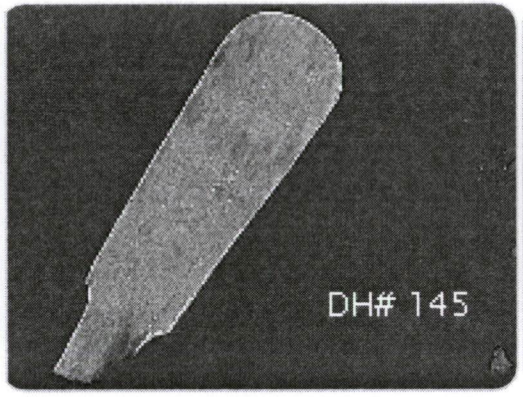
Artifact ID No: DH 10000-126

Description: Fleam



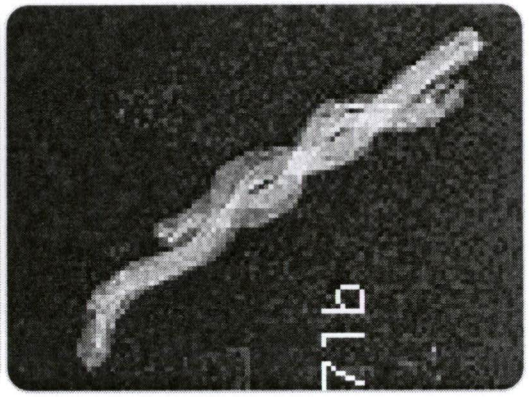
Artifact ID No: DH 10000-135

Description: Box Lock



Artifact ID No: DH 10000-145

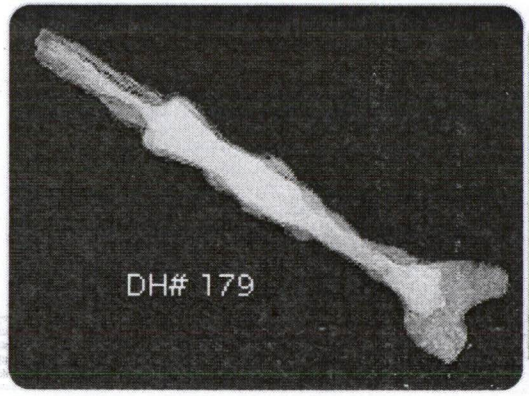
Description: Utensil Handle



Artifact ID No: 10000-251

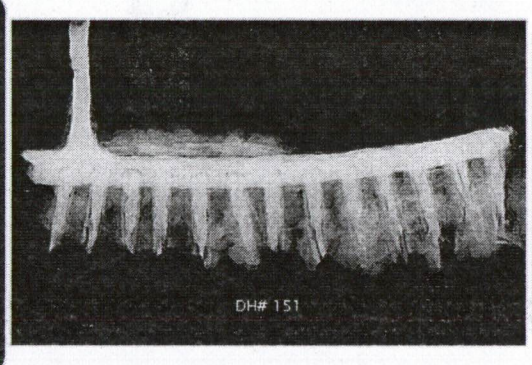
Description: Wire, twisted

Appendix F: Supplemental X-ray Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



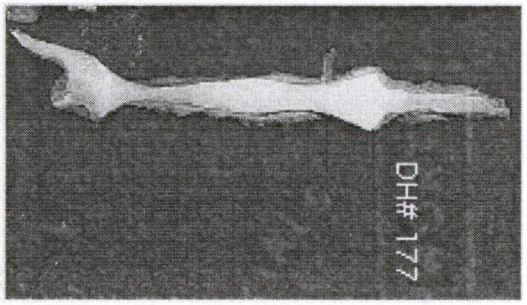
Artifact ID No: DH 10000-179

Description: Utensil Shaft



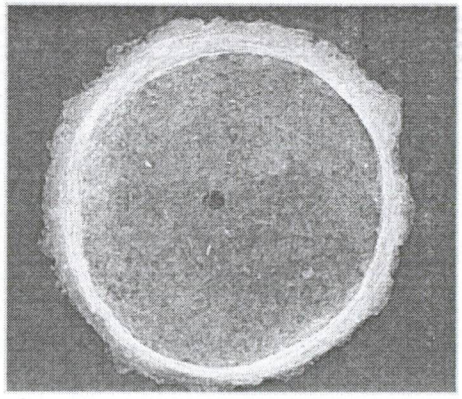
Artifact ID No: DH 10000-151

Description: Unidentified Farm Tool



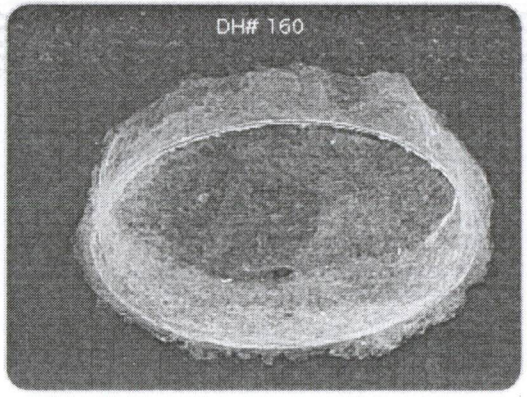
Artifact ID No: DH 10000-177

Description: Utensil Shaft



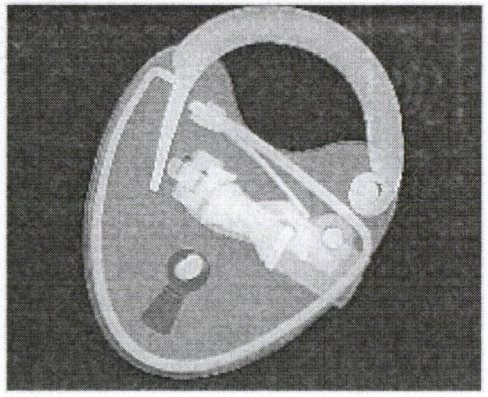
Artifact ID No: DH 10000-160

Description: Lid



Artifact ID No: DH 10000-160

Description: Lid



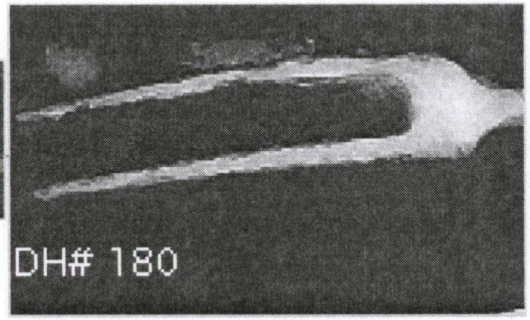
Artifact ID No: DH 10000-176

Description: Padlock

Appendix F: Supplemental X-ray Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

