MADE IN AMERICA? CERAMICS, CREDIT, AND EXCHANGE ON CHESAPEAKE PLANTATIONS

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ABSTRACT

LINDSAY CAROLYN BLOCH: Made in America? Ceramics, Credit, and Exchange on Chesapeake Plantations
(Under the direction of Anna S. Agbe-Davies)

Unlike many other goods in the eighteenth century, which were wholly imported from Great Britain or elsewhere abroad, utilitarian coarse earthenwares were also produced locally within the American colonies. In the Chesapeake region it has been suggested that these local wares were primarily reserved for those unable to directly participate in the tobacco consignment system fostered by transatlantic credit. Due to their generic appearance it has been challenging to identify the presence of locally made ceramics in archaeological assemblages. However, these local goods provide evidence for alternative economic and social networks and distinct forms of credit. This project interrogates craft production and colonial systems of credit and debt in the historic Chesapeake region through the analysis of lead glazed coarse earthenwares, omnipresent components of the eighteenth-century domestic toolkit.

Rather than relying upon visual characteristics for these generic wares, sherds from 37 historic earthenware production sites across the mid-Atlantic and in Great Britain were elementally analyzed via laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) in order to establish geologically distinctive reference groups. Then, coarse earthenwares from domestic plantation contexts (ca. 1690-1830) representing varying social status were analyzed and assigned to production origins based on elemental composition. The results demonstrate the diversity of coarse earthenware sources that Chesapeake residents accessed. There are clear temporal shifts in the sources of coarse earthenware, and in particular a steady

decrease in the use of imported wares in favor of domestically made products. All plantation households sampled used at least some locally made wares, and no sharp differences were seen among households of different status, suggesting that these everyday wares were equally available to and utilized by all, perhaps via plantation provisioning strategies. These results challenge the idea that local products were inferior or low-class. Instead, their omnipresence is evidence for the pragmatic as well as political strengths of local production, from allowing for custom orders and local credit to promoting American self-sufficiency for the nascent revolution.

ACKNOWLEDGMENTS

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My advisor, Anna Agbe-Davies, has been a tremendous supporter of this project from the outset, and has consistently offered sharp insight and a formidable memory for relevant resources. I have learned so much from her about research, writing, and teaching. As a mentor she is unsurpassed. My other committee members have provided assistance and encouragement in many ways. Steve Davis broadened my perspective, urging me to look beyond the Chesapeake, to North Carolina, in order to better contextualize the patterns I uncovered. His thoughtful comments and eagle-eyed proofreading improved this work immensely. From Fraser Neiman, I learned to embrace stats geekery and the power of numbers. Fraser provided me with much of the R code used to run these analyses, and we spent many hours talking through statistical measures. He reminded me to think about the big picture and broad patterns, often offering his expertise in the historic Chesapeake to ground a new hypothesis or explanatory framework. In coursework and discussions, Margie Scarry reminded me to think about ceramics as part of foodways, and to consider how food influences many other aspects of daily life. Vin Steponaitis taught me how to analyze ceramics, and how to develop a successful archaeometric project. Early on in my career at UNC, he connected me with essential analytical resources at UNC, ensuring that I received the necessary analytical training for this study. I couldn't ask for a better committee.

This project was born at Site 8 at Monticello, arising from curiosity about the origins of the ceramics we were uncovering, and developing through conversations with Fraser Neiman, Sara Bon-Harper, Don Gaylord, and many others over the course of summers in the field. I have learned a great deal from my colleagues at Monticello and DAACS, among them Bea Arendt, Lynsey Bates, Carrie Christman, Leslie Cooper, Devin Floyd, Jillian Galle, James Nyman, Beth Sawyer, Jesse Sawyer, Michelle Sivilich, Karen Smith, and Derek Wheeler. Sara Bon-Harper took a chance on me at Monticello for which I will be forever grateful, as my archaeological experiences ever since have been rewarding in ways I could not have foreseen. Her counsel also led me to UNC, and a community that has been unfailingly supportive and inspiring. Many of my cohort-mates and fellow students have become dear friends, especially Dragana Lassiter and Taylor Livingston. David Cranford, Mary Beth Fitts, and Anna Semon were my allies in elemental analysis. For help navigating the bureaucratic end of things and for levelheaded life advice, I must thank Silvia Tomášková. Lisa-Jean Michienzi in the RLA office and Shamecia Powers in Anthropology have helped me more times than I can mention.

When I contacted institutions and asked, "can I shoot your artifacts with lasers?" I expected some trepidation, but was surprised and delighted by the enthusiasm for this project and the generosity of the lenders. For opening their collections to me, I am in the debt of: Alexandria Archaeology, Paul Nasca and Garrett Fesler; Archaeological & Cultural Solutions, Inc. and Merry Abbitt Outlaw; Linda Carnes-McNaughton; the Fairfield Foundation and Dave Brown, Thane Harpole, and Anna Hayden; Linden Fravel; Gloucester County, Virginia; the Guildford Borough Council, Guildford Museum and Abigayle Smyth; the Harlow Museum; the James River Institute for Archaeology, Sherrie Beaver and Nick Luccketti; the Maryland Historical Trust and Maryland Archaeological Conservation Lab, Becky Morehouse, Sara Rivers-Cofield , and Tricia Samford; the Mount Vernon Ladies' Association Archaeology Department, Eleanor Breen, Karen Price, and Esther White; the Museum of Liverpool, Rob Philpott and Liz Stewart; NAVFAC Washington; Wayne Eldred and Byron Smith at Newtown History Center; John Cotter at Oxford Archaeology; Hal Pugh and Eleanor Minnock-Pugh; the State Museum of Pennsylvania and curator Janet Johnson; Joy Green of the Stoke on Trent Museum Archaeological Society; Scott Suter; the Thomas Jefferson Foundation, Monticello; Thomas Jefferson's Poplar Forest Department of Archaeology and Landscapes, Jack Gary and Jenn Ogborne; the Virginia Department of Historic Resources, Dee DeRoche and Bob Jolley; and the Anthropology Laboratory at Washington and Lee University, Alison Bell, James Flexner, and Don Gaylord.

I received LA-ICP-MS training from Sohrab Habibi in the Chemistry Department at UNC. Habibi was very generous with his time and expertise, and this project would not have been possible without his support. Jeff Speakman at the Center for Applied Isotope Studies shared his knowledge of LA-ICP-MS with me and was especially helpful when it came to processing and analyzing the elemental data.

My love of these old pots comes from my family, who instilled in me a reverence for old things, and from my experiences as a potter, especially under the tutelage of Trew Bennett, Tom Clarkson, and James Ward. It is easy to become myopic in graduate school, and I thank my friends near and far for reminding me of the world apart from my laptop. And to Jake Hosen—I'm so glad we did this, and I'm so glad it's over.

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BLUE MCD	Best linear unbiased estimator mean ceramic date
CA	Correspondence analysis
DA	Discriminant analysis
DAACS	The Digital Archaeological Archive of Comparative Slavery
DF	Discriminant function
ICP-MS	Inductively coupled plasma-mass spectrometry
INAA	Instrumental neutron activation analysis
LA-ICP-MS	Laser ablation-inductively coupled plasma-mass spectrometry
MCD	Mean ceramic date
MD	Mahalanobis distance
Nd:YAG	Neodymium-doped yttrium aluminum garnet
NIST	The National Institutes of Standards and Technology
PC	Principal component
PCA	Principal component analysis
PIXE	Particle induced X-ray emission
RSD	Relative standard deviation
SEM-EDS	Scanning electron microscope-energy dispersive spectrometry
SRM	Standard reference material
STP	Shovel test pit
TPQ	*Terminus post quem*
XRD	X-ray diffraction
XRF	X-ray fluorescence

CHAPTER 1: INTRODUCTION

While we are accustomed to seeing "Made in the USA," or "Made in China" on our products today, this is a fairly recent phenomenon. It was not until 1930 that goods imported to the US required labeling by country of origin (19 U.S.C. 1304) and there is still no legal requirement to indicate American products as such. While many current US manufacturers choose to tout their products as American-made, how were American products marketed and consumed in the eighteenth century?

In this project I investigate colonial systems of exchange and consumption in the historic Chesapeake region. The British American colonies were developed to foster mercantilist goals, focused on the extraction of resources from the colonies and creation of new markets for manufactured goods. This transatlantic exchange was implemented through credit relationships backed by the staple crop of tobacco in the Chesapeake colonies of Maryland and Virginia. Archaeologists in the region have long studied the changing consumption patterns of colonists over the course of the eighteenth century, as the consumer revolution made imported luxury items available to a wider public. The majority of domestic items found archaeologically in the eighteenth century were imported from Europe: refined earthenwares and stonewares, glass, personal adornment items, and household tools. It has been more challenging to recover proof of the consumption of locally made products, many of which were ephemeral, made of materials such as leather, wood, or fiber, and distinctly non-luxury items. However, the division between local and imported goods is a meaningful one, as local wares provide evidence for different economic and social networks, and discrete forms of credit from those of the transatlantic trade. I have focused on the analysis of coarse earthenwares, omnipresent components of the colonial American domestic toolkit.

Lead-glazed coarse earthenwares are an ideal artifact type for investigating these economic networks because unlike many other material goods at the time, which were wholly imported from Great Britain or elsewhere, coarse earthenwares were also produced locally and within the broader colonies. In 1736, Virginia Governor William Gooch explained to the British Board of Trade, "the poorest Familys...who not being able to send to England for such Things would do without them if they could not get them here " (quoted in McCartney and Ayres 2004:56-57). Gooch was not writing about luxury or specialty items, but instead describing the necessity for local production of coarse earthenware pottery. He suggested to his superiors that domestic manufactures were relegated to the subset of the population who did not carry the transatlantic credit that would allow them to obtain goods directly from agents in Britain. Were there truly status-based differences in access to these quotidian goods? While coarse earthenwares were ubiquitous in the early American home, the routes by which they made their way into households were variable and have not been adequately explained.

Lead-glazed coarse earthenware is one of the most frequently recovered artifacts on historic period domestic sites in North America. Often called redware, these wheel-thrown ceramics served a variety of foodways, hygiene, and industrial functions from the time of the first European colonization through the nineteenth century. As handmade items the vessels are inherently distinctive in individual appearance. At the same time, the general technology and vessel forms were broadly homogeneous across Europe and its colonies, reflecting specific functional requirements. While some vessels were decorated, most coarse earthenware was unadorned and produced in a limited range of forms and surface treatments. Storage vessels such as crocks and jars, food preparation vessels such as milk pans and bowls, and cooking or baking vessels, all with a simple lead glaze, formed the bulk of a potter's trade. Visually, there may be no clear indicator of whether a vessel was made in England, elsewhere in Europe, or in North America, as they were rarely marked or signed, and clay differences were masked by the firing process. The overall result is a seemingly contradictory individuality of single artifacts, and homogeneity of the class as a whole (Figure 1.1).

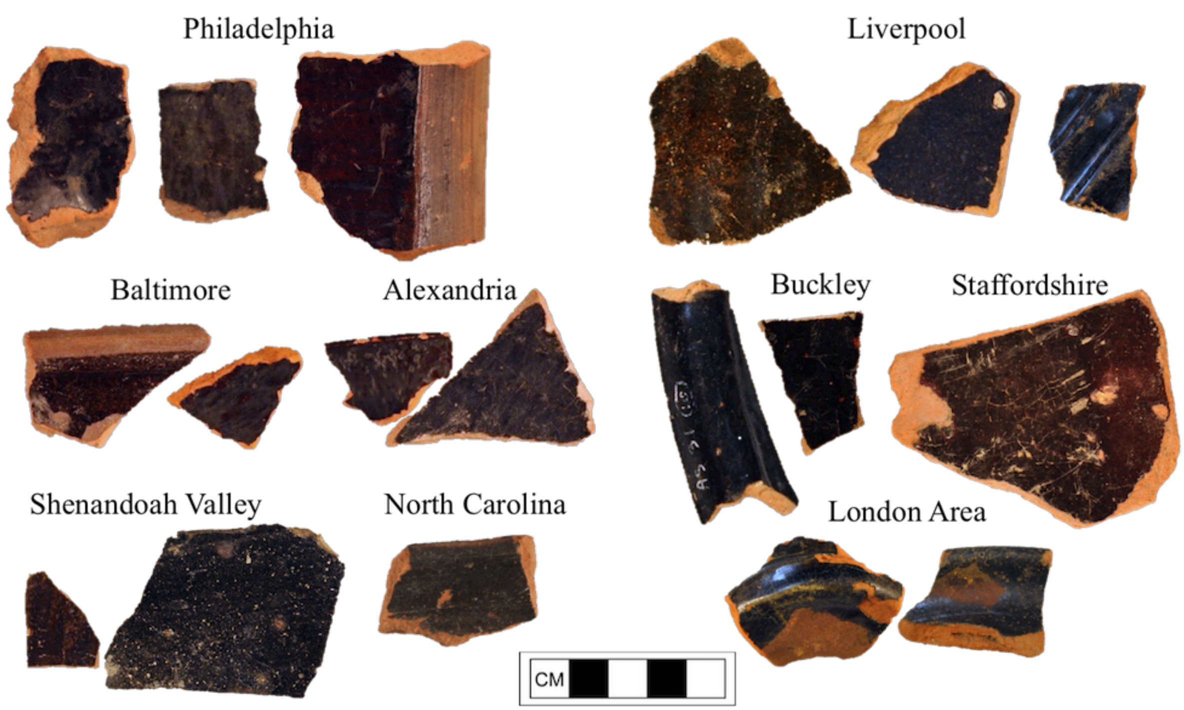


Figure 1.1. Red-bodied coarse earthenwares with dark lead glaze. From ceramic production sites in North America (left) and Great Britain (right). Images courtesy the State Museum of Pennsylvania, Pennsylvania Historical and Museum Commission (Philadelphia); Maryland Historical Trust, Jefferson Patterson Park & Museum, Maryland Archaeological Conservation Laboratory (Baltimore); Alexandria Archaeology, City of Alexandria, Virginia (Alexandria); the Anthropology Laboratory, Washington and Lee University (Shenandoah Valley); Research Laboratories of Archaeology, UNC-CH (North Carolina); Museum of Liverpool (Liverpool and Buckley); Stoke-on-Trent Museum Archaeological Society (Staffordshire); and Harlow Museum (London Area).

The visual homogeneity of coarse earthenware has meant that archaeologists have largely overlooked this type of ceramic, in lieu of more visibly distinctive and tightly datable artifacts. The bulk of utilitarian coarse earthenware tends to lack meaningful categorization, instead being relegated to catchall categories like "redware," which could refer to any red-bodied, lead-glazed vessel made within a 500-year span on one of hundreds of sites in Europe or North America. On Chesapeake sites in DAACS, the Digital Archaeological Archive of Comparative Slavery, these generic coarse earthenwares make up nearly 80% of all coarse earthenwares (Bloch 2011:31).

Furthermore, I was troubled by simple dismissals of local production in the eighteenth century Chesapeake, it being described alternately as sufficient but provincial (*e.g.,* Noël Hume 1969:98-99), or nearly non-existent (*e.g.,* Turnbaugh 1985b:23). These descriptions run counter to the archaeological evidence for numerous production sites across the region, and are predicated on untested assumptions about the desirability of local products in comparison to imported goods.

The goal of this project was to break down the monolithic category of visually generic coarse earthenwares, to quantitatively define the differences among wares from different sources. This makes it possible to address fundamental questions about the nature of the earthenwares found in domestic contexts, in turn unlocking the interpretive potential of these multivalent artifacts. By connecting the production origins of these wares and their use contexts, we can visualize the overlapping networks of trade and exchange—from local relationships to trans-Atlantic commerce—that operated in the historic Chesapeake, and identify who was able to participate within these networks.

Plantation Archaeology

This project is principally concerned with the consumption of coarse earthenware in plantation contexts. Over the past 40 years, plantation archaeology has become a large subfield of historical archaeology. The development of plantation archaeology reflects an engagement with plantations systems as a whole, and especially with investigation of the lives of the indentured servants and enslaved Africans and African Americans whose labor made the plantation system possible. Archaeology on plantations can be separated into two distinct phases. Early twentieth-century archaeological investigations focused primarily on the main house of the plantation, often under the guise of historic restoration with little consideration for the greater plantation landscape and other plantation inhabitants (Heath 2012; Orser 1989; Singleton 1990). In contrast, more recent plantation archaeology has been concerned with the plantation as a whole, and investigation of multiple contexts within it, especially explorations of the experience of slavery (e.g., Ascher and Fairbanks 1971). In hand with the shift in research emphasis has been a movement away from descriptive studies towards stronger interpretive frameworks and the incorporation of a wider range of methodologies, sources, and theory (Heath 2012).

In the initial phase of plantation archaeology, the structure of power within the plantation setting had been taken for granted, and the early studies reinforced understandings of plantation status and class systems gathered from documentary sources. Research for many years focused on answering basic questions about how slaves lived (*e.g.,* Crader 1990; Singleton 1985), and the search for African cultural continuities (*e.g.*, Fairbanks 1984; Jones 1985). Several comprehensive literature reviews have been done on this first phase of plantation archaeology (*e.g.*, Fairbanks 1984; Orser 1984, 1989; Singleton 1990). By the late 1980s, this research was complicated by the introduction of a dominance/resistance model that was used to explain material remains, and by extension, human behavior. The search for evidence of slave resistance and owner responses to it was actively launched (*e.g.,* Barile 2004; Orser and Funari 2001; Singleton 2001) Investigations of resistance went hand in hand with the consideration of agency, specifically regarding the choices enslaved peoples made about their daily lives. The increasing exploration into notions of power and agency allowed for the development of more complex understanding of slaves as individuals and as members of groups. In response, archaeologists began to challenge traditional views of race, class, and the construction of identity, particularly in terms of gender and ethnicity.

In recent years, there has been a re-integration of the plantation from its constituent parts and populations. Slaves and slave quarters are no longer considered to the exclusion of other aspects of the plantation system. "It now seems more appropriate…to study plantations as whole, complex systems that incorporate agricultural, economic, social and cultural subsystems" (Pogue 1995:101). One framework to achieve this has been to consider plantations as nested households (Barile 2004), bounded entities in which the labor of all inhabitants and workers contributed to the overall economic success of the plantation as a whole. At the same point, multiple smaller entities such as family units or corporate groups also operated as households within a plantation. While it is challenging to reconstruct meaningful household associations with archaeological data, household archaeology has become a powerful trend within plantation archaeology (*e.g.,* Battle 2004; Fesler 2004; Franklin 1997). In this study, I focused on the concept of plantation as nested household, balancing the corporate strategies of the plantation as a whole alongside smaller household groups divided spatially and by social and economic status.

Taking a regional and diachronic approach, I concentrated on nine plantations occupied primarily during the eighteenth century (ca. 1690-1830), spanning the colonial and early Federal periods. This was the time during which coarse earthenware production and use peaked in the Chesapeake. The plantations include famous presidential homes, such as Mount Vernon and Monticello, but also smaller plantations owned by less wealthy and prominent individuals. On each plantation, when possible, I sampled coarse earthenware assemblages from at least two of the following types of households: enslaved laborers, free white workers, or the planter's family. Most of these assemblages are part of the Digital Archaeological Archive of Comparative slavery (DAACS; www.daacs.org). DAACS, is "a Web-based initiative designed to foster inter-site, comparative archaeological research on slavery throughout the Chesapeake, the Carolinas, and the Caribbean" (DAACS 2015a). By aggregating datasets from multiple excavations, and cataloging them in a consistent way, DAACS permits robust, data-driven research.

In the nested household model of the plantation system, provisioning, a practice that centrally distributed food and basic items across the plantation, would be expected as the most efficient way to equip households. However, there is abundant material evidence that enslaved people independently purchased a variety of consumer goods, including luxury items such as jewelry and costly ceramics. One of the primary questions of this project was whether coarse earthenwares were procured individually or provisioned on plantations. Homogeneity in coarse earthenware assemblages could indicate plantation-wide purchasing and provisioning strategies. Conversely, differences in the types of coarse earthenwares used in households of varied status could signal distinct degrees of access to certain products.

Methods

In order to identify the geographic origins of the generic coarse earthenwares found in Chesapeake plantation contexts, I first had to distinguish the ceramics by source. Rather than relying on the ambiguous visual characteristics, I turned to analytical chemistry, characterizing these artifacts according to their elemental composition. I first assembled a reference set of coarse earthenwares from known production sites. I identified 37 historic pottery production assemblages from across the mid-Atlantic, as well as from England and Wales, and sampled wasters from each, for a total of 400 samples. Wasters, the ceramic artifacts that did not successfully survive the production process, are ideal as reference material because they reflect the recipes and technology of potters. They are thus more similar to successful vessels than raw clays.

I conducted the elemental analysis for ceramic sourcing using laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS). This is an analytical technique that provides quantitative data on a wide range of elements, while being minimally destructive to the samples. The goal was not to concretely source a vessel used domestically back to a specific production site. Instead, I focused on defining compositional groups that represented "production zones" (Monette *et al.* 2007). There are many more production sites, excavated and unexcavated, than I was able to test. Instead, by using the level of production zone, I follow a broader definition of source as a community of potters in a geologically distinct area. I then used a variety of quantitative techniques, especially discriminant analysis (DA), to understand the patterns in elemental variation among the different production zones, constructing robust groupings representative of geographic source. From this reference set, I then calculated the probabilities of group membership for the generically identified sherds (n=184) recovered from 19 plantation domestic contexts.

Results

By differentiating these wares according to geological source, it became possible to isolate previously undefined or under-defined ware types, resolving the broad category of generic lead-glazed coarse earthenwares into source-specific groups. This is the largest scale ceramic sourcing project to date in a British American context, both in geographic scope and sample size. The elemental analysis was very successful, making it possible to identify the geographic source for over 95% of these coarse earthenwares.

There are clear temporal shifts in the sources of coarse earthenware, and in particular a steady decrease in the use of imported wares in favor of domestically made products. All plantation households used at least some locally made wares, and no sharp differences were seen among the assemblages for households of different status, suggesting that these commonplace wares were equally available to and utilized by all. General homogeneity of assemblages within plantations indicates shared access, and potentially plantation-wide strategies such as provisioning.

The omnipresence of locally made ceramics in these assemblages challenges the conception that local products were inferior or low-class. Instead, I argue that their omnipresence is evidence for the pragmatic as well as political strengths of local production, from allowing for custom orders and local credit, to promoting American self-sufficiency for the nascent revolution. These factors, cemented in neighborly relationships, sustained local industry in the Chesapeake even in the face of equivalent imported wares. Local and intercolonial craft production and trade have been largely overshadowed by the British mercantilist system in the archaeological and historical studies of early America. In this project, I demonstrate that these local products served as meaningful tools for self-sufficiency and engagement within the community.

Organization

The work is separated into six sections. Chapter 2 presents a historical introduction to the Chesapeake region, focusing on economic history and the ways in which tobacco production shaped the character of the region. The agricultural requirements and yearly cycle of the crop prompted certain patterns in spatial organization and labor. In particular, the dominance of the staple crop economy and the mercantilist goals of Great Britain are emphasized for their influence on the nature of trade and exchange in the region. The lack of ready currency promoted the adoption of credit and indebtedness at all levels of exchange. There were a variety of ways to obtain goods in the eighteenth century Chesapeake, from direct trade, to retail purchase, to participation in the global tobacco consignment system. The accessibility of these trade networks to individuals of distinct social status is discussed, as well as how craft production in the Chesapeake operated within these nested economic systems. The Chesapeake economy, while dominated by tobacco agriculture, was not monolithic. Despite the structuring forces of tobacco production, craft producers, consumers, and merchants developed strategies that were temporally, geographically, and culturally contingent.

Chapter 3 provides an introduction to coarse earthenware, the main material class under investigation. In it, I situate the study of historic coarse earthenware within larger disciplinary questions and debates, from the development of typologies to the analysis of consumption practices. I begin with a description and background of the ware type and associated research. Issues of typology are discussed, as the categories created to define coarse earthenwares at times lack clear boundaries and subsume meaningful variation. An attribute-level analysis that permits the independent assessment of characteristics is suggested as the most appropriate way for classification via macroscopic inspection.

Several models are discussed as a means of explaining the patterns of coarse earthenware production and distribution in the Chesapeake, based in economic historical frameworks. The intent is to integrate the study of this ware from production to consumption. I pay special attention to the concepts of demand and consumption, specifically as they relate to coarse earthenware in the eighteenth century. Examples are provided to demonstrate the advantages of local exchange, suggesting that local trade relationships were valuable connections for plantation residents in the region.

In Chapter 4, I turn to the analytical methods of the study, while framing them within the broader disciplinary goals for chemical characterization of pottery and other materials. I provide a background into the relevant geological principles and the concept of source, in order to explain how elemental analysis can be used to identify the origins of ceramic materials. The primary geological provinces included in this study are situated as production zones for the manufacturing of pottery, and I present a description of each pottery production site used to create the reference set for this study. I then explain the chosen method of elemental analysis, laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS), with the step-by-step procedure followed for data collection and processing.

Data analysis is presented in Chapter 5, which is divided into two main sections. The first section explains the process of data analysis and the methods used to assign the reference set samples to analytically robust source groups. A total of twelve groups were defined within the reference set, including five production zones from England and Wales (Buckley, Liverpool, Staffordshire, Surrey-Hampshire Border, and London Area), and seven zones from the Mid-Atlantic US (Philadelphia, Alexandria, Chesapeake Tidewater [excluding Alexandria], North Virginia Piedmont, Shenandoah Valley, South Ridge and Valley of Virginia, and North Carolina Piedmont). Discriminant analysis and Mahalanobis distance posterior probabilities were used to discriminate and validate membership in these groups.

In the second section, I turn to the procedure used to determine the source of coarse earthenware sherds sampled from household assemblages on Chesapeake plantations. The sourcing procedure provided a predicted group assignment for 96% of the 184 sherds sampled. These results indicate that the production zones identified in the reference set adequately captured the primary sources of earthenware available to eighteenth-century Chesapeake residents. Furthermore, an additional source group was uncovered within the domestic site data, centered within Central Virginia Piedmont assemblages, and it likely represents independent production in that part of the Chesapeake. This was an unanticipated and tantalizing result, as no eighteenth-century earthenware kiln sites have been documented here.

In Chapter 6, the results of sourcing are discussed individually for each plantation, with a brief description of the plantation history and level of archaeological treatment. Overall, the results show clear temporal trends in the sources of earthenwares available over time and a dramatic increase in the consumption of locally made wares. Individual plantation strategies such as provisioning are suggested by the patterning of assemblages within plantations.

In Chapter 7, the broader social meanings of these sourcing patterns are discussed. I pay special attention to the functions of coarse earthenwares and the ways in which they supported a variety of household strategies from production to storage. While no sharp status-based differences were seen in the assemblages of coarse earthenwares, it is suggested that households of varying social status had individual kinds of needs for these wares, from low-level storage in enslaved households to large-scale plantation production of items such as butter at Mount Vernon. The system of trans-Atlantic credit through the wholesale trade of tobacco is juxtaposed with the local exchanges of goods along more flexible lines of credit.

While visible markers used to distinguish among coarse earthenware are often ambiguous, these results demonstrate that it is possible to quantitatively develop meaningful source groupings through elemental analysis. Future research will focus on reassessing existing collections based on the results of elemental analysis in order to define and refine our existing coarse earthenware classifications.

CHAPTER 2: HISTORICAL BACKGROUND

To understand the significance of coarse earthenware in the households of the Chesapeake, it is necessary to delineate the unique character of this region. Distinguished from other mainland British colonies by settlement history, economic development, and demographics, the Chesapeake region created special conditions for the trade of coarse earthenware. The dominance of tobacco agriculture at the onset of colonization structured every aspect of life in the region, from where people lived and how they worked, to their social and economic interactions with others. Over the course of the eighteenth century, as tobacco was supplanted by other crops in the region, and in the transition from colony to independent nation, the initial structuring began to break down, creating new opportunities for manufacturing and new markets for Chesapeake products.

Here, I provide a brief overview of colonial settlement in the Chesapeake region with a particular focus on its basic unit of organization: the tobacco plantation. I will demonstrate how the economic system and specifically the reliance upon credit and debt, created novel intersections of local and global markets. I will emphasize how the articles of these intersections: tobacco, ceramics, cloth, and numerous other goods, served to maintain colonists' connections both to metropole and the local community. Many excellent histories of the Chesapeake have been written, and I draw heavily on Breen (2001[1985]), Earle (1975), Kulikoff (2000), Morgan (1998), Russo and Russo (2012), and Walsh (2010).

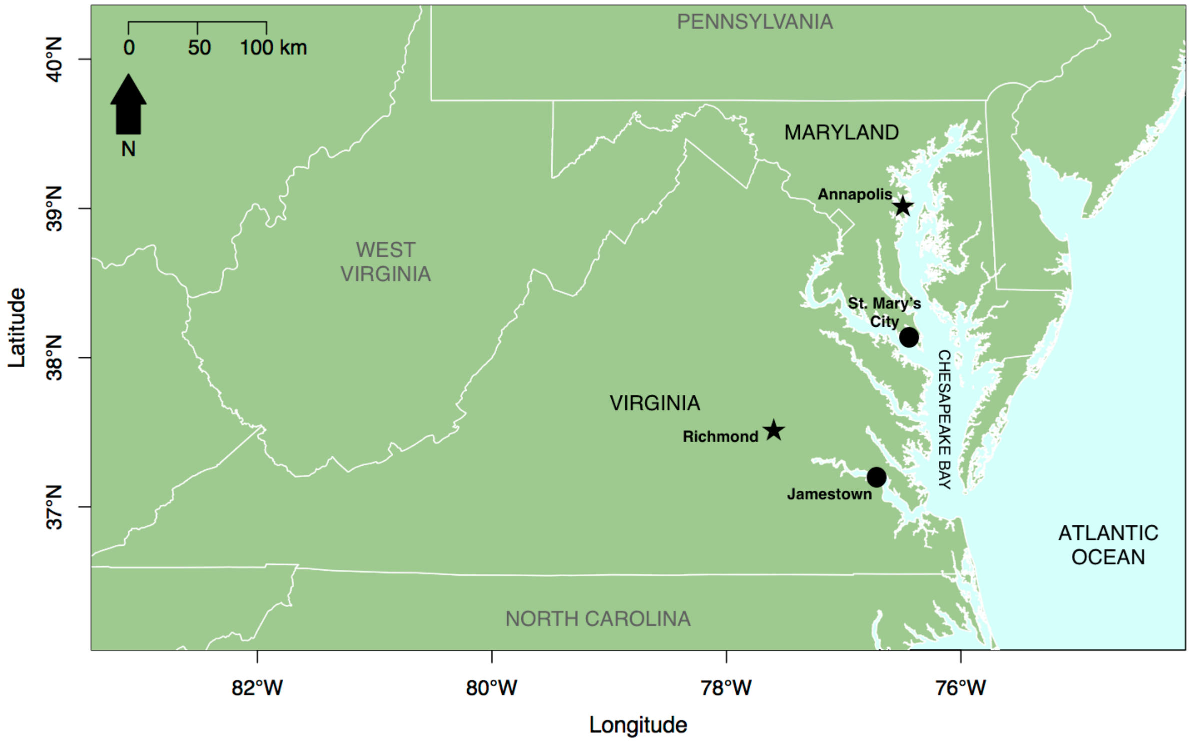


Figure 2.1. Map of the Chesapeake region, showing the early colonial capitals of Jamestown and St. Mary's City.

Settlement History

The Chesapeake region encompasses the contemporary states of Maryland and Virginia on the east coast of North America (Figure 2.1). Named for the bay into which it drains, the region possesses numerous waterways and marine and estuarine resources. The Chesapeake is temperate and supports a wide variety of plant and animal species such as the persimmon tree (*Diospyros virginiana*) and the North American opossum (*Didelphis virginiana*), two whose names reflect their novelty to Europeans in the New World. Humans have occupied the Chesapeake for over 10,000 years. In the Early Archaic period (ca. 11,000-8500 BP), small groups moved seasonally, following game and exploiting wild resources. By the Late Archaic (ca. 5500-3000 BP), there is evidence for greater sedentism, including early plant domestication

(Anderson and Smith 2003:7). During the subsequent Woodland period, there was a shift from nomadic hunting and foraging behavior to plant domestication and settled village life, intensifying during the late Woodland (post 900 CE). Most groups established villages along the numerous river networks. In the centuries leading up to European contact three main groups, identified by language family, occupied the Chesapeake. The Algonquins occupied the Coastal Plain, the Siouans the Piedmont and further west, and isolated Iroquoians in the southern Coastal Plain. While differentiated linguistically and through some aspects of social organization and material culture, the boundaries among these groups were not fixed (Waselkov *et al.* 2006).

At the time of English arrival in the region, most of the Indian population in the Coastal Plain was politically organized under the rule of Chief Powhatan (Wahunsenacawh), a Pamunkey chief (Figure 2.2). He governed through local leaders, known as *weroances*, who occupied settlements along the river networks. Siouan groups such as the Monacans lived in the Piedmont, with the fall line acting as a buffer zone from the Algonquins. Agriculture at the time of colonization focused on corn, with beans, gourds, and a variety of grains and legumes, as well as tobacco.

Figure 2.2. Engraving of Chief Powhatan from John Smith Map of the Chesapeake, first published in 1612. Image courtesy the Library of Congress.

Though a number of early interactions with American Indians were constructive, organized around the exchange of goods, hostilities between the Powhatan chiefdom and European settlers were not uncommon in the first decades of colonization. Over the course of the seventeenth century several treaties were undertaken between the English and Indian groups in Virginia and Maryland, some of which resulted in longstanding times of peace (McCartney 2006). During these engagements Indians ceded or sold much of their land and agreed to pay tribute to British sovereigns. Many died from introduced diseases and warfare, or were enslaved by Europeans and rival groups. Others left the region, moving further into the interior or joining with groups in North Carolina.

By the turn of the eighteenth century, it is estimated that less than 2,000 Indians remained east of the Blue Ridge Mountains (Wood 2006:60). At the end of the century, that number was down to less than 200, living on small plots of land. Disease and out-migration, coupled with acculturation and mixed-race relationships, meant that Indians were largely absent or invisible on the eighteenth century Chesapeake landscape. Nevertheless, as Mouer (1993) argues, Native American and English interactions in the seventeenth century contributed in great measure to the success of the colonial venture, and resulted in a creolized population that owed much to the foodways, subsistence practices, and material culture of the indigenous peoples.

The Chesapeake region was the first successful landing site for English colonization on North America, after the failed colony of Roanoke Island off the coast of North Carolina in the 1580s. The English authorities were concerned with halting Spanish, French, and Dutch incursions into the east coast of North America, and thus supported private ventures that would put an English presence on the landscape. The goal of the Virginia Company of London, established in 1606, was to extract resources such as precious metals and to make profitable trades with the native peoples, not to establish a new homeland. The first Virginia Company ships arrived in the Chesapeake in May 1607 and traveled 40 miles up the James River to found what would be called James Fort, later, Jamestown. Drought, disease, and Indian attacks ravaged the settlers for the first few years. By the early 1620s, settlement had moved outside of the main fortification area. The Virginia Company never found the riches and valuable resources that would make a profitable extractive economy. However, in the 1620s, the production of tobacco for export began in earnest, and the soils of the Chesapeake proved fruitful for the sweet strain of this plant introduced to the colony by John Rolfe. After the second Anglo-Powhatan war in 1622, the Virginia Company lost its charter and Virginia officially became a crown colony. Over the course of the colonial period, the motivation for agricultural productivity continued unabated, with repercussions for the settlement history and economic organization.

The colony of Maryland was first settled in 1634. Unlike Virginia, it began under the proprietorship of a single titled English family, the Calverts. The Calverts were Catholic and during this time of religious upheaval in England they sought to establish a colony of religious tolerance. Calvert's territory extended through the upper Chesapeake, overlapping with territory claimed by Virginia, and with what would later become Pennsylvania. The first town settled was St. Mary's City, near the mouth of the Potomac River. From early in the colonial period, the colonies of Maryland and Virginia were seen as fundamentally related, described in 1656 as "the two fruitfull Sisters" (quoted in Russo and Russo 2012:5). They shared the Chesapeake Bay with its navigable rivers and fertile land. They also shared a climate suited to the production of tobacco, though they grew different strains, and an economic system based on this staple crop by the mid 1600s.

Successful production of tobacco required land and labor. For the first hundred years of settlement, land was readily available. To encourage settlement in Virginia, planters received land allotments of approximately 50 acres for each family member or servant they brought into the colonies, under the headright system. In Maryland Calvert, the Lord Baltimore, also provided land allotments in exchange for the yearly payment of quitrents. The Chesapeake was very slow to develop towns and cities, because the land requirements for tobacco growing and the need to easily ship the harvested crop prompted a dispersed settlement pattern. Colonists established isolated plantations along water networks rather than nucleated settlements.

This pattern persisted well into the eighteenth century (Farmer 1988). As Thomas Jefferson explained, "our country being much intersected by navigable waters, and trade brought generally to our doors, instead of our being obliged to go in quest of it, has probably been one of the causes why we have no towns of any consequence" (Jefferson 2008[1782]:111). The lack of towns confounded the British government, and was deemed barbaric by contemporaries (Earle 1975:79); yet, even with legislation to force town development, they did not become common in the Chesapeake until the latter eighteenth century.

Indentured servants largely fulfilled labor needs in the seventeenth century. The colonial population was unable to reproduce itself due to disease and sex disparity (Horn 1979). Population pressures drove large numbers of men, women, and children to leave England at this time in search of work. In the system of indenture, an employer would pay for a servant's passage across the Atlantic or buy their indenture from a ship captain. In exchange, an adult servant would be contracted to work for their employer for a period of generally five to seven years in order to pay off the debt. While some of the indentured servants had a skilled trade, the majority were agricultural laborers or unskilled (Horn 1979), put to work in the tobacco fields.

Seventy percent of seventeenth century European immigrants to the Chesapeake arrived as indentured servants (Russo and Russo 2012:62). As conditions improved in Europe, the supply of servants decreased and the trans-Atlantic slave trade became an important source of labor in the form of enslaved African people. While some early Africans were indentured and eventually received their freedom, by the end of the seventeenth century colonial laws made slavery of Africans a permanent condition, transferring to their children. This ensured a perpetual, self-propagating, labor force on the plantations.

By the beginning of the eighteenth century, established landholders had fully taken up the arable land in the Coastal Plain of Maryland and Virginia. With increasing land pressures, a period of outmigration began, with settlers heading westward into the Piedmont. The fall line, marking the boundary between the Coastal Plain and Piedmont physiographic provinces, acted as a barrier for settlement. Differential erosion of the soft, unconsolidated Coastal Plain soils compared to the hard bedrock of the Piedmont resulted in waterfalls, disrupting water navigation. Westward past the falls, rivers such as the James remained navigable by small boats and the towns of Richmond, Petersburg, and Fredericksburg developed at the fall line as entrepots where goods moving up and downriver could be moved overland between boats above and below the falls. Settlement within the Piedmont was dispersed, as in the Coastal Plain, but was less structured by access to water, as colonial trading paths began to develop at this time. Roads were more challenging to construct in the hilly, rocky, clay soils of the Piedmont, as opposed to the flat sandy Coastal Plain, so often these inland roads followed established Indian trails. Rather than the earlier headright system, settlers obtained land during the eighteenth century primarily through land surveys and application to the colonial government, receiving patents of approximately 300 acres, though it was not uncommon for the wealthy and influential to obtain thousands of acres (Hendricks 2006:10-11).

While some settlers to the Piedmont were fresh arrivals from the homeland, most had been previously established in the Coastal Plain and moved west in order to secure greater land for tobacco cultivation. Movement into the Piedmont allowed tenant farmers, who made up a significant percentage of households in the Coastal Plain, to own their own property. By the mid eighteenth century numerous new counties had been established in Virginia, large plantations were common, and the Piedmont had exceeded the Coastal Plain economically. In this boom time the enslaved population within the Chesapeake rapidly expanded. Though importation of slaves from the west coast of Africa, often routed through the West Indies, was high during the first part of the eighteenth century, increasingly it was American-born slaves who drove the population expansion (Morgan 1998:86). Many of the enslaved people who populated the eighteenth century Piedmont did not arrive from Africa or the West Indies, but from plantations in the Coastal Plain.

The backcountry, west of the Piedmont, was demographically, economically, and socially distinct from the eastern half of the region (Nobles 1989). For most Anglo settlers of Virginia and Maryland, the Blue Ridge Mountains formed a physical barrier to movement. Though by 1716 the colonial government had surveyed the Great Valley of Virginia, also called the Shenandoah Valley, the lack of mountain passes, distance from trade networks, and fear of Indian attacks stunted movement into the backcountry. When settlement of the Valley began around 1730, it was by settlers moving southward from Pennsylvania rather than westward from the Piedmont. Following the colonial trading path, groups of migrants began to move into the Valley, with some continuing on into North and South Carolina. They were largely members of continental ethnic and religious minorities, especially Mennonites, Moravians, and Huguenots, as well as English Quakers. As ethnic minorities, they tended to self-aggregate, establishing communities of extended families. Towns developed along the trading path, which later became known as the Great Road or Great Wagon Road. A major episode of town building occurred during the French and Indian War, as settlers organized together for safety (Hendricks 2006:121). The Virginia government had encouraged the settlement of the Valley as a buffer from Indian groups.

Rather than establishing large-scale plantations for tobacco, wheat, or other staple crops, small farmsteads were more common in the Shenandoah and further west in the Appalachians, with subsistence agriculture and a number of craft specializations. It is estimated that most farms begun in the early colonial settlement of the Shenandoah Valley consisted of approximately 10 acres of cleared land (Silver 1990:169), due to the difficulties of removing established hardwood forest. While connected to Pennsylvania and other colonies along the terrestrial trade routes, these communities tended to be more self sufficient, relying less upon trans-Atlantic merchandise and credit. In this setting, local craft production such as the manufacture of earthenware pottery was necessary and commonplace.

The character of the Chesapeake, especially east of the Blue Ridge, was in sharp contrast to other English colonies on the mainland. In New England, entire families arrived during a brief period of immigration, and to a large extent recreated the structure of their lives in England in the new place (Landsman 2003). Towns and hamlets sprang up, with little outmigration once a family was established. The Puritan beliefs practiced by the immigrants influenced their social and economic behavior. There was no staple crop in this region; instead, small-scale agriculture and domestic production were standard. The Middle Colonies of Pennsylvania, New York, New

Jersey, and Delaware, also promoted family settlement, the growth of towns, and manufacturing. For example, William Penn worked to attract craftsmen as colonizers of Pennsylvania. Artisans continued to arrive from England to Pennsylvania throughout the colonial period and beyond (Thistlethwaite 1958). While farming was also important in Pennsylvania and the other colonies, colonists did not practice it to the exclusion of other ventures as in the Chesapeake.

The Plantation

The tobacco trade heavily structured the economy of the colonial Chesapeake. This staple agriculture product shaped settlement patterns, yearly schedules, and social interactions. Nearly every worker in the Chesapeake directly or indirectly supported the tobacco trade. In addition to the numerous slaves, indentured servants, and wage laborers working in tobacco fields, craftsmen such as blacksmiths and coopers were occupied making the tools and casks necessary to produce and store the tobacco. Chesapeake planters relied upon trans-Atlantic imports of many goods such as cloth and housewares that were imported from England where craft industries still predominated, as they were not being widely produced in Virginia or Maryland. Coarse earthenware circulated alongside tobacco and other products in this setting, its production, importation, and distribution structured by the staple crop.

As defined in Chapter 1, I consider a plantation to be a distinct spatial and economic unit. For British colonists arriving in the American Southeast and West Indies, the plantation was a newly developed form emerging over the course of the seventeenth century, though as a tool of colonization it shared ties to the plantation model adopted by the British in Ireland (Horning 2013). The plantation may be conceptualized as an extension of household (Barile 2004), or as a super-household, in which the labor of all plantation residents contributed towards the economic benefit of the planter. Alongside agricultural labor and other formalized tasks such as dairying, reproductive labor of slaves also benefited the plantation economically. Spatially, plantations consisted of a plantation core, which housed the main dwelling and specialized activity areas, and the agricultural areas, which included fields in various states of cultivation, barns, pasturage, and other subsidiary activity areas. A large plantation often would be divided into quarters that operated semi-independently, housing separate groups of workers.

In the Chesapeake region as a whole, most plantations began and were organized around the requirements of the staple crop, tobacco. Over time, planters shifted towards diversified production, first in the Coastal Plain and then in Piedmont. In South Carolina, rice and indigo were the main products, and sugar and coffee in the West Indies. The quick adoption of plantation agriculture in the Chesapeake was made possible by the presence of maintained Indian fields and the adoption of Indian agricultural practices. Writing in 1650, Edward Williams described Virginia thus, "there are immense quantities of Indian fields, cleared already to our hand, by the Natives, which till we grow over populous may be every way absolutely sufficient" (quoted in Silver 1990:104). The land was a patchwork of forest, active tobacco fields, and fallow fields regrowing with first succession plants. Tobacco was planted via the swidden system. Trees were girdled or chopped down, though often leaving tree trunks in place. Workers tended tobacco plants using hoes and manual labor rather than requiring the plows and draft animals more common for grain agriculture. A field remained fertile for several years of planting before necessitating a long fallow period. In this system, it was expected that each laborer could care for several acres of tobacco. While plantations could be large, the land actively under cultivation was a small proportion, except for the wealthiest plantations with considerable populations of servants and/or slaves.

Tobacco production was an intensive yearlong cycle from seed to sale. In December, tobacco seeds would be planted in a seedbed, and protected from frost. In late spring, workers transplanted seedlings to the fields. As the tobacco grew over the summer months, it required constant care. Field hands worked in gangs, using hoes and hand tools to plant, weed, and care for the growing tobacco. The top of the plant was removed to ensure that growing energy remained devoted to the leaves. In early fall, before frost, the plants were cut, and hung to cure in the drying barns. When deemed sufficiently dry, workers packed the tobacco into hogsheads as tightly as possible in a process known as "prizing". This resulted in hogsheads weighing up to 1000 pounds. It was now winter, and the cycle would begin anew. English and Scottish ships began to arrive in late fall and would collect tobacco from individual plantations, and later tobacco warehouses at ports. Over the course of weeks to months, a ship would fill their hold with tobacco hogsheads before returning to Europe to sell the crop.

Beginning in the early eighteenth century, in response to falling tobacco prices and declining soil productivity, Chesapeake planters in the Coastal Plain began to diversify, growing wheat and other grains. Wheat was shipped as grain and milled flour not only to Europe, but also to the colonies of the Northeast (Shepherd and Williamson 1972). This shift of staple crops had repercussions across the plantation landscape, changing the spatial organization and the yearly cycle (Neiman 2008). Grains required plowed fields, so unlike the swidden system with tree trunks left in place, workers prepared cleared fields. Draft animals were needed for the plows and carts, and for the manure they produced. In comparison to tobacco, grain production was less labor intensive, and could be worked during downtime in the tobacco cycle. The diversification of crops meant that slaves and other workers on the plantation became more specialized, learning crafts and individualized tasks. On some large plantations, dairying, beer brewing, and other activities of household production required significant outlays of labor and materials.

The wealthy colonists who first established plantations in the Chesapeake were investors attempting to diversify their prospects. The majority of land and resources in the eighteenth century Chesapeake was under the control of relatively few planters. These elite planter families tended to concentrate their wealth through intermarriage and cousin marriage, leading to massive plantation complexes encompassing thousands of acres. Two thirds of planters in the Coastal Plain possessed less than 200 acres (Morgan 1998:43), and these poor to middling planters often began their life in North America as indentured servants or artisans. They operated on a much smaller scale than their wealthier neighbors, with a perhaps few slaves or servants and producing small yearly tobacco crops. Wealth disparities became more pronounced over the course of the seventeenth and eighteenth centuries. While in the early years of colonization, even rich planters tended to live in modest houses of a few rooms without grand furniture or housewares (Sweeney 1994), this soon changed. Homes of the wealthy became larger, more elaborate, and more permanent—made of brick rather than earthfast and frame architecture.

In addition to the planter's family, plantation residents typically included a mixture of free and bonded workers. In the seventeenth century these were most commonly indentured servants. As economic conditions improved in Europe, planters began to rely more heavily on imported slaves arriving from Africa or the West Indies, transitioning fully to enslaved African and African American labor in the early eighteenth century. Enslaved field hands in the eighteenth century were commonly segregated from the planter's family in dispersed communities across the plantation. This distribution kept them close to the fields they worked in gang labor. Not all enslaved workers were field laborers; some, working as house servants such as cooks and maids, or as craft specialists, would reside in the plantation core to better access their work sites. Spinning, weaving, and basic carpentry were common trades assigned to slaves; Monticello was one of the few plantations that had more specialized industries such as nail making, tin-smithing, and furniture production (Kelso 1997). Most Chesapeake planters provisioned their slaves with weekly food rations and minimal clothing and household items. To supplement their diet and household economy, slaves planted household gardens, fished and hunted, raised chickens, produced crafts such as baskets and brooms, and worked additional jobs for wages.

An overseer, usually a free white employee of the planter, would live in some proximity to a community or communities of slaves, in order to ensure their labor and submission. Overseers were the most common wage laborers on plantations, though some plantations had specialized positions for free men as builders, masons, millers, or other plantation tasks. In some cases, tenant farmers or poor neighbors would also work on large plantations as a means of paying off debt or obtaining wages.

The plantation settlement system of the Chesapeake was distinct from that of other British colonial regions. Plantations were standard in the Carolinas as well, though different in scale and production. Planting rice required a larger capital investment and greater landscape transformations. Rather than on a tobacco plantation, where there was no real economy of scale in the number of laborers, rice plantations required large numbers of enslaved workers in order to operate (Morgan 1998). Large plantations were in the norm in the Carolina lowcountry and profits were generally higher than in the Chesapeake, giving even less incentive to diversify. These characteristics served to distinguish lowcountry planters from their neighbors to the north.

Systems of Exchange

The Chesapeake colonies operated within the larger mercantilist doctrine of the British government. As colonies, their role was to provide raw materials and staple crops to the home country. Manufacture of finished goods was discouraged and imports from other countries limited through heavy tariffs. Instead, colonies were expected to purchase their manufactured goods from Britain. In order to function, this system relied upon trans-Atlantic relationships of credit and debt. Large-scale English and Scottish merchants offered credit to wealthy planters on the promise of a successful tobacco harvest, and extended credit to smaller merchants pursuing trade in the colonies. These lines of credit trickled down through economic relationships to increasingly smaller scale market participants. Here, I outline the major mechanisms of the eighteenth century Chesapeake economy, the arrangements that facilitated the movement of coarse earthenware around the Atlantic world from producer to ultimate consumer.

One of the primary reasons for reliance on forms of credit was the lack of hard currency. Nominally, the primary currency system in the colonial Chesapeake was British pounds sterling (£). Prices for goods and services, as well as debts and credits, were accounted for in pounds, shillings, and pence (one pound=20 shillings, one shilling=12 pence). Foreign coins, especially Spanish reales, circulated with variable exchange rates converting their value to the British system. The lack of specie made commerce difficult. Braudel (1973:335) cites a Philadelphia merchant who, in 1721, complained to a correspondent: "creditors here are reluctant and money so scarce that we begin to be, or rather we have for some time already been, racked by a lack of a means of payment, without which trade is quite a puzzling occupation." Storekeepers were the primary local sources of specie. Numerous entries in eighteenth century store ledgers debit "to Cash" line items on patrons' accounts (Figure 2.3).

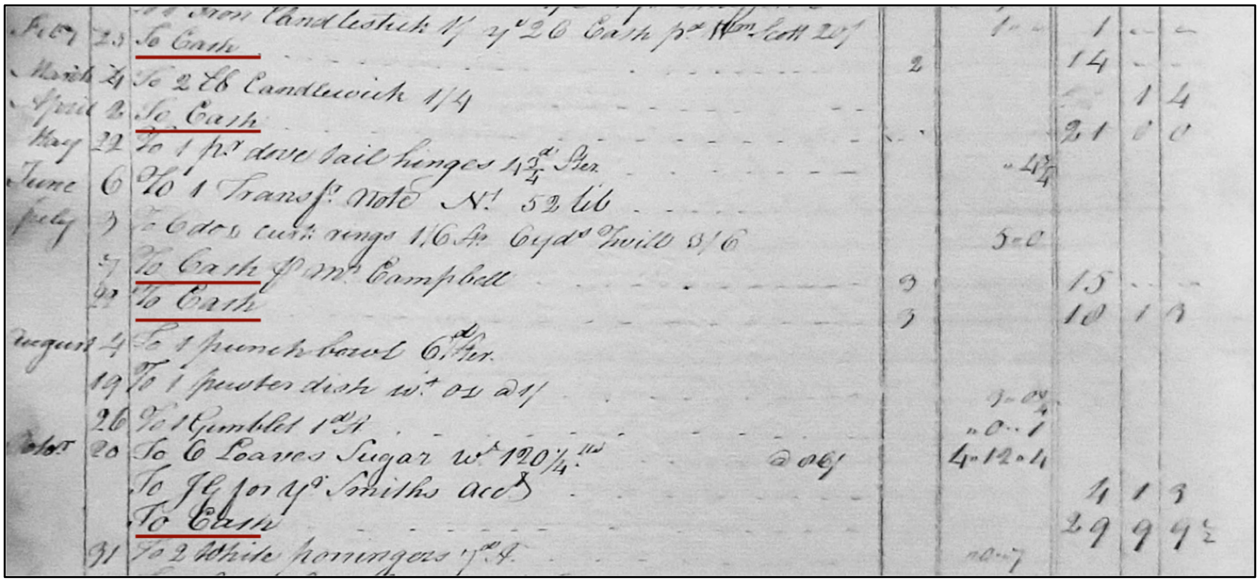
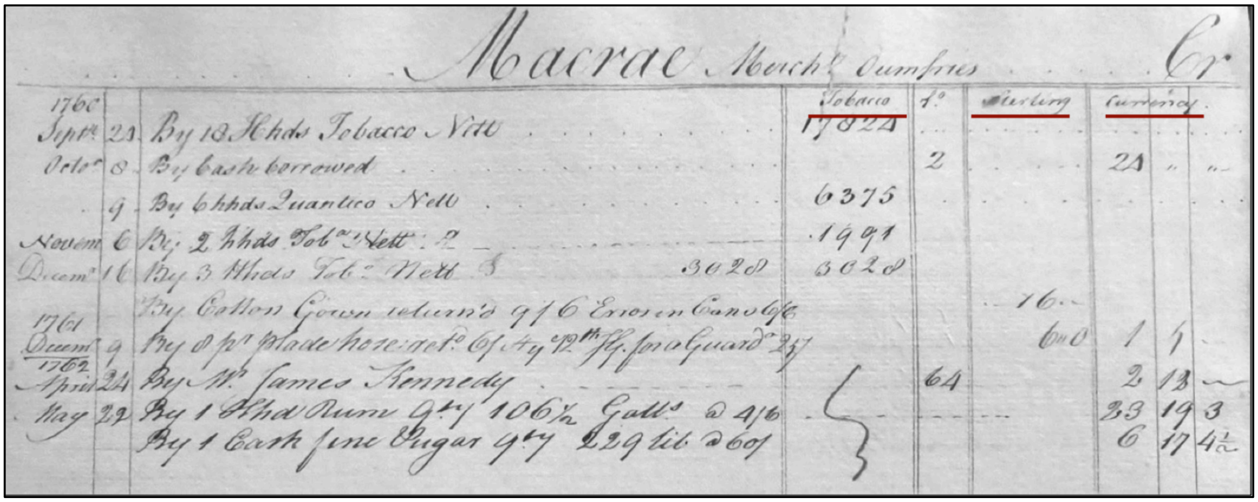


Figure 2.3. Store ledger page from 1761 showing cash withdrawals. From account of customer "Mr. James". Unidentified store ledger, Dumfries, Virginia. Virginia Historical Society (Mss5:3 Un3:1).

Given the constraints on coinage, agricultural products, especially tobacco, came to replace it in many contexts. Taxes were assessed in pounds of tobacco (Russo and Russo 2012:55; Walsh 2010:596), as were fines, tolls and fares, rent (Earle 1975:217), and a host of other fees. Within stores, tobacco by the pound was accepted as readily as cash. A store ledger from Northern Virginia in 1760 listed account credits in three separate columns: Tobacco, Sterling, and Currency, the currency column presumably indicating colonial or foreign notes and coins (Figure 2.4).



Macrae Merch.t Dumfries Cr
Tobacco | Sterling | Currency
1760 Sept 21 By 13 Hhds Tobacco Nett 17824
Octo 8 By cash borrowed 2 21
9 By 6 hhds Quantico Nett 6375
Novem 6 By 2 hhds Tob Nett 1991
Decem 16 By 3 Hhds Tob Nett 3020 3020
1762 April 24 By Mr James Kennedy 64 2 13
May 22 By 1 Hhd Rum 106½ Gall @ 4/6 23 19 3
By 1 Cask fine Sugar 229 lib @ 6/ 6 17 4½

Figure 2.4. Store ledger page with *Tobacco, Sterling,* and *Currency* columns. Dumfries, Virginia store, 1760-1761. Virginia Historical Society (Mss5:3 Un3:1).

Lacking sufficient metal currency, colonial governments attempted to establish their own currencies. Maryland introduced paper currency in 1733, but it caused turmoil to the credit system, as creditors began to demand cash. The currency rapidly depreciated (Earle 1975:109), and it was a number of years before the system of credit returned to normal. Virginia also adopted a local currency, in 1755, though it was not widely used or widely available. The Currency Act of 1764 restricted the colonies' issuance of paper currency, further shrinking the supply. Thomas Jefferson, in his memorandum book of the 1770s and 1780s, routinely wrote down the conversion rate of all the different colonial currencies with which he regularly conducted business. From 1777-1781 he tracked the inflation of paper currency in Pennsylvania, New Jersey, and Virginia (Jefferson 1997:514-515). After the Inspection Acts of 1730 in Virginia and 1747 in Maryland, planters received certificates for their tobacco that passed inspection, and these certificates, known as tobacco notes, circulated as currency (Russo and Russo 2012:143). During the Revolutionary War, and in its aftermath, paper currency and certificates flooded the market. The Continental Congress printed $241 million in the second half of the 1770s, but it rapidly depreciated to 1/100 of its printed value (Kulikoff 2000:259). Despite these attempts to create workable specie alternatives, direct and immediate exchange of cash or paper equivalent for goods and services was the exception, rather than the rule.

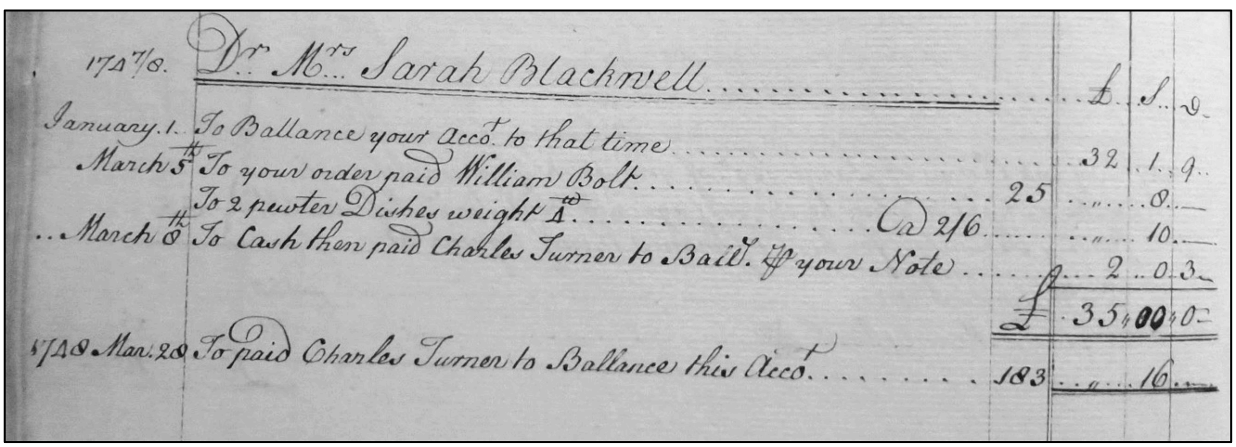
Credit

Without banks, storekeepers and neighbors became the primary extenders of credit. Borrowing sums of money from a neighbor was a common way to obtain coinage or pay off an existing debt, and often served to strengthen friendships, rather than strain them. Harold Perkins described the network of planter debt as the "mesh of continuing loyalties" (quoted in Breen 2001[1985]:96), referencing the ways in which local indebtedness served as a structure for social relationships within communities. Ultimately, credit offered locally by landowners and merchants was made possible through the credit they carried from the merchant houses of Britain as part of the tobacco consignment system.

During the eighteenth century, planters had two main ways to sell their tobacco, and later, wheat. In the consignment system, the planter would have his crop loaded onto a ship to England. It remained his property and also his risk until unloading in Europe. Nevertheless, prices for tobacco were higher in England, so the planter stood to gain, barring maritime catastrophe or market downturn. Factors were crucial to this system, acting as the planter's representative in Great Britain. They negotiated for the sale of the product and sent the planter goods in return. Planters would request items that they wished to purchase from Great Britain with the proceeds of the year's crop. Additional profits above the outlay for supplies would be carried as credit into the next year and could be used for paying off other debts, buying land, or other ventures. Some planters ordered more goods than their plantation household required and operated informal shops with the surplus, providing goods that their isolated, less wealthy neighbors would otherwise be unable to obtain. In some cases they purchased tobacco from smaller neighboring plantations, increasing their transatlantic shipment in order to better negotiate for a higher price.

The British firms extended credit for 12 months or more, matching the agricultural cycle of tobacco. In spite of this, over the course of the eighteenth century decreasing returns for tobacco and general economic instability resulted in a planter class in the Chesapeake that was deeply indebted to British creditors. Robert Beverley, a wealthy planter, described debt as, "the general Fatality which overwhelmes this wretched Country at this time" (quoted in Breen 2001[1985]:92). The credit crisis of 1772, in which a number of British banks failed, had serious repercussions for the Chesapeake planters. There was a scramble by merchants and creditors to collect their debts, forcing some planters to mortgage their land or be taken to court for debts (Kulikoff 2000:225). In such a time, very few were able to extend credit, even locally, causing the economy to stagnate. For the elite planters of the eighteenth century Chesapeake, getting out from under their crippling debt owed to British merchants was a strong motive for unification, a step that would eventually lead towards revolution (Breen 2001[1985]).

Small plantations did not have the scale of production that would allow their owners to carry transatlantic credit. Instead, the planters relied upon more local forms of credit and obtained their goods from merchants or craftsmen operating domestically rather than directly from Britain. It was more feasible for smaller planters to sell their tobacco crop directly to a merchant, middleman, or wealthier neighbor in the Chesapeake, and in doing so to benefit indirectly from transatlantic credit. By the 1770s, the vast majority, 80% of the tobacco produced in the Chesapeake, was sold through merchants in the region (Martin 1994:174), especially Scots merchants (Price 1964). Beginning in the eighteenth century, Scots merchants began to move into the Chesapeake and aggressively market their wares to the residents. They were willing to establish stores at or above the fall line, in order to purchase tobacco from the burgeoning Piedmont market (Soltow 1959). This method of direct sale was not as profitable to the planter as consignment, as tobacco prices were lower in the colonies. However, the diminished return was to some extent offset by the transferal of risk associated with shipping and sale in Europe. Credit obtained through these sales was used within the community to pay bills, buy land, and repay debts. In selling to a local merchant, a planter typically received a mixture of cash, credit, and goods, with a higher exchange rate for goods (Soltow 1959:89). Stores became important sites for carrying credit and the repayment of debt. Ledgers record how neighbors repaid debts owed to one another, through the settling of each other's store accounts (Figure 2.5).



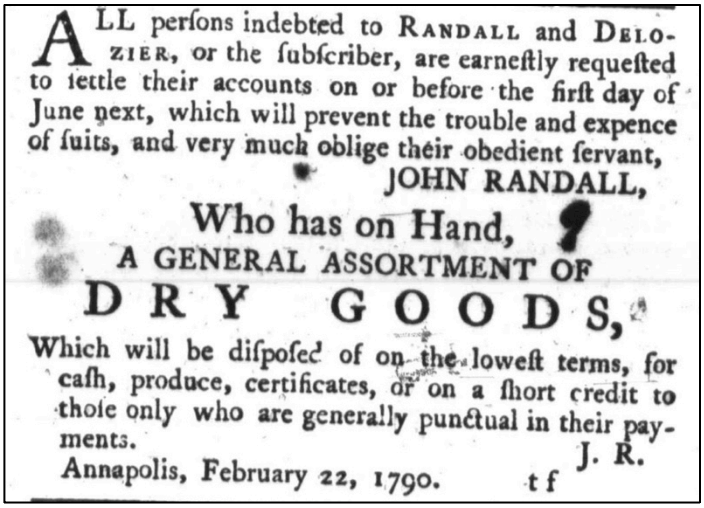
			£	S.	d.
1747/8.	Dr. Mrs. Sarah Blackwell				
January. 1.	To Ballance your Acco.t to that time		32	1	9
March 5th	To your order paid William Bolt	25			8
	To 2 pewter Dishes weight 1 ld @ 2/6				10
March 8th	To Cash then paid Charles Turner to Ball. ℔ your Note		2	0	3
			£ 35	00	0
1748 Marc. 20	To paid Charles Turner to Ballance this Acco.t	183			16

Figure 2.5. Debit page from store ledger of William Massie, New Kent County, VA, 1747-1748. Customer Mrs. Sarah Blackwell used her store credit to pay William Bolt and Charles Turner. Virginia Historical Society (Mss5:3 M3856:1)

Access to credit, whether local or transatlantic, affected the goods and services available to a particular household. The wealthy possessed the greatest access, utilizing a mixture of cash, and local and international credit. Through tobacco consignment, and later wheat and other crops, they were able to purchase expensive and fashionable items directly from London and continental Europe. At the same time, they developed economic relationships locally and in the intercolonial market, carrying credit with neighbors and associates to obtain everyday goods more readily. Wealthy planters also traded directly for labor or local goods. Carr and Walsh (1994:242) note that while George Washington ordered his luxury items through factors, his everyday needs could be fulfilled through intercolonial sources. Washington ordered sugar, candles, and other basic household items from a New York merchant and traded with his neighbors for eggs, cattle, and even land (Carr and Walsh 1994:236).

Small-scale planters as well as landless workers and the enslaved typically conducted business and social relationships within a very small circle, not far from home. By purchasing store goods retail, rather than wholesale, they paid more for imported goods than those who negotiated directly with British sources. Credit and exchange extended by local merchants was critical for participating in the market. Credit offered by merchants was most commonly backed by tobacco, which had locally established exchange rates. Thomas More of Hanover County, Virginia, wrote to his local storekeeper in the 1730s, requesting a number of goods including unbleached linen and a gallon of rum. He explained, "you shall have your tobacco as soon as I can possibly git it down" (Slatten and Bagby 1986:48). More was presumably offered credit on his account until his tobacco was ready for sale. Written evidence of such a request is rare, but the numerous store ledger entries listing account payments by tobacco were likely predicated on similar oral agreements between planters and storekeepers, or the tacit understanding that debts could not be collected until the tobacco was ready for sale each year. Annapolis, Maryland merchant John Randall ran an advertisement in the *Maryland Gazette* for several months in

1790, requesting accounts with him be settled, but continuing to offer “short” credit to customers (Figure 2.6).


ALL perſons indebted to RANDALL and DELOZIER, or the ſubſcriber, are earneſtly requeſted to ſettle their accounts on or before the firſt day of June next, which will prevent the trouble and expence of ſuits, and very much oblige their obedient ſervant,

JOHN RANDALL,

Who has on Hand,

A GENERAL ASSORTMENT OF

DRY GOODS,

Which will be diſpoſed of on the loweſt terms, for caſh, produce, certificates, or on a ſhort credit to thoſe only who are generally punctual in their payments.

J. R.

Annapolis, February 22, 1790. tf

Figure 2.6. Merchant’s advertisement, *Maryland Gazette*, February 22, 1790, Annapolis, MD. Archives of Maryland Online.

At the local level, craftsmen and merchants such as Randall often accepted payment in kind. Store accounts record plentiful entries paid off through crops, animals, labor, and craft products such as butter, shoes, or cloth. While sometimes occurring as a one-time event, more commonly these economic exchanges could be drawn out over months or years. They were generally but not always for fairly small balances. At a superficial level, these transactions were akin to barter: the direct exchange of goods or services without the use of money. Yet, there are several key distinctions that differentiate these deals from barter. While no money changed hands, the exchanges were made within a monetary system. The goods being exchanged had defined monetary value, and were accounted for in a system described by William Baxter as “bookkeeping barter” (Baxter 1946:158). Furthermore, as the exchanges were often not immediate, but extended over long periods, this system may be more accurately explained as a form of credit instituted at the local level. The participants took on risk, with the expectation, but not surety, of payment at a later date.

The Goods

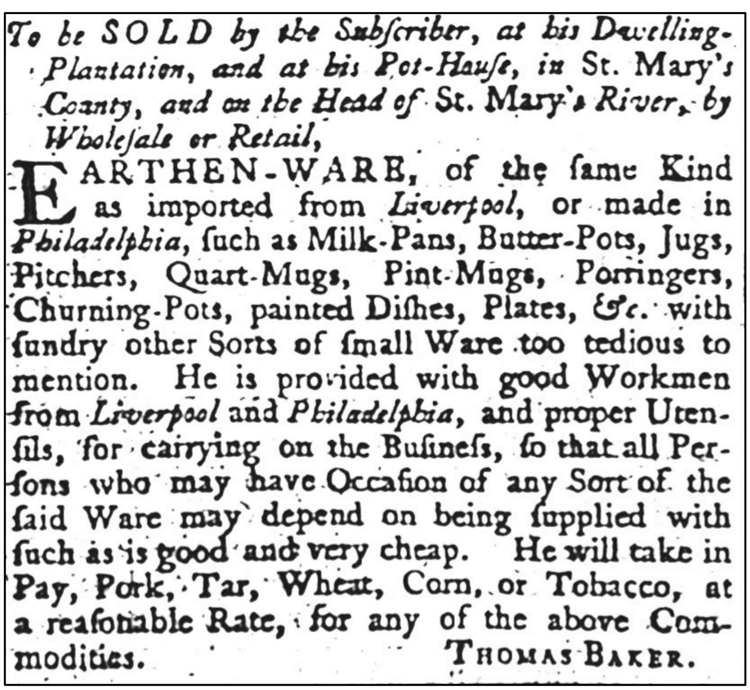
The nature of the goods available from different markets and through different lines of credit, varied. There were three main tiers of market: global, intercolonial, and local. Planters such as George Washington participated directly in the global market, consigning their tobacco to British factors, in return requesting and receiving items such as mahogany chairs and fine tablewares (Carr and Walsh 1994:242-243). Through direct correspondence with those in England, wealthy planters were able to obtain the latest fashions and access a broad marketplace, including goods from continental Europe. On the other hand, there were several disadvantages. Until the mid 1760s, there was often only one shipment per year, so an order from Britain was not quickly fulfilled (Carr and Walsh 1994:107). Depending upon the trustworthiness of one's personal shopper, the goods could also prove to be of inferior quality (Martin 2008:44). One tactic was to divide one's crop between London and Liverpool or Bristol factors, in order to optimize purchasing power. While London was the location for luxury items, everyday goods were more affordable from other ports (Walsh 2010:408).

Goods available inter-regionally and locally were more limited than those available in England, though store accounts record a striking diversity of wares (Martin 2008). The merchants wholesaling tobacco operated stores at the falls and in the backcountry that offered imported wares. The Chesapeake was a huge colonial market for British products, comprising 40% of all mainland colonial trade (Breen 2004:60). New store stock was eagerly awaited, and the markup on imported items was steep: from 100% to several times that was not uncommon (Soltow 1959:94). Intercolonial trade also expanded during the eighteenth century. Goods from the more industrialized colonies of the Northeast and Mid-Atlantic were imported to Maryland and Virginia, alongside British and West Indian goods routed through the northern ports. Though the Chesapeake colonies of Maryland and Virginia did not participate as widely in intercolonial trade as the colonies to the north (Shepherd and Williamson 1972:797-801), they did have documented economic relationships with other colonies (Klingaman 1969; Merritt 1964), and especially with Pennsylvania (Gough 1983:411-412).

Stores also sold local goods, which were either purchased wholesale or taken as payment. In 1785, potter Charles Dunkin (Duncan) was credited six pounds, 15 shilling, and ninepence for supplying earthenware to Israel Janney, a storekeeper operating in Loudoun County, Virginia (Janney 1989; for more on Duncan see Bertsch *et al*. n.d.). This would have been a large volume of earthenware, given that most earthenware items in Israel's store sold for less than a shilling. On several occasions, Blackstone Janney, Israel's brother, also received credit in the store account by transporting loads of earthenware for Israel (Janney 1989). Blackstone was credited eight shillings for hauling the ware from Leesburg, approximately a six-mile journey, and 30 shillings for hauling earthenware from Frederick, Maryland, a 25-mile journey. On other instances the source was not indicated, but the fee suggests that it was within a 10-15 mile radius. Several earthenware potters, including Charles Duncan, were operating in Loudoun County during this time (Bertsch *et al.* n.d.), but Janney did not provide names for his othernearthenware sources.

Ann Smart Martin (2008:202) notes that by the end of the eighteenth century, "retail stores were perhaps the most common nondomestic buildings on the Virginia landscape-in towns, at crossroads, or on plantations." Given the lack of towns, they often operated for a rural clientele and typically welcomed trade with everyone, including slaves. Enslaved African Americans regularly purchased items of personal adornment and household goods at stores, as Barbara Heath has documented for enslaved residents at Poplar Forest, one of the plantations analyzed here (Heath 1997). They paid in cash, earned in a variety of ways (Schlotterbeck 1991), or in kind through goods they had produced, such as vegetables, eggs, or craft products. An account book from the store of Thomas Partridge in Hanover County, Virginia, records the purchase of "2 yds Callico" cloth by "Tinsley's Negro Dick" on October 30, 1738. He paid the same day with two chickens (Slatten and Bagby 1986:47).

Outside of goods obtained through tobacco consignment, colonial merchants, and shops, craftspeople offered a direct source for necessary items. Martin (2008:49) distinguishes between store goods, which were mainly imported, and "the many bulky, simply produced, or processed" items that local artisans provided, such as furniture. Craftsmen sold their goods on similar terms as storekeepers, accepting payment in cash or in kind. Thomas Baker, operator of a pottery in St. Mary's County, Maryland (Fox n.d.), advertised "he will take in pay, pork, tar, wheat, corn, or tobacco, at reasonable rate," acknowledging that his fellow Marylanders could not generally pay in currency (Figure 2.7). Artisans within the community, such as potters, would have been valuable sources for cheap goods that may have otherwise been unattainable.



To be SOLD *by the Subſcriber, at his Dwelling-Plantation, and at his Pot-Houſe, in* St. Mary's *County, and on the Head of* St. Mary's *River, by Wholeſale or Retail,*

EARTHEN-WARE, of the ſame Kind as imported from *Liverpool*, or made in *Philadelphia*, ſuch as Milk-Pans, Butter-Pots, Jugs, Pitchers, Quart-Mugs, Pint-Mugs, Porringers, Churning-Pots, painted Diſhes, Plates, &c. with ſundry other Sorts of ſmall Ware too tedious to mention. He is provided with good Workmen from *Liverpool* and *Philadelphia*, and proper Utenſils, for carrying on the Buſineſs, ſo that all Perſons who may have Occaſion of any Sort of the ſaid Ware may depend on being ſupplied with ſuch as is good and very cheap. He will take in Pay, Pork, Tar, Wheat, Corn, or Tobacco, at a reaſonable Rate, for any of the above Commodities.

THOMAS BAKER.

Figure 2.7. Potter Thomas Baker advertisement, *Maryland Gazette*, September 2, 1756, Annapolis, MD. Archives of Maryland Online.

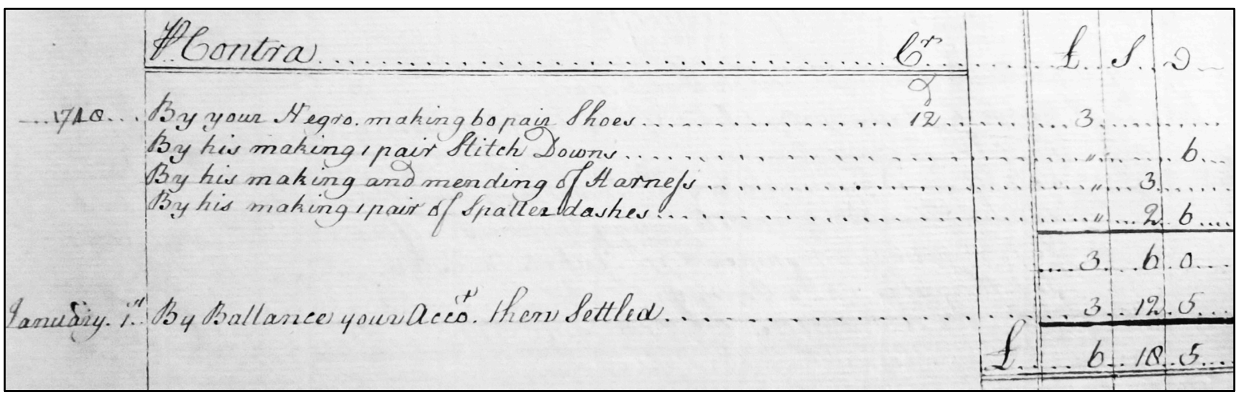
Craft Production

There has been a general tendency to dismiss craft production in the Chesapeake, as it was economically trivial in comparison to agriculture. As Russo and Russo state (2012:152),

> no more than a handful of Chesapeake men may ever have tried to earn their living as potters during the eighteenth century. Local producers of earthenware, gloves, hats, handkerchiefs, and other inexpensive manufactures could not compete with imports so easily carried in the empty holds of ships arriving to collect tobacco.

While the results of this research challenge the assertion that locally made earthenware was rarely produced, it is true that in the early period of colonization when the tobacco trade was booming, there were few identified craft specialists as it was more profitable to farm tobacco and purchase ready-made imports. Artisans who immigrated to the colonies often gave up their trade in order to capitalize on the tobacco profits (Metz 1999:12). In All Hallows Parish of Maryland, Earle found that less than 20% of colonial households had an occupational specialty of any sort, and those with an identified craft specialization were limited to a narrow range of occupations such as woodworker and tailor (Earle 1975). Those who did pursue crafts tended to directly support the tobacco trade, like coopers or blacksmiths, or had output that was impossible or inconvenient to ship, like builders. As well, those who worked primarily in materials abundant in the Chesapeake found a ready market (Russo 1988:400). The scale of production was also smaller than in colonies to the North, where manufacturing in some places supplanted agriculture.

However, during times of market downturns, in addition to diversifying crops, some Chesapeake residents turned to crafts and home manufactures, increasing self-sufficiency and maintaining income. In this rural area, artisans tended to operate part-time or seasonally (Daniels 1993:753; Kulikoff 2000:201), maintaining an identity as agriculturalist in addition to their craft specialty. Those not explicitly labeled as craftspersons or artisans at times still provided necessary products. In some households, enslaved workers produced surplus crafts for local exchange, for the benefit of the planter or themselves. While formalized as part of the plantation economy in operations such as Monticello’s nailery (Kelso 1997; McVey 2011), on other plantations and smallholdings, the production of household goods by enslaved labor was an expected informal contribution. In the year 1748, Mrs. Mary Clopton made a number of purchases at William Massie’s store in New Kent County, Virginia. Her account was settled in large part due to the work of one of her unnamed slaves, who produced 60 pairs of shoes and several other leather items (Figure 2.8). Sixty pairs of shoes indicate a significant household time investment by an unidentified cobbler.



	Per Contra	Cr	£	S	D
1748	By your Negro making 60 pair Shoes	12	3		
	By his making 1 pair Stitch Downs			"	6
	By his making and mending of Harness		"	3	
	By his making 1 pair of Spatterdashes		"	2	6
			3	6	0
January 1st	By Ballance your Acct. then Settled		3	12	5
		£	6	18	5

Figure 2.8. Credit page from store ledger of William Massie, New Kent County, VA, 1747-1748. Customer Mrs. Mary Clopton paid her debts through the labor of one of her slaves, who made shoes and other footwear, and repaired leather items. Virginia Historical Society (Mss5:3 M3856:1).

Within towns like Baltimore, artisans frequently took up additional ventures, either learning multiple trades, or by transitioning to merchants, innkeepers, or other profitable endeavors (Sheller 1988). Certain fields such as silversmithing, gunsmithing, and watchmaking were commonly combined (Hollan 2010). These multiple occupations have contributed to the invisibility of certain craft specialists in the documentary record, as one of their roles may have gained primacy. Furthermore, informal exchange was common for craft items, which would not necessarily result in documentation. The lack of written evidence makes it difficult to accurately judge the extent and the significance of domestic manufactures in the colonial and early Federal Chesapeake. Aside from the odd account in store records or newspaper advertisement, archaeological materials often represent our greatest potential evidence for the production and exchange of local goods.

This research challenges the notion that craft production was negligible on the Chesapeake landscape because there were few large-scale endeavors, and few named practitioners. Rather than approaching local craft production as a fringe activity within the staple crop economy of the Chesapeake, I instead consider the making of crafts as an embedded practice that was undertaken formally or informally by many Chesapeake residents. The products may have been inexpensive, but as surplus above subsistence they provided a means for tapping into the world of goods available through credit relationships within stores and communities.

Conclusion

In this chapter, I have outlined the settlement and economic history of the historic Chesapeake region. I emphasized the significance of the tobacco plantation as a primary structuring agent of the landscape, the economy, and social relationships. I have discussed the importance of credit at multiple tiers, from transatlantic to local, for shaping household access to goods. To better ground this argument through material culture, in Chapter 3 I turn to the primary material class under investigation: pottery. There I will explain how anthropological and archaeological approaches to ceramics may be usefully applied to the context of coarse earthenware in the colonial and early Federal Chesapeake.

CHAPTER 3: CERAMIC PRODUCTION, DISTRIBUTION, AND CONSUMPTION

In this chapter, I develop a framework for the study of historic coarse earthenware in Chesapeake, discussing major trends in archaeological and historical ceramics research as they are relevant to this project. I argue that existing research has failed to examine the coarse earthenware economy systematically, instead relying on provincial studies that do not account for the transatlantic scale of production and distribution. It has been difficult to reconcile the dual origins of this ware as both a European and Euro-American product. In order to understand lead-glazed coarse earthenware, we must consider the whole system, which included producers on two continents, multiple routes of distribution, and multiple types of consumers. While pottery production sites have been studied individually, there has been little synthetic work to situate these producers within a larger social and economic framework that includes the consumers of their wares. At the local level, archaeologists have identified vessels from domestic sites as the products of local kilns (*e.g.*, Fesler 2004; Kelso and Chappell 1974; Straube 1995), but broader investigations of how local craft economies functioned, and the effects they had on extended trade networks, have not followed. To highlight the significance of this ware to Chesapeake households, we must give equal attention to every step, from manufacturing to its ultimate disposal.