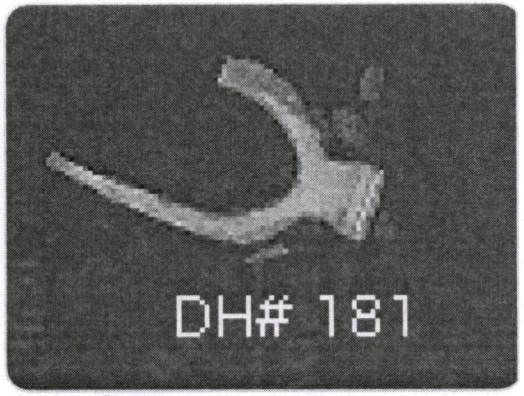
Artifact ID No: DH 10000-178

Description: Fork



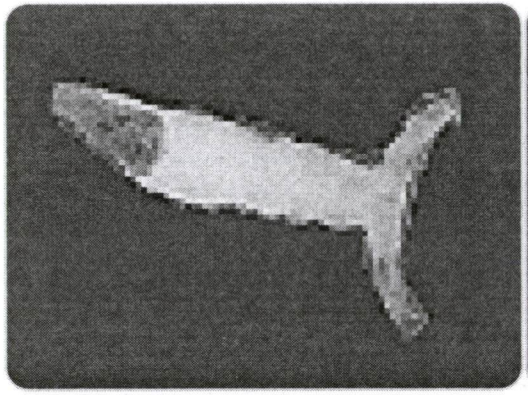
Artifact ID No: DH 10000-180

Description: Fork



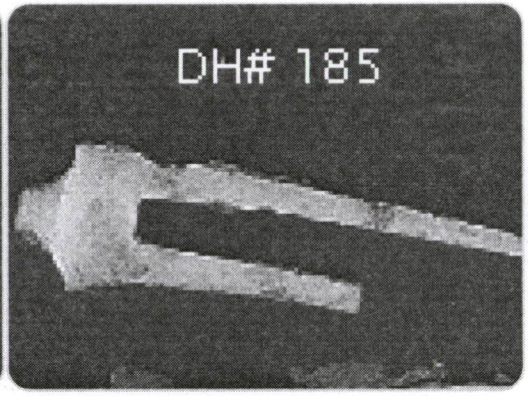
Artifact ID No: DH 10000-181

Description: Fork



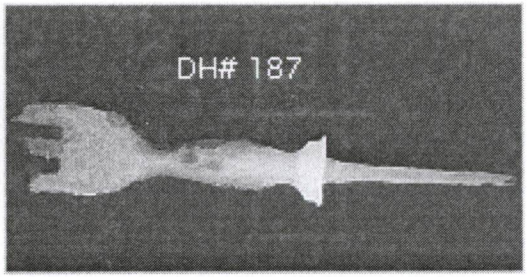
Artifact ID No: DH 10000-183

Description: Fork



Artifact ID No: DH 10000-185

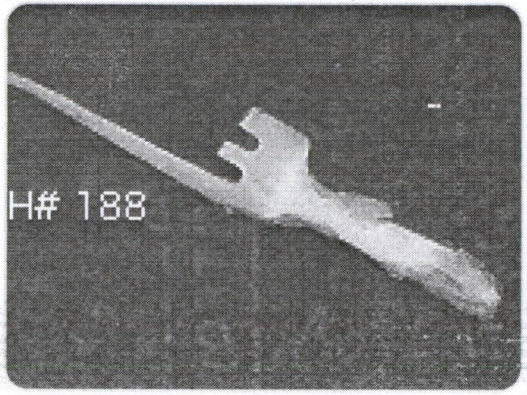
Description: Fork



Artifact ID No: DH 10000-187

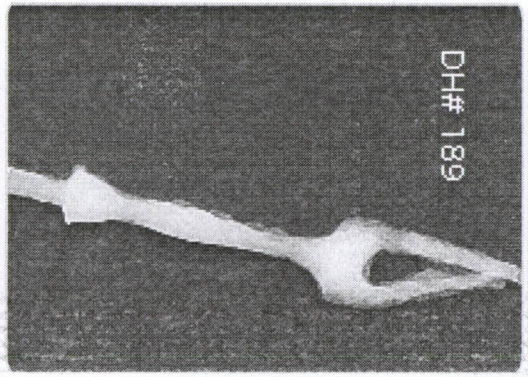
Description: Fork

Appendix F: Supplemental X-ray Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



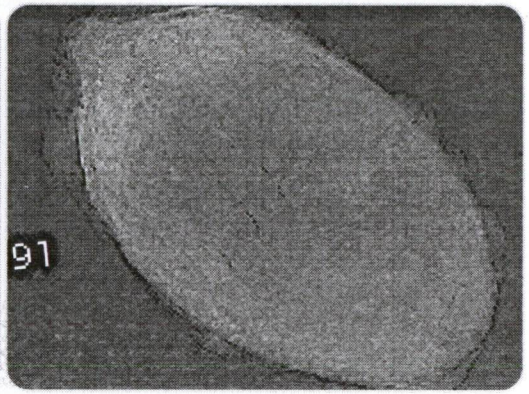
Artifact ID No: DH 10000-188

Description: Fork



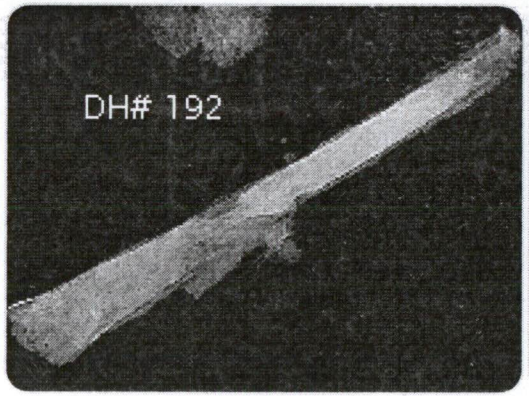
Artifact ID No: DH 10000-189

Description: Utensil Shaft



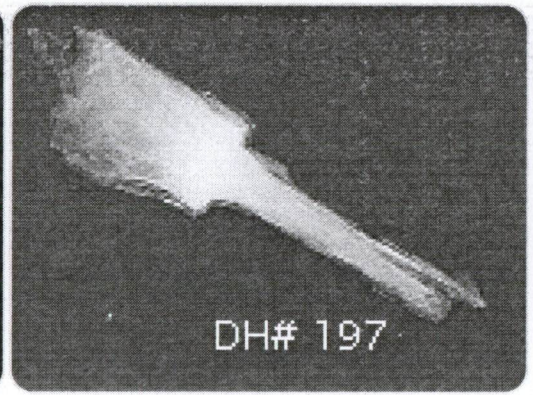
Artifact ID No: DH 10000-191

Description: Sppon Bowl



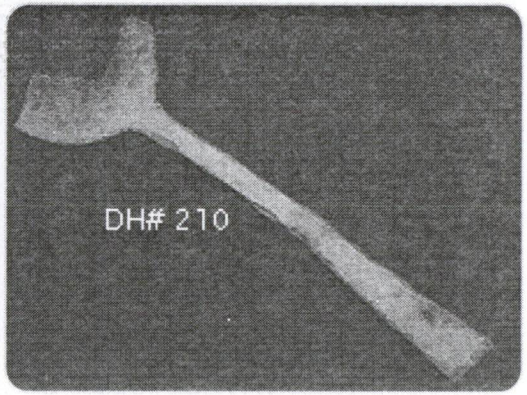
Artifact ID No: DH 10000-192

Description: Utensil Handle



Artifact ID No: DH 10000-197

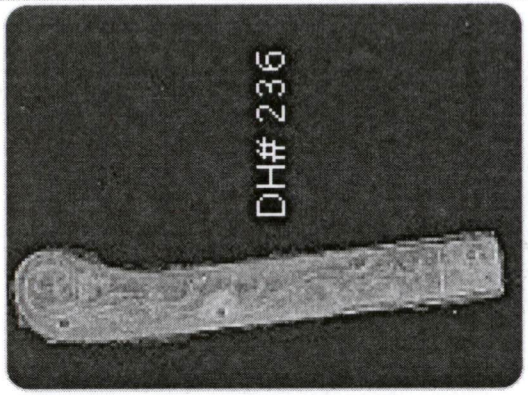
Description: Knife



Artifact ID No: DH 10000-210

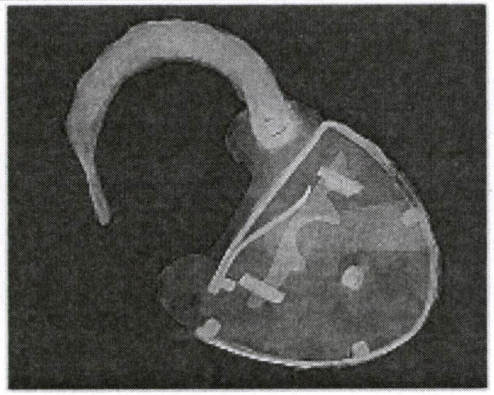
Description: Spoon

Appendix F: Supplemental X-ray Documentation	Client	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