After providing a brief introduction to ceramics and craft research in archaeology, I describe and outline the history of historic coarse earthenwares. I explain how I have adapted classificatory structures to organize this artifact class into analytical units, and then I evaluate economic and historical models that can be used to conceptualize the production, distribution, and use of coarse earthenware in the Chesapeake. Maintaining the importance of integrating different stages of the ceramic economy, I focus on the model of demand and consider how questions regarding the social significance of consumption can be expanded to encompass the purchase of these utilitarian goods.

Lead-Glazed Coarse Earthenware

Coarse earthenware, sometimes referred to as “redware,” is a general category of low-fired historic ceramic. Like other earthenwares, it is fired at or below 1000°C, which consolidates but does not vitrify the clay body. The paste typically contains visible paste inclusions either naturally occurring in the clay source or as tempering agents added by the potter. The color of coarse earthenware paste is highly variable, depending upon the chemical composition of the clay, especially the presence of iron oxides, and the firing conditions. Often, the color of the completed vessel will differ from the color of the raw clay and may range from bright orange to dark brown and gray, or pale colors of buff, pink, or yellow. As the paste is not vitrified, it remains somewhat porous. To counteract the permeability of the vessel, historic potters typically glazed earthenwares using a lead-flux glaze appropriate to the low-firing clays. Hollow forms such as butter pots, milk pans, and storage jars were wheel-thrown, while some flat forms such as dishes were either slab-molded or wheel-thrown (Figures 3.1).

Figure 3.1. Interior and exterior of press molded dish from Brookhill Pottery, Buckley (mid 17th-early 18th C). Interior slip decoration and glaze, unglazed exterior with smoothed surface characteristic of molded vessels.

The identification of a ceramic as coarse earthenware references the low firing temperature and grainy qualities of the paste, in comparison to the more fine-grained refined earthenwares. Historic refined earthenwares, typified by ware types such as creamware and pearlware, tend to be pale-bodied and produced in thinner forms with different methods from coarse wares (Figure 3.2). A few attempts were made to produce this ware in America during the eighteenth century, but it was not successful (Hudgins 2009; Hunter 2009).

Figure 3.2. Creamware refined earthenware plate recovered from Monticello's Dry Well, late 18th C. Image courtesy the Digital Archaeological Archive of Comparative Slavery, the Thomas Jefferson Foundation, Monticello.

Lead-glazed coarse earthenware had been made in England since the Middle Ages (Figure 3.3). During the seventeenth century it accounted for two-thirds of all ceramics manufactured there (Weatherill 1982:243), with the remaining third being tin-enameled earthenware and early salt-glazed stoneware (Green 1999; Skerry and Hood 2009). At this time, much of the coarse earthenware was still produced in small, rural workshops (Brears 1971; McGarva 2000; Weatherill 1982), though there were clusters of potteries in areas such as Buckley (Amery and Davey 1979; Davey 1987; Davey and Longworth 2001a, 2001b; Longworth 1999, 2004), North Devon (Allan and Pope 1990; Watkins 1960), and the Surrey-Hampshire Border (Pearce 1992, 2007). By the eighteenth century, these well known locations were producing utilitarian coarse earthenware for the British and colonial market (Nenk and Hughes 1999; Noël Hume 1969:102).

Figure 3.3. *The Potter*, woodcut by Jost Amman, 1568. Shows an earthenware potter working on a throwing wheel. Image courtesy Digitale Texte der Bibliothek des Seminars für Wirtschafts- und Sozialgeschichte (http://www.digitalis.uni-koeln.de/Amman/amman_index.html**).**

In addition to its own domestic production England imported wares from the Netherlands, France, Germany, Italy and Spain (Barker 1999), which then made their way to across the Atlantic to the English colonies. There was also direct trade between the colonies and other European polities, especially with the Dutch (Schaefer 1994; Wilcoxen 1987). Though there were material and decoration characteristics specific to some regions, on the whole coarse earthenware was produced in generalized forms for storage and food preparation, as well as for chores such as dairying. Due to its physical characteristics, coarse earthenware was better suited for thick and sturdy vessels rather than delicate forms, though tablewares such as mugs were commonly produced. Forms were largely homogeneous across the country and the European continent, as Post-Medieval interchange between British, Dutch, and German pottery industries had created melded forms (Gibble 2001:258; Figure 3.4).

Figure 3.4. Coarse earthenware vessel forms. Row 1, tea and tableware forms: teapot, saucer, mug, pitcher, tankard, plate. Row 2, utilitarian forms: bowl, jug, pipkin, milk pan. Row 3, utilitarian forms: storage pots or jars. After Beaudry *et al.* 1983.

Lead-glazed coarse earthenware arrived in the Chesapeake with the first settlers of Jamestown, and began to be produced within the colony in the first decades of settlement. Utilizing the manufacturing techniques they learned in their homeland, the first potters to arrive in the colonies were English, setting up workshops in New England and the Mid-Atlantic. Beverly Straube (1995) describes these potteries as small-scale endeavors with very little infrastructure, perhaps not even kilns. There is some evidence that these early seventeenth century potters were itinerant, moving across the landscape and producing pottery for neighborhoods across the Tidewater. They made both tablewares and utilitarian goods and have been described as highly skilled artisans, though their early works reflect the testing period of new raw materials and conditions. By the eighteenth century, while there are fewer known sites of pottery production in the Coastal Plain, the potters that were at work in the Tidewater appear to have been more established. An example is the William Rogers pottery, in Yorktown, which operated in the first half of the eighteenth century and on a much greater scale than any previous Chesapeake potters (Barka 1973, 2004; McCartney and Ayres 2004; Straube 1995). The wares produced there, both earthenwares and stonewares, served a local market and were exported for intercolonial trade as well. Only a few potters, such as Henry Piercy, in Alexandria at the end of the eighteenth century, appear to have approached this scale of production in the Chesapeake (Magid 2005; Magid and Means 2003). A competent coarse earthenware potter could produce dozens or hundreds of nearly identical vessels per day. Producing pottery was labor intensive and took skill, but had fairly few material or equipment requirements and thus could be done cheaply (Kelso and Chappell 1974:59; Myers 1984:52).

Over the course of the eighteenth century, settlement rapidly expanded west into the Piedmont. Yet, with a few exceptions (Russ 1995, 1999), historic pottery production is unknown within the Piedmont of Virginia. The absence of known potters had led to the assumption that coarse earthenware used in the Piedmont was imported from domestic or British sources. In the mid eighteenth century, potters cropped up along the western frontier, especially in the Shenandoah Valley. For the most part, these small-scale potters were not part of the British-American population moving westward from the Coastal Plain, but members of ethnic and religious minorities moving south from Pennsylvania. Many ceramic production sites have been identified within this phase, operating during the mid-late eighteenth and nineteenth centuries. For an overview of Shenandoah Valley pottery production see Comstock (1994), Evans and Suter (2004), Rice and Stoudt (1929), Russ (1999), or Wiltshire (1975).

Historic accounts and documentary evidence are frequently utilized in studies of historic pottery and pottery production on both sides of the Atlantic. In some cases the only known evidence for a potter is a newspaper advertisement (see MESDA n.d.), while in other cases deeds, account books, personal letters, and official correspondence provide information on the identity and efforts of potters (*e.g.*, Carnes-McNaughton 1997; Comstock 1994; Lasansky 1990; McCartney and Ayres 2004; Pugh and Minnock-Pugh 2010a, 2010b; Rice and Stoudt 1929; Weatherill and Edwards 1971). Potters in the Chesapeake have also been studied based on extant work, sometimes based on a single signed vessel (*e.g.,* Evans and Suter 2004:69). There is a large body of information on early American pottery production sites, descriptions of the potters' output, as well as potters' family histories drawn from these resources, with many others building from archaeological investigations of pottery production sites (*e.g.*, Barka 1973, 2004; Carnes-McNaughton 1997; Cotter and Hudson 1957; Kelso and Chappell 1974; Magid and Means 2003; Russ 1999; South 1999; Straube 1995).

Published works on historic earthenware potters in the Chesapeake tend to be particularistic, focusing on one potter or workshop, though several regional (*e.g.*, Comstock 1994; Rice and Stoudt 1929; Russ 1999; Straube 1995) or citywide (*e.g.,* Alexandria: Magid and Means 2003) studies have been undertaken. In Great Britain, the work has been more synthetic, describing the rural pottery production in general (*e.g.*, Brears 1971; McGarva 2000) or geographically bounded pottery traditions (*e.g.*, Buckley: Allan and Pope 1990; Davey and Longworth 2001; Harlow: Davey and Walker 2009), rather than focusing exclusively on individual potters or potteries. In recent years, there has been greater interest in understanding historic potters within larger decorative and ethnic traditions in the United States (*e.g.,* Beckerdite *et al.* 2010; Heindl 2010; Pugh and Minnock-Pugh 2010a; South 1999). Yet, on the whole, studies of coarse earthenware tend to emphasize the production phase of the wares, without full consideration given to the distribution and use of the potters' products. While valuable, the compartmentalization of historic coarse earthenware research, dividing production from distribution and consumption, has limited its interpretive potential.

Lead-glazed coarse earthenware was not the only American-made ceramic in the eighteenth century. Colonoware is also a coarse earthenware, but was hand-built, rather than wheel-thrown, and was not glazed. It was produced in a variety of forms, some of which mimicked European tablewares (Figure 3.5). Though much debate still exists over the producers of these wares (*e.g.,* Cobb and DePratter 2012; Ferguson 1992; Heath 1996; Steen 1999), they were not the same British producers that made lead-glazed coarse earthenware in the early Chesapeake. Instead, colonoware was made by Native Americans, such as the Catawba (Plane 2011; Riggs 2010), or perhaps in some cases by enslaved Africans. Colonoware was used in the Chesapeake predominantly during the eighteenth century. Turnbaugh (1985a:22) found that: "Colono ware seems to occur in ceramic samples in inverse proportion to English colonial redware. Both of these wares filled the need for cheap, readily available red earthenwares in their respective regions." Colonoware does not persist in the Chesapeake, becoming much more rare over the course of the eighteenth century (but see Galke 2009). Functionally, colonoware performed some of the same roles as lead-glazed coarse earthenware, and is also evidence of local economic relationships.

Figure 3.5. Colonoware vessel with European style footring from excavations at Ayers Town, a late eighteenth-century Catawba site. Image reproduced from Davis *et al.* 2014.

Salt glazed stoneware was another domestically produced ceramic, which came to replace coarse earthenware production in many places in America. First made in England in the 1670s, in the Chesapeake it was produced as early as the 1720s at the William Rogers pottery (Barka 1973, 2004; McCartney and Ayres 2004; Straube 1995). Predominantly utilitarian in form and function, stoneware was stronger than coarse earthenware, as the fabric vitrified during firing and became impermeable (Figure 3.6). Many American potters transitioned from earthenware to stoneware production or produced both types of ware. However, stoneware required clay that could withstand the higher heat. Stoneware was such an important commodity that American potters would transport stoneware clay great distances (Ries 1897). Some attempted to stretch their imported stoneware clay with local earthenware clay, finding a mixture that retained stoneware properties (Warner 1985:183).

Figure 3.6. American salt-glazed stoneware sherds from Eden Street pottery in Baltimore, Maryland, early 19th C. Sherds exhibit characteristic cobalt decoration and left example has impressed 2-gallon capacity mark. Image courtesy the Maryland Historical Trust, Jefferson Patterson Park & Museum, Maryland Archaeological Conservation Laboratory.

Given the potential for non-local sources of stoneware clay on production sites, elemental sourcing of stoneware is more complex than earthenware and has been excluded from this study. For further information on stoneware production in Virginia and Maryland, see Hornsby Heindl (2013), Kille (2005), Magid (2004) and (2012), Mueller-Heubach (2013), Russ (1999) and (2004), Russ and Schermerhorn (2005), Umstott (1995), and Zipp and Zipp (2004). Discussion of the material properties of clay and the production sites utilized in this study continue in Chapter 4.

Ceramics in Archaeology

Objects, while always fundamental to archaeology, have been viewed with different emphasis over time. In the cultural-historical period, archaeologists considered objects in terms of the information they conveyed about the chronology or identification of a group, in early years equating culture with suites of material objects. By the mid twentieth century, archaeologists such as V. Gordon Childe saw the transmission of collective traditions such as craft technologies as fundamental parts of societies (Childe 1948[1936]). The rise of processual archaeology in the 1960s brought with it a focus on objects as evidence for behavioral adaptations to environments and for their ability to express social organization. Over the course of the latter twentieth century, archaeologists became increasingly concerned with the meanings conveyed through things. Specifically, the study of craft production developed as an analytical lens through which to understand the past. Ethnoarchaeology as well as archaeological studies of craft specialization more broadly began to focus on production "as a socially embedded action," rather than an evolutionary process (Hendon 2007:167). The recognition that craft production extended beyond functional concerns was significant. Archaeological studies into the contexts of craft production have considered specifically the ways in which crafts intersect with economic, political, social, and ritual domains, the construction of social identity through crafts, and the relationships between producer and consumer (Costin 1998:3).

Within archaeology, ceramic studies in particular have greatly expanded over the past 30 years, moving beyond description and process to address the ways in which pottery mediates human interactions. Pottery is an especially useful unit of analysis because it is often used and requires frequent replacement, driving a perpetual demand (Stark and Garraty 2010:50), and has near omnipresence in archaeological contexts. Ceramics fulfill specific functional requirements, and often have forms or decoration that can be linked to certain traditions or times. There are endless methods for describing the attributes of ceramic wares, including technological, functional, and decorative perspectives, each of which is able to address distinct types of research questions.

While archaeologists have studied the production, distribution, and consumption of ceramics and other crafts in a range of contexts and time periods, studies of historic ceramics have often been treated differently from those of ancient ceramic economies. A fundamental divide is perceived to exist between holistic studies of prehistoric or non-western contexts (*e.g.*, Brumfiel and Earle 1987; Costin and Wright 1998) and the historic period. For those studying the colonial Atlantic world, globalization, the capitalist economy, and the rise of industrialization are taken as evidence of profound distinction from other systems. The presumption of factory or large-scale production and global distribution effectively divorces ceramic producers from ceramic consumers in most North American contexts. Historic ceramic studies are more likely to focus on the economic worth of specific ceramic ware types (*e.g.*, Miller 1980, 1991), or the status sought through use of costly wares (*e.g.,* Breen 2013; Galle 2006), than issues of production and mechanisms of exchange . Studies of colonoware, the coarse earthenwares produced in the Southeast and the Caribbean by enslaved Africans or native peoples, have been exceptions (*e.g.,* Ferguson 1992; Hauser 2008). Colonoware, by its informal production methods and association with native and enslaved groups, in a sense falls out of history and into the prehistoric realm, where questions of ethnic identity and cultural continuity are brought to the fore, binding together technological and social considerations (but see Cobb and DePratter 2012; Galke 2009). However, I argue that historic ceramic processes for European-style coarse earthenwares share many characteristics with other ancient or non-western ceramic economies, and benefit from a more holistic investigation. Here, I begin with what is often the first step, description.

Descriptive Analyses

Descriptive studies of ceramic artifacts provide valuable information on the technological and decorative aspects of pottery production, and their presence in specific contexts. Fundamentally, in order to conduct any analysis, it is necessary to assess on some level the sameness or difference of a collection of artifacts. These systems of description and classification are created as problem-solving tools. Categories make it possible to ask certain types of questions, to conduct quantitative analyses, and to compare data across sites. At the same time, categories are limiting and may mask certain kinds of variation.

Typologies are common systems of categorization for organizing ceramics, in which practitioners separate artifacts into mutually exclusive categories known as types. A type definition focuses on the co-occurrence of attributes and may be considered as "a specific and cohesive combination of features" (Krieger 1944:277). The often subjective nature of the decision-making that drives typologies has troubled archaeologists for decades (*e.g.*, Adams 1988; Krieger 1944; Spaulding 1953; Whallon 1972). Specifically there have been debates over the benefits of hierarchical or taxonomic decision-making processes, in which there is a stepwise series of divisions based on particular traits, or paradigmatic processes, in which each attribute is evaluated simultaneously. Increasingly, there have been studies of ceramics that shift focus from the creation of types to attribute level analysis as advocated by Irving Rouse (1960), a method that does not assume the existence of formal, mutually exclusive types. In Rouse's modal analysis, each attribute, such as manufacturing technique, would be independently assessed as a mode, and a sample could fall into different groups, depending on the mode under investigation. Anna Agbe-Davies (2006) argues that this method is especially effective for archaeological collections in which complete artifacts are rarely recovered.

Whether to adopt a formal artifact taxonomy or a non-hierarchical classification is dependent upon the types of questions that are being asked of the data. Both types and attributes can be analyzed at multiple scales, from individual artifact to multi-site assemblage level studies. Named types provide a shorthand that facilitate analysis, but at the same time may mask internal heterogeneity of the constituent members. Furthermore, it is difficult to assess legitimacy of our categories in terms of the realities of the past. The question of whether assigned types reflect "real" differences in how artifacts were recognized by past people is a constant subject of debate within the discipline (*e.g.*, Adams 1988; Hill and Evans 1972; Wylie 2002).

In historic earthenware research, one solution has been the development of folk taxonomies. Coarse earthenwares can be described and evaluated according to the colors of the clay body, the methods of manufacture and the presence and types of inclusions, as well as by form and surface treatment. The Potomac Typological System (POTS), a folk taxonomy, was developed using historic documents to compile pottery terms common in colonial Maryland and Virginia based on form (Beaudry *et al.* 1983), and was later adapted for other regions (*e.g.*, Gibble 2001, 2005 for Pennsylvania; Turnbaugh 1983 for the Northeast). However, temporal and regional variation in historic pottery terms makes it difficult to generalize these categories across larger areas. A major downfall of these typologies based on form is that they rely upon whole or reconstructable vessels, which are rare archaeologically.

In this project, I focus on sherd-level data. An attribute analysis, which measures each attribute independently, such as that made possible through the cataloging structure of a database such as DAACS, is better able to characterize fragmentary remains (e.g. Hirshman *et al.* 2010). In addition to cataloging each ceramic sherd into taxonomic categories of material and ware type, DAACS uses a relational database that records individual attributes such as paste color, glaze color, size, sherd thickness, and decorative technique, that researchers may evaluate independently to develop their own classifications.

In Bloch (2011), I demonstrated the utility of this attribute-focused system for uncovering broad regional or temporal trends in coarse earthenware across many sites in the Chesapeake. I challenged the utility of the named ware types “Redware” and “Coarse Earthenware, unidentified”, the two main categories of generic coarse earthenware in DAACS, which are distinguished by paste color. In my analyses, I found that the range of paste colors found in coarse earthenwares did not exhibit meaningful separation temporally or spatially, suggesting that both pale and dark-bodied earthenwares were produced and used interchangeably. However, by retaining independent attributes, it was possible to move beyond the given ware types to consider other characteristics that exhibited patterned variation.

In the exploratory data analysis of over 10,000 sherds of coarse earthenware, I also revealed that production techniques for historic coarse earthenwares changed predictably through time, and that certain attributes of coarse earthenware were more common at some sites than others, indicating differential availability or functional requirements among sites and sub-regions of the Chesapeake. Single-glazed vessels, with interior glaze only, were more common earlier, transitioning to fully glazed vessels by the end of the eighteenth century. Black-glazed vessels were more common in the Piedmont than in the Coastal Plain, suggesting a potentially discrete origin. Sherd thicknesses remained consistent over time, indicating the enduring need for vessels in uniform shapes and sizes. The elucidation of these general patterns, as well as site-based inconsistencies, has provided a basis for the current project.

The typing of ceramics and other artifacts creates distinct kinds of archaeological data. My intention for this study was to capture the range of coarse earthenwares that plantation residents used domestically in the eighteenth-century Chesapeake. With this goal in mind, I relied loosely upon existing classification systems for historic coarse earthenwares, while retaining independent attributes. The coarse earthenware sampled in this study was produced using European/Euro-American modes of production, which included wheel-throwing and press molding, the use of lead glaze, and kiln structures for firing. Though I did incorporate the cataloged classification of these wares into types, I did not accept the classifications *a priori*.

Figure 3.7. Earthenware sherds from the Liverpool area. Wares with marbled paste and thick black glaze, as seen in Buckley, N. Wales. Recovered from excavations at an 18th C. pottery kiln in Rainford, Merseyside. Images courtesy the Museum of Liverpool.

Coarse earthenware types, such as Buckley, North Devon, Iberian, and others by their names assume a shared geographic origin. While certain characteristics such as paste (*e.g.*, Buckley-type ware) or decoration (*e.g.*, Pennsylvania slipware) have been advanced as meaningful markers of geographic origin and thus used as the basis for defined types (*e.g.,* Hurry and Miller 1989; Noël Hume 1969), these classifications developed in special contexts and are not always generalizable to broader temporal and geographic investigations. For example, wares classified in North America as Buckley due to their marbled red and buff paste were made throughout the Coal Measures region of England and Wales, not limited to Buckley (Amery and Davey 1979; Davey and Longworth 2001a; Figure 3.7). Furthermore, potters in Buckley produced a wide range of wares, some with marbled pastes, but many without (Davey and Longworth 2001a; Figure 3.8). The category of Buckley-type is therefore misleading in geographic scope, and accurately encompasses only a fraction of the wares produced in Buckley.

Figure 3.8. Coarse earthenwares from the Brookhill Pottery, Buckley, N. Wales. Variety of forms such as tankards and plates, with decorative techniques and pastes not typically associated with Buckley wares in North American contexts. Images courtesy the Museum of Liverpool.

Rather than forcing sherds into these imperfect categories, I followed DAACS protocols, completing an attribute level analysis that maintained independence of variables. The elemental analysis provided a separate line of evidence specific to determining geographic origin, which could support or refute the type classification. For further description of my cataloging procedures, see Chapter 4.

Siting Production

What explains the apparently isolated incidences of ceramic production within the Chesapeake? Models will always be idealized, unable to incorporate all of the complexities of real world interactions, but they provide useful starting places for testing hypotheses and assessing broad patterns within the data. Here I introduce several frameworks that have been commonly applied to craft production in the past and consider the ways in which the historic Chesapeake fits or does not fit into these models.

Ethnoarchaeology, the application of contemporary ethnography to inform past human practices, has been offered to better understand the methods and practical considerations of ancient pottery producers, as well as providing examples of the strategies for the marketing and distribution of potters' wares (*e.g.*, Arnold 1985, 2008; Kramer 1997; Rye 1981). Oral histories and folklore studies have also been conducted in order to better understand the lives of potters still utilizing traditional methods (*e.g.,* Glassie 1999, Sweezy 1994, Zug 1986). Studies such as these assist archaeologists in making sense of the variation among ceramic styles and functions, and the complex factors that prompt adaptation or abandonment of pottery production. Furthermore, diachronic studies (*e.g.,* Arnold 2008) offer insights into changes over time in these pottery systems and may suggest explanations or alternatives for understanding shifting patterns in the past.

In order to understand production, we must consider it in tandem with distribution and consumption. Pottery was prepared for individual markets, each with its own distribution network. Distribution is a difficult process to recover archaeologically. The routes by which pottery made its way from a potter's workshop to a family hearth were variable and complex, and did not typically leave material or documentary traces. The distance that pottery would travel, and the number of intermediaries between producer and consumer was dependent on a host of factors. These include the terrain and transportation mechanisms, the economic system or systems present, and the relative abundance of the desired pottery. Here I introduce the character of pottery production in the historic Chesapeake, and consider several models for interrogating the economic contexts of craft production in the region.

In the Chesapeake region, craft production as a whole has been under-investigated, as the strong economic relationship with England fostered by tobacco monoculture is considered to have stifled domestic production (Russo 1988:401; Turnbaugh 1985a:23; Walsh 1999:57). The incidences of known pottery production in the Chesapeake are patchy spatially and temporally, without any clear hub of potting industry. This is in contrast to other regions such as the Northeast, where production took place at multiple scales, from the part-time farmer/potter to the urban workshop, and remained fairly consistent and long-term aspects of the regional economy. For these reasons it has been hypothesized that many of the American-made coarse earthenwares found archaeologically in the Chesapeake were produced outside of the region, in larger potting centers such as Philadelphia (Bower 1985; Pendery 1985; Steen 1999) or central North Carolina (Heath 1999:58).

Economic geography models of production rely on several principles that can be seen to influence the growth of production in certain places, while inhibiting it in others. First, economic activities are mediated by a tradeoff between economies of scale, in which centralization is more efficient by lowering production cost, and transportation costs, in which the shipment of raw materials or finished products great distances will increase cost. The costs of production and distribution must not exceed the value of the product. Depending on the context, it may be more efficient to disperse production across the landscape rather than centralize it (Costin 1991:14). The ability to centralize production is additionally governed by the need for a ready labor pool and a local customer base. "There will obviously be an incentive to concentrate production of a good near its largest market, even if there is some demand for the good elsewhere" (Krugman

1980:955). Therefore, it is important to recognize that centralized production almost always relies upon a preexisting urban environment.

Central-place theory (Christaller 1966) is one model that has been commonly adapted for archaeological contexts. It hypothesizes that under certain conditions evenly spaced production centers will arise to provide goods. It is based upon behavioral assumptions that consumers will buy goods and choose markets nearby when available, and that merchants will work to maximize profits (Smith 1979: 113, after Christaller 1966). In such a model, there may be centers of different sizes; for example, large urban centers that can provide a wide range of domestic and imported products, and small towns or markets that mainly provide local or regional products. The result is a lattice of evenly spaced centers at several different scales. This model has been proposed for archaeological systems (*e.g.,* Smith 1979), but it has been criticized as well for the limitations in accounting for the complexity of past human landscapes (*e.g.,* Crumley 1979; Stark and Garraty 2010). It is not a good fit for the transatlantic trade of colonial British America, as long distances across water were mitigated by a variety of other factors. Furthermore, the Chesapeake largely lacked the smaller centers responsible for redistributing goods.

In contrast to central place theory, Kramer (1997) employed a "gravity" model to predict the interaction between ceramic producers and consuming populations in Rajasthan, India. The model, based on "social physics," begins with the premise that "the amount of interaction between two cities is directly proportional to the number of people living in those cities, and inversely proportional to the intervening distance" (Crumley 1979:146). Furthermore, distance and trade costs, which might include colonial relationships or a bias toward local products (Anderson 2010), can be built into the gravity model. Kramer estimated the interaction between Indian villages, taking into account settlement size and distance, with the prediction that interaction would decrease as distance increased, but also that interaction was positively correlated to the size of the settlement (Kramer 1997:156).

Gravity-based models differ from central-place theory in that the characteristics of the consuming areas are recognized as equally influential on the nature of the trade. Kramer found that the expectations of the model were often complicated by the realities on the ground, such as economic competition and the relative value of certain ceramic wares. These actualities affected the distance that goods traveled and suggest that similar issues would affect the distribution of ceramics in archaeological contexts (Kramer 1997:156-167). The gravity model is more sensitive to social factors, but accounting for them within the gravity equations soon renders it cumbersome. While the gravity model at a macro scale can be applied to explain the mutual attractions of Great Britain as producer and Chesapeake as consumer in the mercantilist economy, the colonial context of these interactions was clearly a driving force and offers an equally compelling economic model. Gravity is less able to explain interregional or local trade relationships in the shadow of transatlantic commerce, given that historical evidence for trade costs, such as local bias, is lacking.

Both of these models presume the existence of cohesive geographic centers. The Chesapeake was very slow to develop towns and cities, because the land requirements for tobacco growing and the need to easily ship the harvested crop were not conducive to city dwelling. In an agricultural system organized around a staple crop, settlement is structured primarily by the location of farmland and the movement of agricultural products (Algaze 2008:25). Trade routes, towns, and economic relationships develop, as needed, in order to facilitate the trade of the most important economic item. Some economic systems will foster the growth of towns and cities as entrepots for trade, while others do not.

The tobacco consignment system also distinguished the Chesapeake economically from the middle colonies to the north, and the Carolinas to the south. Individual planters could conduct trade more or less directly with Great Britain, even across great distances. Earthenware imported to the colonies was inexpensive, arriving as ballast on ships that would then return laden with tobacco. For those not directly part of the tobacco consignment system, redistribution of imported goods to progressively smaller places occurred though the establishment of stores.

These historical patterns hold long-term repercussions, explaining why even with the growth of urbanism in the late eighteenth and early nineteenth centuries, large-scale ceramics production never became common in the Chesapeake. This scale of production had already become fixed in other locations, within America and abroad. As Paul Krugman (1991:81) emphasizes, “there is a circularity that tends to keep a manufacturing core in existence once it is established.” According to his framework, there is a window of time in which production specialization may arise, after which point the course of history is set. “If a region gains an initial advantage, those processes will concentrate new growth and its multiplier effects in the already expanding region rather than elsewhere” (Algaze 2008:39). Though Chesapeake planters abandoned tobacco monoculture over the course of the eighteenth century in response to falling market prices, the tobacco trade had already structured the economic system of the Chesapeake. "The…domination of the plantation economy, which was dependent on its extensive commerce network, contributed to continued reliance upon imported items"(Russ 1999:194).

If we compare the Chesapeake situation to England, or Pennsylvania, the seat of large urban ceramic production in the mid-Atlantic, sharp distinctions arise. While all had ready access to raw materials for craft production, the Chesapeake lacked the labor pool, market base, and trade infrastructure found elsewhere. The city of Philadelphia, on the other hand, was a successful urban center that reestablished many of the traditional economic practices of England. Philadelphia began to produce coarse earthenware in quantity around the turn of the eighteenth century. Rather than in the Chesapeake, where tobacco agriculture monopolized the labor pool, William Penn worked to attract craftsmen as colonizers of Pennsylvania. "As a result of [Penn's] efforts, 49 percent of the 352 purchasers of land in the period from 1681-1685 could be identified as belonging to handicraft/artisan classes" (Gibble 2001:30). Artisans continued to arrive from England throughout the colonial period and beyond (Thistlethwaite 1958). Philadelphia craftsmen as a whole were a large class, able to organize themselves for mutual benefit, and to engage politically (Rigal 1998; Schultz 1990), similar in many ways to the guild system of crafts in Europe. In addition to trained artisans, ships brought over indentured servants as well as slaves who worked in pottery workshops. The burgeoning population provided both labor and a consumer base for craft products. This promoted an ideal environment for artisans, as the local market was large enough to ensure full-time labor demands and competitive wages (Krugman 1980:955). There was a positive feedback loop, in which Philadelphia was able to combine its resources with existing human labor and capital. Philadelphia remained a major source of domestically produced ceramics until the nineteenth century.

The economic geography framework offered by Krugman helps explain why urban production developed in Philadelphia and not in the Chesapeake, but offers less concrete explanations for the fluid nature of the farmer/potter production model that does appear to have been common in the Chesapeake. Despite the availability of coarse earthenwares from imported and interregional sources, small-scale production was still practiced in the Chesapeake. At least in some instances, it was a frontier industry, arising in locations where broader trade networks had not yet been established, or were not secure enough to provide timely and reliable shipments.

At other times, it occurred in places where equivalent imported goods were readily available. In the following pages, I introduce the concepts of demand and consumption in order to provide alternative explanations for small-scale local production in the region, shifting the focus to include the ultimate consumers of the earthenware products.

Demand

The demand for coarse earthenwares on the historic Chesapeake landscape was fundamentally intertwined with the prevailing economic systems, but these must not be assumed to be monolithic (Shammas 1982). Within historical studies the dominance of capitalism and global trade has often overshadowed more localized economic systems. "Most researchers have developed a complex vision of consumption that routinely melds capitalism, Westernization, and materialism in a more-or-less synonymous phenomenon…distinct from local experiences and identities" (Mullins 2007:198). The focus on global processes has led some scholars to question whether consumers had real agency in the process of consumption: "contemporary models of consumer choice may not be appropriate in an economy where the system of distribution was subject to such large scale modulations beyond the control of the individual consumer, whatever their local social and economic status" (Thompson 1999:183). Though the global and capitalist market cannot be discounted, local and regional markets, both formal and informal, served important roles in the the early historic Chesapeake as well. Together, the factors influencing ceramic demand represent social, environmental, and geographic pressures; negotiations taking place between pottery producers and pottery consumers, among social classes, and within communities.

James Deetz (1996:73) distinguished four factors that establish pottery in foodways:

“availability, need, function, and social status.” Availability may be thought of in absolute terms, whether a product existed and was potentially obtainable. Need and function are closely tied, related to the intended uses for the objects, as well as the suitability and desirability of ceramics to fulfill a necessary task. For example, in some cases wood or metal objects may have been as serviceable or better suited for a job than a ceramic object. Finally, social status involves a consideration of the prestige associated with owning, using, and displaying a particular object. Each of these elements contributes to the demand for a product.

To apply this framework of demand for coarse earthenware to the eighteenth-century Chesapeake, there are many factors that must be contemplated. In terms of availability, earthenware differed in its absolute availability over time, depending upon the schedule of transatlantic shipments, the presence of working local potters, and the reliability of transportation. For example, during the earliest phase of colonization in the Chesapeake, coarse earthenware from local and interregional sources was less available in absolute terms, because of the lack of an established pottery industry during the early years of settlement. Instead, coarse earthenwares were most abundant as English exports. By the mid-eighteenth century, this pattern had flipped: the export of coarse earthenwares from England largely ceased, displaced by refined wares (Gibble 2001:53). Instead, manufacturing hubs like Philadelphia and burgeoning rural industry throughout the mid-Atlantic produced the necessary earthenware, or provided alternative materials. The expansion of local and intercolonial trade networks increased the availability of these wares.

Aside from absolute availability, it is necessary to consider the economic availability of these wares for households of varying social classes. Archaeological evidence demonstrates that these wares were among the most accessible. Nevertheless, depending upon financial and social resources, and connections within networks of trade and exchange, purchasing power for specific sources of coarse earthenwares may have been limited. As discussed in Chapter 2, the poorest classes relied upon locally available wares from stores or artisans, while planters who directly participated in tobacco consignment had wider access and more control over the goods they purchased.

It is difficult to judge the economic benefits of buying domestically made coarse earthenware in comparison to imported coarse earthenware. The economies of scale of the larger pottery industries meant that, even when considering increased transportation costs, the effective cost of a vessel may not have varied a great deal between local and imported wares. Merchants advertised Philadelphia-made and English-made wares simultaneously, indicating that they were available as equivalent products—and at the same prices (Gibble 2005:36).

The need for coarse earthenwares was high during the eighteenth century as they fulfilled many important functions within the home, from food storage and preparation to eating and drinking. Coarse earthenwares were the cheapest of all types of ceramics available in colonial America (Gibble 2001:55). Therefore, assuming that they fulfilled the functional requirements, they offered the most cost-efficient solution for stocking the household. They were more economical than refined ceramics, porcelains, or pewter as tablewares, and less costly than utility stonewares as well. For a household concerned more with thrift than with conspicuous consumption, coarse earthenwares may have been chosen over other ceramics.

Over the course of the eighteenth century, need for these wares declined, as longer-lasting metalwares and stonewares came to replace a number of their utilitarian functions, and refined earthenwares replaced coarse earthenware tablewares in most households. New technology can have startling impacts on craft production in short periods of time. For example, in the contemporary Yucatan, Arnold found that the advent of piped water in villages resulted in a sharp decrease in the need for ceramic water jars; within 10 years, production of these vessels had largely ceased (Arnold 2008:106). In response to decreased demand, Chesapeake earthenware potters shifted their production from food storage and preparation vessels to industrial goods such as water pipes and chimney pots (Evans and Suter 2004), or began to produce stonewares instead (Evans and Suter 2004; Magid 2004).

It is a challenge to assess the possible benefits to social status that could arise from the consumption of coarse earthenware. Unlike fancy tablewares, coarse earthenwares remained cheap, plain, and relegated to private areas of the home throughout the colonial and early Federal period. Nevertheless, there are certain aspects of consumption that may be usefully applied to the social significance of these wares, as outlined below.

Consumption

In the early years of study, consumption research focused on trade statistics, production and distribution, material culture, and contemporary social commentary. Over the course of the 1980s, there was a shift to cultural topics that included social, geographical, and gendered patterns in consumption (Glennie 1995). While anthropologists for many years had been concerned with exchange and prestige goods, these were not explicitly about consumption (Miller 1995a:143). The study of consumption as a social practice was brought to the attention of social scientists with the works of Pierre Bourdieu (1977, 1984) and Mary Douglas and Baron Isherwood (1996[1979]) in the 1970s. They were the first to theorize objects as active participants within societies, as *material culture*. Their analyses of contemporary consumption practices emphasized the ways that objects were manipulated within social systems, and how social class influenced purchasing behavior. Historical studies of consumption have focused on the consumer revolution of the eighteenth century (Carson 2003; Martin 1993); the increased availability of costly goods such as Chinese porcelains to non-elites was the hallmark of this revolution. It was during the colonial period that Europeans and Euro-Americans began to obtain ceramics for display purposes only, as visual manifestations of their sense of taste. The lack of use wear on some vessels is evidence that richly painted delftware and other ornate ceramics were at times more decorative than functional in the colonial home (Griffiths 1978:75). It is difficult to fit coarse earthenware consumption into standard consumption models, which often focus on rare, decorative, or expensive goods. In most cases there is no evidence to suggest that utilitarian wares served as display goods.

Instead, I contend that the consumption of coarse earthenware in the Chesapeake was socially meaningful, but does not align neatly with the ways in which consumption has been typically addressed within historical studies, due to its utilitarian nature. Paul Mullins (2007:195) has argued that archaeology is well suited to "confront the multivalent meaning of goods, probe the ideological roots of material symbolism, and emphasize that even the most commonplace objects provide insight into meaningful social struggles." Utilitarian or commonplace goods may offer special awareness of social practices of consumption, suggesting that our contemporary notions of coarse earthenware may be unduly limited. "At any given point in time what looks like a homogeneous, bulk item of extremely limited semantic range can become very different in the course of distribution and consumption" (Appadurai 1986:40). There is an implicit assumption that the consumption of coarse earthenware is to be understood more in terms of availability and need rather than status. However, while commonplace and available in absolute terms, access to particular sources of goods was structured by class, as well as race in the colonial Chesapeake, specifically within the dominant plantation context.

There is a growing body of literature on slavery and consumption practices (*e.g.,* Deetz 1996; Galle 2004, 2006; Heath 2004a; Martin 2000; Schlotterbeck 1991; Wilkie and Farnsworth 2010). These studies emphasize autonomy and consumer choice on the part of enslaved people. Yet enslaved individuals were members of nested households, with varying economic obligations and claims at the level of plantation. Practices such as provisioning slaves with food and household items were highly variable, and must be considered alongside alternative modes of acquisition such as independent purchase by enslaved plantation residents. Consumption on plantations was complicated by wealth, status, and race. Comparative studies of planter, overseer, and slave households (*e.g.,* Moore 1985; Otto 1984) have demonstrated that plantation status and racial identity affected access to material goods. Furthermore, Otto defined three potential patterns among plantation assemblages: the "white dominance" pattern, with shared assemblage characteristics for white households in comparison enslaved black households, the "hierarchical" pattern, tiered along social and occupational differences, and the "wealth-poverty" pattern, reflecting similarities in the economic status of overseer and slave households in comparison to the planter's household (Otto 1984:160-161). Moore and Otto found that, in general, planters and overseer households had higher cost goods than households of enslaved individuals, signifying a white dominance pattern. At the same time, other factors such as the overall wealth of the plantation mitigated the differences among plantation households (Moore 1985), with less wealthy planters having assemblages more similar to those of their employees and slaves. These results emphasize how access to markets was structured by socioeconomic status and also by race. In this study, I sampled earthenwares from a variety of households on plantations, including planter, overseer, and slave, in order to consider the results in light of these social and economic identities. In situations of limited participation within the broader market, the social value of locally produced and locally available wares may have exceeded the value placed on imported wares. I consider some of these local relationships below.

Buying Local

A local product conveys different meanings from an imported product. In some situations, the social value of these wares may have rested in the relationships that they mediated between neighbors or associates. For example, Timothy Scarlett has investigated the importance of locally made pottery to Mormon religious communities in nineteenth century Utah (Scarlett 2010). From this social perspective, consumption cannot be understood apart from production (Costin 1998:3). In the Chesapeake, local potters often tailored their products to specific household needs within their community, producing in direct response to commissions. In 1803, Shenandoah Valley earthenware potters Christian Fechtig and George Vogelsang drew in customers through an advertisement that specifically offered custom orders: "Commands from the country, & etc. by the quantity will be thankfully received and punctually attended to" (quoted in Comstock 1994:400). Rural potters especially realized that their farming neighbors had particular functional requirements, and were willing to cater accordingly.

In January 1814, we have documentary evidence of one such transaction between potter and customer, when Thomas Jefferson patronized his cousin Richard Randolph, who had recently begun operating a stoneware pottery outside of Richmond, Virginia (for more on this operation see Mueller-Heubach 2013). Jefferson asked Randolph, "Would you be so good as to send me two gross of your beer jugs; the one gross to be quart jugs and the other pottle [ditto]" (Jefferson 1987:417; pottle is equivalent to half-gallon). Later on that year, he posed an additional request, explaining, "I am now engaged in brewing a year's supply of malt strong beer, which however I have no chance of saving but by a supply of quart jugs from you. I received (I think) 10 ½ dozen and must ask the favor of 4. gross more for which Mr. Gibson will pay your bill" (Jefferson 1987:418). This direct correspondence between pottery producer and consumer is the only of its kind known for the plantations considered here.

Local craft production had a number of advantages over more distant trade. Thomas Jefferson relied upon local relationships with craftsmen in order to make special orders, obtain prompt results, and presumably, obtain a fair price. These large orders of ceramics were necessary for his household industry, demonstrating the scale of his production. In an archaeological and documentary study of Virginia planters, Alison Bell (2000) argued that these men were more concerned with "conspicuous production," than conspicuous consumption of luxury items. By focusing their wealth into increasing their plantations' productivity, they showcased their ambition and social position. From this perspective, Jefferson's wholesale orders of ceramics were signals of his success as a planter.