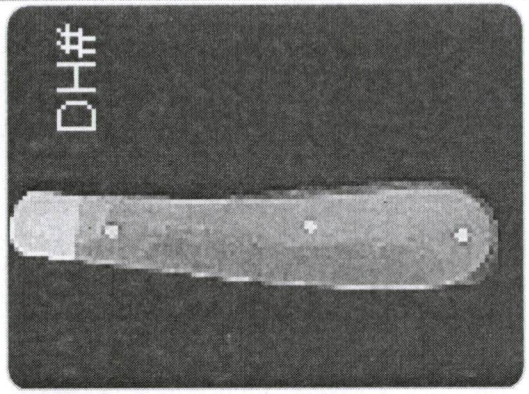
Artifact ID No: DH 10000-236

Description: Pocket Knife



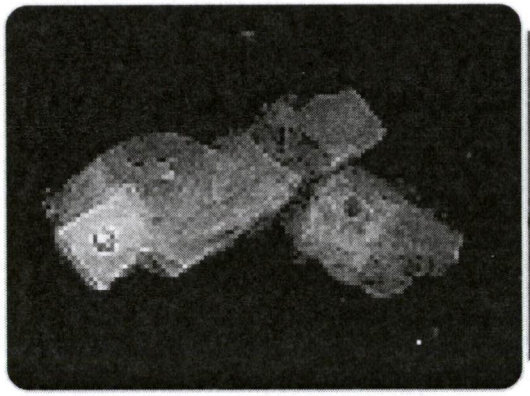
Artifact ID No: DH 10000-232

Description: Padlock



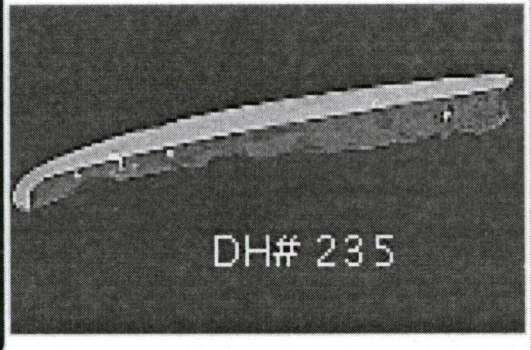
Artifact ID No: DH 10000-231

Description: Pocket Knife



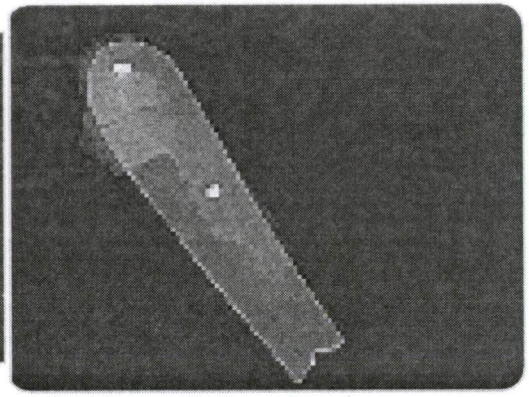
Artifact ID No: DH 10000-250

Description: Pocket Knife



Artifact ID No: DH 10000-235

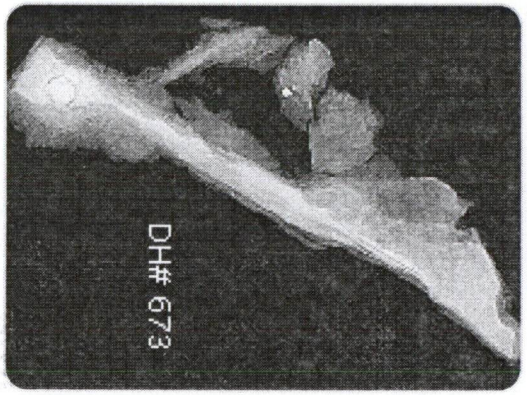
Description: Pocket Knife



Artifact ID No: DH 10000-234

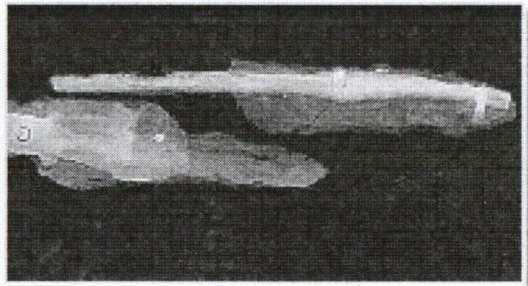
Description: Pocket Knife

Appendix F: Supplemental X-ray Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