Of further interest, this transaction between Jefferson and Randolph was mediated by Patrick Gibson, Jefferson's factor in Richmond, Virginia (Founders Online 2015). Gibson, an English-born merchant, extended Jefferson credit and managed his purchases that arrived in Richmond for shipment upriver to Monticello and Poplar Forest. In exchange, he received the products of Jefferson's Piedmont plantations: tobacco, flour, and other crops. It is notable that at this time, Gibson had recently engaged George Jefferson, a cousin of Thomas Jefferson, as a partner in his business. This example demonstrates the complicated web of social and economic relationships in which local craftspersons contributed, where third parties and extended family were common participants. The interdependence fostered by exchanges such as this extended beyond economic concerns into social realms. In this context, local pots, while not display objects, acted as a social lubricant in addition to their functional roles.

Local products such as ceramics gained further significance in the context of colonial unrest. The demand for pottery from local sources was fueled by politics during the time of the American Revolution. "In certain circumstances that provoke attention to otherwise unquestioned and unnoticed routines and materials, everyday objects and practices might become extraordinary tools to accomplish social and political projects" (Naum, 2012:94). The relationships between local and global commodities became of immediate significance to colonial Americans. While the American colonies were by no means self-sufficient (Breen 2004), the idea of domestic manufacturing came to serve ideological goals. During the Revolution, consuming, or choosing not to consume, imported goods became a powerful political statement. In this revolutionary climate, "private decisions were interpreted as political acts; consumer choices communicated personal loyalties" (Breen 2004: *xv*). An anonymous Carolina planter published a call for action in the June 27, 1769 *South Carolina Gazette*:

> Can we then hesitate one moment longer, to unite with our brother sufferers in the other colonies, in the only probable means of averting so horrid a train of evils as are staring us in the face? Namely, that of coming into a general resolution, not to consume one farthing more of British manufactures than we can possibly avoid.

This writer echoed the sentiments of Benjamin Franklin, who a year earlier had written (1837[1768]:253), "Let us agree to consume no more of their expensive gewgaws. Let us live frugally, and let us industriously manufacture that we can for ourselves." At the same time, the anonymous gentleman tailored his argument specifically to address the issues faced by southern planters. He worked to dispel the concerns of his brethren about how the sale of their crops would suffer from a rejection of British goods, and suggested an agreement to limit the purchase of imported goods to a few necessities for plantation and household operation, rather than a full boycott. At the same time, he encouraged home manufactures.

American consumers at this time were forced to critically examine their economic and social relationships to Britain and America. American manufacturers offered alternatives to imported items, and therefore opportunities for colonists to collectively resist the imposition of British economic policies and assert their self-sufficiency. Compared to imported ceramics, domestically made wares composed a negligible economic portion of the ceramic market in the American colonies. Yet, Carl Steen (1990:58) has argued that the capacity of American potters to produce necessary items "would be retained and referred to when considering the arguments for and against an agreement to boycott English goods—including ceramics." Shortly after the Revolution, Alexandria, Virginia coarse earthenware potter Henry Piercy played upon these same sentiments in his pottery advertisement, vowing that his products would "assure him the patronage of all those who wish to encourage home manufactures" (Magid and Means 2003:81). The Revolutionary period formed a critical juncture in American history, a point for the construction of a distinct American identity. In attempting to divorce economically from Great Britain, the American colonies declared themselves willing to fulfill their own needs. Domestic crafts such as ceramics made this possible, ideologically reinforcing the idea of self-sufficiency.

The demand for coarse earthenware in the colonial and early Federal Chesapeake must be understood from economic, functional, and social perspectives. As with other classes of material culture, the meanings embodied by these wares were on the whole mundane, which does not detract from their significance as markers of social meaning. The concept of consumption can be expanded beyond conspicuous consumption to accommodate utilitarian goods, recognizing the distinct ways in which the objects served as tools for self-sufficiency and engagement within the community.

Conclusion

Here, I have situated historic coarse earthenware within a framework of anthropological and archaeological theory, acknowledging the ways in which this study articulates with, or fails to engage with, existing explanatory models. The compartmentalization of historic coarse earthenware research to date, dividing production from distribution and consumption, has limited its interpretive potential, an issue that this study seeks to address. Special attention has been given to the complexity of coarse earthenware production, distribution, and consumption in the Chesapeake, in which consumers appear to have simultaneously and interchangeably purchased transatlantic, intercolonial, and locally made wares. I focus on the multiple components of demand: availability, need, function, and social status, as equally significant to understanding the patterns in use of this quotidian artifact. I challenge the dominant studies of consumption, which have in many instances narrowly defined consumption in terms of expensive or showy goods. Instead, it must be acknowledged that the vast majority of goods consumed in the Chesapeake were utilitarian, and that a study of everyday consumption, rather than luxury consumption, privileges different questions. In particular, I argue for the pragmatic as well as political strengths of local production as factors that sustained the industry in the Chesapeake, even in the face of equivalent imported wares. Having laid a historical and theoretical groundwork, the following chapter introduces the methodology of ceramic sourcing as a tool for uncovering material evidence of the economic and social relationships of potters and consumers.

CHAPTER 4: METHODS OF ELEMENTAL ANALYSIS

Archaeological interpretations are built upon detailed description and analysis of artifacts, sites, and landscapes. In the mid-twentieth century, the array of analytical methods greatly expanded through technological advances. While scholars as early as the eighteenth century had undertaken scientific analyses of archaeological materials, such as ancient metals (Pollard and Heron 2008), it wasn't until the twentieth century and the advent of new technologies such as ^{14}C dating and the construction of nuclear reactors for academic research that large scale quantitative analyses became possible. The methodological offshoot of archaeology concerned with these technologies became known as archaeometry (Pollard and Heron 2008:8). Analytical developments have allowed archaeologists to ask—and answer—new and different questions, from fundamental issues of chronology and the movement of people and objects, to social organization and economic relationships in the past (Bishop 2014:252). In this chapter I outline the principles and methods that guide this archaeometric project.

One of the primary purposes of archaeometric studies, and analytical chemistry especially, has been to identify the sources of artifacts, such as the quarries and outcrops for lithic materials or the clay beds and workshops used to produce pottery. Ceramics, as items widely circulated, have been the most common material focus (Pollard and Heron 2008:100). By understanding the life cycle of a vessel, from raw material to ultimate disposal, it becomes possible to better understand the lives of past people who made and used it (Tite 2008:216). The earliest scientific studies of ceramics took place at the end of the nineteenth century (Pollard and

Heron 2008:6); since that time a large number of techniques have been developed to describe and quantify differences among ceramic wares. Analytical chemistry has been less commonly employed for use on historic ceramics, as for many ware types there is abundant documentary evidence that helps to resolve questions about their origins and production. However, there have been a variety of successful studies on lesser-known wares that discovered new information not evident from macroscopic attributes (*e.g.,* Cranfill 2006; Haggarty *et al.* 2011; Monette *et al.* 2007; Oka 2008; Owen and Greenough 2010; Scarlett *et al.* 2007; Smith *et al.* 1995; Skowronek *et al.* 2014). Fundamentally, ceramic characterization and sourcing studies rely upon two factors: the geological characteristics of clays and tempering agents, and human actions that turn raw materials into synthetic objects (Arnold *et al.* 1991:88). Here, I delve into these factors, specifically as they relate to historic lead-glazed coarse earthenwares.

Geological Principles

Compositional analysis of ceramics depends upon the principle that clay sources have elemental signatures specific to their geological parent material, and that these signatures are retained within the fired ceramic body, though they may be attenuated by clay mixing, the addition of temper, and diagenetic processes. Given that clay is abundant on the earth's surface and heavy to transport, most potters do not work far from their clay source (Arnold 1985, 2008; Comstock 1994:23-24). The "Provenience Postulate" as developed by Weigand *et al.* (1977:24) states that successful sourcing is dependent on the presence of "differences in chemical composition between different natural sources that exceed, in some recognizable way, the differences observed within a given source." This variation can be measured at the mineral level or the more basic elemental level. When embarking upon a sourcing project, one must understand the underlying geological variation within the region under investigation in order to assess the likelihood of chemical variation and minerals or suites of elements that may drive patterns of difference among the samples.

Furthermore, the concept of source as understood through elemental or mineralogical analyses is incomplete without consideration of macroscopic attributes such as form or decoration. Also implicit in the idea of source is a consideration of the socioeconomic forces that drove the production, distribution, and consumption of the wares (Rice and Saffer 1982:396). Due to the many complex geological, chemical, and cultural factors influencing the composition of a ceramic sherd recovered archaeologically, the concept of source must be very clearly articulated in any research project. Depending upon the scale of the analysis and the expected variation, a source may be "a single mine, a single widespread clay stratum, all clays in a single drainage, a single community of potters, or perhaps even a group of such communities" (Arnold *et al*. 1991:70). As explained below, in this study I have followed a broad definition of source that relies upon geological provinces. Here, I explain the fundamentals of clay formation and mineralogy that are necessary to understand the resulting geochemical variation in fired ceramic vessels, as a foundation for the definition of source used in this project.

The term clay is most often used in a general sense to classify soil particles that are particularly small, under 0.002mm. In geological terminology, clay refers specifically to a suite of silicate minerals that have formed through the physical and chemical weathering of parent material. The fundamental units of clay minerals are tetrahedral or octahedral molecules of silicon, aluminum or magnesium, and oxygen, the most basic of which is the SiO_4 tetrahedron. These molecules come together to form sheets. Hydroxyl groups bind the sheets together, creating a water cushion in between the layers. It is this platy and hydrous arrangement that gives clay its plasticity. The substitution of other ions such as aluminum or magnesium for silicon also affects the mechanical properties of clay, such as the ability to incorporate water, and the degree of shrinkage when water is removed (Chamley 1989:6). Clay formations are not pure and tend to consist of clay minerals mixed with other minerals of various sizes, and organics (Pollard and Heron 2008:112). The distinction between clay minerals and clay formations must be maintained, as the specific mineralogical properties of each are responsible for physical properties in ceramic production.

There are two main types of clay formations: residual (or primary) clays, and alluvial (secondary or sedimentary) clays. Residual clays develop in place as weathering products from underlying geological formations. The creation process of every geological formation influences its composition and structure so that it differs elementally and physically from other formations. Certain elements may be more abundant than others, and depending on the structure of the rock minerals, certain mineral complexes may be more easily broken down through weathering. Weathering, the physical and chemical breakdown of rocks, takes numerous forms. One of the most common is hydrolysis, in which water and rock minerals break down and recombine into new minerals such as clays. Mobile elements (*e.g.*, Na, K, Ca, Mg, and Sr) may become depleted in the resulting material, washing away with water (Chamley 1989:23). It is through the process of hydrolysis that feldspars and micas transition into clays (Schmidt 1993:20). Other minerals, such as quartz, are more resistant to weathering, being physically hard and elementally stable. Felsic rocks such as granites tend to be the most durable, while mafic rocks such as basalt weather more easily (Schmidt 1993:20). Furthermore, the climate of a region impacts the weathering process, as temperature and rainfall influence mechanical and chemical breakdown of mineral formations (Chamley 1989:49). Residual clays, more recently weathered, are typically coarse and are less suitable for pottery manufacture by themselves than alluvial clays, with some exceptions.

Secondary clays are those transported away from primary sources by alluvial or colluvial processes, making their way into water networks, where they are deposited along the banks of water systems. In contrast to primary clays, secondary clays tend to be more fine-grained. This is because larger and heavier particles have been left behind, while the finest particles remain suspended in water and travel further. As well, the clays continue to weather, becoming more mature sediments, with fewer unstable minerals than primary clays (Schmidt 1993:68). Secondary clays will also typically contain a variety of other materials such as organics that become mixed in during the transport process. Clays transported to a marine environment will become enriched in the major elements of seawater such as sodium and potassium (Pollard and Heron 2008:125), as well as minor elements. The mineralogical and elemental makeup of a clay deposit is the result of complex factors including the parent material and its age, the weathering mechanisms within the environment, and the process of transport for secondary clays (Pollard and Heron 2008). In some cases, primary and secondary clays may continue to share a number of characteristics, while in other cases secondary clays become weathered, mixed, and amended in profoundly different ways.

While some clay deposits are usable for pottery production directly out of the ground, more commonly potters must prepare the clay in some way. Clay suitable for pottery must have good workability, with the appropriate combination of plasticity and stiffness (Rye 1981:20-21). Good pottery clay is able to withstand mechanical stresses. It must roll into a ball, form into a coil, and be resistant to cracking and deforming. Clay that cracks or resists manipulation is “lean” or “short,” meaning that it cannot physically hold together to produce a long coil, and is therefore not workable alone for pottery production. Clay may also be too “fat,” so pliable that it will not hold a shape. Potters learn to mix overly fat clays and lean clays when necessary to produce material of the optimal workability (Ries 1897:72; Rye 1981:31). In addition to mixing clays, potters may sieve, levigate, or grind clays to remove larger particles, producing smoother and more pliable clay. Some potters intentionally sour their clay, by storing it in a wet state and allowing microorganisms to grow within it. This process enhances weathering, increasing the plasticity of the clay. Rye (1981:31) noted that “connoisseurs of soured clay employ stench to judge workability,” acknowledging the olfactory byproducts of breakdown via bacteria.

Furthermore, tempering agents such as rock, grog, shell, or plant matter may be added to the clay to increase mechanical and thermal strength. The aplastic inclusions in historic coarse earthenwares are generally ambiguous in origin. As their name implies, coarse earthenwares typically contain some visible inclusions, most often sand-sized particles (0.06-2mm diameter). As the clay beds utilized by historic potters are known to be heterogeneous deposits, and aplastic inclusions tend to be small (though North Devon gravel-tempered wares are an exception), it is rarely straightforward to determine whether they are naturally occurring or have been intentionally added as tempering agents. Temper adds strength to vessels during forming and use, but when using a pottery wheel, the ability to exert steady and even pressure while forming a vessel means that very fine pastes can be formed into vessels without the use of temper for structural support. The importance of temper for chemical characterization is project specific. Herbert and McReynold’s (2008) tests of raw clays indicated that the presence or absence of temper did not improve their ability to chemically group clays and sherds; indicating that the aplastic inclusions found in the Woodland period sherds in North Carolina may have been naturally occurring in the clays, derived from shared parent material (Speakman *et al.* 2008:71-

72). As described below, in other studies, tempering agents may serve as important indicators of source.

During the firing process for earthenwares the clay minerals of the paste consolidate, and depending on the mineral and temperature may partially vitrify. The chemical signature of the clay body is largely retained, though volatile elements may escape during the firing (Stoner and Glascock 2012:2669). When a ceramic vessel is discarded, weathering processes can affect the elemental and mineral composition of the clay body (Buxeda i Garrigós 1999). Depending upon the depositional environment, certain mobile elements such as calcium, potassium, and sodium may leach out of or absorb into the ceramic (Golitko and Terrell 2012; Neff 2012:247; Pollard and Heron 2008:127; Tite 2008:225). However, a number of elements are insoluble, and do not weather out of fired ceramics. These include most notably the rare earth elements (REEs: *i.e.,* the lanthanide series, scandium and yttrium), which are commonly used as the basis for ceramics sourcing (Neff 2012:246). Fundamentally, ceramics must be conceptualized as synthetic products, with potential variation attributable not only to the basic geological ingredients, but to the cultural and diagenetic processes that also shape a vessel's life history (Price and Burton 2011:217).

Archaeometric Methods

Focusing upon geochemical differences among sources, a number of methods have been developed for use on ceramic materials (Beaudry 1991). The goal of each method is to define suites of characteristics that define discrete provenance groups. There are two main distinctions between these types of analyses: the first between mineralogical vs. elemental analyses, and the second between bulk and point techniques. Bulk techniques homogenize the clay matrix and inclusions, whereas point techniques individually sample each pottery component. The choice of technique depends upon a number of factors having to do with the nature of the study assemblage, the research goals, and limitations of time, funding, etc. Complementary techniques are often employed to better understand the components of a fired vessel. Several common methods are outlined below and summarized in Table 4.1. Special attention has been given to inductively coupled plasma-mass spectrometry, the chosen technique for this study.

Table 4.1 Comparison of Common Ceramic Characterization Techniques

	Technique				
	Petrography	XRD	XRF	INAA	ICP-MS
Destructive analysis	✓	✓	(✓)	✓	✓
Powdered sample		✓	(✓)	✓	(✓)
Sectioned or whole sample	✓		(✓)		✓
Can be used to analyze raw materials	✓	✓	✓	✓	✓
Can be used to analyze vitrified ceramics (>700°C)	✓		✓	✓	✓
Provides mineralogical analysis	✓	✓			
Provides elemental analysis			✓	✓	✓
Provides quantitative data	(✓)	(✓)	✓	✓	✓

Petrography is a technique of optical mineralogy that has been used for ceramic analysis for many years, particularly championed by Anna Shepard (Shepard 1956). It focuses upon the identification and quantification, size, and shape of different components within a sample. This is typically done in a fairly labor-intensive and destructive procedure, by thin-sectioning a sherd or fired clay sample, mounting it on a slide, and counting individual minerals within a specified area. Using a polarizing microscope, it is possible to identify minerals based on their specific shape and the way they diffract light, which results in different colors. Through this process, one can determine the dominant minerals and thus know something about the parent materials from which the clay weathered or the kind of tempering materials added. Textural analysis or grain size analysis is also part of many petrographic studies. These analyses use the frequency and size of inclusions in a sample as the basis for characterization (Davidson 1995:53). With the advent of modern computing and imaging, it can be performed fairly easily (*e.g.,* Daniels and Lipo 2008; Davidson 1995; Pereira 2011).

Petrographic techniques are often used in conjunction with elemental techniques (*e.g*., Alex *et al.* 2012; Carpenter and Feinman 1999; Golitko and Terrell 2012; Stahl *et al.* 2008; Stoner and Glascock 2012). Understanding the composition of the tempering agents is particularly important in bulk analyses, as the temper may muddy or attenuate the important signatures of the clay matrix (*e.g.,* Carpenter and Feinman 1999), though researchers have been able to quantify the effect of temper through the use of mathematical corrections (Wallis and Kamenov 2013:894, *e.g.,* Steponaitis *et al*. 1996; Sterba *et al.* 2009). For a brief overview of petrographic methods, see Peterson (2009).

X-ray diffraction (XRD) has also been employed to identify minerals and their proportions in powdered ceramic samples (*e.g.,* Stanjek and Hausler 2004; Tenorio *et al.* 2005; Weymouth 1973). A diffractometer measures the angle of diffraction produced as x-rays bombard the minerals in the sample. The angle of diffraction is specific to the crystalline lattice of each mineral. The result is a spectrum with intensity peaks that can be identified to certain minerals. Unlike petrography, it is a bulk technique that identifies the mineral phases of both clays and aplastic inclusions. One of the main utilities of XRD is to determine the temperature of firing by assessing the mineralogical transformations that occur at different temperature points (Tite 2008:219).

X-ray Fluorescence (XRF) is a technique that also works by bombarding a sample with x-rays; but it interacts with samples at an elemental level rather than a mineral level. X-ray fluorescence spectrometry may be done using either a benchtop instrument (*e.g.,* Hein *et al.* 2002; Tsolakidou and Kilikoglou 2002), or a handheld instrument (*e.g.,* Hunt and Speakman 2015; Shugar and Mass 2012), both of which function in similar ways. An x-ray tube within the instrument produces a collimated x-ray beam, and a sample is placed in the beam's path. The energy, as photons, collides with atoms of the sample, causing electrons to be ejected from inner shells. As other electrons moves to take the places of ejected electrons within atoms, excess energy is released as a secondary x-ray. The energy of the secondary x-ray is specific to each element. An x-ray detector within the instrument counts the secondary x-ray energy, and a spectrum is produced in software that shows the energy intensities at characteristic energy points.

For benchtop instruments, samples are prepared into pressed or fused pellets from powdered samples, in a fairly destructive process. Handheld devices may be used on almost any sample, non-destructively, though better results are obtained from prepared clean and uniform surfaces or homogenized pellets. The detection limits for XRF are generally a bit lower than for other elemental techniques, and light elements, sodium and below, cannot be reliably detected. In recent years, the use of handheld XRF has become common in archaeological studies; while quantitation is still a challenge (Frahm 2012; Frahm and Doonan 2013; Shackley 2010; Speakman and Shackley 2013), studies are yielding promising results (*e.g.,* Aimers *et al.* 2012; Freeland 2013; Golitko 2011; Hunt and Speakman 2015; Padilla *et al.* 2006; Papadopoulou and Zachariadis 2004).

Instrumental Neutron Activation Analysis (INAA) has been the standard for bulk elemental analysis for many years. Since the mid-twentieth century, INAA has been used to characterize archaeological ceramics, and is therefore well tested (for overview, see Speakman and Glascock 2007). INAA works by irradiating a powdered sample in a nuclear reactor, which produces radioactive nuclides. As the nuclides decay, the gamma rays that are released, specific to each element, are measured (Pollard and Heron 2008:51; Speakman 2013:52). The results are accurate and precise for around 30 elements. Furthermore, the data from multiple labs can be successfully compared (Speakman and Glascock 2007; Tite 2008:225; *e.g.,* Speakman 2013). Due to the necessity of having a nuclear reactor, there are only a few laboratories in the United States capable of performing NAA.

Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) is an elemental technique that uses the unique atomic masses of isotopes as the criteria of separation. Samples are introduced into a plasma torch via suspension in solution or as aerosols. The high heat of the plasma torch (7-10,000 K) causes the samples to atomize. The charged atoms are then sent into a mass spectrometer, which sorts the isotopes on their mass-to-charge ratio (Neff 2003:23; Pollard and Heron 2008:56). The results of ICP-MS are accurate and precise, with values of parts-per-million to parts-per-trillion possible (Speakman and Neff 2005:4), and a wider range of elements can be detected than with any other method.

Samples prepared for solution ICP-MS must be treated with acids and/or high heat to break them down. Acid digestion (*e.g.,* Monette *et al.* 2007), microwave digestion (*e.g.,* Kennett *et al.* 2002; Larson *et al.* 2005), and weak-acid extraction (*e.g.,* Burton and Simon 1996; Carpenter and Feinman 1999; Triadan *et al.* 1996) methods have all been tested for the analysis of archaeological ceramics. Used in this way, ICP-MS is a bulk technique, though it has been argued that weak-acid extraction targets the matrix (*e.g.,* Burton and Simon 1996). Solid samples may also be analyzed using ICP-MS via a laser ablation system. In this method, as described in greater detail below, a laser vaporizes a miniscule portion of the solid sample and suspends it in a carrier gas to the plasma torch. This technique is best used as a point technique to individually characterize the clay matrix, inclusions, or surface treatments of a ceramic.

Each of the above methods and additional techniques (*e.g.,* PIXE, SEM-EDS, microprobe, etc.) has its benefits and disadvantages in terms of analytical strength, sample requirements and preparation, time, and cost. Researchers must carefully consider the nature of their sample assemblages, the research questions they wish to address, and the available resources when selecting a method for characterizing ceramics. For the study of historic lead-glazed coarse earthenwares, I determined that laser ablation ICP-MS would be the best method of analysis available. It provides elemental data on a wide number of elements known to be important for ceramic sourcing, and has lower limits of detection for certain elements than other techniques (Speakman *et al*. 2007:277). Furthermore, it is microdestructive, requiring only a small fragment of each analyte. Contamination is easier to control with LA-ICP-MS than with techniques that require powdered analyte, as the sample remains intact (Speakman *et al.* 2007:276). Historic coarse earthenwares are typically glazed, which would cause contamination in bulk analyses if the glaze were not removed from each sample. However, with laser ablation, the surface treatments can be entirely avoided, along with aplastic inclusions that may influence the signals from the clay matrix. "LA-ICP-MS provides a tool for determining precisely *which* component of the paste is creating structure in bulk data"(Larson *et al.* 2005:100). Successful tests of LA-ICP-MS for the matrix analysis of archaeological ceramics include Beck and Neff (2007); Belfiore *et al.* (2014); Cochrane and Neff (2006), Eckert and James (2011); Golitko (2011); Golitko and Terrell (2012); Niziolek (2011) and (2013); and Stoner and Glascock (2012). In many cases, researchers successfully determined compositional groups using LA-ICP-MS that could be upheld through comparison with INAA (*e.g.,* Dussubieux *et al.* 2007; Larson *et al.*

2005; Stoner and Glascock 2012, Vaughn *et al*. 2001, Wallis and Kamenov 2013) or petrographic techniques (*e.g.,* Alex *et al.* 2012).

Establishing A Reference Set

In the historic period, as with ethnographic examples today (Arnold 1985, 2008), most potters established their workshops near clay sources as the weight and bulk of clay made transporting it costly and time-consuming. Thus, the clay used on pottery sites may be assumed to have a relationship to local geological formations. Wasters, the sherds representing vessels broken or damaged during the production phase, are common artifacts found on production sites. They embody not only local clay, but also the potential admixture of clays and inclusions by potters. The use of wasters to establish a reference set of earthenware products is therefore ideal, in that they encompass both the natural and cultural factors that are a part of pottery production (Mommsen 2001:658; *e.g.* Monette *et al.* 2007; Scarlett *et al.* 2007). Kiln wasters can be used to form "control groups" to which samples of unknown provenience can be assigned (Pollard and Heron 2008:100).

In the absence of identified pottery production sites, most ceramics sourcing studies rely upon assemblages in which certain sherds are assumed to be locally produced, based on various attributes. In some cases, researchers have systematically collected raw clays or possible tempering materials in order to link ceramic sherds with regional origin. In many instances, these studies have yielded promising or compelling results (*e.g.,* Beck and Neff 2007; Stahl *et al.* 2008). Nonetheless, as kiln sites for historic coarse earthenwares are plentiful, it was simpler and the results less ambiguous to compare fired vessels from production sites to fired vessels from domestic contexts, which is the procedure followed here.

Production Zones as Source

The goal of this study has not been to concretely source a vessel used domestically to a specific production site. There are many more identified production sites for eighteenth century earthenwares than could be included, and innumerable additional sites that remain unknown archaeologically. Often potters were only in operation for a few years in a particular location or in the case of Morgan Jones' site in Westmoreland County, VA, less than a year (Kelso and Chappell 1974). The transient nature of pottery production on the historic landscape makes it unlikely that a sherd from one of the included domestic sites could be definitely attributed to a single workshop or potter included in this study. Instead, I focused on defining compositional groups that represent "production zones" (Monette *et al.* 2007). The production zone may be thought of as a synthetic grouping that is primarily based on expected internal geological consistencies. In this study, production zones formed the smallest source groups, with broader regional and continental aggregations considered as appropriate.

While production zones have shared geological characteristics, they also have distinct temporal constraints and social and economic histories. Therefore, it is useful to consider a production zone as a cultural unit as much as a geographic unit. For example, the Shenandoah Valley of Virginia is chemically distinctive from other production zones in this study, as the clays there have weathered from limestone deposited hundreds of millions of years ago. In the settlement history of the Chesapeake region, the Valley was one of the last areas to be settled, by ethnic groups that differed from the predominantly Anglo settlement of the Coastal Plain and Piedmont. Thus the production zone of Shenandoah Valley is temporally as well as geologically and culturally bounded. By using the level of "production zone" within this project, I follow a broad definition of source that identifies communities of potters in a geologically distinct area.

The compositional groups that result are therefore reflective of both natural and social variation (Bishop 2014:260).

Sampling Strategy

I focus here on the two primary sources for historic coarse earthenwares used in the Chesapeake: the mid-Atlantic US and Great Britain. While one might assume that a great difference between continental geology would subsume regional compositional differences, previous studies have found this not to be the case (*e.g.,* Rodriguez-Alegria *et al.* 2003). Each of these potential sources is comprised of multiple distinct production zones. The elemental signature of a production zone based on geological variation transcends the discrete use of clay resources by particular potters: in some cases the same clay source has been used by multiple generations of potters. For this reason, I have included production sites in use both before and after the eighteenth century, in order to more completely capture the geological signatures of a production zone.

I have focused upon production sites that were in operation during the eighteenth century, and obtained approximately 10-15 waster sherds from each of 37 production sites, for a total of 400 sherds. The samples represent the production range of the potters operating at a site, encompassing differences in ceramic pastes, glazes, decorative techniques, and forms (after Rye 1981:7). Sherds chosen were large and distinct enough to ensure I did not sample the same vessel multiple times (after Monette *et al*. 2007:126). Given the incomplete nature of the archaeological record, some production zones are better represented than others. It is anticipated that further investigations may impact the boundaries of the production zones currently defined.

In selecting individual production site sherds for analysis, I took into account the significance of particular vessel forms, decorations, and other attributes such as glaze color that represented distinct attributes. In production site assemblages, I selected a range of sherds that represented the production series of a pottery: examples of the range of pastes, forms, and decorative techniques. The purposive sampling strategy followed these guidelines:

1. When possible, sherds were selected from chronologically stratified deposits, in order to capture evidence of changing production series.
2. After assessing the entire assemblage, multiple sherds were selected that appeared representative in paste, form, glaze, and decoration to the bulk of the assemblage so that the sherds could be considered "average" examples for a particular site.
3. Each sherd selected from an assemblage varied in at least one attribute, or were taken from tightly controlled deposits, in order to ensure the same vessel was not sampled twice (after Monette *et al*. 2007:126).
4. A range of vessel forms at each site was selected (after Rye 1981:7). Vessels of different size or function may have required special clay recipes or represent temporal differences
5. A range of decorative techniques was selected, also potentially representing temporal changes to production, or the work of multiple potters.
6. Wasters that appeared anomalous due to overfiring, bloating, or spalling were generally avoided, as these could reflect an unsuccessful firing sequence or disposal processes that may have impacted the chemical composition of the sample.

These sampling criteria were employed for all production site assemblages in order to obtain good sample coverage of the clays used and products manufactured within each production zone.

Production Sites

In the following pages, I will outline each production zone and describe the pottery production sites sampled within it (Figures 4.1- 4.2). When possible, waster samples from multiple sites within each production zone were collected. The inclusion of multiple sites helped to build an "average" sample from the different zones, minimizing the effect of a particular potter's clay recipe or clay source. While a zone is defined by a degree of internal homogeneity, individual clay formations or production methods will vary. Multivariate methods, as described in the following chapter, were used to determine the range of elemental values that defined zones.

Furthermore, the inclusion of multiple production sites within each zone made it possible to verify the geographic boundaries of zones. In several cases, zones that were expected to be elementally homogeneous exhibited patterned differences that instead split the group into multiple zones. Large sample sizes made it possible to identify outliers indicative of intra-zone distinctions, improving the spatial resolution of sourcing assignments. In some zones, very few production sites have been investigated archaeologically or have collections that are available for research. In the Virginia Piedmont for example, only one earthenware kiln site has been identified archaeologically. These zones containing fewer sites were intrinsically less robust. In all cases, it must be stressed that the names applied to these zones are shorthand that makes it possible to quickly identify the general geographic area. The names indicate a relationship to a place, but cannot always be taken directly as markers of source. For example, sherds associated with Philadelphia zone are "Philadelphia-like," but may have been produced elsewhere in the same geological province. The boundaries for these zones are still being tested.

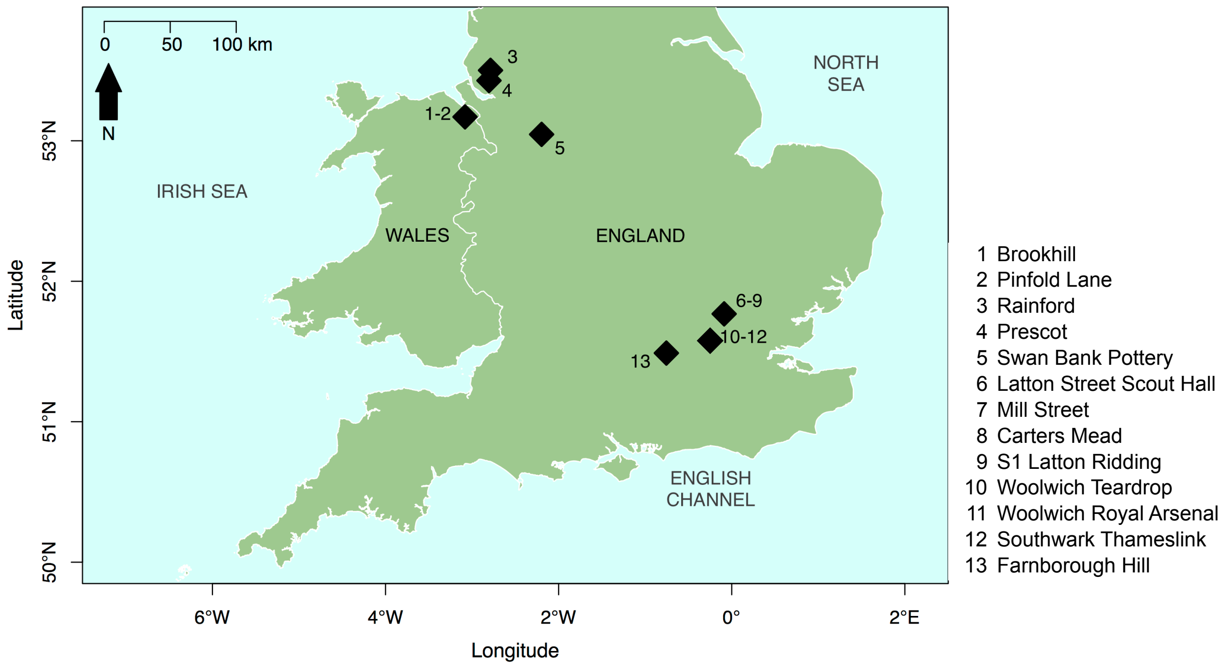


Figure 4.1. Map of the British production sites sampled.

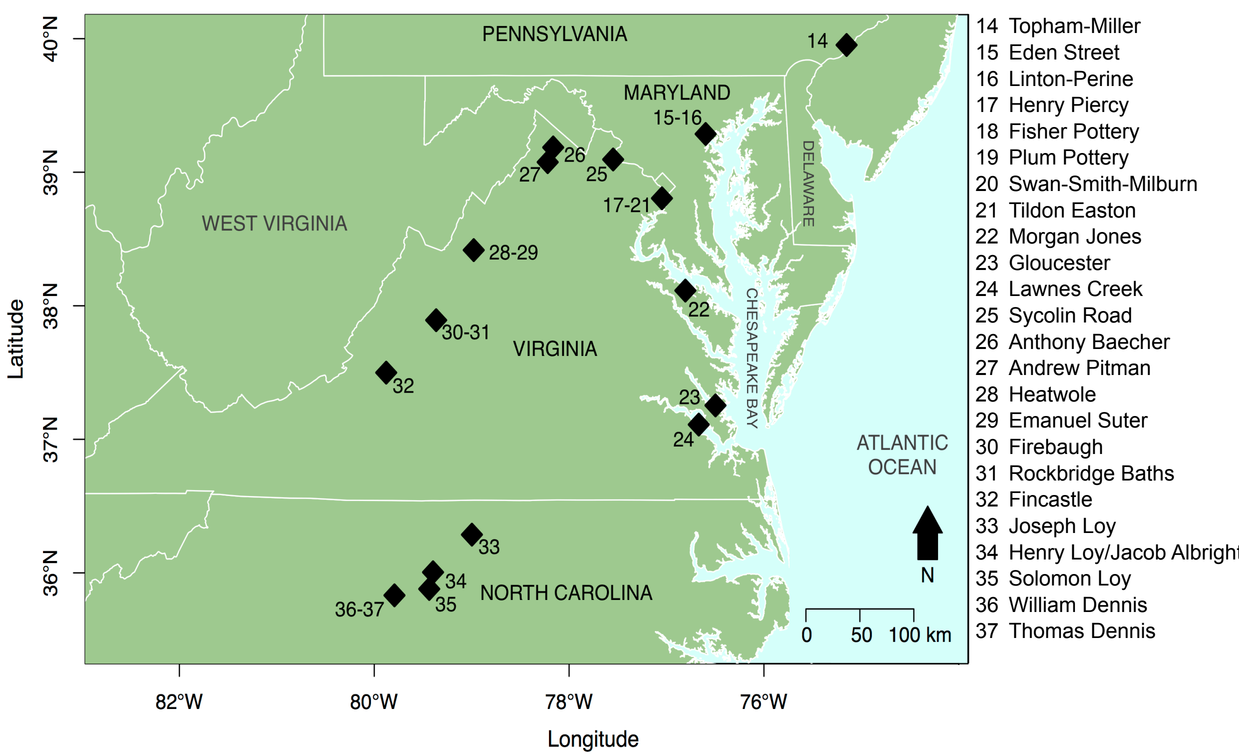


Figure 4.2. Map of Mid-Atlantic production sites sampled.

Table 4.2 Sampled Production Sites by Production Zone

Production Zone	Site Name	Location	Production Period (C.)	Site Number	No. of Samples	Lending Institution
Coal Measures	Brookhill	Buckley, Wales	Mid 17th-Early 18th	n/a	14	Museum of Liverpool
	Pinfold Lane	Buckley, Wales	Late 17th-Early 18th	n/a	15	Museum of Liverpool
	Rainford	Merseyside, England	17th	n/a	14	Museum of Liverpool
	Prescot	Merseyside, England	18th	n/a	14	Museum of Liverpool
	Swan Bank	Burslem, Staff., England	13-18th	n/a	18	Private Collection
London Area	Latton Street Scout Hall	Harlow, Essex, England	15th-17th	n/a	14	Museum of Harlow
	Mill Street	Harlow, Essex, England	16th	n/a	12	Museum of Harlow
	Carters Mead	Harlow, Essex, England	16th-17th	n/a	4	Museum of Harlow
	S1 Latton Ridding	Harlow, Essex, England	17th-18th	n/a	11	Museum of Harlow
	Woolwich Teardrop	London, England	Late 15th-early 17th	n/a	8	Oxford Archaeology
	Woolwich Royal Arsenal	London, England	Mid 18th	n/a	5	Oxford Archaeology
	Southwark Thameslink	London, England	Mid 17th-Mid 18th	n/a	2	Oxford Archaeology
Surrey-Hampshire Border	Farnborough Hill	Hampshire, England	15th-17th C.	n/a	20	Guildford Museum
Philadelphia	Topham-Miller	Philadelphia, PA	Mid 18th-Mid 19th	36PH91	20	State Museum of PA
Tidewater Chesapeake	Morgan Jones	Westmoreland Co., VA	Late 17th	44WM39	15	VDHR
	Lawnes Creek	Isle of Wight Co., VA	Late 17th-Early 18th	44IW026	5	Archaeological & Cultural Solutions
	Gloucester	Gloucester, VA	18th	44GL40	16	Gloucester County, VA
	Eden Street Kiln	Baltimore, MD	19th	18BC28	12	Maryland Historical Trust
	Linton-Perine	Baltimore, MD	Mid-Late 19th	18BC20	16	Maryland Historical Trust
	Henry Piercy	Alexandria, VA	Late 18th	44AX87	10	Alexandria Archaeology
	Fisher Pottery	Alexandria, VA	Late 18th	44AX80	8	Alexandria Archaeology
	Plum Pottery	Alexandria, VA	Early 19th	44AX7	6	Alexandria Archaeology
	Swann-Smith-Milburn	Alexandria, VA	Early-Mid 19th	44AX29	6	Alexandria Archaeology
	Tildon Easton	Alexandria, VA	Mid-Late 19th	44AX76	11	Alexandria Archaeology
N. Virginia Piedmont	Sycolin Road	Loudoun Co., VA	Early-Mid 19th	44LD1195	15	VDHR

Table 4.2 (continued). Sampled Production Sites by Production Zone

Production Zone	Site Name	Location	Production Period (C.)	Site Number	No. of Samples	Lending Institution
Shenandoah Valley	Andrew Pitman	Frederick Co., VA	Late 18th-Mid 19th	44FK528	16	Private Collection
	Anthony Baecher	Frederick Co., VA	Mid-Late 19th	44FK550	13	VDHR
	Heatwole	Rockingham Co., VA	Mid-Late 19th	n/a	9	Private Collection
	Emanuel Suter	Rockingham Co., VA	Mid-Late 19th	n/a	8	Private Collection
	Firebaugh	Rockbridge Co., VA	Mid 19th	44RB290	16	Washington and Lee
	Rockbridge Baths	Rockbridge Co., VA	Mid-Late 19th	44RB84	10	Washington and Lee
South Ridge and Valley	Fincastle	Botetourt Co., VA	Mid 19th	44BO304	14	Washington and Lee
Piedmont North Carolina	Solomon Loy	Alamance Co., NC	18th-19th	31AM191	3	RLA, UNC-CH
	Loy/Albright	Alamance Co., NC	19th	31AM278	8	RLA, UNC-CH
	Joseph Loy	Person Co., NC	19th	31PR59	5	Private Collection
	William Dennis	Randolph Co., NC	19th	31RD981	4	Private Collection
	Thomas Dennis	Randolph Co., NC	19th	31RD982	3	Private Collection

Investigated by many different scholars over decades of research, the production sites included in this study have had a wide range of treatment, from a few hours of surface collection to complete excavation over the course of months or years. Reports of some investigations have been published; many have not. Table 4.2 summarizes the production site assemblages. Sample catalog and images are found in Appendix A and B. The production sites are organized first by continent, and then by geological province.