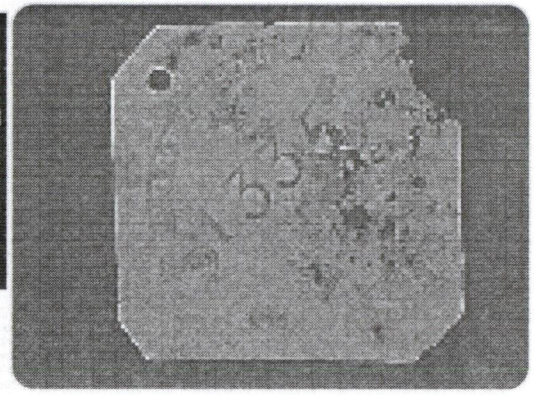
Artifact ID No: DH 10000-673

Description: Pocket Knife



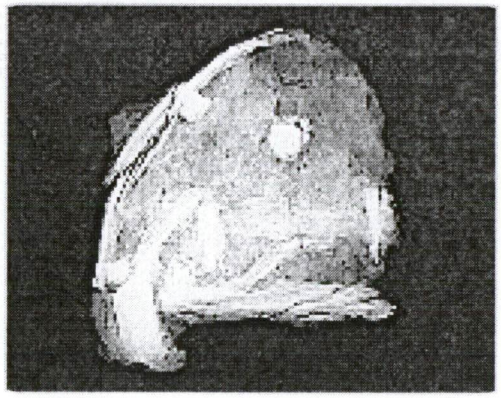
Artifact ID No: DH28Q

Description: Pocket Knife



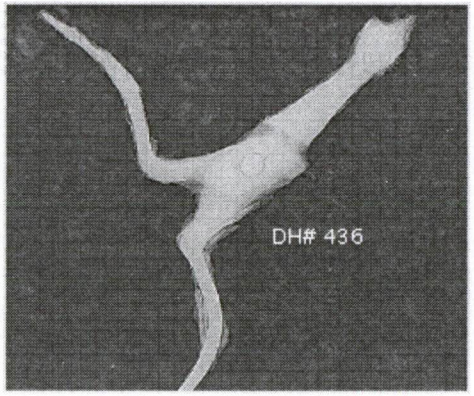
Artifact ID No: DH MC

Description: Slave Tag



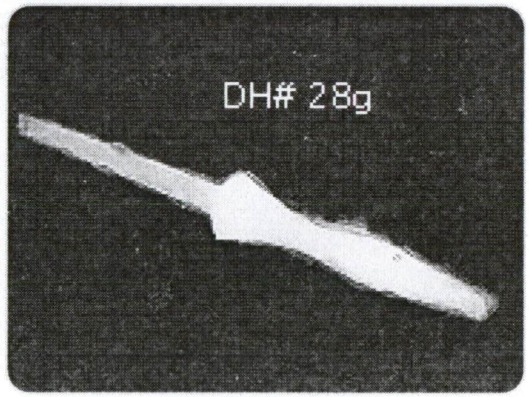
Artifact ID No: DH 10000-703

Description: Lock



Artifact ID No: DH 10000-436

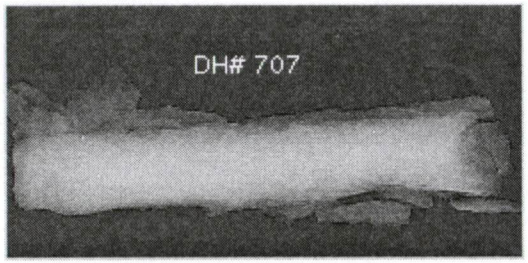
Description: Tongs



Artifact ID No: DH 10000-28G

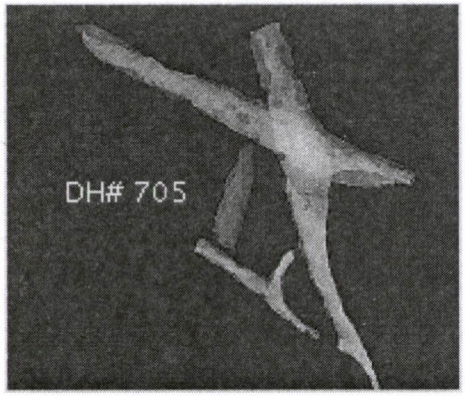
Description: Utensil Shaft

Appendix F: Supplemental X-ray Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



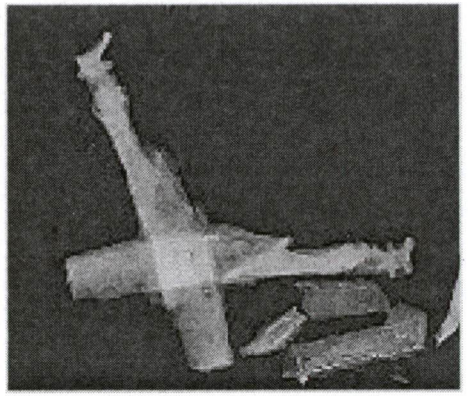
Artifact ID No: DH 10000-707

Description: Spike



Artifact ID No: DH 10000-705

Description: Scissors



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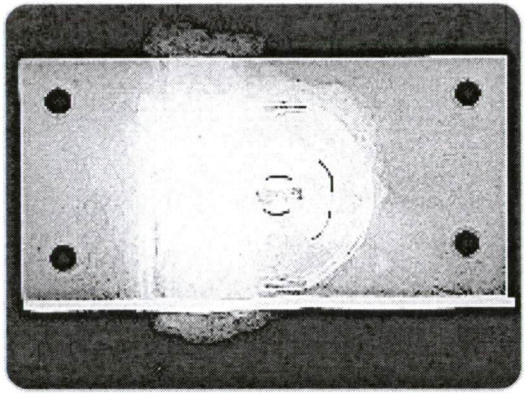
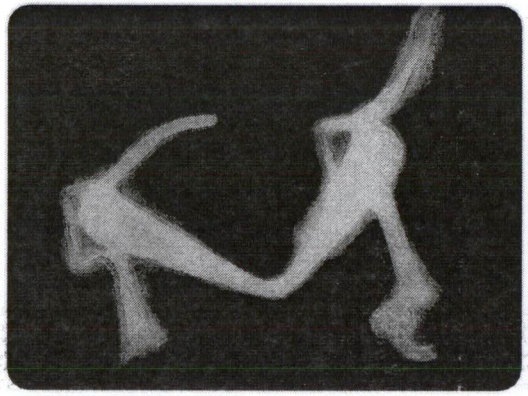


Artifact ID No: DH 10000-718

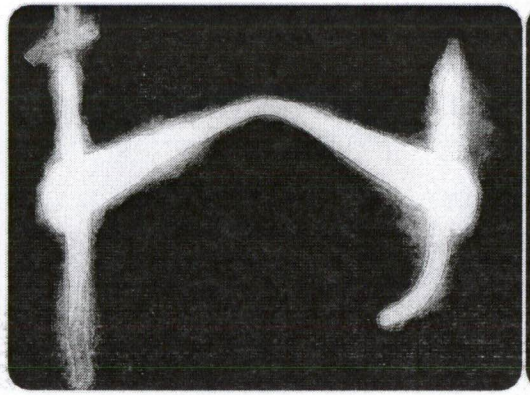
Description: Lock

Appendix F: Supplemental X-ray Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