Great Britain

The Coal Measures

This geological province is characterized by deposits of marine and glacial sediments interbedded with coal deposits. Fault lines have exposed these bands of clays and coal, along with lead sulfide that has mineralized within the faults (Davey and Longworth 2001a:63). This special geological formation has abundant clays suitable for potting, as well as lead necessary for glazing, and coal for firing the kilns. The red clay (sometimes identified as boulder clay) and buff colored clay deposits are secondary clays resulting from glacial transport of sediments, while fine white clay has weathered from limestone formations of marine origin (Davey and Longworth 2001a:63). As a result of this fortuitous combination of raw materials, many locations within the Coal Measures have a long history of earthenware production, including Buckley, Liverpool, and Staffordshire.

Buckley: The town of Buckley is located in Flintshire in northern Wales, falling within the Coal Measures. Nineteen kiln sites have been identified in Buckley, and the production of pottery there has been intensively researched and excavated since the 1950s. Historical archaeologists in North America have for decades associated Buckley with a certain type of utilitarian lead-glazed coarse earthenware that has a paste composed of marbled red and buff clays, and a thick black glaze. The attribution of this type of ware to Buckley may be traced back to the archaeological work done in the 1950s (Davey and Longworth 2001a). Yet, vessels with a marbled paste were produced throughout the Coal Measures, and marbled wares were only one type of earthenwares produced by Buckley potters. In this study, pottery from Buckley is represented by samples from two kiln sites: Brookhill Pottery and Pinfold Lane.

Brookhill Pottery was in operation from approximately 1640-1720, making it the earliest site producing post-medieval wares known to date in Buckley (Davey and Longworth 2001a). It was excavated beginning in the 1970s by James Bentley, and has been dated through the analysis of ball clay pipes (Amery and Davey 1979:52). As many as 12 kilns have been uncovered at Brookhill, reflecting the relatively long production period. No contemporary documentary evidence has been recovered to identify the potters who operated at this location. A wide range of pastes, forms, and decorative techniques were employed at Brookhill. Along with marbled paste wares, buff-bodied and dark red-bodied wares are also present, with a variety of glazes and surface treatments. Though in North America ceramics identified as Buckley are almost exclusively utilitarian vessels such as butter pots and milk pans, at Brookhill there are a large number of tableware forms such as tankards, and decorative sgraffitto, combed and slip-trailed wares (Longworth 2004; Figure 3.8).

Operation at *Pinfold Lane* Pottery overlapped with the later phase of production at Brookhill, approximately 1690-1720. Also excavated in the 1970s, the findings at Pinfold Lane have been summarized by Davey (1987). Kiln bases were identified, and kiln furniture including saggars and setting tiles were found. The waster assemblage at Pinfold Lane shares several vessels forms and decorative techniques with Brookhill, especially those dating to the later period of production at Brookhill. Pinfold Lane has higher quantities of press-molded wares and bowls with a single sine wave slip trailed around the rim (Davey and Longworth 2001a). The paste is variable, though a large number of black-glazed wares with marbled paste are present.

Greater Liverpool: Liverpool is a port city in Merseyside on the western coast of England, also located within the geologic province of the Coal Measures. Liverpool has been identified in historical documents as an important shipping port for the transatlantic trade; in spite of this, coarse earthenwares produced in and near Liverpool have not typically been considered as part of this trade. British scholars have noted the similarities in paste and decoration of earthenwares from Buckley and the Liverpool area (Amery and Davey 1979; Davey 1987), which has driven a desire to develop methods for effectively identifying products of these two areas. Two sites near Liverpool have been included in this study, each associated with villages east of Liverpool: Prescot and Rainford.

Excavations in Eccleston Street, *Prescot*, began in the 1970s, as a mitigation project. At that time, several clay preparation and storage facilities were uncovered, along with a large number of wasters. Documentary evidence suggests that this pottery may have been operated by Henry Woods, one of six potters identified in Prescot through their wills in the mid-eighteenth century (McNeil 1982). The pottery wasters recovered from this excavation are predominantly utilitarian with red and buff marbled paste and black glaze. A number of other coarse earthenware kiln sites are known within the town, some of which have been investigated archaeologically. The town of *Rainford* in Lancashire has a long history of pottery production, dating back to at least the sixteenth century. Several sites of pottery manufacture and waster disposal have been located and investigated archaeologically. The materials sampled in this study are from an unidentified pottery site, likely dating to the eighteenth century, excavated in the 1980s. No report was produced. The wares are a mixture of coarse utilitarian and finer tablewares. In contrast to other Coal Measures products, there are far fewer decorated pieces among the Rainford and Prescot assemblages.

Staffordshire: This region has become eponymous with refined earthenwares such as Spode and Wedgwood; but the pottery industry was exceedingly well developed there and many types of wares were produced, including utilitarian coarse earthenwares and slipwares. Staffordshire is also within the Coal Measures geologic province, and the abundant clays found within this province were utilized by potters, resulting in redwares, whitewares, and marbled-body wares. Six towns make up the pottery center Stoke-on-Trent, with Burslem being the oldest town producing pottery. Samples from this region come from a site known as *Swan Bank Pottery* in Clayhanger Street, Burslem. Excavated by the Stoke-on-Trent Museum Archaeological Society in 2007 and 2008, this site housed a salt-glazed stoneware kiln, but also contained a large number of earthenware wasters spanning approximately 300 years of potting history (Stoke-on-Trent Museum Archaeological Society n.d.). These included potentially quite early wares such as Midlands Purple (fourteenth-eighteenth centuries; Figure 4.3).

Figure 4.3. Midlands Purple earthenware. Recovered from Swan Bank Pottery, Burslem. Midlands Purple is unglazed, and characterized by a deep purple reduced body. Image courtesy Stoke-on-Trent Museum Archaeological Society.

London

The greater London area of southeastern England is located within the London Basin geologic province, comprised primarily of marine sediments deposited during the Tertiary period. The basin contains abundant red-firing clay suitable for earthenware production. London was the largest English market for earthenware throughout the medieval and post-medieval periods, thus there were many pottery industries eager to sell in this locale. These products are sometimes termed London Area redware or London Area Post-Medieval Redware (PMR), and are characterized by a sandy red body, yellow-tinged clear glaze, and at times the presence of a reduced firing core within the body. A particular slip-decorated variety of London Area redware, called Metropolitan ware, was marketed to London and produced nearby (Figure 4.4). Unlike in the Coal Measures, potters operating in this region used wood as the primary fuel for stoking kilns. Two locations of London Area redware have been included within this study, the towns of Woolwich and Harlow.

Figure 4.4. Metropolitan slipware bowl/pan from excavations in Harlow, Essex. Image courtesy Harlow Museum.

Pottery was being produced in Woolwich, east of London on the south bank of the Thames, as early as the thirteenth century. The predominant wares were sandy-bodied red-fired earthenwares. At the *Teardrop* site, excavated by Oxford Archaeology in 2007-2008, five kilns were uncovered, spanning a production range from the thirteenth-seventeenth centuries. Wasters and domestic sherds recovered from this excavation and adjacent excavation of the *Royal Woolwich Arsenal* have been sampled as examples of London area redware. Two additional samples of post-medieval earthenware from Southwark near Woolwich were identified as consistent with London area production as well (John Cotter, personal communication 2012), and were included in the Woolwich assemblage.

The town of *Harlow* in Essex was a major producer of London area redware from the thirteenth to eighteenth centuries. Earthenware sherds from Harlow often have a very dark or black reduced core, with bright red exterior surfaces. This diagnostic feature suggests that the kiln structures used to fire these wares had restricted airflow for most of the firing process, then were opened at the end of the firing to allow oxidation of the surfaces. Numerous excavations of pottery kiln sites have been undertaken in Harlow, and samples from five sites have been included in this study.

The *Mill Street* site produced pottery during the sixteenth century. Two kilns were uncovered during excavation. One of the kilns was significantly smaller than the other and may have been used for preparing glaze ingredients or firing small batches of fine earthenwares (Davey and Walker 2009). The wares from this site were mainly undecorated utilitarian redwares with some black-glazed vessels, and production predated the inception of Metropolitan slipwares. *Carter's Mead* was a slightly later site, with an assemblage still dominated by plain utilitarian redwares and black-glazed vessels, but it also contained some early Metropolitan slipwares. It is estimated that this site produced vessels during the sixteenth and early seventeenth centuries. *Latton Street, Scout Hall* was excavated in 1969. No kiln has been uncovered associated with this site, but significant quantities of wasters were recovered from a large pit feature. Stylistically, the sherds date primarily to the seventeenth century, with Metropolitan slipwares as well as undecorated utilitarian wares and black-glazed tablewares.

Latton Ridding is the latest Harlow assemblage sampled in this study. The samples were recovered from surface collection near the kilns on site. The kilns and production areas were separately excavated, including a pugging pit, where clay was consolidated (Davey and Walker 2009:22). Dating of the site via ceramic typology and clay pipes placed its period of use firmly within the seventeenth century and possibly continuing into the eighteenth century. A 1778 map of the area indicates a "potty house" on the site, but it is uncertain whether this was an active venture at the time (Davey and Walker 2009:22-23).

Surrey-Hampshire Border

Dividing the counties of Surrey and Hampshire, the Blackwater valley was an important pottery production center in the medieval and post-medieval period in England, known especially for thinly potted, buff-bodied wares with bright green or yellow glazes, commonly called Border ware or Surrey-Hampshire Border ware. Located over the Reading Beds on the western edge of the London Basin, this region had plentiful buff- and red-firing clays. The potters operating in this region supplied London into the 1700s with large quantities of earthenware, in forms such as pipkins, chafing dishes, and pitchers. *Farnborough Hill* is the most intensively excavated of the Surrey-Hampshire border kilns in this region. It was excavated from 1968-1972, and several kilns were uncovered, dating from the fifteenth and sixteenth centuries, though there is evidence for pottery production before and after that time. The wares recovered from Farnborough Hill, largely buff-bodied pipkins and other finely potted wares, have been meticulously described by Pearce (2007; Figure 4.5).

Figure 4.5. Yellow-glazed pipkins recovered from Farnborough Hill Pottery. From top left: handle, 3 rim fragments, tripod base. Image courtesy Guildford Borough Council, Guildford Museum.

North America

Philadelphia: The Philadelphia pottery industry was the one that numerous colonial potters sought to emulate. Potters directly from Europe were brought to work in Philadelphia in many cases, and in the eighteenth century the wares from Philadelphia were commonly known to be high quality (Magid and Means 2003). Partially this was due to the abundant clays available in the immediate vicinity of the city. Philadelphia is located within the small Coastal Plain province of Pennsylvania. The city is situated on the Trenton Gravel formation, a Quaternary deposit consisting primarily of alluvial sands and clays deposited by the Delaware River. The *Topham-Miller* site was located in central Philadelphia, and excavated in 1997 as part of mitigation project for the Metropolitan Detention Center (Dent *et al.* 1997). It was first operated as a pottery from 1766-1783 by Daniel Topham. He died in debt and the property was sold to

Andrew Miller in 1785. Miller family members operated it until the 1840s, transitioning towards industrial products in the nineteenth century (Magid and Means 2003:61). A great variety of wares were produced on site, all earthenware. Forms included fine tablewares with black glaze, as well as many slip trailed and combed dishes. Utilitarian forms such as butter pots were also produced.

Chesapeake

Tidewater: The Tidewater region of Virginia and Maryland encompasses the land east of the Fall Line, also known as the Coastal Plain. Geologically, it is composed of Quaternary deposits of unconsolidated gravels, sands, and clays that have eroded out of the uplands. Many alluvial clay deposits are found in this zone and were exploited by early European colonists. Several sites from the early 1600s into the eighteenth century have been identified here, and a majority of the early pottery sites seem to have been temporary, perhaps operated by itinerant potters.

On the Middle Peninsula of Virginia, in Westmoreland County, an earthenware pottery site was in operation for a very brief period in the seventeenth century. Extant county records show that potter Morgan Jones and Dennis White bought the land in 1677 in order to produce earthenware; yet, records also show that Dennis White died in 1677, at which point the land reverted to the previous owner (Kelso and Chappell 1974:53). Therefore, the *Morgan Jones* site has an extremely limited date range, presumably less than a year. Excavations in 1973 uncovered the remains of a kiln and numerous earthenware wasters and kiln furniture. The potter Morgan Jones is well documented throughout the Chesapeake in the later seventeenth century. He produced earthenwares in southern Maryland, as well as further south in the Virginia Tidewater.

As one of the few identified potters in the seventeenth century Chesapeake who is known to have worked throughout the region, many vessels recovered from seventeenth century contexts have been attributed to him (Straube 1995:23). Wasters from the Westmoreland County site represent mainly milkpans and large storage jars, with clear lead glaze.

On *Lawnes Creek*, in Isle of Wight County, a scatter of earthenware wasters has been found, dating to the seventeenth century (Straube 1995). While no kiln has been uncovered, as it may have eroded into the James River, a potter clearly operated at this site. It has been suggested, based on the vessel forms recovered, that the same potter was producing here as at Challis (named for potential potter Edward Challis), another seventeenth-century site near Williamsburg (Straube 1995:29). The wares recovered from Lawnes Creek tend to be single-glazed, with reduction causing the clear glaze to appear olive green.

During the 1970s excavation of a ravine in *Gloucester Point in* Gloucester County, kiln wasters as well as earthenware and stoneware sherds were found, suggesting a local potter for the town. The assemblage included domestic items from the town, and no kiln site was recovered. While some of the utilitarian wares were likely imported, many have characteristics of local pottery, including iron nodules in the paste and forms consistent with those produced in Yorktown. The William Rogers pottery site in Yorktown, in operation from approximately 1720-1740, produced large quantities of earthenwares and stonewares (Barka 2004; McCartney and Ayres 2004; Steen 1990, 1999; Straube 1995). There is debate over the origins of the kiln debris and local-like pottery found in Gloucester County, as it has been suggested that these represent waste from the William Rogers pottery workshop on the opposite shore of the James River, rather than a pottery in Gloucester Point (David Brown, personal communication 2012; McCartney and Ayres 2004:53).

Baltimore was important colonial town in the Chesapeake. Potters in Baltimore are best known for producing large quantities of American stoneware in the nineteenth century; yet, many of these potters produced earthenware as well. Two pottery sites were sampled from Baltimore: Eden Street pottery and Linton-Perine pottery.

The *Eden Street* pottery site was surface collected in 1980. No report was produced (but see Pogue n.d.). In the early 1800s, potters David Parr and James Burland were identified as business partners in a venture located on Eden Street in Baltimore (Kille 2005). The ceramics recovered from this archaeological site, including kiln wasters and imported refined earthenwares, support an early-mid nineteenth century date of production and occupation, but whether they are Parr and Burland products has not been verified. The predominant wares are stonewares, with cobalt decoration, along with kiln furniture. The earthenware wasters from this site include both utilitarian and tableware forms, with several colors of glaze but no surface decoration.

The Linton-Perine pottery was excavated in the 1970s as part of a mitigation project. The site on Lexington and Pine streets was operated as a pottery from the 1820s to the 1880s. Maulden Perine, who then partnered with William Linton, ran it first. In 1848, Linton took over sole ownership, and William Linton and then his son William G. Linton operated the pottery, until the early 1880s (Harrison 1977). Perine and Linton were predominantly engaged in the wholesale market and produced large quantities of earthenware and stoneware for sellers in Baltimore and surrounding regions (Myers 1984). The wares recovered from this site include utilitarian and tablewares in a variety of forms, as well as flower pots and molded tobacco pipes made of marbled red and white clay (Figure 4.6).

Figure 4.6. Molded pipe fragments from the Linton-Perine pottery in Baltimore. Top row: figural pipe bowls of man wearing crown, unglazed (left) and glazed (right) example. Bottom row: fragments of pipes with marbled paste. Image courtesy the Maryland Historical Trust, Jefferson Patterson Park & Museum, Maryland Archaeological Conservation Laboratory.

Alexandria: The potters of Alexandria, first beginning in the eighteenth century, produced both earthenware and stoneware. The early earthenware potters in Alexandria were heavily influenced by the Philadelphia trade, and their earthenwares resembled Philadelphia pots in both form and decoration (Magid and Means 2003). Five sites from Alexandria were sampled: Henry Piercy, Fisher, Plum, Swann-Smith Milburn, and Tildon-Easton.

Henry Piercy, the first known and best studied of the Alexandria potters, arrived from Philadelphia, having learned potting in his brother's workshop there. Henry Piercy's pottery in Alexandria was established in 1792 and operated until 1809. Areas associated with Piercy's workshop have been excavated in several phases from the 1960s through the 1990s. His products include many slip-trailed dishes and black-glazed tablewares. Numerous potters in Alexandria were workers or apprentices in Piercy's pottery before establishing their own workshops.

Fisher Pottery, operated by Thomas Fisher, was located nearby. It opened for business in 1795 but may have closed as early as 1798 (Magid and Means 2003). The wares recovered from

Fisher Pottery in 1969 were more heavily utilitarian in nature than at Piercy Pottery, although some fine tablewares were recovered.

Lewis *Plum*, who also learned from Piercy, began producing earthenware at a location on Wolfe and Columbus Streets in Alexandria in 1814. Potting continued here by Plum and others until 1828 (Magid and Means 2003). The wares recovered from excavation in 1975 suggest that most of Plum's products were utilitarian or industrial, especially unglazed flowerpots. In the early nineteenth century, as in other locations, many potters shifted from earthenware production to stoneware production.

The *Swann-Smith-Milburn* workshop in Wilkes Street was in operation from 1813-1876, and through its successive ownerships produced large quantities of utilitarian stoneware, while also continuing to make earthenware (Magid 1995; Magid 2012). Material from the Wilkes Street site, including some earthenwares in the form of robust storage jar fragments with minimal glazing, was salvaged in 1977.

The *Tildon Easton* site on Peyton Street also produced mostly stoneware, though it was an unsuccessful venture and closed after only two years in 1843 (Magid 1995:66). It was excavated in 1983-1984 and contained the first excavated kiln structure in Alexandria. The earthenware sherds recovered from this excavation are parts of large, undecorated storage vessels.

Shenandoah Valley

The Shenandoah Valley (or Great Valley) of Virginia lies in between the Blue Ridge and Appalachian mountains in western Virginia. Geologically, it is predominantly limestone and dolomite. These sedimentary rocks formed in the Ordovician and Cambrian after the deposition of marine sediments of the Iapetus Ocean, a precursor to the Atlantic Ocean. The lithology of the Valley is distinctive from the rest of Virginia. The clay found in the Valley is excellent for pottery production and was used extensively throughout the mid-late eighteenth and nineteenth centuries for earthenware as well as stoneware production. A number of pottery sites have been archaeologically investigated, and documentary evidence often provides names for the craftsmen working at these sites (Comstock 1994; Russ 1995,1999). Six sites within the Shenandoah Valley have been included here.

In the northernmost reaches of the Valley, two pottery sites have been sampled. The *Andrew Pitman* site is located in Frederick County and was occupied by Andrew Pitman from 1782 to 1838, as both a house and a potting workshop. The domestic structure is still extant along Main Street in Stephen's City. Several phases of archaeological investigation have been undertaken on this lot since the 1990s. Store accounts from the early nineteenth century verify that Pitman was bartering earthenwares with the local shopkeeper in exchange for red lead, a glaze ingredient (Park 2001:12). Andrew's brother John was also a potter operating in the area. Both likely learned the trade from their father, a German immigrant (Park 2001:16). This is one of the earliest identified pottery sites in the Shenandoah Valley and produced a wide range of tablewares and utilitarian items, many with slip trailing. The paste is fine and fired to a strong red color.

Also in Frederick County is the site of *Anthony Baecher*, which was excavated in several phases in the 1980s and 1990s by different researchers. Baecher operated a pottery near Winchester in the latter half of the nineteenth century, though he had previously worked in Pennsylvania and Maryland (Espenshade 2003:256). His work has been well documented (*e.g.,* Comstock 1994; Rice and Stoudt 1929), and Baecher is best known for producing decorative earthenware figurines. Yet the bulk of his products, as evidenced by archaeological collections, were simple storage vessels with interior glazing. Clay deposits that appeared suitable for earthenware production were encountered close to the ground surface on this site (Espenshade and Kennedy 2002:24).

Further south, in Rockingham County, was the largest concentration of historic earthenware potters in the Valley, with at least 53 documented potters at more than 12 potteries. Many were related by blood or marriage. *John Heatwole* operated a pottery along the Dry River in western Rockingham from the mid-late nineteenth century, where he produced earthenwares and stonewares. Described in the 1860s as “genteel as any Yankee ware we ever saw” (Evans and Suter 2004:13), his wares were well made and often signed, dated, or decorated. The wasters recovered through surface collection on this site exhibit a gradient of firing temperature from earthenware to stoneware. Some wares with lead glaze are highly fired and nearly vitrified, while some stonewares are low-fired and retain a pinkish body (Figure 4.7).

Figure 4.7. Heatwole “pink” stoneware. Exterior (left) and interior (right). Private collection.

Nearby is the site of one of *Emanuel Suter’s* pottery operations. Suter learned the craft from his cousin John Heatwole in the 1850s and thereafter established his own business in Rockingham (Evans and Suter 2004). His New Erection Pottery was a large-scale operation, with a variety of domestic and industrial products. He produced earthenwares and stonewares for domestic use, continuing to receive orders for lead-glazed earthenwares in the late nineteenth century (Evans and Suter 2004:17). In addition to these wares, his shop made flower pots, drain tiles, and chimney caps.

Located in Rockbridge County is the site of *Rockbridge Baths*. A kiln and other activity areas were uncovered in the 1980s as part of a statewide survey of historic potteries by the Washington and Lee Archaeology laboratory. Both earthenware and stoneware were produced at this site during the mid-late nineteenth century. The predominant forms are simple storage vessels and other utilitarian items, including a large number of bisque-fired pan forms. The potter or potters who worked at this site have not been identified.

Also in Rockbridge County is a site known as *Firebaugh*, excavated during the statewide survey by Washington and Lee. John Morgan and John Firebaugh owned it, operating during the mid-nineteenth century (Russ 1995:118-119). Stoneware was the primary product at this site, as evidenced by wasters, and often has a pinkish hue to the body that indicates a low firing temperature. The earthenwares from the site are large and utilitarian with a simple clear glaze. A high proportion of metallic oxide inclusions in the paste of these wares created a speckled appearance to the glaze.

Southern Ridge and Valley

While located within the culturally defined area of the Shenandoah Valley, Botetourt County, Virginia falls within the Ridge and Valley province and has a distinct lithology. *Fincastle Pottery* is located here and was excavated in the 1980s by Washington and Lee University. Unlike most other Shenandoah potteries, Fincastle produced only earthenwares, and was likely operated by Jacob Noftzinger and his sons (Russ 1995:111). Storage vessels are the most common form recovered from this site. In addition to domestic wares, large quantities of kiln furniture were found among the wasters.

Virginia Piedmont

The Virginia Piedmont was formed during uplift of the Blue Ridge Mountains during the Precambrian and Paleozoic. Geologically, it is largely composed of metamorphic and igneous rocks such as basalts and granites, along with sedimentary deposits from the Triassic (Dietrich 1970:105). The minerals of the basaltic and metamorphosed basalt formations are iron-rich. When weathered, this results in the red Piedmont soils dominated by clay particles (Schmidt 1993:115). The Piedmont region widens significantly from North to South through Virginia.

At its northern extent, in Loudoun County, is the site of *Sycolin Road*. To date, this is the only earthenware kiln site that has been investigated archaeologically in the Piedmont of Virginia. Though at least eight potters have been identified within the documentary record of nineteenth century Loudoun County, the operator of this site has not been established (Bertsch *et al.* n.d.). The kiln remains and wasters recovered here are consistent with an early-mid nineteenth century production period. Both earthenware and stonewares were made at Sycolin Road, with utilitarian and largely undecorated vessels the majority of wares found. The site is located on a Jurassic geological formation predominated by diabase, a metamorphosed basalt. As the only site representing this geologically diverse production zone, the definition of this production zone is not robust.

North Carolina Piedmont

Following along the eastern edge of the Blue Ridge Mountains south into North Carolina is the broad Piedmont region of North Carolina. As in Virginia, the lithology of this region is largely made up of igneous or metamorphosed igneous rocks, but the formations are distinct. The Carolina Slate Belt, a band of granitic rocks and felsic metavolcanics such as rhyolite, underlies much of the region. This region has a rich pottery tradition, with many identified Euro-American pottery operations, the earliest of which was by Moravian potters in the area now known as Old Salem in the 1750s (Beckerdite and Brown 2009; Bivins 1973; South 1999). Pottery production here has continued into the twenty-first century throughout the region and is centralized in areas such as Seagrove.

Five sites have been sampled within the North Carolina Piedmont, representing two potting families. The Loys were Huguenots who settled in North Carolina in the 1760s. Martin Loy was an immigrant potter who founded what is now called the St. Asaph's tradition of earthenware in North Carolina, characterized by distinctive decorative techniques such as the use of black-slipped grounds and slip trailing in the form of fleur-de-lis and imbricated triangles (Beckerdite *et al.* 2010). *Henry Loy*, a son of Martin, and his father-in-law Jacob Albright operated a pottery workshop in central Alamance County in the late-eighteenth and early-nineteenth centuries. The records do not make clear whether Jacob Albright was a potter, though he certainly helped to finance the operation (Beckerdite *et al.* 2010:26). A limited archaeological assessment of the site was undertaken, resulting in the collection of waster products. While most of the sherds were small and heavily weathered, a number were recovered with slip decoration including trailing and marbling. Both tablewares and utilitarian vessels were produced.

Henry Loy's sons Solomon and Joseph Loy became potters as well. Two sites associated with *Solomon Loy* have been excavated in southern Alamance County, yielding the remains of three kilns as well as large quantities of earthenware and stoneware wasters and kiln furniture (Carnes-McNaughton 1997). Many of the wares have decorative elements and vibrant colors from the addition of colored grounds (engobe), slip trailing, and drips of slip and metallic oxides. The *Joseph Loy* site, also dating to the early-mid nineteenth century, is located north of the Henry and Solomon Loy sites, in Person County. Limited archaeological testing on this site revealed a kiln base and earthenware wasters similar in character to those found at the other Loy sites, including slip decoration and the use of colored grounds (Carnes-McNaughton 2010:134).

Heading southwest along the Slate Belt is Randolph County, where two adjacent sites related to the Quaker history of North Carolina have been investigated, dating to the early nineteenth century. The first pottery was operated by *William Dennis*, followed by a second pottery workshop erected by his son *Thomas Dennis*, on an adjoining property. These workshops were strategically located along a colonial trading road (Pugh and Minnock-Pugh 2010a). A square kiln was excavated at the William Dennis site in the 1990s, at which time quantities of earthenware wasters and kiln furniture were recovered. The most common vessel type found was a dish form, often with slip and metallic oxide decoration (Pugh and Minnock-Pugh 2010b). Similar vessel types and kiln furniture have also been recovered from the site of the Thomas Dennis pottery workshop. Both Thomas and William Dennis left North Carolina for Indiana, in 1822 and 1832, respectively, perhaps over the issue of slavery (Pugh and Minnock-Pugh 2010a:73). The location of the Dennis potteries is currently the home of New Salem Pottery, where the owners, Dennis descendants, continue to make earthenware from clays found on the property. Large nodules of manganese and iron ore are found within the clay beds as well, providing a ready source for slip and glazing ingredients.

Overall, the sites contained within this reference set represent nearly 600 years of potting history in Great Britain and the Mid-Atlantic United States. While it was not possible to incorporate all potential coarse earthenware sources for the eighteenth-century Chesapeake, those represented here were expected to represent the majority of sherds found in domestic plantation contexts.

Sample Analysis

Sample Preparation

Each sherd used in this project was cataloged according to the protocols outlined in the DAACS cataloging manual (Aultman *et al.* 2014; Appendix A). I selected this cataloging guide as it focuses upon quantitative and objective measurements as well as functional and stylistic description, and was designed specifically for historic artifacts. As discussed in Chapter 3, the DAACS database is non-hierarchical, meaning that each artifact attribute can be analyzed individually, rather than as a function of a formal ceramic type.

Munsell color charts were employed to determine paste and surface color. The opacity of the glaze was indicated as a separate field, in order to distinguish the color of the underlying paste from the color of the glaze. This field made it possible to assess the interaction of glaze and body in the appearance of surface color. In addition to the fields required by DAACS, I recorded the paste inclusions of each sherd, including size, composition, and percentage. This step is not generally included in historic ceramic analysis, as coarse earthenwares are the only types of historical ceramics that typically contain visible inclusions. Nevertheless, these aplastic components of the ceramic paste, whether naturally occurring or added by the potter, may have analytically useful distinguishing characteristics. Archaeologists have used certain paste inclusions as the basis for attributing historic coarse earthenwares to a local source, such as hematite nodules in the Virginia Coastal Plain (*e.g.*, Fesler 2004, Straube 1995). My analysis makes it possible to quantitatively determine whether the temper patterning among these samples is indeed specific to a production zone.

After cataloging and photography, samples were prepared for elemental analysis. A freshly broken surface was exposed for each sample. Tile nippers were used to remove a small fragment from each sherd, approximately 0.5 cm^2 or smaller. The fresh surface of the fragment was then ground smooth using a Dremel tool with a tungsten carbide bit, in order to present a uniform surface for laser ablation. During analysis, the laser was positioned very close to the surface of a sample, magnifying surface irregularities. In order to ensure that each analysis removed the same amount of material, the surface must be even across the entire laser path. The fragments were then rinsed with deionized water and allowed to air dry. Samples, organized by site, were mounted to a consistent height on standard microscope slides using double-sided tape. Approximately 20 samples were affixed to each slide (For images of prepared slides, see Appendix B).

Instrumentation

LA-ICP-MS was completed in the Mass Spectrometry Laboratory, housed within the Chemistry Department at the University of North Carolina at Chapel Hill (UNC-CH), under the supervision of Dr. Sohrab Habibi. The samples were introduced via an Excite 193 ultra short pulse excimer laser and ablation system (Teledyne/Photon Machines, Bozeman, MT), coupled to an Element XR double-focusing magnetic sector field ICP-MS (Thermo Fisher Scientific, Bremen, GER).

The Excite laser system has an excimer (excited dimer) laser. It operates via the excitation of noble gas. A mixture of argon and fluorine gas is excited, leading to the creation of unstable ArF molecules that emit UV radiation as they dissociate. The UV energy produced is 193nm wavelength. This gas-based laser system is a more recent development than the commonly employed Nd:YAG (Neodymium-doped yttrium aluminum garnet) laser. Nd:YAG lasers are typically used at wavelengths of 266 or 213nm, but shorter wavelengths are desirable for ceramics analysis, as the shorter wavelength increases the ablation of dense materials (Kuleff and Djingova 2012:169). Fractionization, the uneven vaporization of elements in a sample over time due to differences in elemental volatility (Hattendorf and Gunther 2014:669; Speakman and Neff 2005:9), is a major concern of LA-ICP-MS sampling. Excimer lasers typically have decreased fractionization over Nd:YAG systems as well (Jantzi 2013:23), along with higher coupling efficiency (Jeffries 2004:331). Most archaeometry labs continue to operate with the older Nd:YAG laser systems; thus, there are few published studies reporting use of the newer excimer laser for archaeological materials (but see Stoner and Glascock 2012).

The sample holder for the Excite laser ablation system had two slots that accommodated standard microscope slides (3 inch x 1 inch) and 5 circular mounts (Figure 4.8). Reference materials, including NIST SRM 679 (Brick Clay), and NIST SRM 610 and 612 (Trace Elements in Glass) were mounted in the circular mounts, and two slides containing samples were exchanged throughout a day. The sample cartridge was placed into the laser system and sealed to be airtight. After every replacement, the sample chamber was evacuated of air and refilled four times in succession, in order to remove atmospheric contaminants.

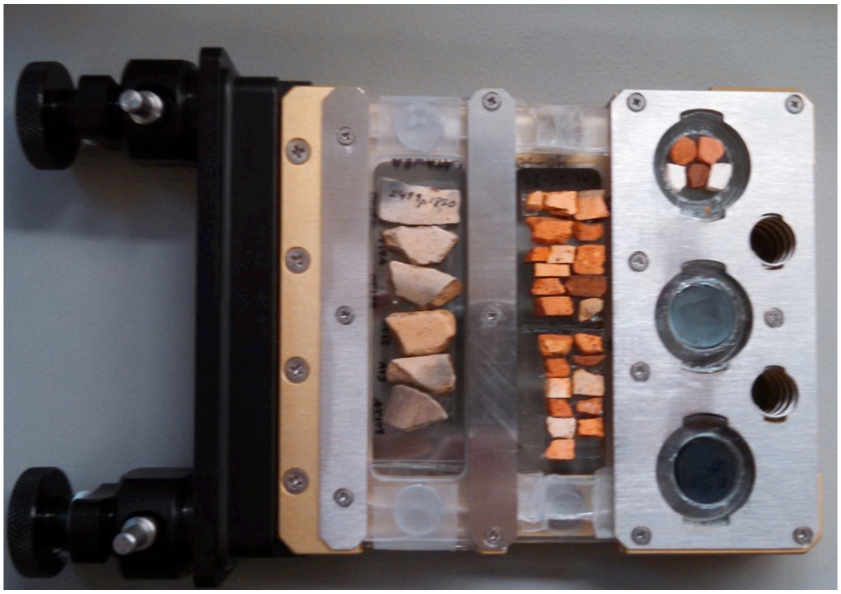


Figure 4.8. Laser ablation sample cartridge. Two slide holders hold ceramic samples, and three circular mounts hold reference standards.

The sampling process for laser ablation is spatially discrete, so that the operator is able to pinpoint the areas to ablate. The material is sampled through several steps. First, the area to be ablated is selected via an integrated camera. A laser beam of a set diameter, typically 5μm to 150μm, and controlled energy, is applied to the surface. Spots, lines, or raster patterns may be selected. The laser beam excites electrons within the sample matrix, which transfer energy as heat to the surface of the sample. The rapid increase in temperature at the surface causes vaporization, then, as it cools, particles on the order of nanometers begin to form (Hattendorf and Gunther 2014:652-3). These particles, made up of ablated material, are suspended in helium gas and carried to the plasma torch.

In this analysis, each pottery sample was analyzed three times along the fresh surface, in a different location each time, in order to obtain an average representation of the clay matrix. Using the internal microscope and video imaging, measurement lines 0.6mm long, and 0.11mm wide were placed on the surface. Laser ablation lines were laid in such a way as to avoid inclusions in the matrix with a diameter larger than 30 μm, and any voids (Figure 4.9). Lines have been shown to have better signal stability than spots (Speakman and Neff 2005:9; Wallis and Kamenov 2013:897), which is especially important for heterogeneous materials such as ceramics. Each measurement line was preablated with a repetition rate of 10Hz, laser power of 20% (1.77 J/cm^2), and scan speed of 50 µm/sec. This removed surface contamination. For data collection, the laser was set to a repetition rate of 20 Hz, 35% power (4.13 J/cm^2), and a scan speed of 10 µm/s. These settings were optimized to provide even sample ablation and reduce fractionization. The 0.6mm line at 10 µm/s resulted in a 60 second data collection ablation for each scan line. Helium, rather than argon, was used as a carrier gas as it resulted in smaller particles during ablation (Jantzi 2013:22). The helium was operated at a flow rate of 0.4 liters per minute (LPM).

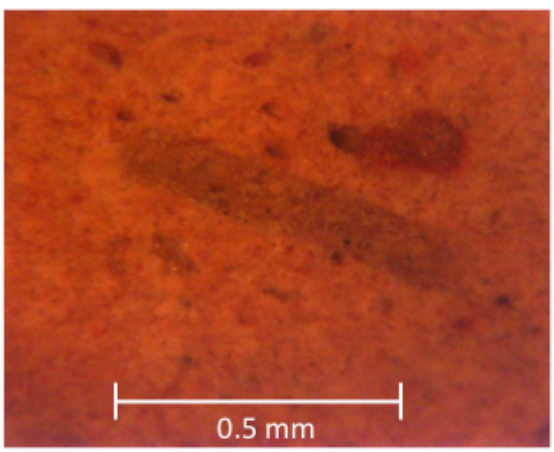


Figure 4.9. Ablation scar on earthenware.

The aerosolized sample in helium was mixed with argon at a flow rate of 0.9 LPM, before entering the plasma torch. The flow rate of sample gas was optimized to reduce the formation of polyatomics and doubly charged ions (Jantzi 2013:18), while maintaining a steady sample signal. The presence of polyatomic ions is problematic, as it will cause spectral interferences (Hattendorf and Gunther 2014:665). Molecular ions of argon (argides) are the most common species, though other atmospheric gases will also form polyatomics. Data were collected on 45 isotopes: ^{7}Li, ^{23}Na, ^{27}Al, ^{30}Si, ^{39}K, ^{44}Ca, ^{45}Sc, ^{47}Ti, ^{51}V, ^{52}Cr, ^{54}Fe, ^{55}Mn, ^{59}Co, ^{60}Ni, ^{63}Cu, ^{64}Zn, ^{85}Rb, ^{88}Sr, ^{89}Y, ^{90}Zr, ^{93}Nb, ^{98}Mo, ^{107}Ag, ^{115}In, ^{120}Sn, ^{121}Sb, ^{133}Cs, ^{137}Ba, ^{139}La, ^{140}Ce, ^{142}Nd, ^{152}Sm, ^{153}Eu, ^{159}Tb, ^{164}Dy, ^{174}Yb, ^{175}Lu, ^{180}Hf, ^{181}Ta, ^{197}Au, ^{208}Pb, ^{209}Bi, ^{232}Th, and ^{238}U. Elements were chosen based on their utility for elemental analysis of ceramics, and particular isotopes were chosen in order to minimize polyatomic interferences.

After ionization, the ions were accelerated to a uniform velocity and measured in the mass spectrometer. The Element XR is a double focusing instrument. The magnetic sector first filters ions so that only those with specifically defined mass-to-charge ratios will pass through into the electrostatic sector. Then, in the electrostatic sector, the energy is focused before passing into the detector. The Element XR operates in both analog and counting mode via a dynode detector system as well as a Faraday cup. These detectors allow for the fast and precise detection of ions in major as well as trace concentrations across a wide mass range.

It took approximately nine seconds for the mass spectrometer to scan through the entire mass range for the 45 isotopes measured. For each measurement line, data were collected on 12 scans, for a total of 108 seconds of analysis. The first and last two scans measured background signal during laser pause, with eight scans of laser ablation data collection in between. Only the scans with stabilized signals for all elements were included in the final signal average, resulting in the averaging of four replicates per ablation line (scans 5-8). Background signal was independently measured for each scan from the initial laser pause scans, and subtracted from the averaged intensities. Signal levels were constantly monitored during analysis, and unusually low intensity or irregular scans were rerun. For each sample, three independent measurement lines were ablated to account for the heterogeneity of the clay matrix.

Data Processing

Signal standardization is a potential issue with the laser ablation sample introduction method. Unlike acid digestion ICP-MS, where it is straightforward to standardize and quantify the amount of sample reaching the torch, with laser ablation this is more difficult to regulate, as the amount of sample ablated varies due to matrix heterogeneity, microtopography, and matrix density (Neff 2003:23; Speakman and Neff 2005:6). Researchers have developed a number of standardization procedures that control for differences in sample signal strength. A commonly used solution is the Gratuze method (Gratuze 1999; Gratuze *et al.* 2001; Neff 2003; Speakman and Neff 2005). In order to standardize the elemental signal, after subtracting background noise and correcting for isotopic abundance, the element intensity is converted to a ratio of each elemental count to a single element. Silicon was used as the internal standard. As an omnipresent constituent of clay minerals, it was expected to be present in approximately the same proportion within samples. After this step, the elemental values for each measurement line were visually compared, and the values were averaged. Anomalous measurement lines, with readings different by an order of magnitude or greater on multiple elements were removed from analysis.

Following the Gratuze method, the concentrations for each data point were calculated using response coefficient factors (Gratuze 1999:873; Neff 2003). These were calculated based on the linear regression of normalized counts of standard reference materials (SRM) against their reported values (Golitko and Terrell 2012:3573; Speakman and Neff 2005:7). The reference materials for this study, including NIST SRM 679 (Brick Clay), NIST SRM 610 and NIST SRM 612 (Trace Elements in Glass) were analyzed under the same settings as unknowns. They were scanned after every 10-15 samples. In the final step of the Gratuze Method, the standardized and calibrated elemental values were converted to oxides. The Gratuze method assumes that the elements measured compose the entire elemental makeup of the sample, with the exception of oxygen. By converting the elemental signatures to oxides and summing to 100%, oxygen was included (Eckert and James 2011:2160; Speakman and Neff 2005:6). For values as parts-per-million concentrations, an oxide correction was applied.

Reported values for SRM 610 and SRM 612 were taken from Pearce (1997). SRM 679 was produced by NIST from a clay source in Maryland; thus it was expected to be an especially good matrix match due to its geographic proximity to sources of samples in the dataset. Over the course of analyses, the quality control values for the reference materials were consistent. As have been published in a variety of sources, on average the relative standard deviation (%RSD) for the Trace Elements in Glass SRMs should be around 5% or better with LA-ICP-MS (*e.g.*, Dussubieux *et al.* 2007; Niziolek 2013:2827; Sharratt *et al.* 2009:799). This was true for this analysis. Furthermore, the %RSD for Brick Clay was on par with reported values for other non-homogeneous reference materials such as New Ohio Red Clay, generally within the range of 5-20%. (Niziolek 2011; Sharratt *et al.* 2009; Wallis and Kamenov 2013:902; Appendix C), A number of elements had poor %RSDs, and were subsequently removed from the dataset. These included Ag, In, Sb, Hf, and Au.

The resulting dataset became the foundation used to define the elemental character of production zones. This reference data was then applied to predict the zone assignment for sherds of unknown origin recovered from domestic contexts. In the following chapter, I describe the multivariate techniques used to analyze these data in order to predict the sources of these ceramics. The sourcing results are compelling, and demonstrate the value of applying geological principles and elemental analysis for recovering geographic information from these visually ambiguous wares.

CHAPTER 5: DATA ANALYSIS

This chapter explains the results of elemental analysis on historic coarse earthenwares as a means of defining production zones and characteristic products from those zones. As described in Chapter 4, the goal of elemental sourcing studies is to define groups within the data that share patterning in elemental abundances, based on underlying geological similarities. One may conceptualize these groups “as centers of mass in the multidimensional space defined by the full set of elemental concentrations (Neff *et al.* 2006:62). In order to best uncover and define the patterns within an elemental dataset, it is necessary to employ a variety of exploratory data techniques and descriptive statistics.

Due to the fragmentary nature of the archaeological record, many ceramic sourcing studies rely upon comparison of raw materials with ceramic products. Clay and temper sources may be sampled to develop spatially discrete areas of procurement. The drawbacks of this method are that it is impossible to comprehensively sample every possible raw material source, and variation among sources may be diluted by admixture of materials during the production sequence. The “criterion of abundance” is often used alongside raw materials sourcing, or in lieu of it, when raw materials cannot be sampled. This principle states that the most prevalent wares found in a consumption context are most likely locally produced, while the more rare ceramic types have a higher probability of being nonlocal (Bishop *et al.* 1982:301). In a historic setting, this relationship cannot be assumed, as many wares common on archaeological sites arrived exclusively from nonlocal sources, such as Chinese porcelain.

This study is distinct in that it begins with a reference or training set of ceramics recovered from known production sites. The more permanent nature of historic pottery production sites, with kiln architecture, make it possible to identify wares found on these sites as local products. There are a few exceptions: pottery workshops are often associated with dwelling spaces, and thus there are instances in which wares from elsewhere were ultimately deposited along with other refuse into the waster pile at the pottery workshop. For example, this was found to be the case at Topham-Miller pottery in Philadelphia, as described below. Nevertheless, on the whole, samples from identified production sites form a strong analytical unit.

I began this study with the premise that the production zones I identified represented elementally discrete areas based on elemental composition, and therefore expected them to separate from one another elementally. While beginning with known groupings, I did not rely on *a priori* assumptions about the homogeneity of each production site assemblage or each zone. Potters undoubtedly tested different clay recipes or utilized different clay sources that would cause deviations from the group-wide elemental measurements. Yet, given that the clay used at each workshop can be assumed to be local (Arnold 1991), I presumed that there would be greater homogeneity within groups than among groups, following the provenience postulate.

The results of elemental analysis are divided into two parts. First, I explain the methods for defining the compositional groups that represent production zones, and the resulting training model. Then, I describe the procedure for sampling unknown coarse earthenwares from plantation contexts and assigning them to the defined compositional groups.

Building the Training Model

After quality control checks, as discussed in Chapter 4, the first step in preparing elemental data is generally to log-transform the values, using a log-10 scale. This is done for two reasons. The first is to minimize the differences in scale between major elements and trace elements. Major elements are typically found in concentrations many orders of magnitude greater than trace elements, and as raw values would thus overwhelm patterning of trace elements. By log-transforming the data major and minor elements can be assessed in tandem. Secondly, log transformations have been shown to normalize the distribution of trace elements, making them more conducive to analysis (Speakman 2013:65). Statistical analyses rely upon the assumption that the data within a dataset have normal, or Gaussian, distribution. Unless otherwise noted, all data transformations and explorations were conducted using the R program for Statistical Computing, version 3.1.2. The packages used for specific routines are noted as applicable.

The next step is to choose which elements to include and exclude from analysis, and to impute the missing values in a dataset. Five elements were excluded based on their %RSDs (Ag, In, Sb, Hf, and Au. Nickel was also excluded, as it had poor RSD for both clay and glass standards, due to low values and interference from the nickel cone within the mass spectrometer. Lead was measured, but not included in analyses, due to the potential for contamination from the lead glaze on most samples.

In the resulting dataset, only two elements measured via LA-ICP-MS had missing values for one or more observations, indicating that there were readings below the threshold of detection. Many analyses will not accept null values, so rather than removing a variable from a dataset entirely, it is preferable to mathematically compute an appropriate substitute value for missing observations. Missing values for molybdenum (Mo) and bismuth (Bi) made up less than 0.1% of observations for each element. The missing values were imputed using the *Amelia* package in R. *Amelia* uses an expectation-maximization algorithm to estimate the statistics of an incomplete dataset, and then infers the missing values (Honaker *et al.* 2011). The final dataset included values for 37 elements: Li, Na, Al, Si, K, Ca, Sc, Ti, V, Cr, Fe, Mn, Co, Cu, Zn, Rb, Sr, Y, Zr, Nb, Mo, Sn, Cs, Ba, La, Ce, Nd, Sm, Eu, Tb, Dy, Yb, Lu, Ta, Bi, Th, and U.

Table 5.1. Samples by Production Zone

Production Zone	Count
Buckley/Liverpool	57
London Area	56
North Carolina	23
Northern Virginia Piedmont	15
Philadelphia	20
Shenandoah Valley	72
South Ridge & Valley	14
Staffordshire	18
Surrey-Hampshire	20
Tidewater Chesapeake	105
Total	400

As a preliminary method for investigating the potential structure of the dataset, I performed principal components analysis (PCA) on the production site samples (Table 5.1). Principal components analysis (PCA) is a technique of exploratory data analysis that is commonly used to identify clusters of samples that may represent compositional groups. PCA extracts the variance within a dataset and recombines it to form new variables. This is especially useful for elemental data, as often the variables are correlated, which can make it difficult to clearly identify patterns among the many elements. PCA retains the same information as the original element concentrations, but aggregates it in such a way that most of the variation can be explained by fewer, uncorrelated, components. Each new variable, known as a principal component (PC), accounts for a decreasing amount of variance. There will be as many PCs created as original variables. This method condenses the dimensionality of the data, maximizing the amount of variance that can be visualized in two or three dimensions. By plotting the first two PCs it is possible to see the best two-dimensional representation of the multidimensional space of the elemental dataset. Samples that cluster within a PCA plot are elementally more similar than those that are further apart.

PCA also retains the information on which of the original variables contribute to each PC. Plotting both variables and samples, known as a biplot, visualizes not only which samples are similar to one another, but also which variables drive their similarity or difference. Variables are plotted as vectors; the length and orientation of the vector represents the importance of each variable to each PC. Vectors overlapping or with acute angles to one another are positively correlated, vectors at a 90 degree angle are uncorrelated to one another, and vectors 180 degrees from one another are negatively correlated.

Figure 5.1 shows a principal components biplot of the production site samples and 20 elemental variables. There are at least three main groups present within the data. Samples in Group 1 are loosely organized, and are distinguished by a negative correlation to trace elements, indicating depletion in those elements. Group 2 samples are positively correlated with manganese (Mn), zinc (Zn), iron (Fe), and cobalt (Co). Group 3 samples are positively correlated to trace elements, especially zirconium (Zr), uranium (U), and thorium (Th). As expected, this plot demonstrates that there is some inherent patterning among the elemental concentrations within the dataset.

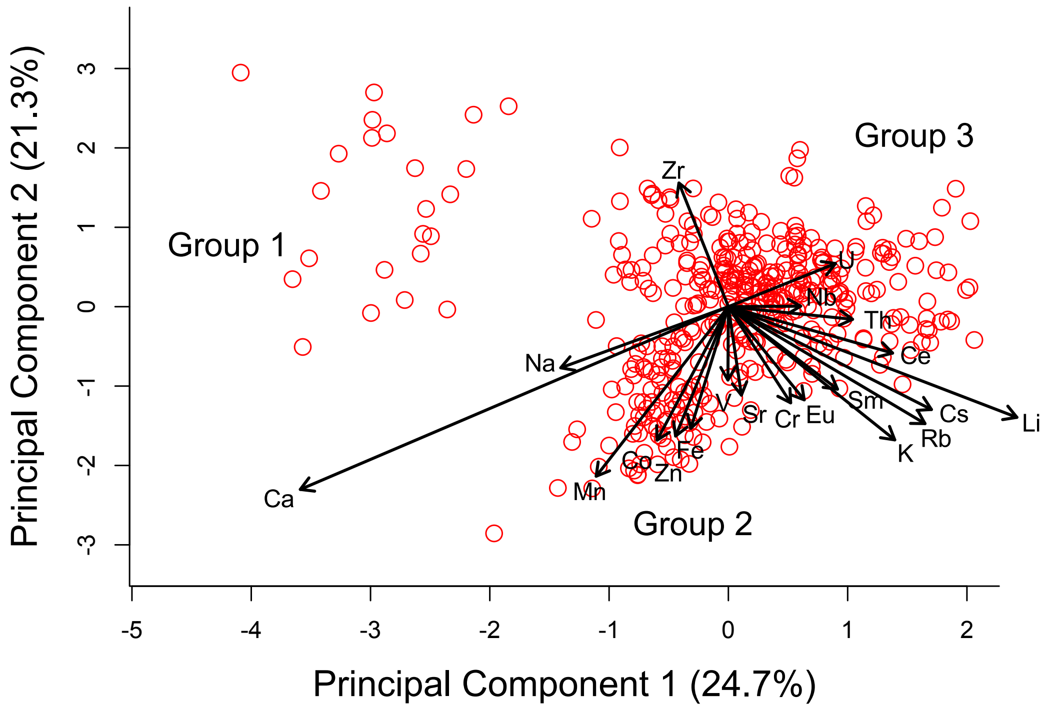


Figure 5.1. Principal components analysis biplot for production site samples. Based on 20 logged elemental concentrations (Li, Na, K, Ca, V, Cr, Fe, Mn, Co, Zn, Rb, Sr, Zr, Nb, Cs, Ce, Sm, Eu, Th, U).

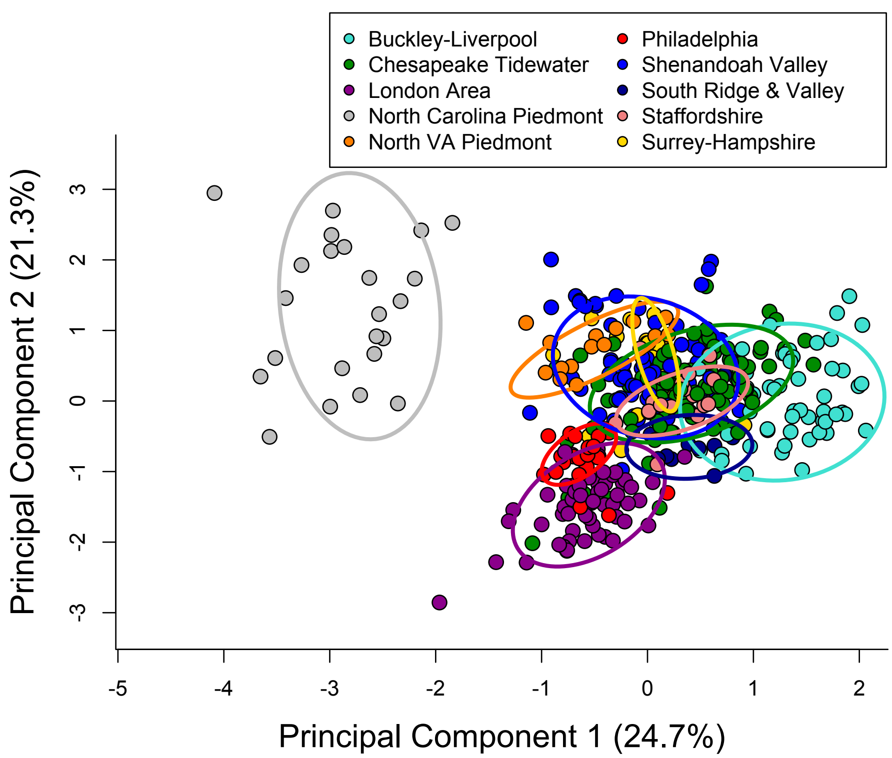


Figure 5.2. Principal components plot of production site samples by preliminary production zone. Ellipses represent 90% confidence interval for each zone.

Figure 5.2 shows the PCA re-plotted, this time identifying each sample by production zone, in order to determine whether the structure within the dataset was reflective of group assignment. Ellipses, representing 90% confidence intervals, identify the centers of mass for each group in PC space. From this, it is evident that there are shared elemental characteristics among samples from within a production zone. While there is significant overlap in two-dimensional space, subsequent PCs provide further group discrimination. North Carolina Piedmont sherds form the most distinct group, though it is internally heterogeneous. Samples from Buckley and Liverpool within the Coal Measures zone are higher in alkali metals lithium (Li) and cesium (Cs) than samples from other zones. Zirconium concentration serves to distinguish samples from the Northern Virginia Piedmont, while high manganese (Mn) and other transition metals differentiate London Area and Philadelphia samples.

Bivariate comparisons, such as Figure 5.3, showed continent-based trends. Concentrations of cesium and lithium are highly correlated by continent, with higher levels in Europe and lower levels in North America, with the lowest in the Carolina Piedmont. Bivariate plots of elemental concentrations also suggest that several of the production zones are internally heterogeneous, instead representing multiple discrete production zones. The Coal Measures zone, for example, divides into a Buckley group and a Liverpool group by concentrations of tin and potassium (Figure 5.4). The Tidewater group contained samples from Baltimore, MD, Alexandria,VA, the Northern Neck peninsula of VA and the lower Chesapeake Bay, VA. Alexandria could be reliably separated from the rest of this group by concentrations of silicon, chromium, rubidium, and sodium (Figure 5.5). In all subsequent analyses, these refined groups were retained, resulting in 12 production zones.

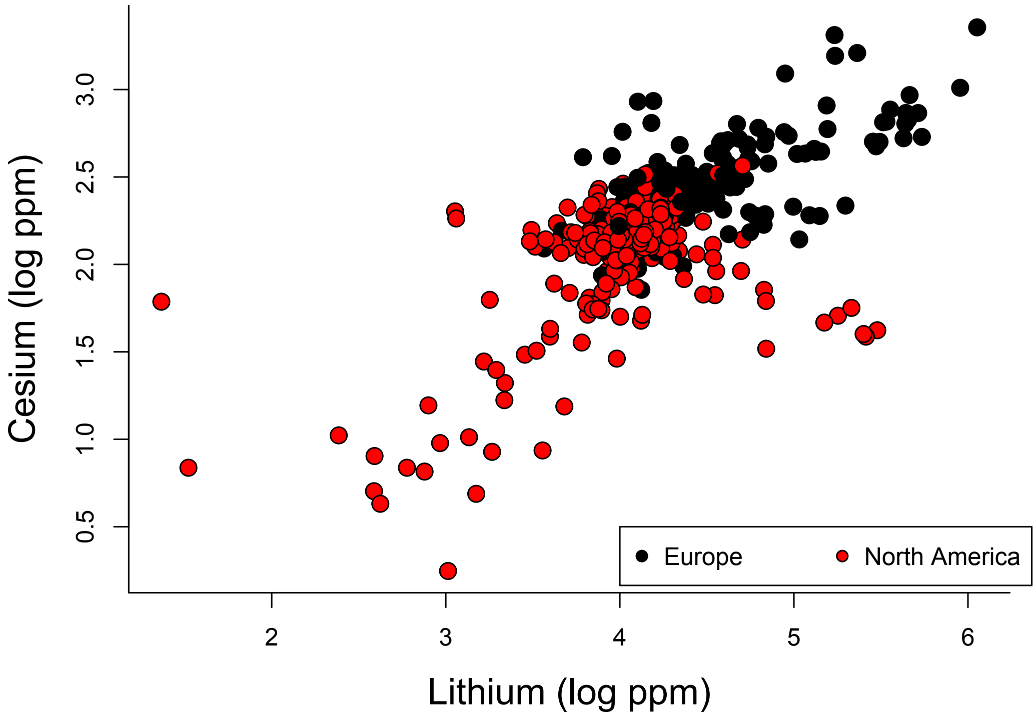


Figure 5.3. Bivariate plot of lithium and cesium, coded by continent.

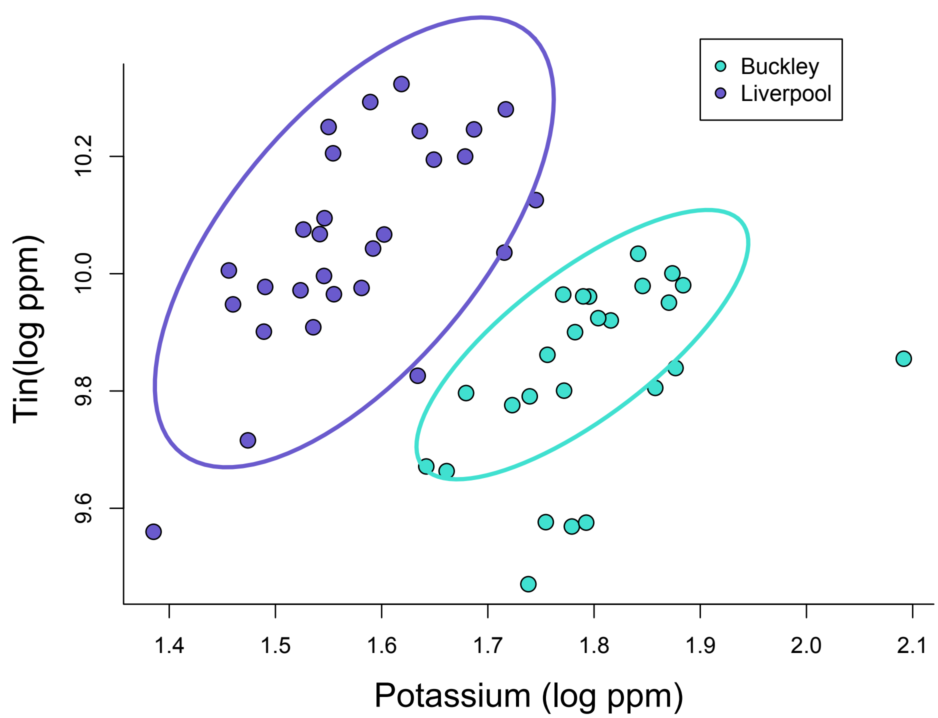


Figure 5.4. Bivariate plot of potassium and tin, showing separation of Buckley and Liverpool samples.

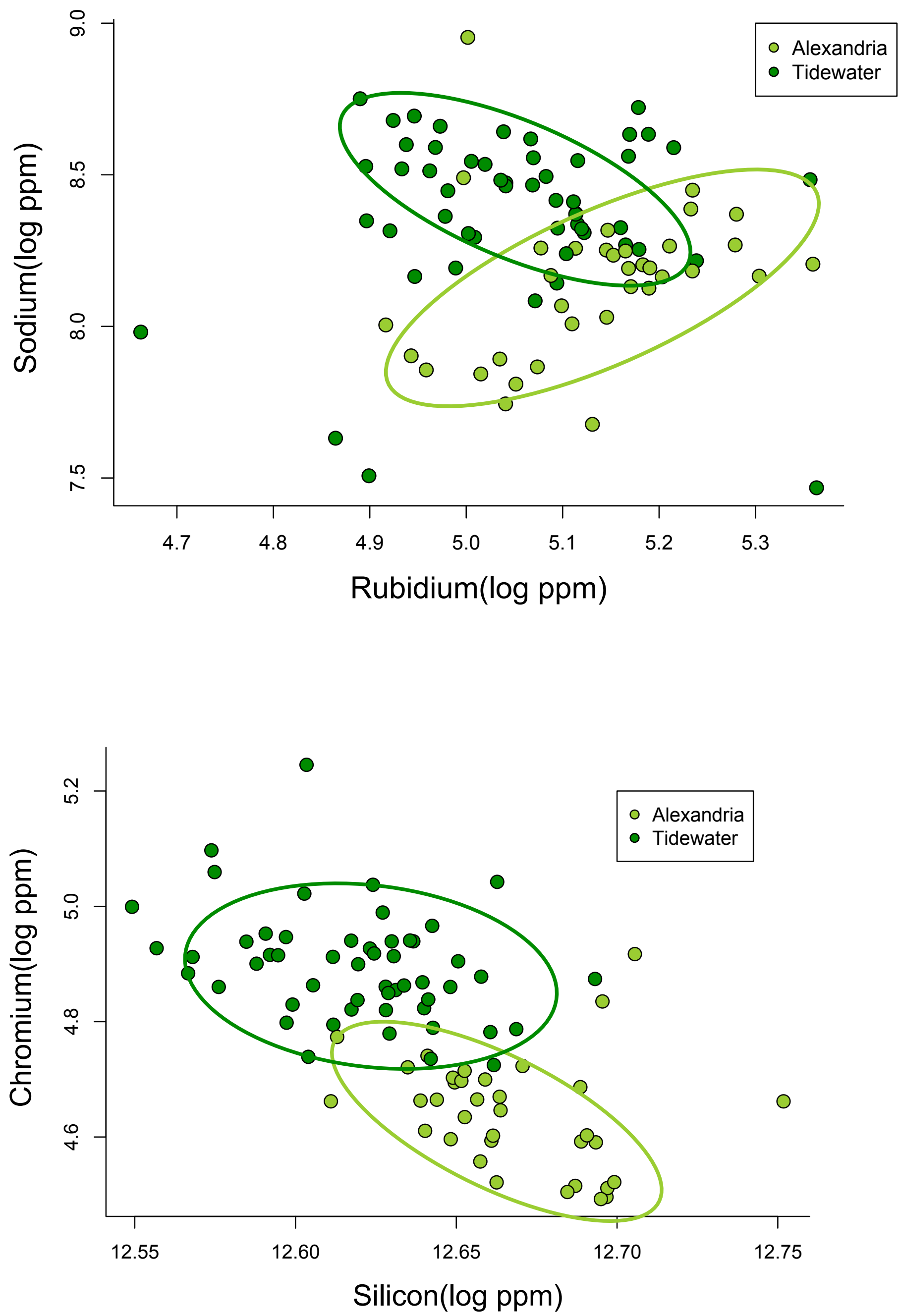


Figure 5.5. Bivariate plots of rubidium and sodium, above, and silicon and chromium, below, showing separation of Alexandria samples from those of the broader Tidewater region.

Given these initial tests of the structure of the data, which demonstrated that the production zones formed naturally distinct groups, linear discriminant analysis became a powerful tool for creating a robust training model to predict the assignment for unknown sherds. Discriminant analysis (DA) shares similarities with principal components analysis in that it retains and recombines the variance within a dataset into new linear combinations of variables, called discriminant functions (DFs). However, DA relies upon predefined groups within the data and the discriminant functions are built to maximize the distances among group means.

Relying upon assumptions of group membership is both a benefit and a drawback. Beginning with established groups provides a basis on which to test and refine group membership, resulting in strong analytical categories. On the other hand, the DA function will attempt to assign samples within any groups that are created, so care must be taken to avoid reifying groups that do not have underlying natural patterning within the data. To verify membership in a group, posterior probabilities are calculated using leave-one out cross-validation with Mahalanobis distances.

Mahalanobis distance (MD) is a calculation of the generalized distance of each sample from the centroid of the cluster of which it is presumed to be a member. Probabilities of group memberships are then computed from MDs, making it possible to verify or refute group assignment. MD calculations require that there are more observations within each group than variables. In order to maximize the amount of variance used, generally principal components (*e.g.,* Niziolek 2011; Sharratt *et al.* 2009; Speakman 2013); or discriminant functions (e.g., Bartlett *et al.* 2000; Cochrane and Neff 2006; Kuhn and Sempowski 2001) are provided as variables in lieu of the elements themselves, ideally enough to subsume at least 90% of the variance within the dataset (Speakman *et al.* 2008:58).

Small group size can make MD probabilities unreliable. Harbottle (1976, quoted in Speakman *et al.* 2008:58) refers to this as "stretchability." In a small cluster, each individual specimen has greater weight than in a large cluster, and thus may stretch the group towards its own location. In general, it is recommended to "jackknife" the probabilities by "[excluding] each sample from the group to which it is being compared, even with the sample has been assigned to that group" (Speakman *et al.* 2008:60). Jackknifing is a conservative measure that cross-validates group membership. This form of leave-one-out cross-validation was performed while calculating probabilities in this study. The threshold for assigning group membership based on Mahalanobis distance probabilities varies by project, but setting the threshold at 1% probability is common (*i.e.,* Joyce *et al.* 2006, Niziolek 2011). Since establishing the boundaries of production zones in this study was preliminary to projecting the assignment of unknown sherds, all samples that were attributed to the expected groups were retained, even with weak probability of assignment.

Figure 5.6 is a preliminary plot of the DA with the full training set (n=400) for the 12 production zones identified through PCA and bivariate plots (R package *MASS*, by Ripley *et al.*). In a discriminant analysis, there will be one fewer discriminant functions than groups, so 12 groups yielded 11 discriminant functions. Ellipses representing 90% confidence intervals identify the centers of mass of each group within the first two DFs, which subsume over 60% of the variance in the dataset. As in PCA, the North Carolina Piedmont is the most distinct, showing no overlap with any other groups and driving the patterning of the first discriminant function. European samples, the Buckley, Liverpool, Staffordshire, Surrey-Hampshire, and London Area groups, also have distinct orientation compared to the Chesapeake and Philadelphia samples, along the y-axis. European groups fall below zero, while American groups plot above zero.

As with PCA, vectors are used in discriminant analysis to display the loadings for elemental variables, which explain the underlying variables that compose the discriminant functions (Figure 5.7). Along discriminant function 1 (x-axis), high aluminum and depletion in trace elements serve to discriminate the North Carolina group. European groups are correlated with cesium, strontium, and potassium, among others. Chesapeake and Philadelphia groups are highly correlated with rubidium.

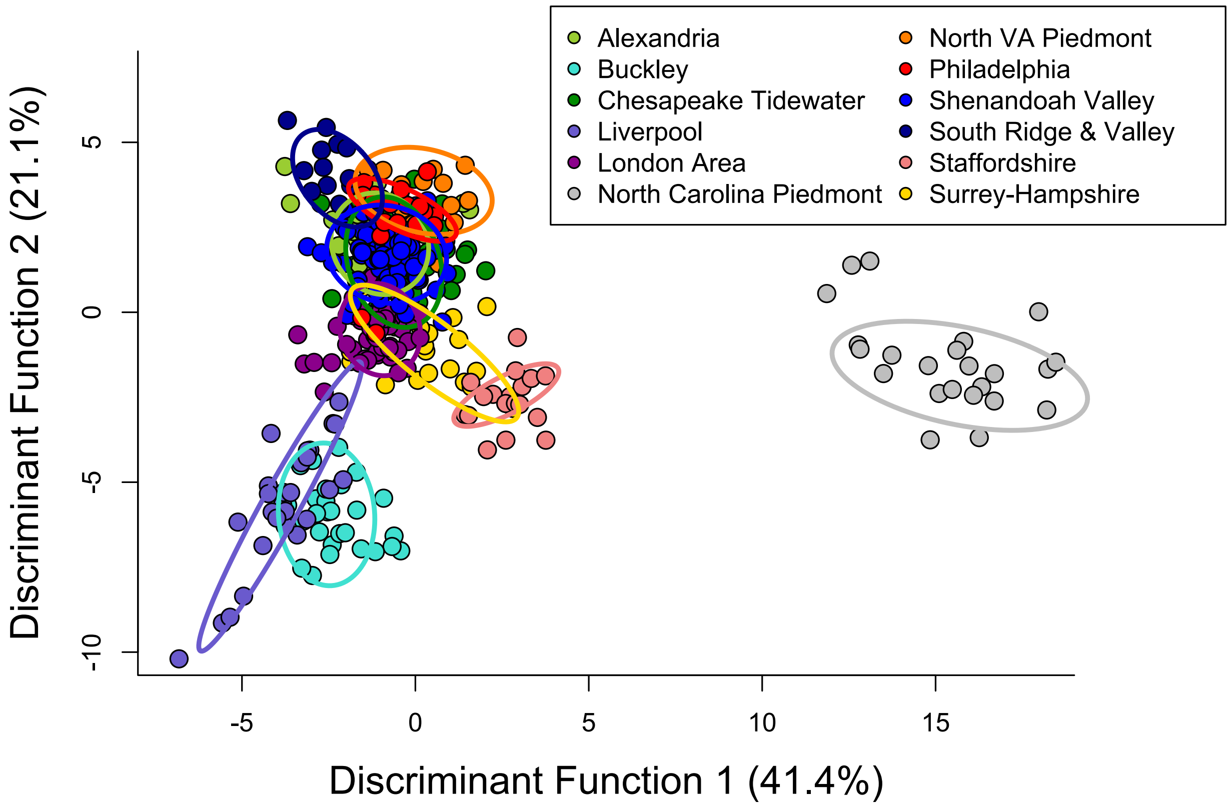


Figure 5.6. Plot of first two discriminant functions, by production zone. Ellipses represent 90% confidence intervals.

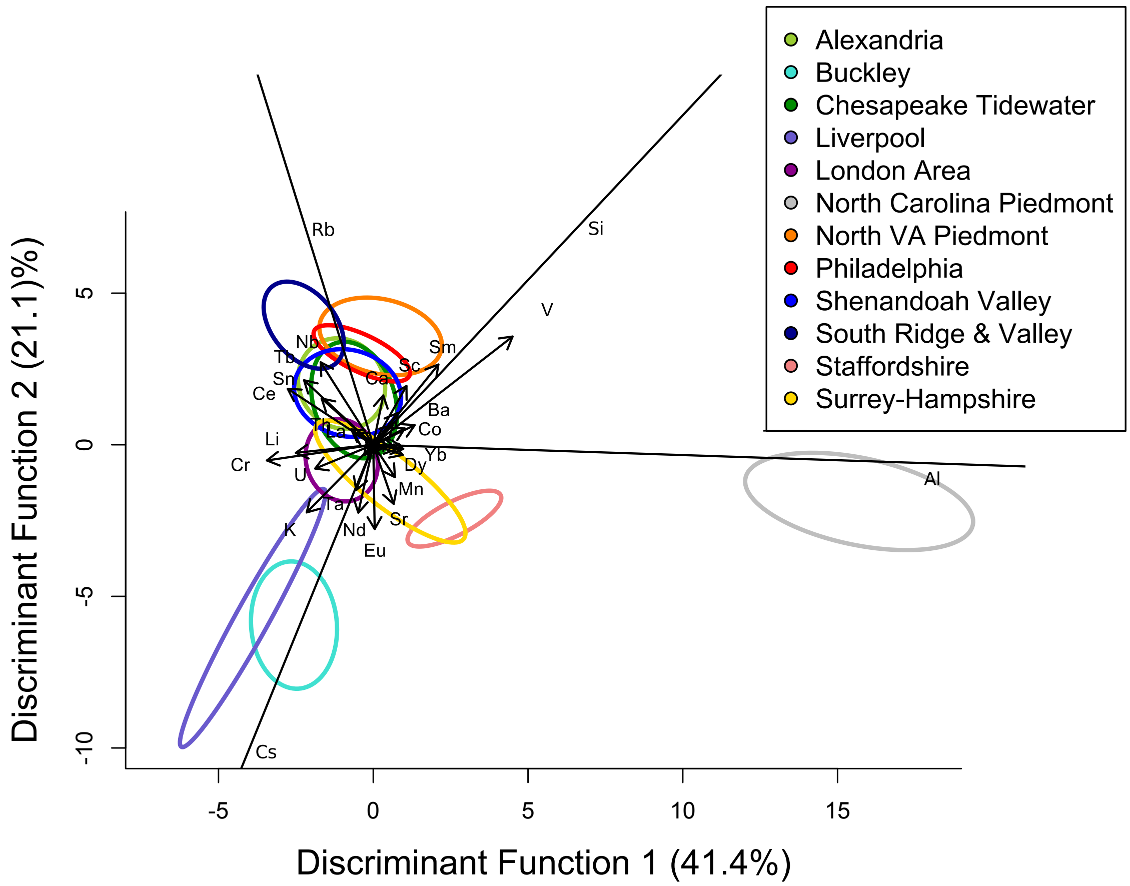


Figure 5.7. Plot of the variables contributing to the first two discriminant functions. Ellipses colored coded by zone represent the centers of mass for each zone with 90% confidence interval.

In the first two dimensions of DA, there is significant overlapping of zones. In particular, the zones of Chesapeake region show overlap along DF 1 and DF 2 of the complete training dataset. The Shenandoah Valley zone and the Tidewater zone appear especially similar. This is logical, considering that the clay found in the Coastal Plain arrived as alluvium from the rivers flowing through the Shenandoah Valley and other upland areas. This overall chemical homogeneity within the region has been found in several other studies of Chesapeake archaeological materials (*e.g.,* Bollwerk 2012, Steadman 2008). However, in the multidimensional space of the full DA, these zones resolve into separate groups. A plot of DF 2 and DF 3 shows how elemental differences, namely depletion in trace elements, distinguishes the

Tidewater and Shenandoah Valley groups (Figure 5.8). Along the third DF, the London Area also separates from other groups.

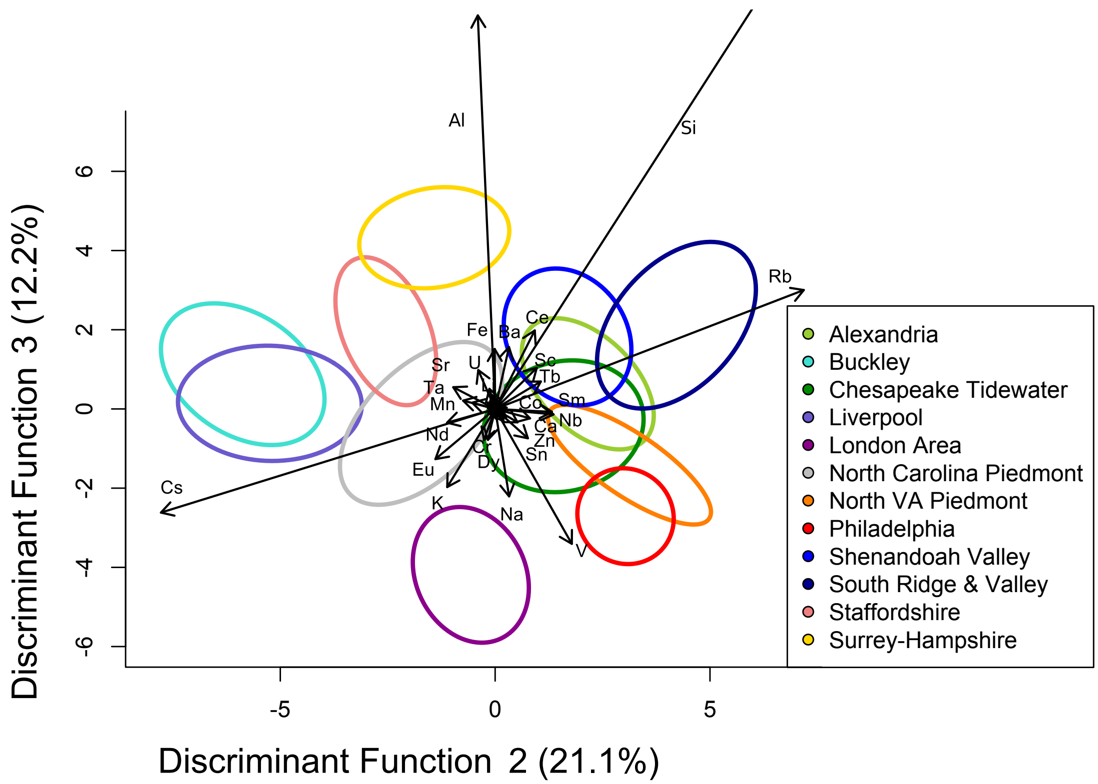


Figure 5.8. Biplot of second and third discriminant functions. Ellipses represent 90% confidence intervals around the centers of mass for each group.

Mahalanobis distance probabilities were calculated using the linear discriminant functions as variables (Huberty and Olejink 2006: 287). In order to create the most discrete and conservative groups for the training set, the prediction function was run several times, removing and reinserting outliers each time until all remaining sherds were assigned to the expected training groups. The posterior probabilities of group membership for 12 zones after cross-validation resulted in a correct group assignment rate of 92% (Appendix D).

34 samples were removed in order to yield 100% assignment to the expected groups. These samples could not be assigned to any group, or had predicted assignment to a zone

different from that in which they were recovered. In either case, the samples were uncharacteristic of their zones, or shared significant characteristics with multiple zones, resulting in similar probabilities of membership for two or more groups. There are a number of reasons that may explain why a sherd would "mis-assign" to a different zone. Of these sherds that were mis-assigned, the most (14) had predicted assignments to a nearby group, suggesting that they were likely locally produced, but from individual clay deposits that more closely match a neighboring geological region. This was especially common between the Shenandoah Valley and Alexandria or Tidewater zones, as the clays from these regions share a geological origin. I return to this issue when discussing domestic sample attribution below.

Eight samples had predicted assignment to the wrong continent. Four of these come from Gloucester Point, an assemblage that also contained domestic refuse with ceramic ware types known to be imported, such as Delft. It is therefore likely that while coarse earthenware, these mis-assigned sherds represent successful imported vessels that were used in domestic contexts and became mixed with pottery waste during deposition. Two of the continent mis-assigned sherds were examples of sugar molds recovered in Philadelphia (Figure 5.9, 5.10), and had been presumed to be evidence for Philadelphia production of sugar wares, as part of the sugar refining industry that was known to take place in the city. Instead, the sherds showed a high probability of assignment to London, which was a global exporter of sugar. Sugar refining wares are found in many colonial Atlantic contexts and were sometimes but not always locally made (Magid 2005).

Figure 5.9. Fragments of conical sugar mold (YTM19, left) and loaf sugar mold (YTM20, right) recovered from the Topham Miller Pottery site in Philadelphia. Images courtesy the State Museum of Pennsylvania, Pennsylvania Historical and Museum Commission.

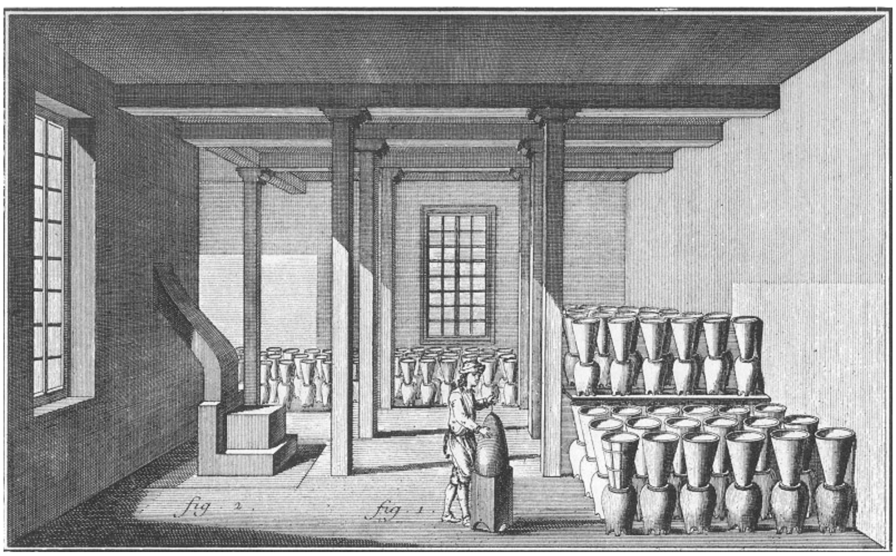


Figure 5.10. Illustration from Diderot's Encyclopédie, 1762, showing sugar refining jars and cones in use. Image courtesy University of Chicago: ARTFL Encyclopédie Project, http://encyclopedie.uchicago.edu/.

The remaining two continent-misassigned sherds came from Surrey-Hampshire a Liverpool, but show a weak assignment to the American zones. Given the temporal and spatial gulf between these regions, there was no reason to assume that these sherds are American. Instead, it was notable that the Surrey-Hampshire sherd is an example of the less common red-bodied Surrey-Hampshire Border ware. Lacking enough representative samples of this variant in the dataset, the model was unable to correctly attribute this sherd. Six samples were assigned to "far" neighbors—*e.g.,* Chesapeake samples assigning to Philadelphia, or vice versa. Three of these come from Gloucester, which for the reason stated above, likely represent true products of Philadelphia. The remaining six sherds were unable to be assigned to any zone, or could not reliably be grouped into a zone. Removing these 34 sherds yielded a modified training set of 366 production site sherds, representing each of the 12 geologically distinct production zones. This dataset then became the model for projecting the assignment of unknown sherds from domestic plantations across the Chesapeake.

Sourcing Unknown Samples

For this study, I chose plantation assemblages across the Chesapeake that represented geographic, temporal, and economic spread (Table 5.2, Figure 5.11). The majority of sites were part of the Digital Archaeological Archive of Comparative Slavery (DAACS), thus their excavation and artifact data was fully available online in a consistent format. When possible, multiple domestic assemblages were sampled from each plantation in order to investigate potential variation in household earthenware provisioning strategies. These include assemblages associated with planter households such as the Washingtons at Mount Vernon and the Jeffersons at Monticello and Poplar Forest, as well as assemblages associated with overseers or tenants and enslaved or bounded workers (Table 5.2). Further description of each plantation and assemblage is provided in Chapter 6 with the assemblage sourcing results.