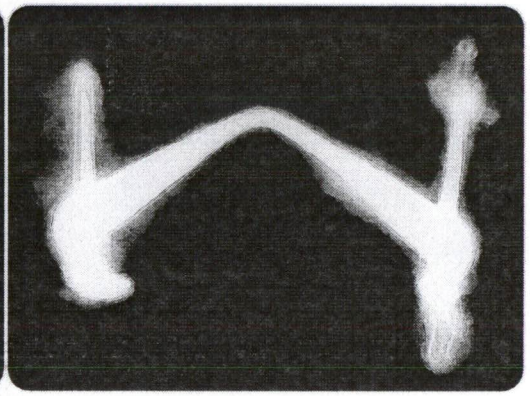
Artifact ID No: Horse Bit

Description: View 1



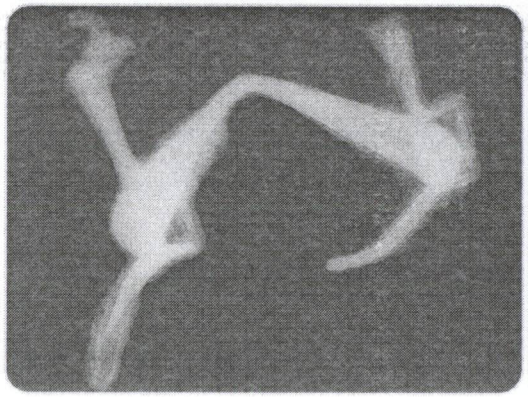
Artifact ID No: Horse Bit

Description: View 2



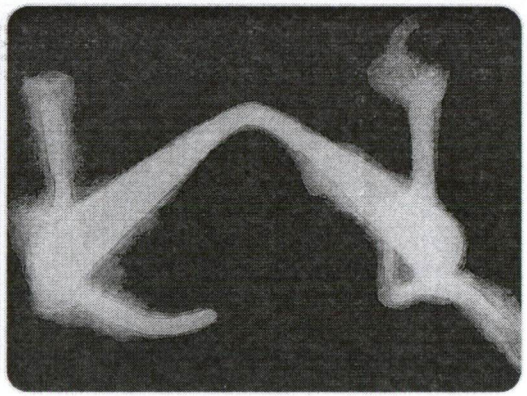
Artifact ID No: Horse Bit

Description: View 3



Artifact ID No: Horse Bit

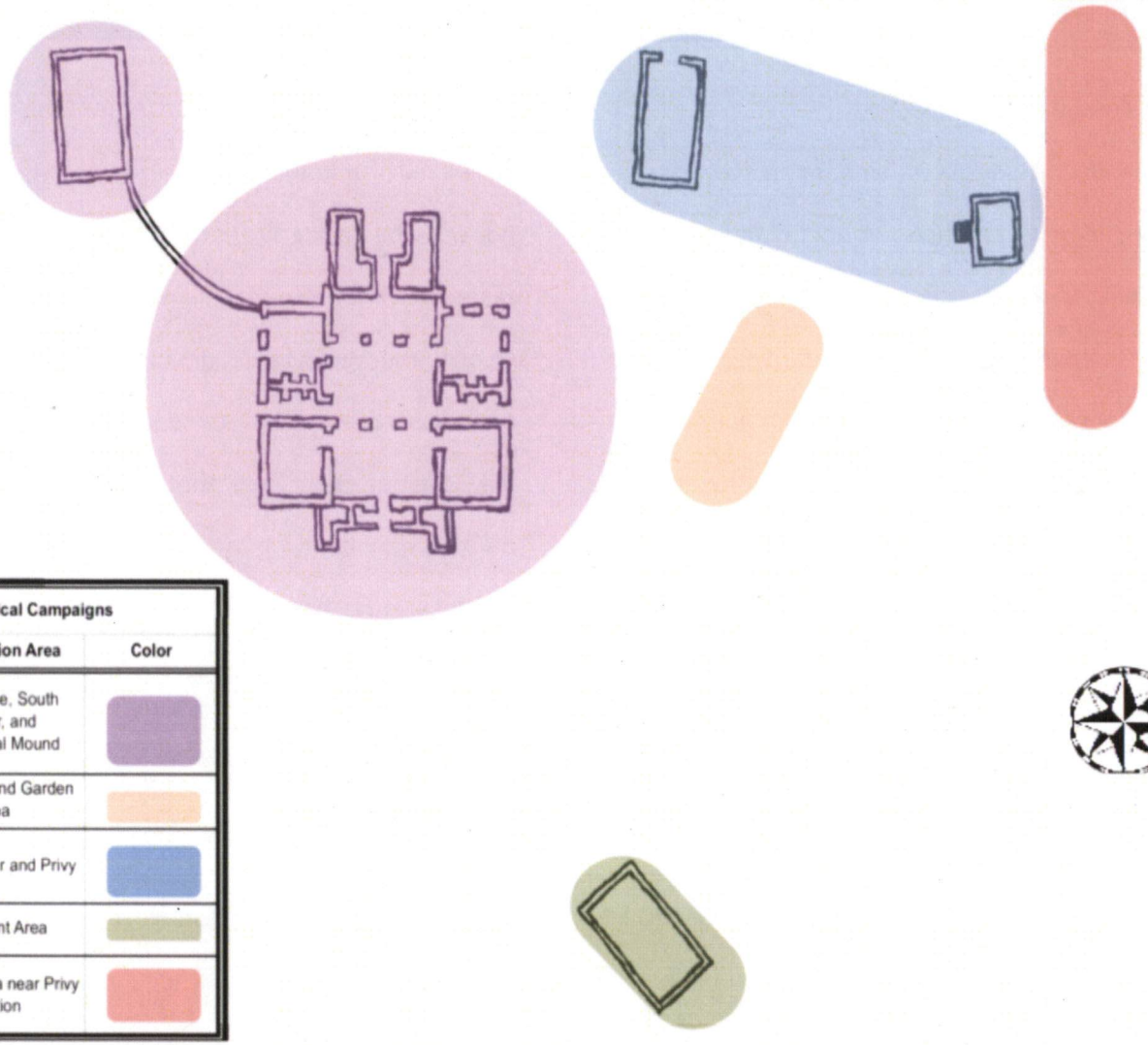
Description: View 4



Artifact ID No: Horse Bit

Description: View 5

Appendix G: Supplemental X-ray Documentation	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center



Archaeological Campaigns		
Year	**Investigation Area**	**Color**
1974	Main House, South Flanker, and Ornamental Mound	
1980	East Lawn and Garden Area	
1981	North Flanker and Privy	
1989	Waterfront Area	
2003/2005	Wooded Area near Privy location	

Appendix H: Lock Documentation and Recommendations	**Client**	Drayton Hall Collection
	Project	Recommendations of Conservation Approaches

History & Project Goals:

The goal of this assessment was to survey the metal hardware contained in the house and document its condition. One specific lock was chosen for further study as a representative sample of the overall hardware collection. The lock is located on the main floor in the stair hall, which faces the Ashley River. The doorway is located on the northeast side of the building, often thought of as the back door to the house. The lock is classified as a "box lock" and dates to c. 1800.

When determining the appropriate treatment for this lock several coating methods were analyzed. Traditional painting and lubrication methods were researched as well as modern paints and lubricants. Another aspect to this assessment is the preservation philosophy in use at Drayton Hall. This philosophy consists of using the fewest interventions possible to stabilize and preserve the house. This added another dimension to the methods researched in that most methods for metal restoration involve the removal of unstable paint layers and reapplication of new paints or coatings. The total removal of the original paint was not acceptable in this situation; neither was applying a modern coating that would make the locks and hardware appear new. By using these criteria as the beginning step, more appropriate historic methods were researched.