Table 5.2. Plantation Assemblages Sampled

Plantation/Assemblage	Region	Primary Household Type	Occupation Range for Phases Sampled	MCD	BLUE MCD	Further Resources
King's Reach	Coastal MD					
King's Reach		Planter	Late17th-Early 18th	1704	1708	MAC Lab n.d.(b); Pogue 1997
King's Reach Quarter		Servant/slave	Late17th-Early 18th	1705	1709	King 1999; MAC Lab n.d.(c)
Fairfield	Coastal VA					
Fairfield Midden		Planter/slave	Early-Mid 18th	1741	1757	
Fairfield Quarter		Slave	Early-Mid 18th	1720	1725	Brown 2006
Mount Vernon	Coastal VA					
South Grove		Planter	Mid 18th	1744	1746	Breen and Galle 2013; Mount Vernon Archaeology Department n.d.
House for Families		Slave	Mid 18th	1741	1747	Pogue 2003; Pogue and White 1991
Ashcomb's Quarter	Coastal MD	Servant/slave/tenant	Early-Mid 18th	1735	1746	Catts *et al.* 1999; Sawyer 2006a
Utopia	Coastal VA					
Utopia III		Slave	Early 18th	1719	1729	Fesler 2004; 2005a
Utopia IV		Slave	Early-Mid 18th	1730	1741	Fesler 2004; 2005b
Chapline Place	Coastal MD	Slave/tenant	Mid 18th	1755	1769	Crowl *et al.* 1999; Sawyer 2006b
Mattapany-Sewall	Coastal MD					
Mattapany Manor		Planter	18th-19th	-	-	
NAVAIR		Slave/tenant	Mid-Late 18th	1758	1768	Tubby and Watts 1995, Cooper *et al.* 2010
Monticello	Piedmont VA					
Site 7		Slave	Mid 18th	1744	1761	Bon-Harper 2006a
Site 7 Overseer		Overseer	Late 18th	1774	1783	Bon-Harper 2006a
Dry Well		Planter	Late 18th	1769	1778	Bates *et al*. 2013; Kelso 1997
Site 8		Slave	Late 18th	1793	1790	Bon-Harper 2006b
Poplar Forest	Piedmont VA					
North Hill		Slave	Late 18th	1791	1794	Heath 2007b; Heath and Gary 2012
Quarter		Slave	Late 18th-Early 19th	1795	1796	Heath 2007c; Heath and Gary 2012
Wing of Offices		Planter	Late 18th-Early 19th	1859	1843	Heath and Gary 2012; Kelso 1991

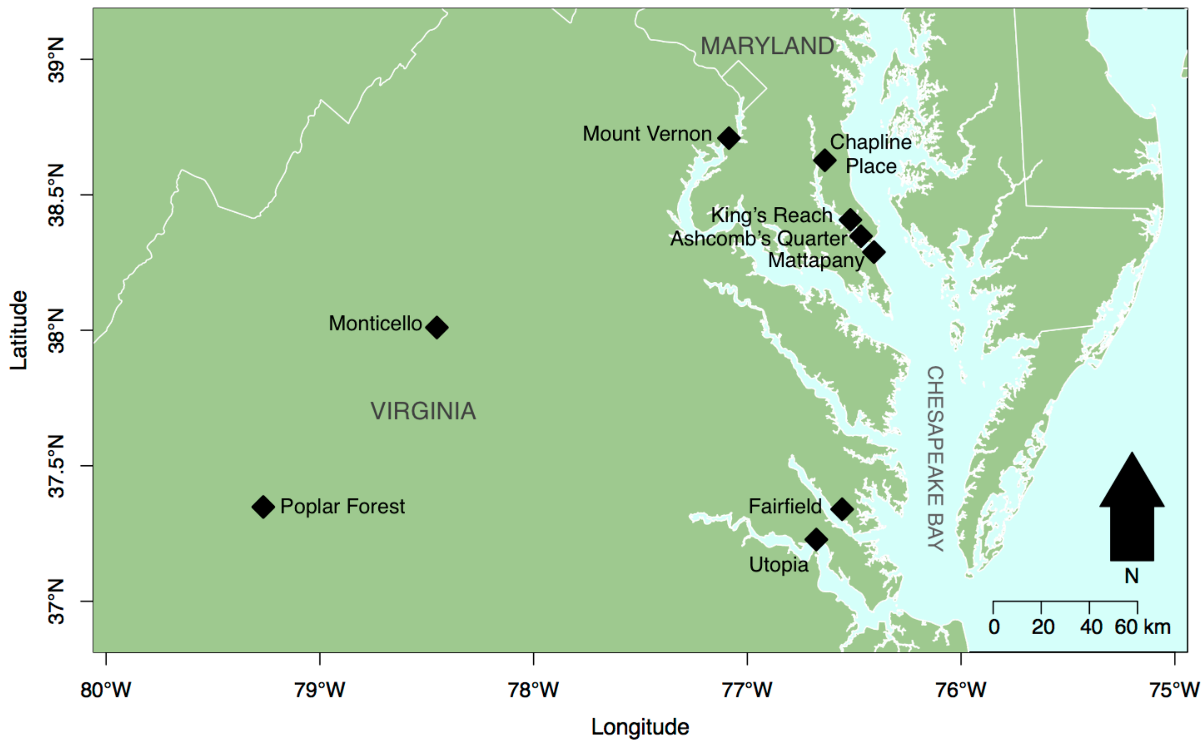


Figure 5.11. Map of the Chesapeake region with location of plantations sampled in this study.

I employed a purposive sampling strategy to select coarse earthenware sherds from domestic assemblages. Approximately 10 sherds were selected from each assemblage. The domestic assemblages sampled here typically contained a range of ceramic ware types, including multiple coarse earthenwares. Since the goal of this project was to identify the origins of visually homogeneous earthenwares, the majority of samples taken from each assemblage (87% overall) represented vessels that lacked readily identifiable geographic or cultural markers. These sherds were cataloged in DAACS as "Coarse Earthenware, unidentified" or "Redware", depending on paste color. In some cases, sherds thought to represent a known ware type, such as Buckley or Staffordshire, were included in the sampling, both to verify their correct classification, and to account for the presence of that ware type within the assemblage as a whole.

I took care to ensure that a single vessel was not sampled more than once, by selecting sherds with diagnostic form, thickness, or surface treatments. Assemblage size varied tremendously among the plantations, meaning that in some instances the samples taken represent nearly all of the coarse earthenware vessels in an assemblage. For example, at Mount Vernon the assemblages had been previously vesselized, providing a minimum vessel count for the coarse earthenware artifacts. The small number of unique vessels meant a smaller sample group was taken from Mount Vernon. For sites with multiple phases in DAACS, samples were chosen from contexts with good chronological control. The assemblage counts used throughout this analysis reflect the counts from these subsetted assemblage phases (Appendix E).

Dating

To assess temporal variation among the assemblages it was necessary to develop a consistent dating method. The occupation ranges provided by excavators formed useful information but did not provide a clear method of ordination, had a great deal of overlap, and were variable in span. Instead, I relied upon mean ceramic dates and correspondence analysis as methods for classifying assemblages into constructive temporal categories. Mean ceramic date (MCD) equations, first introduced by Stanley South (1978), are commonly used in historical archaeology. At their simplest they provide an average of the manufacturing midpoints of historic ceramic types, weighted by the counts of each type of ceramic present in the assemblage:

$$MCD = \frac{\sum m_j p_j}{\sum p_j}$$

j = ware type
m = manufacturing midpoint
p = relative frequency

MCDs are easily skewed by ceramics that have long production spans, such as Delft (approx. 1600-1802) and Chinese porcelain (1600-1900). All production spans used here are taken from DAACS (DAACS 2015b), which establishes 1600 as the earliest time at which a ceramic would have arrived in the New World. While production of these wares began before 1600, they did not arrive in North America until European settlement. One method to account for ceramics with long production spans is to calculate Best Linear Unbiased Estimator MCDs (BLUE MCDS, Neiman and Smith 2005). This calculation works like a standard MCD, but utilizes inverse weighting for production span, creating better temporal resolution. BLUE MCDs diminish the weight of wares with long production spans, and more heavily weight wares with short production spans.

$$MCD_{BLUE} = \sum m_j p_j \left(\frac{1}{s_j/6}\right)^2$$

j = ware type
m = manufacturing midpoint
p = relative frequency
s = manufacturing span

Both MCD and BLUE MCD values are provided here, but unless otherwise noted, BLUE MCDs have been used for dating. In all cases, it must be emphasized that the manufacturing midpoint is not the same as a use date, thus MCDs are measures of the time that is best represented by a particular combination of ware types. They are not calendar dates and do not account for use life and disposal, but provide a standardized method for ordination and define the temporal relationships of these assemblages to one another. A table containing the assemblage level ware type data used for these calculations may be found in Appendix E.

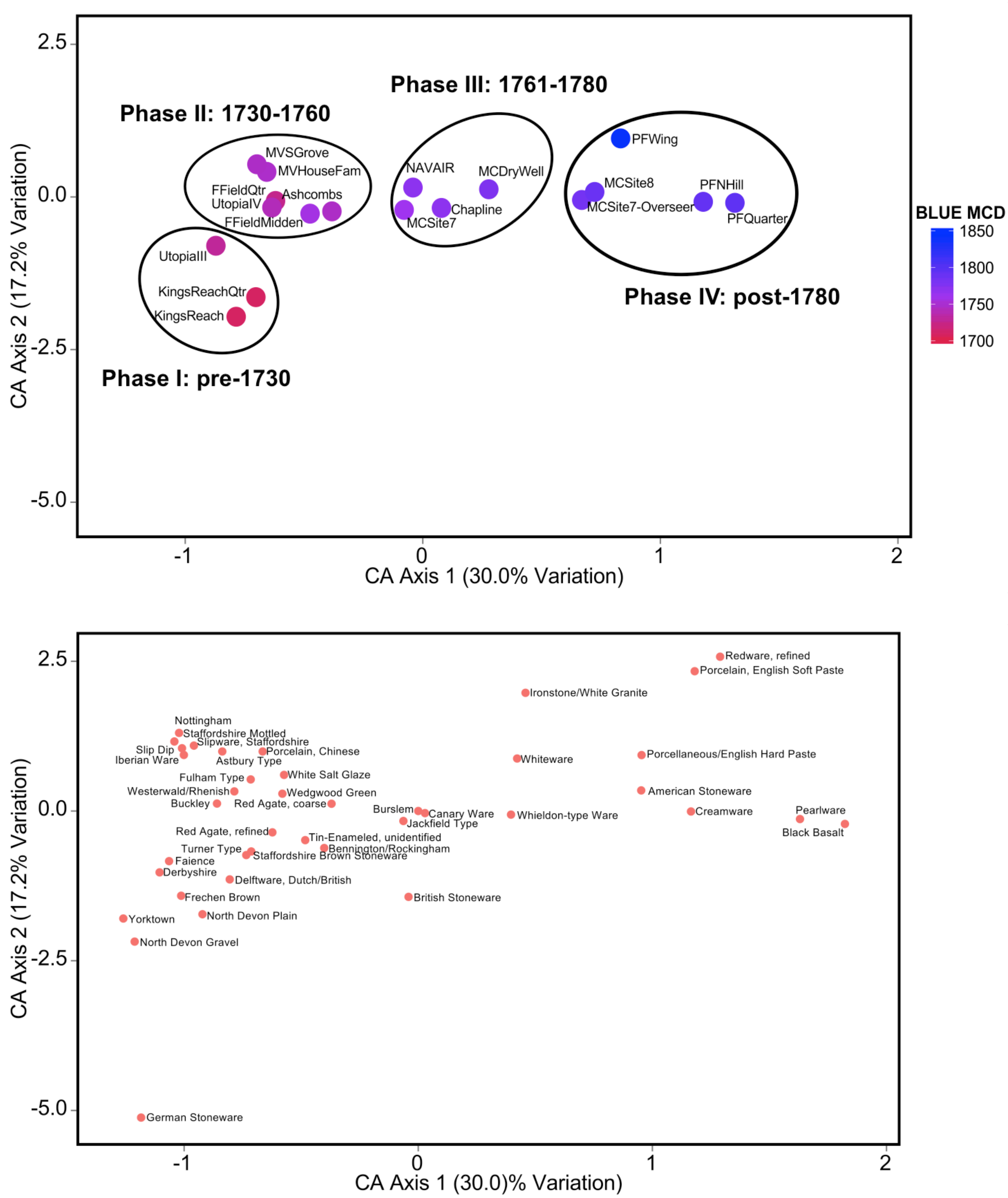


Figure 5.12. Correspondence analysis plots of assemblages (top), coded by BLUE MCD, and ware types (bottom). Four main occupation phases are indicated.

Correspondence analysis is a multivariate exploratory data analysis technique that functions similarly to PCA, but is intended for categorical data rather than continuous data, and graphically displays the relationships within and between the variables and observations. CA simplifies multivariate datasets, by extracting the dominant patterns and representing them as dimensions. Ware type counts for each assemblage were used here to develop a CA of the dataset.

A plot of the first two CA dimensions accounted for 47% of the variance within the dataset (Figure 5.12). The first dimension was correlated with time as was clearly demonstrated by color-coding each assemblage by mean ceramic date. Early ceramic types such as North Devon are found on the left-hand side of the plot, associated with early sites such as King's Reach. Later eighteenth century ceramic types such as Ironstone/White Granite are found on the right-hand side of the plot. The second dimension was also correlated with time, with earliest assemblages at the bottom, and later assemblages at the top. The assemblages split into four general phases, based on the prevalence of different temporally specific ware types, roughly corresponding to each quarter of the eighteenth century. The first phase was dominated by coarse earthenwares, especially North Devon, and German stoneware. During Phase II, Delft, Westerwald, and white salt-glazed stoneware were central, as well as early Staffordshire earthenwares. It should be noted that Fairfield Quarter has a BLUE MCD of 1725, which should place it in Phase I, but the CA patterning suggested it was more similar to Phase II assemblages. I have retained it as a Phase II assemblage in these analyses. The break between Phase II and Phase III represented the shift to Staffordshire refined earthenwares, such as Whieldon-type ware. Phase IV represented the end of the eighteenth century and the wide variety of available wares including the exceedingly popular creamware and pearlware, whiteware, and European porcelain. The assemblages from Phases I and II were entirely within the Coastal Plain, consistent with the settlement history of the Chesapeake. Phases III and IV were dominated by Piedmont assemblages. The broader shifts in ceramic material (coarse earthenware, stoneware, refined earthenware, and porcelain) were also clearly evident through these phases. As I discuss below, the consumption of coarse earthenware, not only in general proportion of ceramic assemblages but also by source, changed dramatically over time.

Outcomes

Domestic samples were prepared, analyzed via LA-ICP-MS, and the elemental concentrations calculated concurrently with the production site samples, as outlined in Chapter 4. The elemental concentrations were log-transformed, and then they were projected into the DA space of the training set (Figure 5.13). While the majority of sherds cluster within the spaces defined by the 12 production zones, there is a clearly distinct cluster of unknowns to the right of the Mid-Atlantic assemblages. The group is characterized by a high correlation with silicon. The majority of samples in this group come from Monticello, followed by Poplar Forest. The criterion of abundance suggests that this cluster represents production local to the central Virginia Piedmont, where both Poplar Forest and Monticello are located. As no historic earthenware production sites have been uncovered within the central Virginia Piedmont, there are no known reference materials for the region.

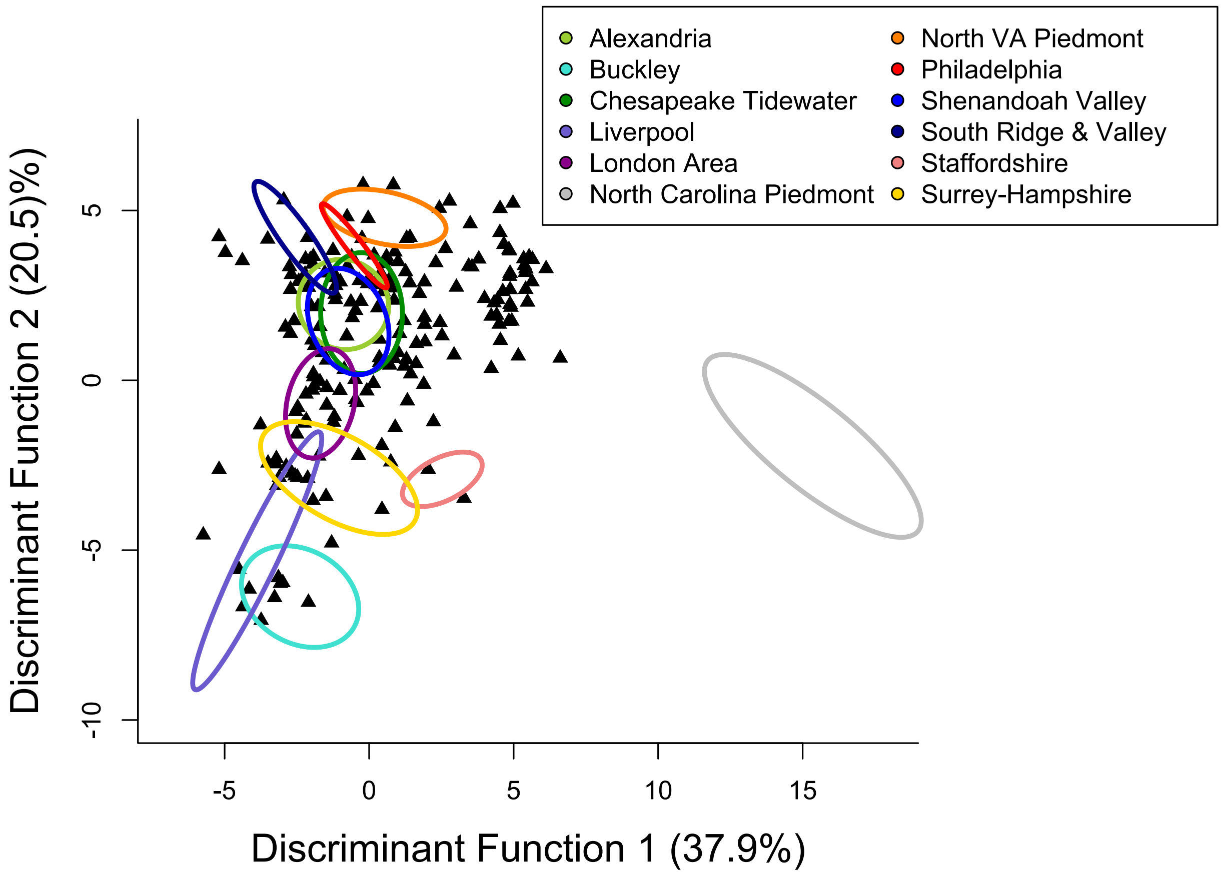


Figure 5.13. Discriminant analysis plot showing the projection of the unknown samples, represented by triangles. Ellipses represent the 90% confidence interval for each production zone. A cluster of sherds to the right of main cluster of production zones indicates a distinct production group.

Discriminant analysis and Mahalanobis distances share the assumption that the groups identified by the researcher represent all possible groups. The measures will calculate probabilities for group membership only to identified groups; thus when groups are missing it can result in poor predictions. Recognizing a latent group within the unknown dataset, it was then logical to add its members into the training set as a new group, in order to better account for the structure of the data. When the core samples (n=32) within this unknown cluster are group-identified by scores on discriminant function 1 (Figure 5.14), and then the discriminant analysis rerun, the resulting plot showed that the new production zone exhibited clear discrimination from other groups in the training data, without affecting the sherd assignments of the existing groups. The probabilities of group membership remained 100% for the samples within existing groups, and were calculated at 100% for the samples selected to construct this unidentified group. The resulting modified training set was used for the remainder of the analysis (Figure 5.15).

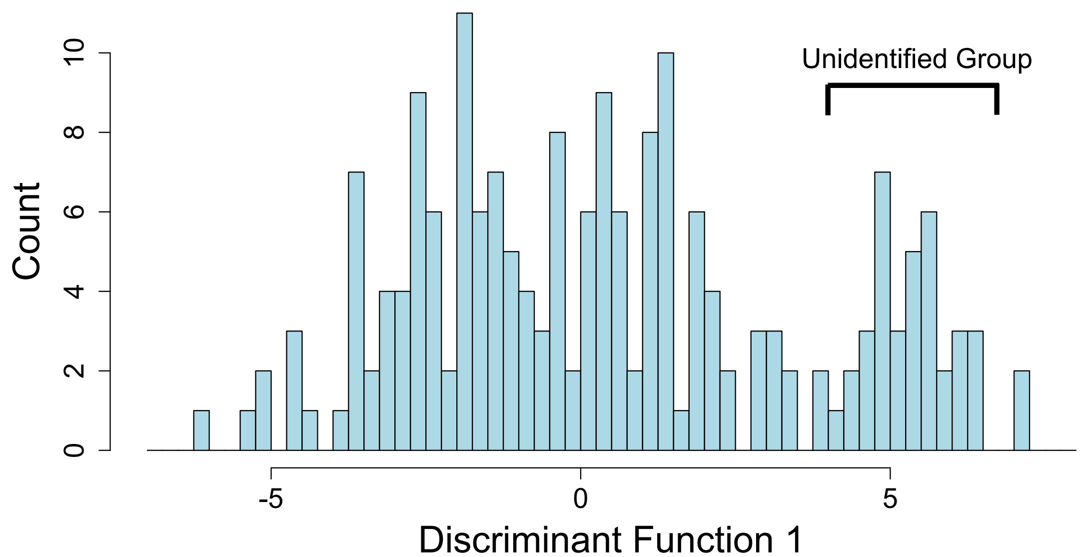


Figure 5.14. Histogram of discriminant function 1 scores for domestic samples.

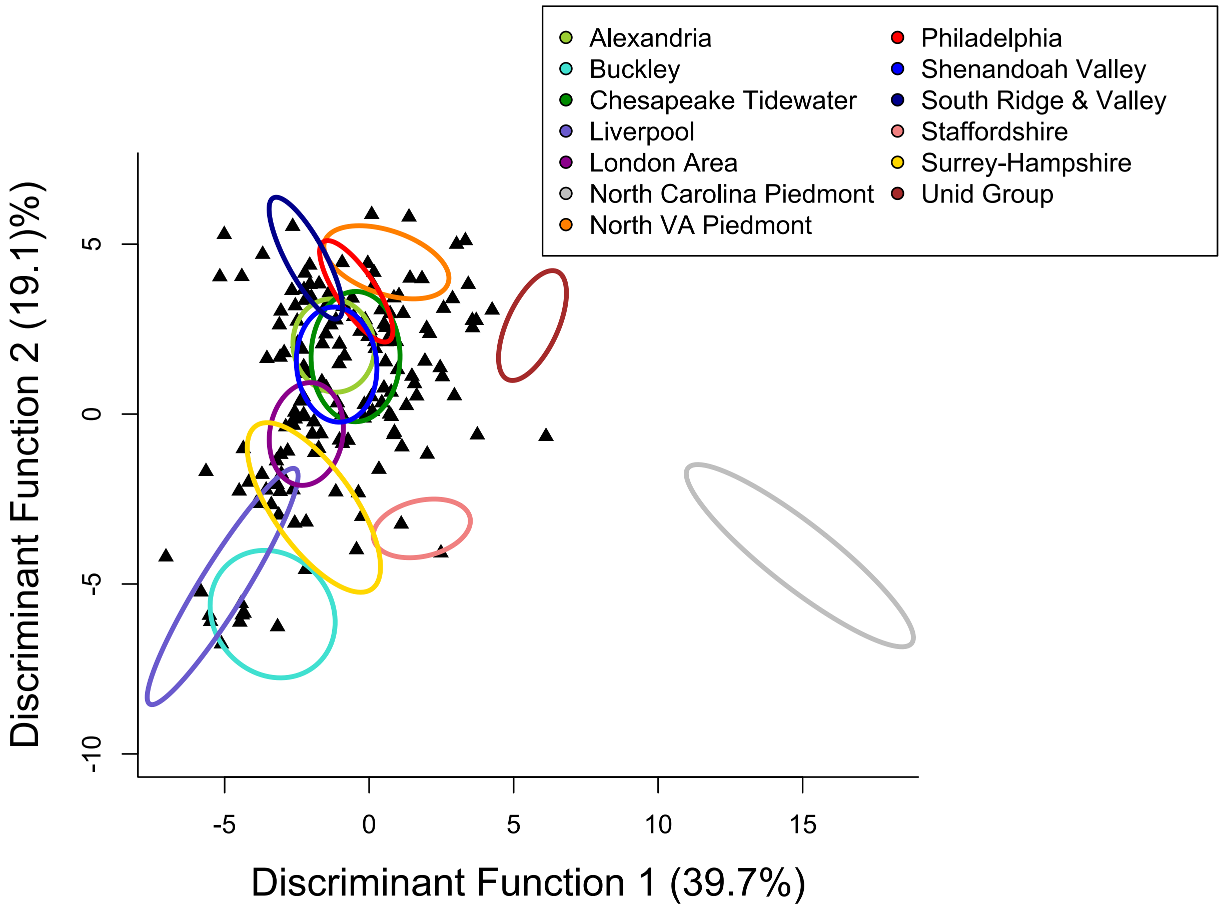


Figure 5.15. Discriminant analysis plot showing the projection of the unknown samples into modified reference set containing 13 zones. Ellipses represent the 90% confidence interval for each production zone.

When the remaining unknown sherds was re-projected into the modified training set DA, there was greater overlap with the training groups, suggesting that the training set successfully accounted for the majority of sources of the unknown sherds in this study. MD probabilities were calculated on the modified dataset of 152 unknown sherds (184 original -32 assigned to new group). The result was that all but seven sherds had at least a 1% probability of group assignment. These probabilities represent the best association with the given groups; with the acknowledgment that group membership may shift if additional production groups are included. This is one of the drawbacks of Mahalanobis distance probabilities, which are predicated on the assumption that the groups identified represent all possible groups. Thus, far outliers may be predicted to fall within a group, even if they are not very similar. Furthermore, MD probabilities are calculated for each group independently: it is common for a sherd to have a significant probability of membership in more than one group. Probabilities of membership to groups may be found in Appendix D.

Thirteen sherds from Coastal Plain domestic assemblages have predicted probabilities placing them in upland production zones. Due to the elemental homogeneity of the Chesapeake as a whole and the transport of upland sediment into the Coastal Plain, it is likely that these outlying sherds were not produced in these upland zones, but represent distinct secondary clay sources from within the Coastal Plain. This is supported by the fact that a number of the production zone samples known to have been produced in the Coastal Plain were earlier excluded from the training set because they had predicted probabilities placing them in upland production zones. With additional production site samples from the Coastal Plain, I am confident that these sherds would discriminate into discrete Coastal Plain groups. However, given the sampling constraints here, I have retained the predicted group assignments, with the acknowledgement that these sherds were produced from "Shenandoah Valley-like", or "Piedmont-like" clay sources, but probably not in the Shenandoah Valley or the Piedmont.

The overall rate of assignment for the domestic samples was 96%. Sourcing studies for archaeological ceramics typically report prediction of approximately 80% of samples (*e.g.,* Beck and Neff 2007; Golitko and Terrell 2012). The results here suggest that the sampling procedure successfully included the production zones that were the primary sources for generic coarse earthenware in the Chesapeake, and affirms that waster sherds recovered from production sites can be elementally tied to sherds found in domestic contexts. A summary of the results by assemblage follows in Chapter 6.

CHAPTER 6: RESULTS

To contextualize the analyzed samples within the assemblages as a whole, ceramic counts by material type and counts of all coarse earthenwares as cataloged by ware type are provided. The sources for sampled sherds predicted via Mahalanobis distance posterior probabilities are juxtaposed with their prior cataloged assignment. As noted in Chapter 5, in general the samples selected for analysis were taken from generic earthenware types, cataloged as “unidentified earthenware”, “redware”, or other non-location specific types, which made up the majority of most coarse earthenware assemblages. See Appendix A for a description of all samples included in this study.

Within the assemblages sampled, coarse earthenwares made up 29% of all ceramics (Table 6.1). Of those, 48% were cataloged with some degree of specificity to nine different geographically specific ware types, while 52% were identified only as unidentified coarse earthenware or redware (Figure 6.1). When the overall results of sourcing were considered, eight new sources, or production zones, were identified: Liverpool, Philadelphia, Northern Virginia Piedmont, Alexandria, Tidewater Chesapeake (excluding Alexandria), Shenandoah Valley, Southern Ridge and Valley, and a new zone that is likely the Central Virginia Piedmont. The North Carolina Piedmont was included as a potential source, but no domestic sherds had a predicted assignment to this zone. In addition to doubling the number of production zones that had been identified via macroscopic analysis, the elemental analysis returned predicted assignments for over 96% of the sherds sampled. As these samples are considered representative of the assemblages from which they were taken, this suggests that it is possible to geographically identify nearly all of all coarse earthenwares from these sites. This would be a vast improvement in the classification of lead-glazed coarse earthenwares, from 52% unknown to less than 10%.

Table 6.1. Sum of Sherd Count by Material Type in Sampled Domestic Assemblages

Ceramic Material	Count
Total Stoneware	8157
Total Coarse Earthenware	12,770
Total Refined Earthenware	20,714
Total Porcelain	2,234
All Ceramic	44,365

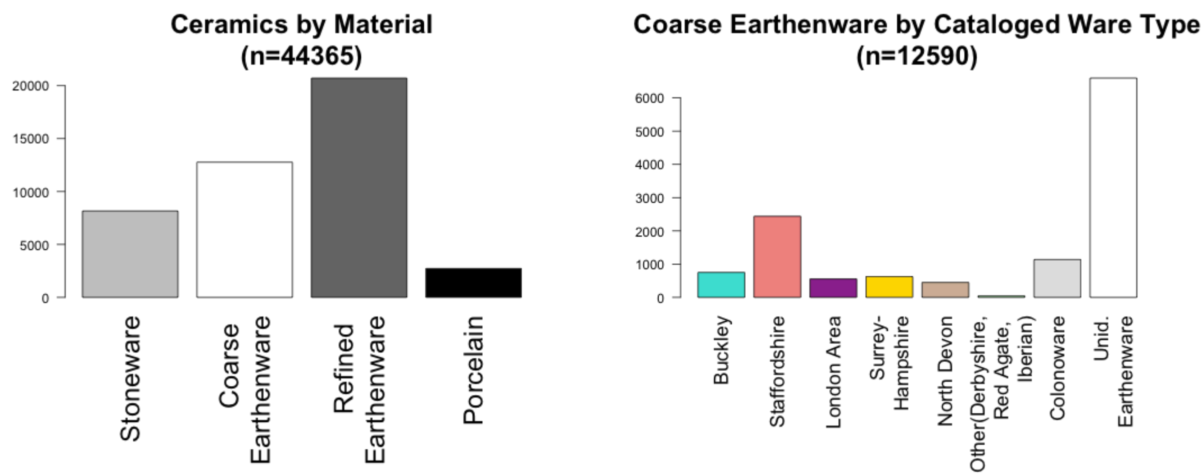


Figure 6.1. Summary counts of full ceramic assemblages included in this study, as representative of Chesapeake as a whole.

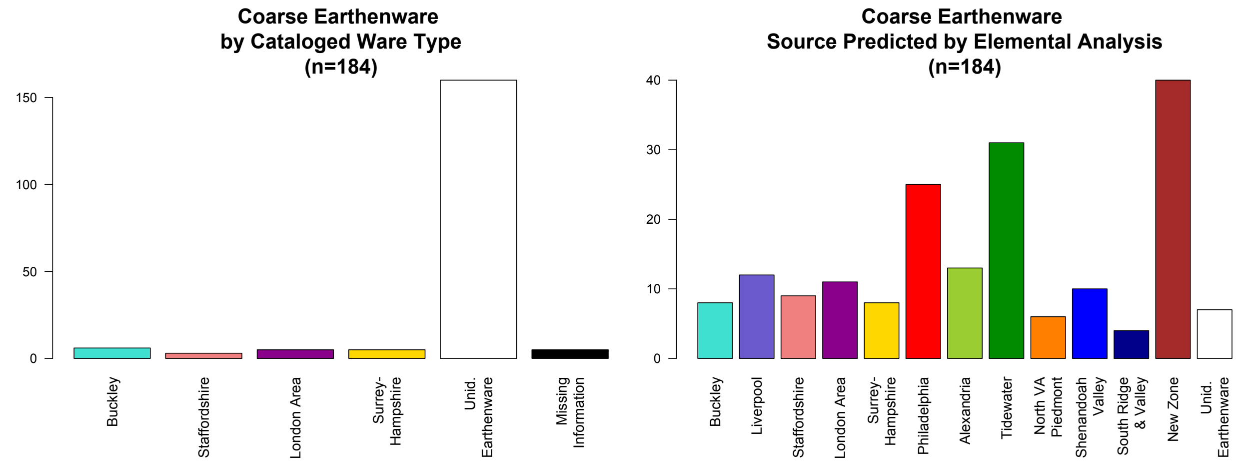


Figure 6.2. Identification of coarse earthenware types for the sampled sherds as cataloged, compared to the results of sourcing via elemental analysis.

The diversity of source for these sherds is striking. British sources are represented by five production zones: Buckley, Liverpool, Staffordshire, London Area, and Surrey-Hampshire. Interregional sources are represented only by Philadelphia, as no sherds were attributed to production in North Carolina. Local production within the Chesapeake is represented by six zones: Alexandria, which separates from the rest of the Tidewater (Coastal Plain) province, Northern Virginia Piedmont, Shenandoah Valley, Southern Ridge and Valley, and the new unidentified group that likely represents the Central Virginia Piedmont.

I present the assemblage specific results below, along with a brief description of each plantation and assemblage. The sites are introduced geographically beginning with Maryland, then into Coastal Plain Virginia and finally to the Piedmont. Unless otherwise noted, background information on these sites has been drawn from the sources listed in Table 5.2. These individual results contribute to specific temporal and spatial patterning in coarse earthenware procurement. Broad intraregional and temporal patterning will be discussed in greater detail at the conclusion of the chapter.

Results by Assemblage

King's Reach

The King's Reach site is located on the bank of the Patuxent River in Calvert County, Maryland, on land owned by the state of Maryland and operated as the Jefferson Patterson Park and Museum (JPPM). This area, comprising an earthfast dwelling and adjoining quarter (18CV83) was excavated between 1981 and 1987 by researchers of the Maryland Historical Trust and JPPM. The homelot has been dated to approximately 1690-1715 through archaeological evidence including pipe stem dating, TPQs from dated coins, and architecture. The ceramic assemblage is consistent with this date range and the MCD procedure used in this study yields a BLUE MCD of 1709. There is no documentary evidence for the occupants of this dwelling but the archaeological evidence suggests that the site was occupied by a wealthy household, which may have been that of Richard Smith, Jr., who went on to build a brick house nearby around 1711 (Pogue 1997).

A contemporary earthfast structure (18CV84) was discovered approximately 300 feet east of the main homelot, during several phases of excavation between 1981 and 1999, and has been interpreted as a quarter associated with King's Reach (King 1999; MAC Lab n.d.-c). This site, designated King's Reach Quarter, is not to be confused with the quarter structure contained within the primary King's Reach homelot.

The ceramics from both King's Reach assemblages were dominated by coarse earthenware, and Surrey-Hampshire border ware in particular (Figure 6.3). This ware ranges in paste color from white to salmon, with the transparent glaze appearing various shades of yellow to olive-green, or more rarely, copper green. Other named ware types were also present in smaller quantities, such as British brown stoneware and delft, as well as generic lead-glazed coarse earthenwares.

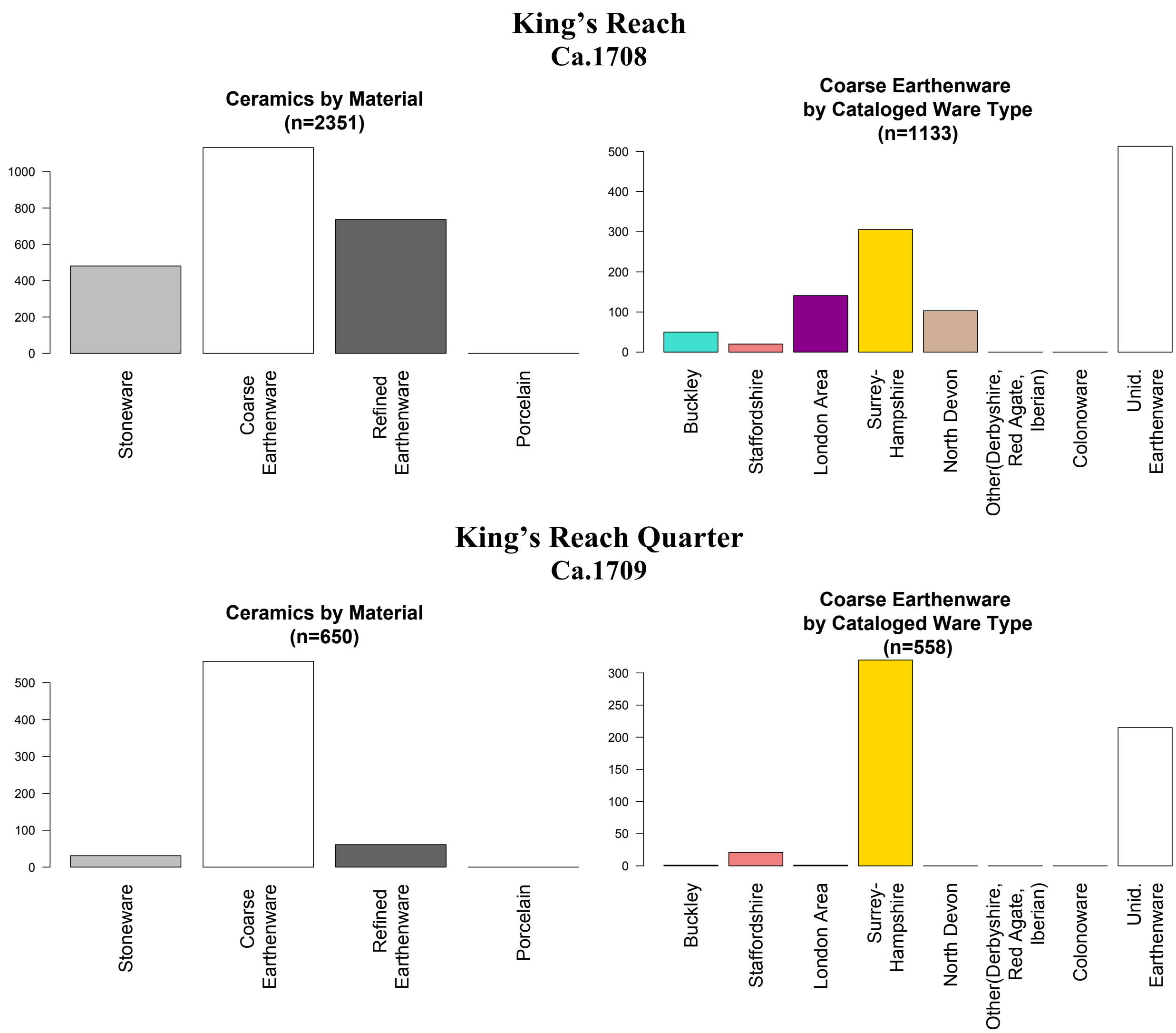


Figure 6.3. Assemblage totals for King's Reach and King's Reach Quarter, by material and cataloged coarse earthenware type.

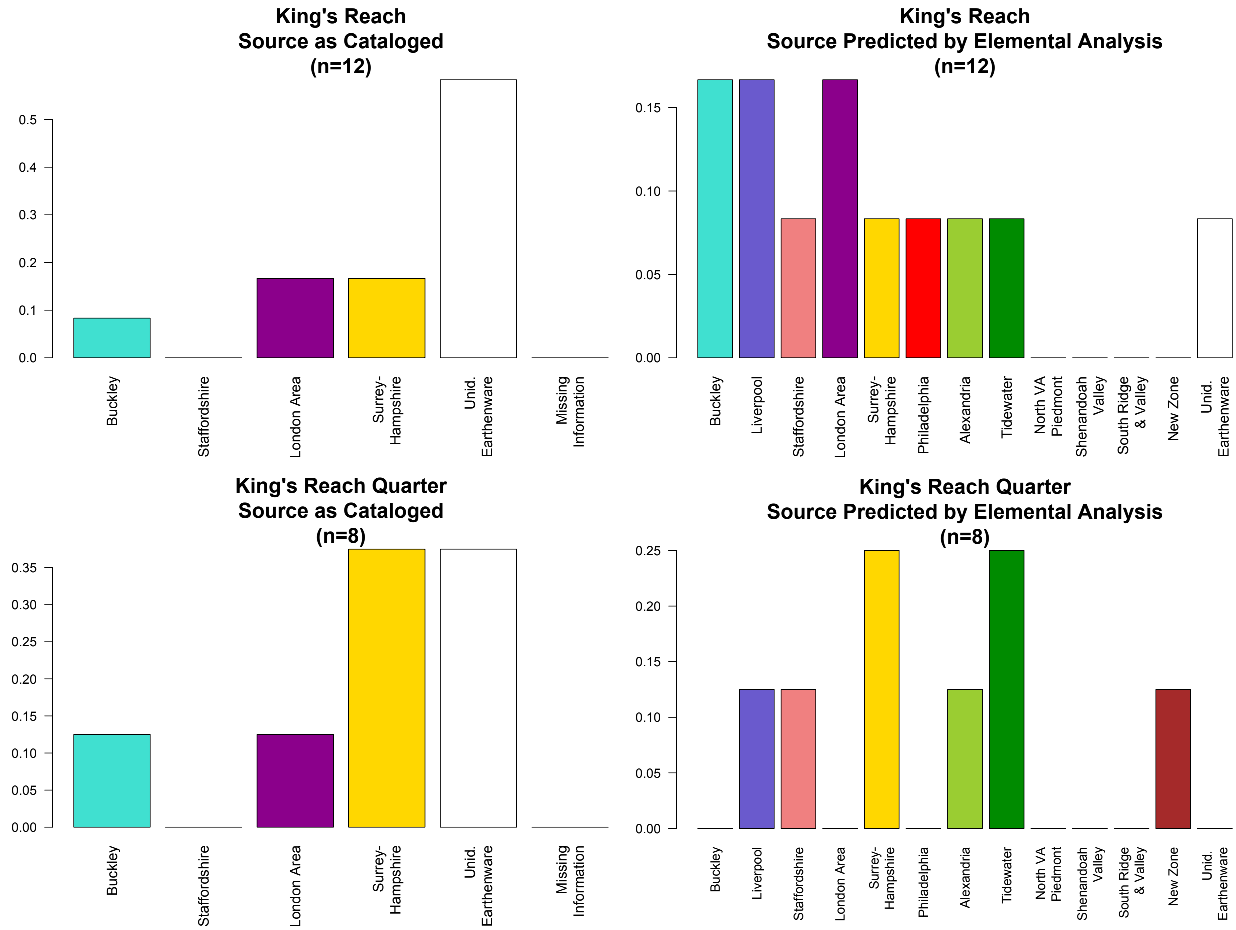


Figure 6.4. Cataloged identification of the sampled sherds from King's Reach compared to the elemental sourcing results.