Protective metal coatings used to stabilize iron and other metals historically include: paints, varnishes, and oils. Many recipes can be found in trade publications produced for painters. *The Art of Painting in Oyl,* by

John Smith was printed in London in 1723. This publication gives a recipe that is a mixture of turpentine, linseed oil, red lead, and oil of turpentine.[1] The mix was left to stand in the heat and then remixed and used to varnish all types of iron. The use of red lead as a rust preservative for iron appears to be well known and is named in many recipes.[2] There are variations on these recipes using sulfur as an additive. Tinted finishes were sometimes used in a formula known as lacquer. Lacquers contained spirit varnish with organic dyes and were in common use from 1750-1850.[3] The use of a lead based paint or varnishes containing lead were typically used in historic treatments for ironwork. Natural oils and waxes were used as lubricants.

Modern treatment methods include: the removal of corrosion products, rust inhibiting treatments, with paints being the most common, and lubrication for moving pieces. The removal of rust or corrosion products is completed through abrasion treatments followed by washing the hardware unit to remove any remaining residue. The unit must be painted or coated with wax immediately upon drying or corrosion will begin again. When paint is chosen, rust inhibiting primers and topcoats should be used. It is often good practice to use the same system of paints to ensure compatibility. If waxes are chosen for coating the unit, only tested and proven restoration waxes should be applied. If natural waxes are used they can build up on the surface of the hardware diminishing

the fine details of the piece. In addition they are tacky when applied and collect dust and soil easily.

The wax used most often in museums is Renaissance Micro-Crystalline Wax Polish, formulated originally for the British Museum. This wax is a blend of natural and synthetic waxes. According to the manufacturer, it provides an improved moisture barrier due to the finer microcrystalline structure.[4] Waxes add corrosion protection but not adequate lubrication. Modern lubricants are often sold in a liquid form. These types cause preservation concerns due to the moisture they add to the metal surface and their dirt collecting potential. As a result of these issues, liquid based products are not recommended. Powdered graphite is a lubricant that has been used in modern times in industrial, residential, and commercial settings. It has shown potential in the lubrication of historic locks.[5]

Methodology & Assessment:

The first step for any preservation project is to research the subject under study and to perform a conditions assessment. The lock chosen for this project was visually inspected while attached to the door. Photographs were taken from several angles and the lock was measured. The next step was to remove the lock from the door.[6] The first attempt at removal failed due to rusting and bending of the screws holding the lock in place. These screws were not original, but inappropriate repair screws, and did not fit into the holes properly. After attempting to remove this lock, other locks and

hinges in the house were inspected and were determined to also contain rusted screws and nails. Active corrosion was found on all metal hardware visually inspected at the time. The corrosion present was seen as brightly colored rust coming from joints, hinges, holes, and bolts. Past corrosion was also present in the form of dark rust stains and a "patina" like coating on the metal surfaces. Also witnessed at this point in the inspection were lubricant stains around many of the hardware units. These stains were dark in color and feathered out from the metal connections into the wood surfaces. The residue of lubricant was dry to the touch.

During the second attempt of removal, the lock was realigned on the door and extra pressures were exerted on the screws to facilitate their removal. Once removed from the door, the lock was again visually inspected on the exterior and interior and photographs were taken of the interior mechanisms. (Photographic Documentation Sheet) During this inspection, the moving parts of the lock were removed and individually inspected. The interior of the lock was found to be in a reasonable state of preservation. Active corrosion was present, however none of the interior mechanisms had rusted to the point of breaking and all working parts were still movable and intact. After the lock was photographed, it was reassembled and returned to the door. During the reattachment process, ghost marks from previous locks were visible and compared to the current lock. Several holes were found which did not align with the current lock and ghost marks found indicated the

presence of two previous locks, visible in Photograph 3 on the documentation sheet.

The lock measured 6" in height, 10 ¼" in length, and 1 ½" deep. It is considered a robust lock for the early 1800s. The handle connection is different than many of its contemporaries. The spring is in one continuous piece and is larger than typical locks from this period. To stabilize the lock the following procedures are needed: removal of corrosion products, the addition of a protective coating to prevent further corrosion, and the application of a lubricating agent for the sliding action of the bolt and spring.

Recommendations:

Since traditional repainting treatments were eliminated from the choices available, due to the preservation philosophy employed at Drayton Hall, the recommendations for the lock include the removal of rust from the interior of the lock. This would be followed by painting and lubrication with powdered graphite, on only the interior surface. By choosing to repaint the interior of the lock the exterior's visual appearance will not be changed, in keeping with the philosophy of the least intervention possible. Additionally the lubrication of interior working mechanisms will not visually impact the lock. In accordance with the preservation philosophy of replacing with "in kind" materials; the interior should be coated with a traditional varnish containing linseed oil and lead. These

two components are essential in rust prevention. Once the varnished is allowed to dry completely, powdered graphite should be applied to the interior mechanisms before the lock is returned to the door. The working parts of the lock should be moved repeatedly to ensure good mobility, to fully lubricate the mechanisms, and to remove any excess graphite before placing the lock back in place. The exterior of the lock should not be coated or changed, as no active corrosion could be seen. The original coating has degraded over time but appears to have reached equilibrium.

The use of traditional varnish treatments on the non-visible metal portions can be applied to this lock and all other hardware at Drayton Hall. As these treatments will create no visual impact and will increase the lifespan and workability of the hardware, they are a compromise to total paint removal and restoration. The use of small amounts of powdered graphite can also be applied to all the hardware with moving parts. Due to its powdered form, it will not drip under gravity in the way a liquid would. As it is not a liquid it will not hold dirt, creating stains and films on the surface of the metal. The exterior metal surfaces of the hardware should remain untouched as long as no active corrosion is present. Based on visual inspections of these pieces the corrosion appears in areas that are enclosed and at joints where adequate ventilation is lacking. The inability to thoroughly dry out the joints and connections is the cause of corrosion. Because the house is not climate

controlled the most suitable method for limiting corrosion is to coat these points.

House museum caretakers are faced with unique challenges and with an ethical obligation to preserve and maintain the interior and exterior of the building. The obligation to "do no harm" to the building also includes preventing structural and detail failures. Rust, if not stopped, will result in failure of the metal hardware unit and must be addressed. These recommendations are a best practice compromise balancing a complete restoration of the hardware versus allowing the corrosion to continue. The measures suggested include historically accurate treatments with a smidgen of modern technology.

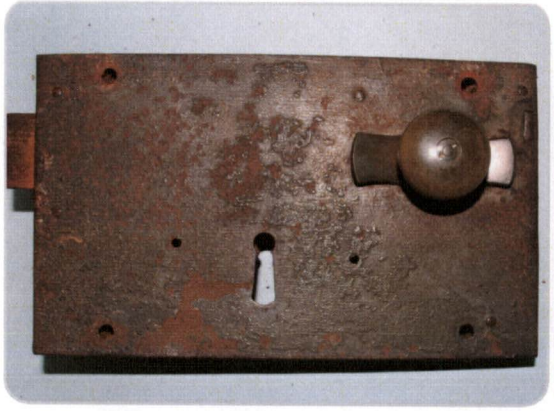
[1]Susan L. Buck. Paint, Varnish, Stain and Drying Oil Recipes for Replication. Self produced. January 2007.
This list includes all types of stain and varnishes. It replicated recipes from John Smith, PF Tingry, Timothy Fishwick, and Isaac Byington, which date from 1723-1816.
[2] Pamela W. Hawkes. "Paints for Architectural Cast Iron." APT Bulletin 11 (1979): 17-18.
[3] Theodore Zuk Penn. "Decorative and Protective Finishes, 1750-1850: Materials, Process, and Craft." APT 16 (1984): 33.
[4] Conservation by Design Ltd. "Materials Safety Data Sheet." and "Product Data Sheet." No date: 3.
[5] The use of graphite was discussed with modern lock technicians at Jantzen Lock in Charleston, SC and with architectural historian and Director of Preservation at Drayton Hall, Matthew Webster.
[6] Matthew Webster and Carter Hudgins, from the Preservation Department at Drayton Hall assisted in the removal of the lock from the door.

Appendix H: Lock Documentation and Recommendations	Client	Drayton Hall Collection
	Project	Recommendations of Conservation Approaches

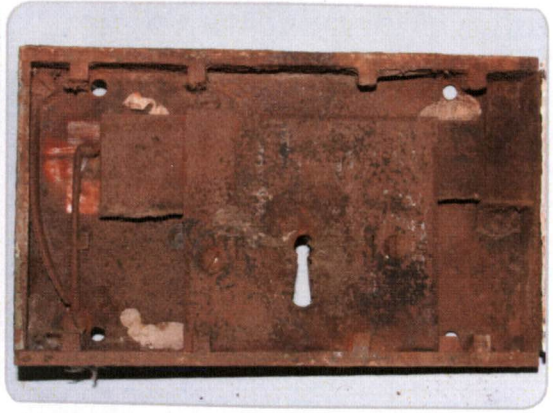
Photograph 1: View of lock in place

Photograph 2: View of lock in place

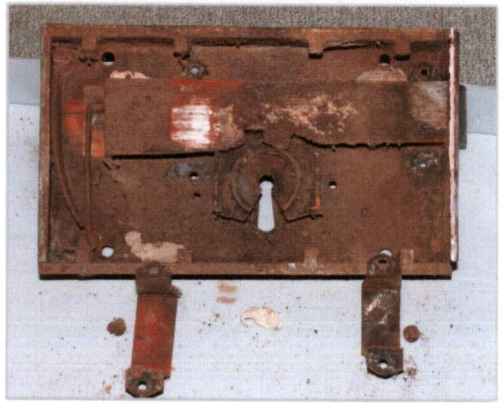
Photograph 3: View of door without lock, note multiple bolt and keyholes



Photograph 4: Exterior view of lock



Photograph 5: Interior view of lock, assembled



Photograph 6: Interior view of lock, disassembled

Appendix I: Treatment Methods Available for Archaeological Iron	**Client**	Drayton Hall Archaeological Collection
	Project	Subcritical Research Experiment, Clemson Conservation Center

Treatment Method	Equipment Needed	Advantages	Disadvantages
Mechanical	Cleaning tools; including sponges, dental picks; abrasives; water; detergents	Least amount of training required, equipment need, and cost	Abrasion to artifact surface causing loss of fabric, no chloride measurements
Soaking	Tanks larger than artifact; chloride and pH monitoring systems; water	Low financial investment required; little training needed	Results are unpredictable; large amounts of wastewater; very long treatment period
Soaking with Chemicals or Heat	Water; tanks larger than artifact; chloride and pH monitoring systems; chemicals and neutralization; electrical source; proper ventilation;	Similar to soaking, slightly more effective	Similar to soaking; difficult for larger artifacts
Electrolytic	Water; tanks larger than artifact; chloride and pH monitoring systems; chemicals required; chemical neutralization; electrical source; proper ventilation; anodes	Low in cost, more effective than soaking	Large amounts of wastewater; monitoring closely; long treatment period; higher costs than soaking
Thermal/Plasma	Gasses required; safety equipment; heat generator	Shorter treatment times	High in costs; changes to metal microstructure; safety concerns; high level of training needed; no long term analysis for large/composite artifacts
Subcritical Water	pH and chloride monitoring system; water supply; chemicals and neutralizers; a tank which can withstand high pressures	Lower wastewater amounts; very short treatment periods; effective chloride removal; possibly universal applicability	High pressure tanks are expensive; still in research phase; high level of training required

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