The results of sourcing verify the cataloged classification of some of the Surrey-Hampshire Border wares, but also better define some of the generic wares (Figure 6.4). While the majority of coarse earthenwares sampled were imported, which is consistent for the early occupation date, several sherds had local attribution, and one sherd was attributed to Philadelphia. The presence at this early date of intercolonially traded goods was unexpected, as Philadelphia was at this time just beginning to build up its reputation as pottery producer. It is significant that Robert Smith, Jr. was a merchant as well as planter, and it is possible that his mercantile activities brought him into intercolonial trade of these products earlier than his neighbors. King's Reach Quarter assemblage had exemplars from fewer sources than the main dwelling, though the sample size was also smaller.

Ashcomb's Quarter

The site known as Ashcomb's Quarter (18CV362) is also located in Calvert County, Maryland, on the bank of the Patuxent River. It was once part of a tract of land called Compton, which by the late seventeenth century was owned by John Ashcomb. In 1745 the land was sold to Daniel Rawlings. Ashcomb's Quarter was excavated in several phases during the mid-1990s by John Milner and Associates (Sawyer 2006a). The site consists of both prehistoric and historic components. While a number of features were uncovered, no architectural evidence for a historic domestic structure was found. The site is located near the river, and it is likely that a significant portion has eroded into the water (Catts *et al*. 1999:170). Many of the historic artifacts were recovered from an adjacent ravine. Excavators offer an occupation range of 1684-1730, which is consistent with ownership by the Ashcomb family. At the same time, a number of later eighteenth century ceramics in the assemblage, including creamwares and pearlwares, suggest either a continuing occupation or later intrusions on the site. The MCDs for this site fall within the early- to mid-eighteenth century. Though lacking definitive evidence, this site has been associated with occupation by enslaved or indentured servants of the Ashcomb family.

Coarse earthenwares form the primary class of ceramics in this assemblage, as expected for early eighteenth century contexts (Figure 6.5). Buckley, North Devon, and Surrey-Hampshire Border wares are present, but the samples selected for analysis are primarily generic in appearance. Notably, a large proportion of sherds from Ashcomb's Quarter have a predicted assignment to Philadelphia, with further samples identified to local sources. A sherd identified as "Chalky Paste" ware in cataloging notes was unable to be identified to source, though it is likely of North American manufacture, based on its overall chemical composition. Chalky paste wares have been defined by archaeologists working at St. Mary's City (Miller 1983), and have been identified at several seventeenth century sites in Southern Maryland. They are assumed to be local products, but no definitive evidence has been uncovered. The ware is very low-fired, resulting in a paste prone to wear and toothbrush abrasion during laboratory processing.

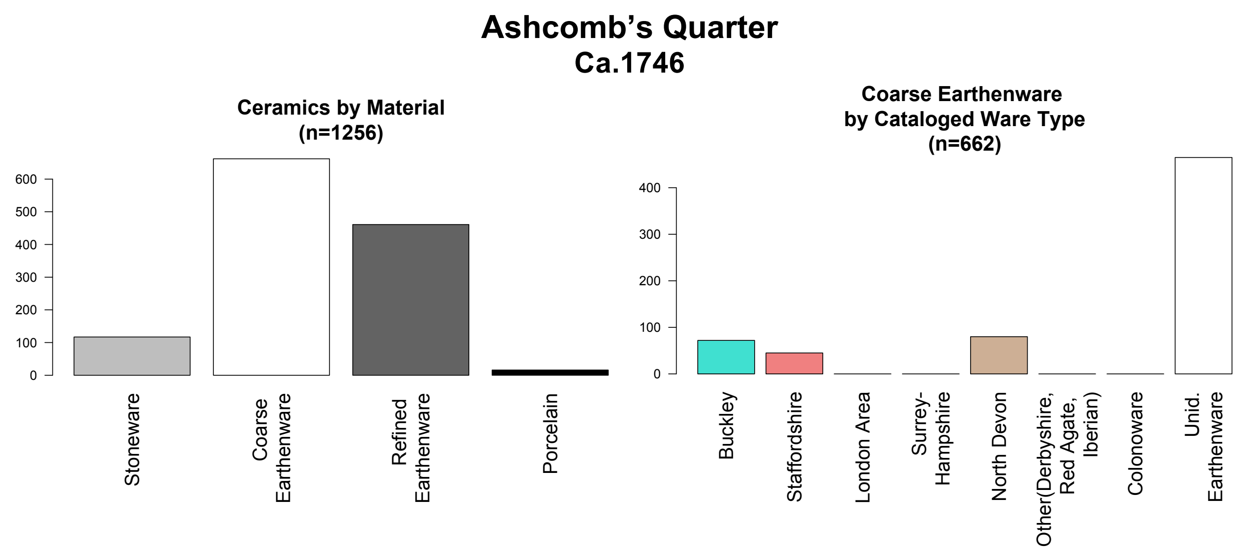


Figure 6.5. Assemblage totals for Ashcomb's Quarter, by material and cataloged coarse earthenware type.

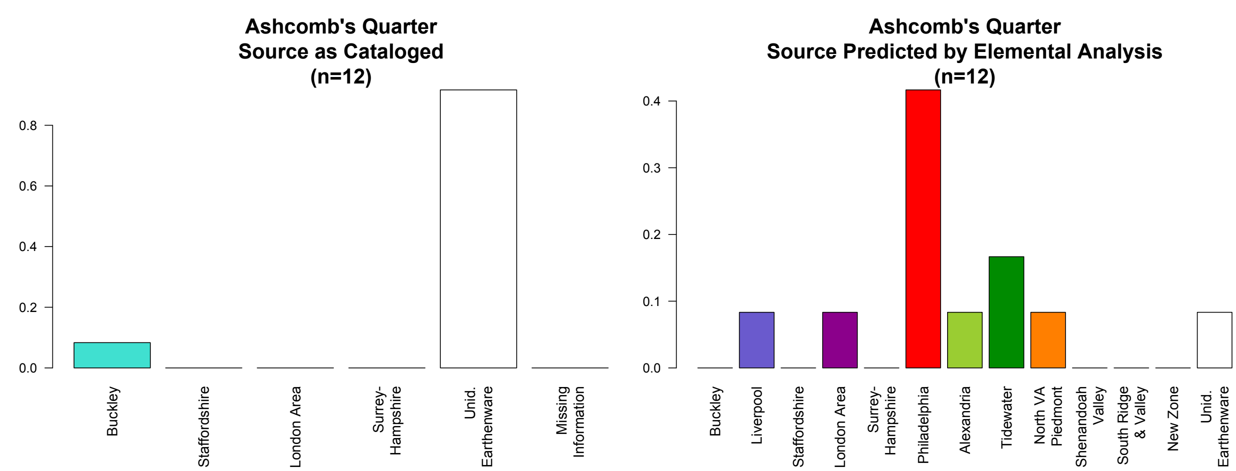


Figure 6.6. Cataloged identification of the sampled sherds from Ashcomb's Quarter compared to the elemental sourcing results.

Not much is known about earthenware production in southern Maryland. The only historic earthenware pottery sites excavated in Maryland are located in Baltimore and western Maryland. Though the presence of local potters such as Morgan Jones and Thomas Baker is known from documentary sources, no production sites have yet been uncovered archaeologically.

Chapline Place

Chapline Place (18CV344) is located on a historic tract of land patented as Overton in Calvert County, Maryland. Overton was owned by the Hance family from 1682-1815 (Crowl *et al.* 1999). During excavation in advance of a residential community development, subfloor pits consistent with three separate structures were uncovered on this site. The orientation of the pits to one another suggests successive rebuilding on the same plot, rather than contemporaneous occupation of the structures. Ceramic dating of the overall site provides an occupation in the latter half of the eighteenth century; individual occupation phases have not been determined for the successive building episodes (Sawyer 2006b). Lacking documentary evidence, the occupants of this site are unknown, but likely lower class given the impermanence of the architecture and the quality of material goods. Though Overton operated as a tobacco plantation worked by slaves for many years, Benjamin Hance, who owned Overton in the late eighteenth century, converted to Quakerism and manumitted his slaves in 1783 (Crowl *et al.* 1999:2-4). Free African-American laborers worked and lived at Overton according to the 1800 census (Crowl *et al.* 199:2-5), though Benjamin's brother Francis took control of the plantation in 1803 and returned to an enslaved labor system. Given this history, there are many possible residents of Chapline Place: enslaved laborers, free laborers or tenants, an overseer, or a young Hance household.

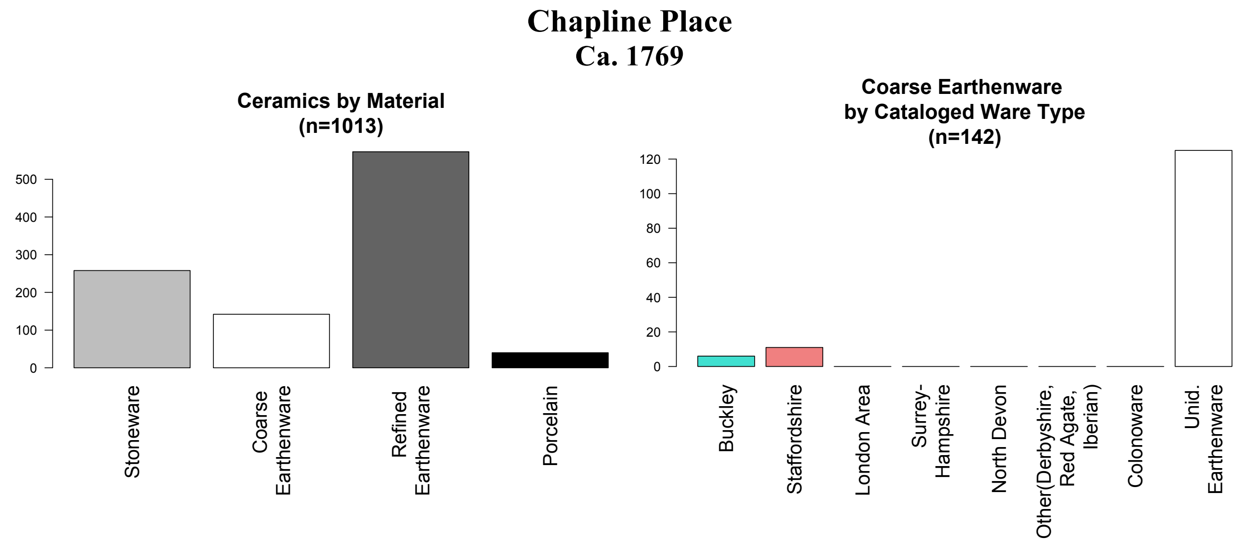


Figure 6.7. Assemblage totals for Chapline Place, by material and cataloged coarse earthenware type.

The Chapline ceramic assemblage contains relatively few coarse earthenwares, and abundant stonewares, reflective of the shift in ceramic technology during the latter eighteenth century (Figure 6.7). Both tablewares and utilitarian forms are represented. Of the generic coarse earthenwares, which make up the vast majority of coarse earthenwares, 50% are consistent with Chesapeake production (Figure 6.8). The increasing proportion of locally produced wares over time is a consistent trend throughout the region.

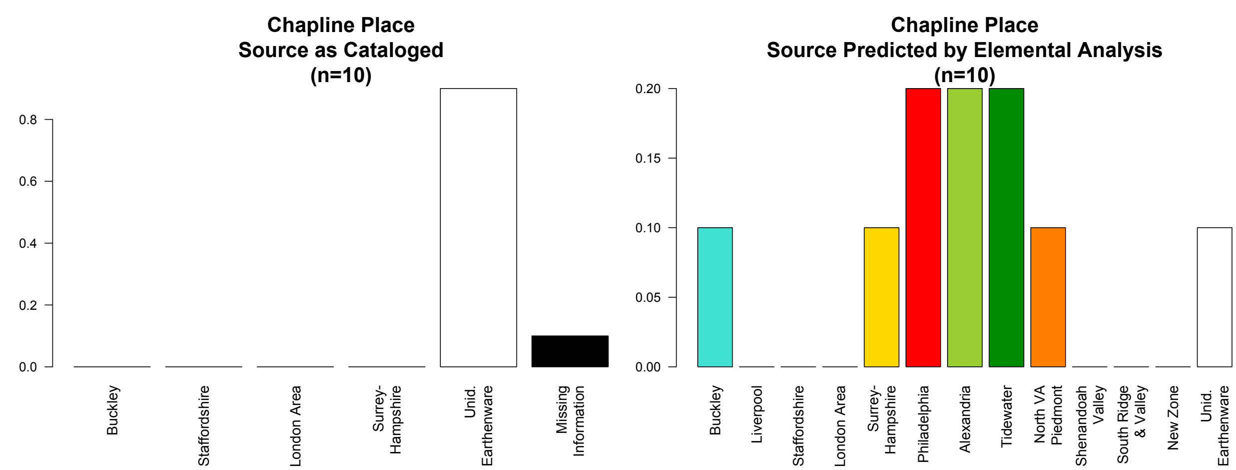


Figure 6.8. Cataloged identification of the sampled sherds from Chapline Place compared to the elemental sourcing results.

NAVAIR/Mattapany-Sewall

The Mattapany-Sewall plantation complex is now contained within the Patuxent River Naval Air Station. During the eighteenth century, this land was owned by the wealthy Sewall family, residents of the Mattapany manor house (18ST738). The Mattapany manor house was constructed in the first half of the eighteenth century and occupation continued into the nineteenth century. The area encompassing the manor house site was shovel-tested, but no further excavations were undertaken. Artifacts from this investigation reflect a long period of occupation, including whitewares consistent with a nineteenth century component. Very few coarse earthenwares were recovered from the STPs, but four samples were taken, all four of which are elementally consistent with local Coastal Plain production (Figure 6.10).

NAVAIR (18ST642) has been interpreted as an enslaved laborer or tenant dwelling associated with the Mattapany-Sewall plantation complex (Cooper *et al.* 2010). The site is located nearly a mile from the Patuxent river, which follows the mid-late eighteenth century inland settlement pattern of the region (Tubby and Watts 1995:21). The site was excavated in several phases from 1994-1995 by Tidewater Atlantic Research, whose researchers uncovered a brick chimney base and subfloor pit associated with a single structure. The ceramic assemblage is consistent with a late eighteenth century occupation.

Coarse earthenwares form an overwhelming majority of wares found on this site, including tablewares and utilitarian wares (Figure 6.9). This is unusual for the time, as refined earthenwares had become common. The majority of the wares sampled are consistent with local or Philadelphian production, which suggests ready access to local products (Figure 6.10). Midcentury, Thomas Baker operated a pottery nearby in St. Mary's County (Figure 2.7). His workshop is a potential source for NAVAIR residents' locally made wares.

NAVAIR
Ca. 1768

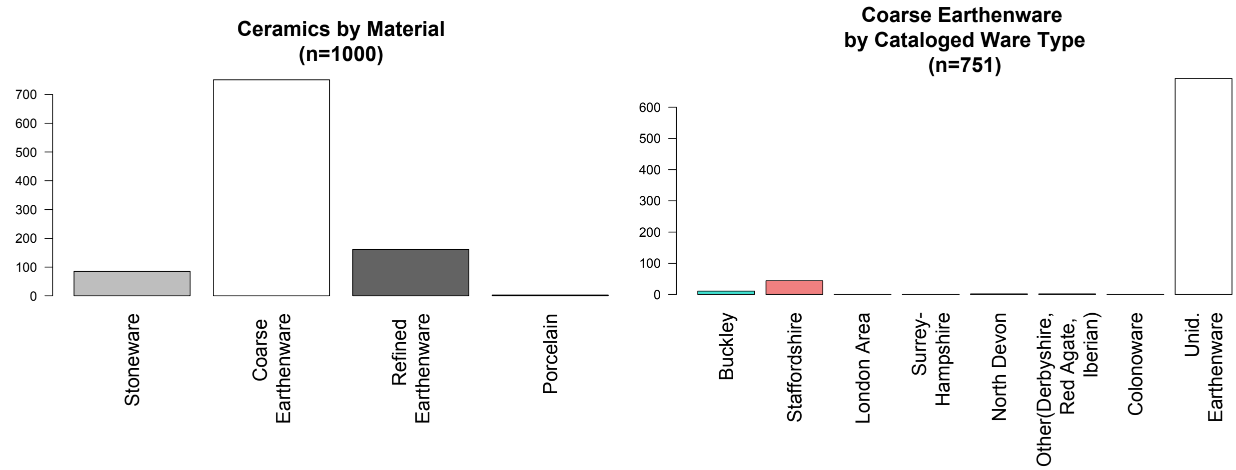


Figure 6.9. Assemblage totals for NAVAIR, by material and cataloged coarse earthenware type.

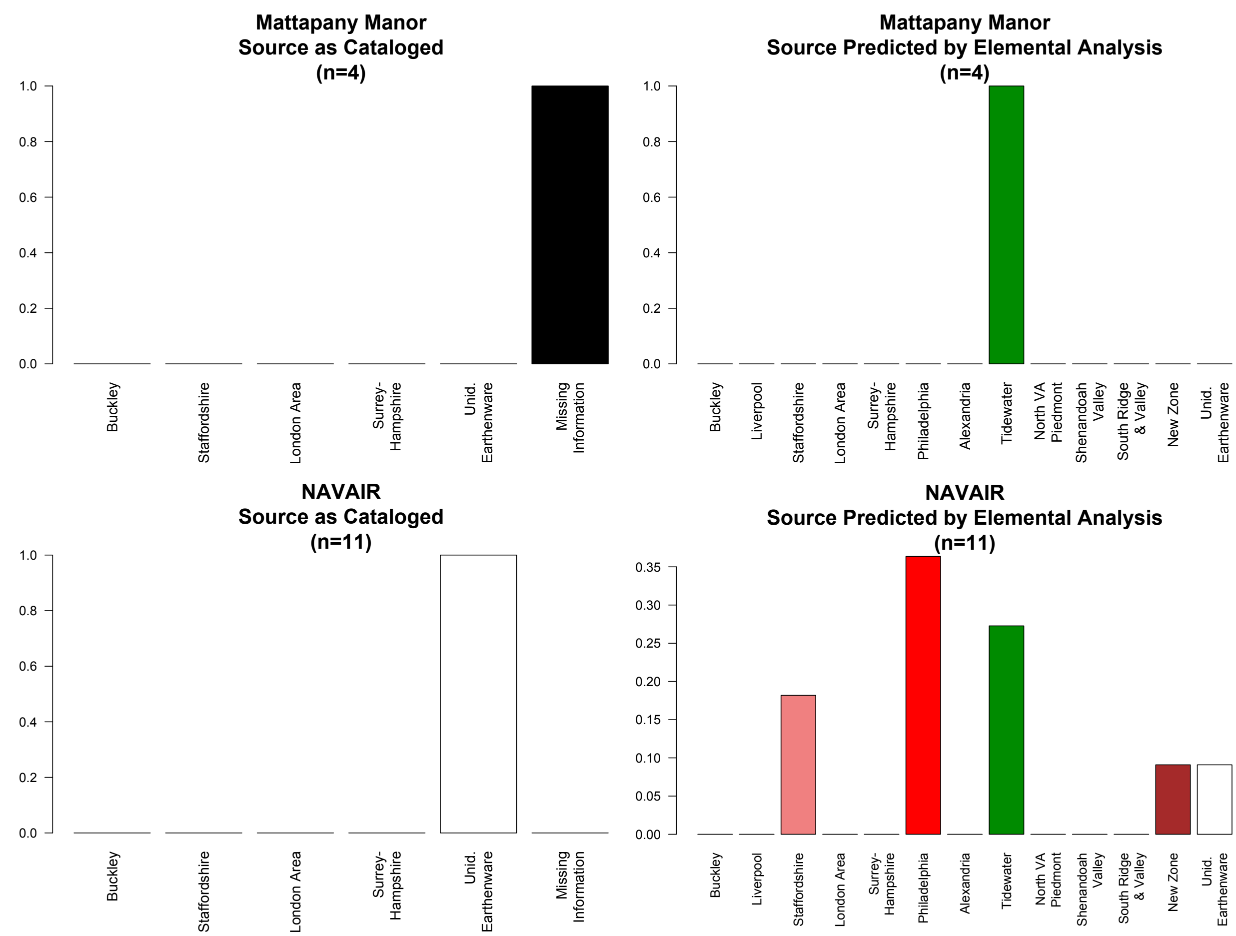


Figure 6.10. Cataloged identification of the sampled sherds from Mattapany manor and NAVAIR compared to the elemental sourcing results.

Mount Vernon

Two assemblages were sampled from Mount Vernon, the plantation home of George Washington on the Potomac River in Virginia. The House for Families assemblage was recovered from an approximately 6’ x 6’ brick-lined cellar associated with a dwelling for enslaved house servants and skilled workers in the Home Farm of Mount Vernon, near the mansion house. The cellar was excavated between 1984 and 1990. Archaeological evidence dates the deposits within the cellar to 1759-1793; by 1793 the building had been demolished as new slave quarters were constructed nearby (Pogue 2003; Pogue and White 1991:189). Mean ceramic dating of the cellar deposits separates the strata into pre- and post-Revolutionary War, but the majority of the ceramics are typical of the early-mid eighteenth century (Figure 6.11). Very few coarse earthenwares were recovered from the House for Families, so only six samples from discrete vessels were taken. While the majority of coarse earthenwares are cataloged as Staffordshire, those that were generically identified come from a number of sources, including Liverpool and local production (Figure 6.12).

The South Grove Midden is located adjacent to the mansion house, and is interpreted as containing refuse from the Washington household as well as other domestic assemblages from the Mansion House Farm. It was excavated primarily during the 1990s, with several earlier twentieth century utility and landscaping disturbances cutting through the Midden (Breen and Galle 2013). Deposition in this area south of the house began during the occupation of Lawrence Washington in the 1730s and continued into the late eighteenth century, though the bulk of the deposition was mid-eighteenth century and thus roughly contemporaneous with the assemblage from the House for Families.

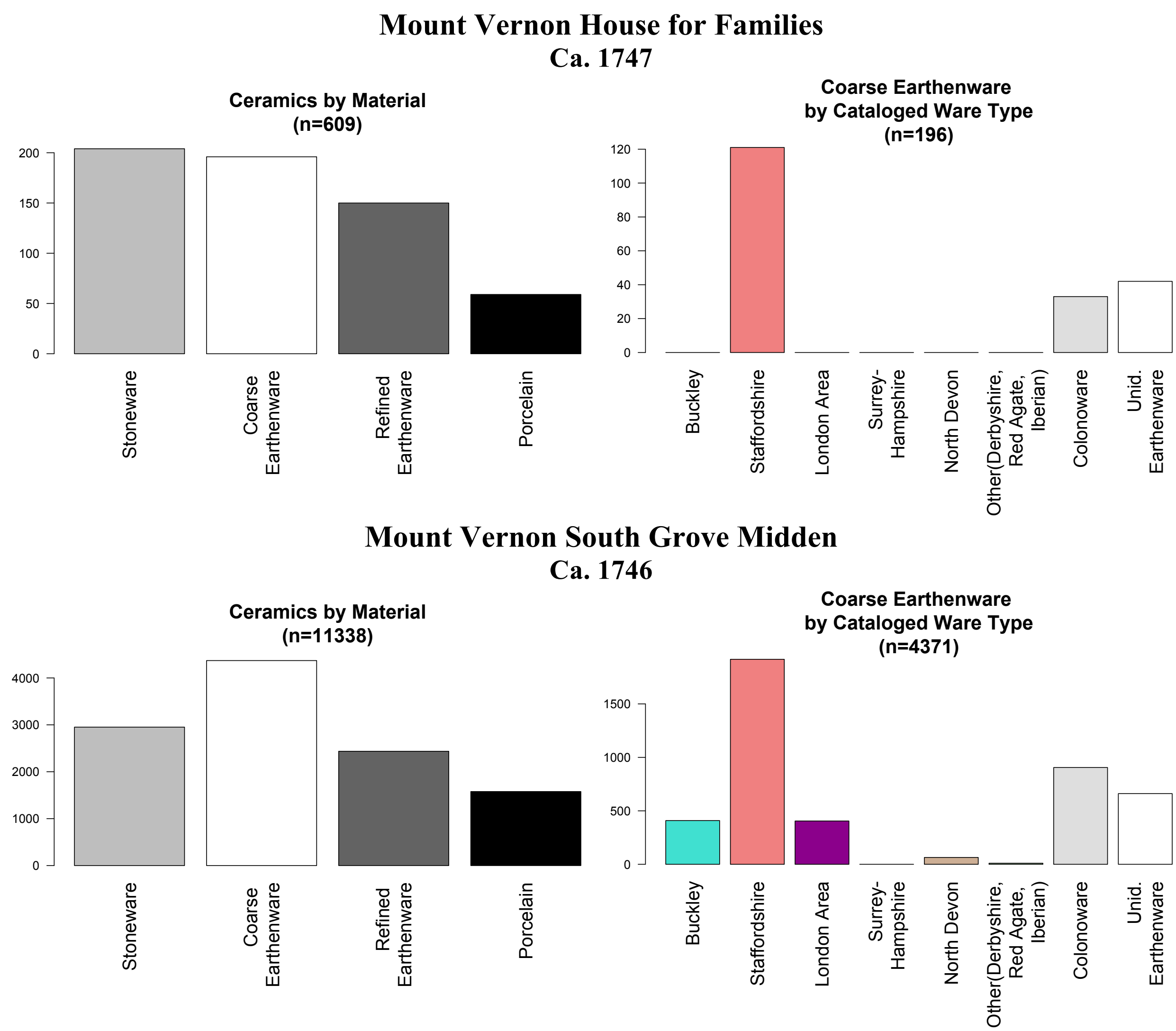


Figure 6.11. Assemblage totals for Mount Vernon assemblages, by material and cataloged coarse earthenware type.

The coarse earthenwares from the South Grove Midden have also been vesselized. Several uncommon forms have been reconstructed, including two water coolers of London Area redware. The South Grove Midden is currently the only site in DAACS to use the ware type London Area redware for classifying coarse earthenwares, though examples of this ware have been found in many of the assemblages sampled, as distinguished via visual inspection and confirmed with elemental analysis. Of the sites sampled, Mount Vernon had the lowest proportion of generically cataloged coarse earthenwares. The wares analyzed from the South

Grove Midden show similar sourcing to the House for Families, and it is notable that in both cases the locally made earthenwares were perhaps quite local, as indicated by assignment to neighboring Alexandria rather than the broader Tidewater region. No earthenware potters have yet been identified in the Alexandria area prior to the end of the eighteenth century.

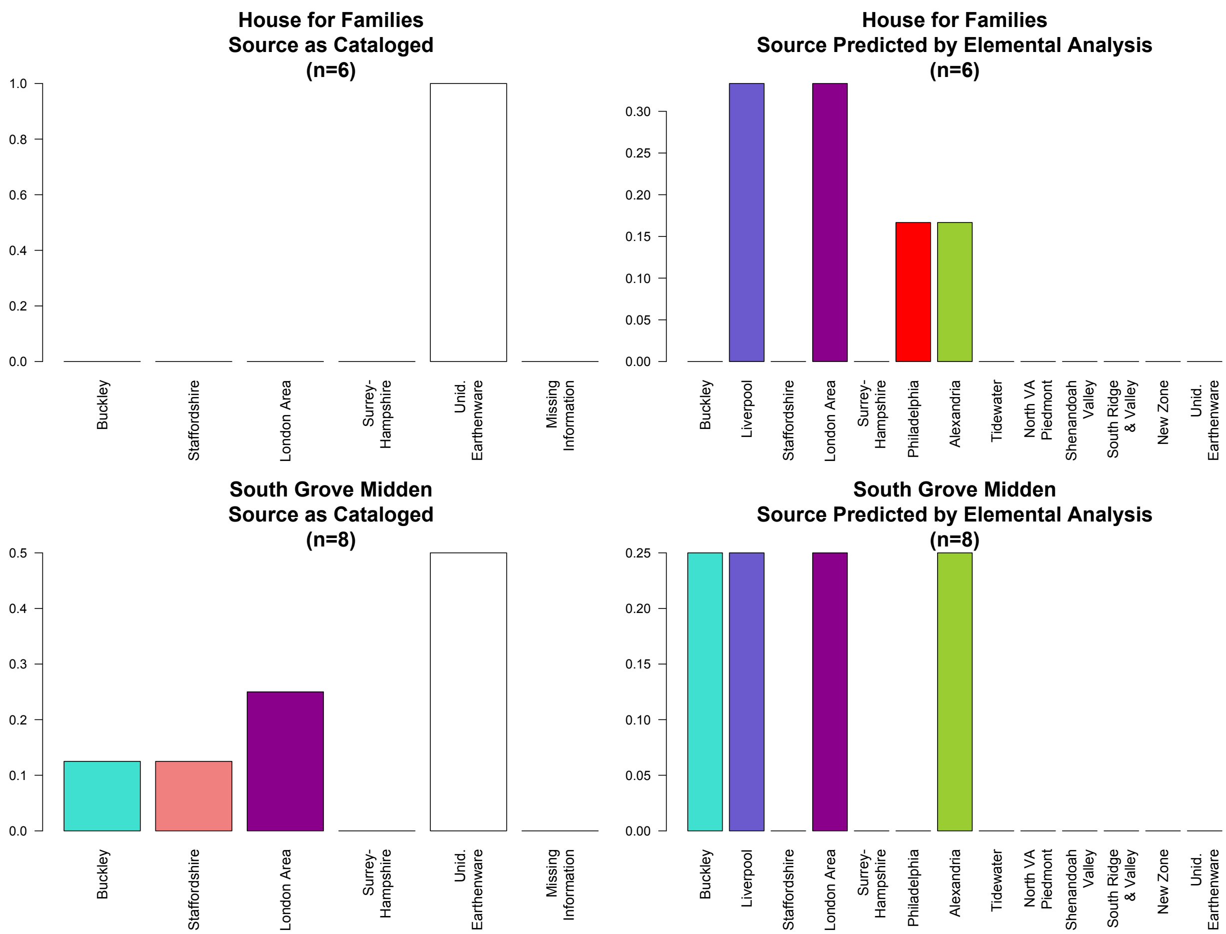


Figure 6.12. Cataloged identification of the sampled sherds from Mount Vernon's House for Families and South Grove Midden compared to the elemental sourcing results.

Fairfield

Fairfield plantation in Gloucester County, Virginia, was property of the prominent Burwell family from the mid-seventeenth to late eighteenth century. During that time, many enslaved persons labored for the Burwells, some of whom likely lived in the Fairfield Quarter.

This site, uncovered during systematic survey of the plantation core by the Fairfield Foundation, is located approximately 75 feet west of the manor house. Excavated between 2001 and 2005, the plantation core was found to contain evidence for two structures and associated subfloor pits, oriented with the manor house foundation (Brown 2006). The fill of the subfloor pits contains artifacts consistent with destruction in the second quarter of the eighteenth century, though the MCD is slightly earlier. West of the quarter, a large midden was discovered containing significant quantities of domestic refuse. Investigations are still ongoing but a disposal span from the mid-eighteenth to mid-nineteenth century for the midden as a whole is suggested by the datable artifacts it contains. This places the use of the midden as roughly contemporaneous with the abandonment of Fairfield Quarter. The MCDs for the sampled contexts of the midden provide a date squarely in the mid eighteenth century.

While the Fairfield midden has a higher proportion of imported wares as cataloged (Figure 6.13), the sourcing results for both the Quarter and the midden samples indicate a mixture of American and imported wares were in use (Figure 6.14). Additionally, both show evidence for intercolonially traded wares from Philadelphia.

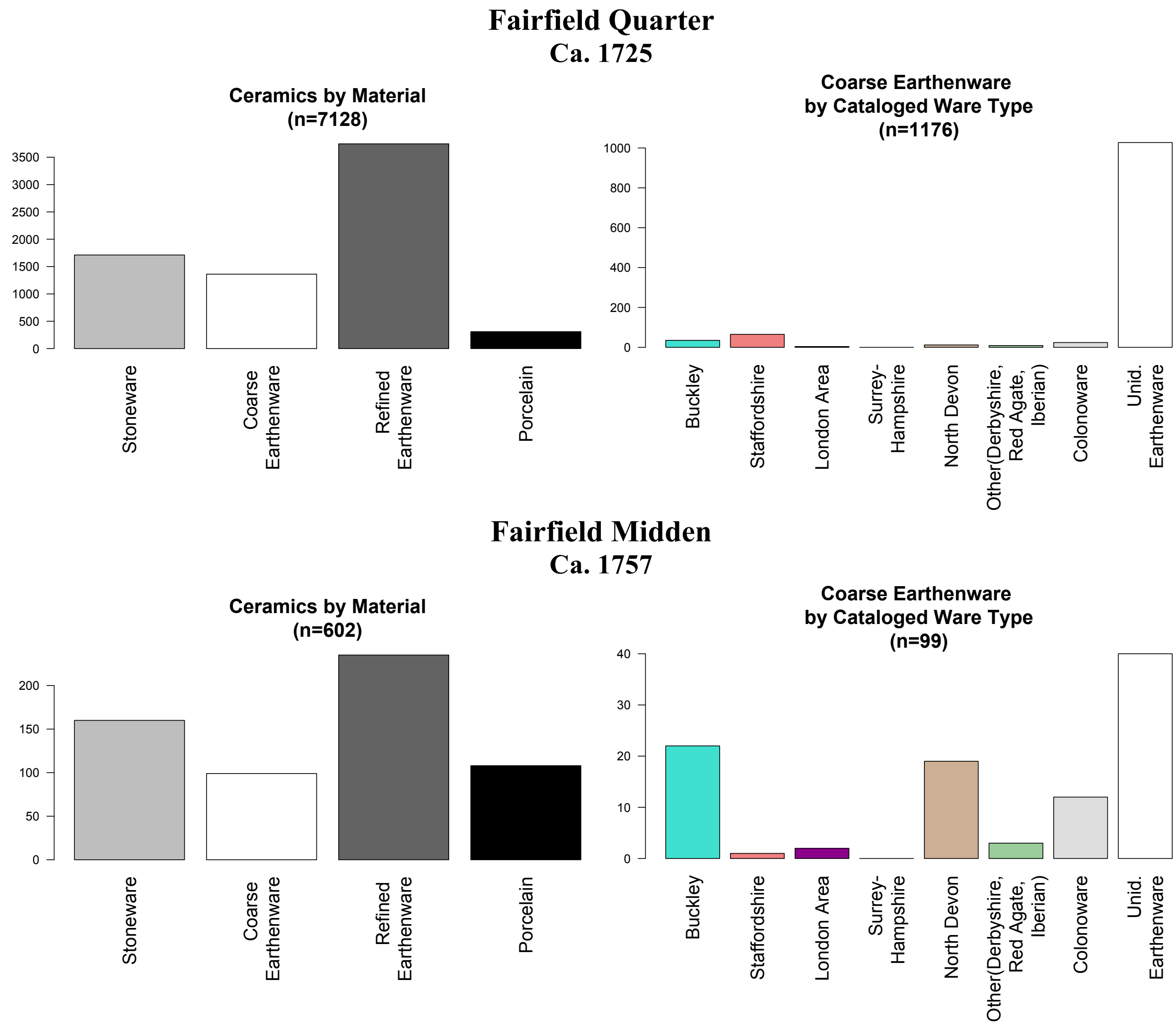


Figure 6.13. Assemblage totals for Fairfield plantation assemblages, by material and cataloged coarse earthenware type.

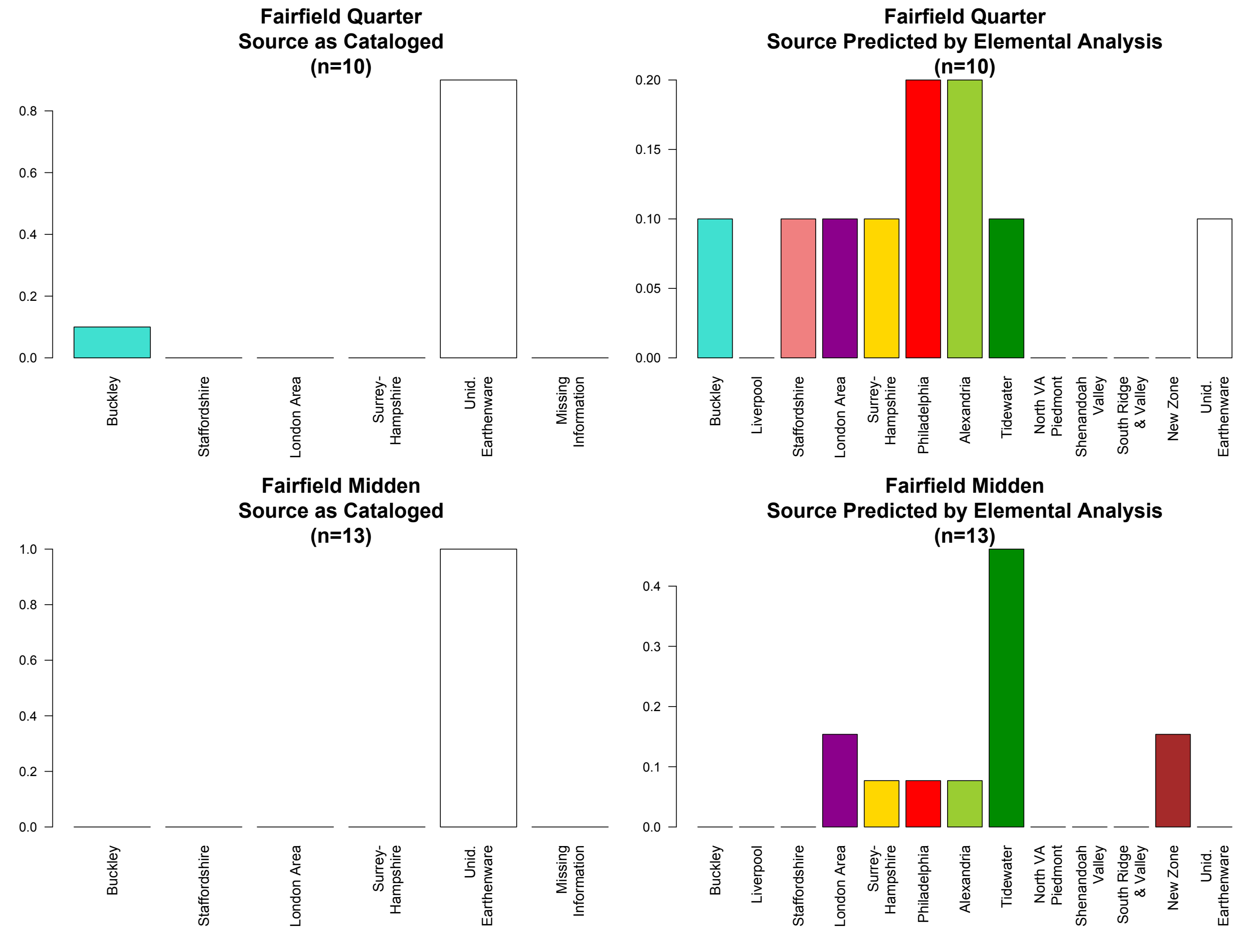


Figure 6.14. Cataloged identification of the sampled sherds from Fairfield Quarter and Midden assemblages compared to the elemental sourcing results.

Utopia

The Utopia tract is located in James City County, Virginia, on the outskirts of Williamsburg. The land encompassing the Utopia quarter site lies along the James River, was patented very early in Virginia's colonization, and was known as Utopia from the early seventeenth century onward. From the 1970s through the 1990s there were a number of excavations at this location, as the area was developed for multipurpose use by Anheuser-Busch, Inc. Evidence for four geographically and temporally distinct occupations was uncovered at Utopia (Fesler 2005a). Utopia I consisted of an earthfast building built around 1675 for housing slaves or indentured servants. As a seventeenth century assemblage, Utopia I has not been included in this study. Utopia II dates from the first quarter of the eighteenth century, when the property was owned by James Bray. This structure was likely occupied by slaves. The low sample size for ceramics at Utopia II (10 unidentified coarse earthenwares) led to its exclusion from this study as well.

The Utopia III site consisted of two earthfast dwelling structures and associated activity areas (Fesler 2005b). It has been dated via documentary and archaeological evidence to the period of ownership by Thomas Bray II and his nephew James Bray III during the second quarter of the eighteenth century. Utopia IV dates to the third quarter of the eighteenth century, during the ownership of Lewis Burwell IV, of the Fairfield Burwells. Utopia IV is located several hundred feet from the other Utopia occupations, and evidence was found for three structures, including a duplex (Fesler 2005c).

The Utopia III ceramic assemblage is dominated by coarse earthenwares, as befits the early date (Figure 6.15). The later site of Utopia IV still has significant quantities of coarse earthenware, but the named ware types are distinctive from those of Utopia III, due to temporal variation in availability. In particular, there is a notable increase in the proportion of Staffordshire wares from Utopia III to Utopia IV.

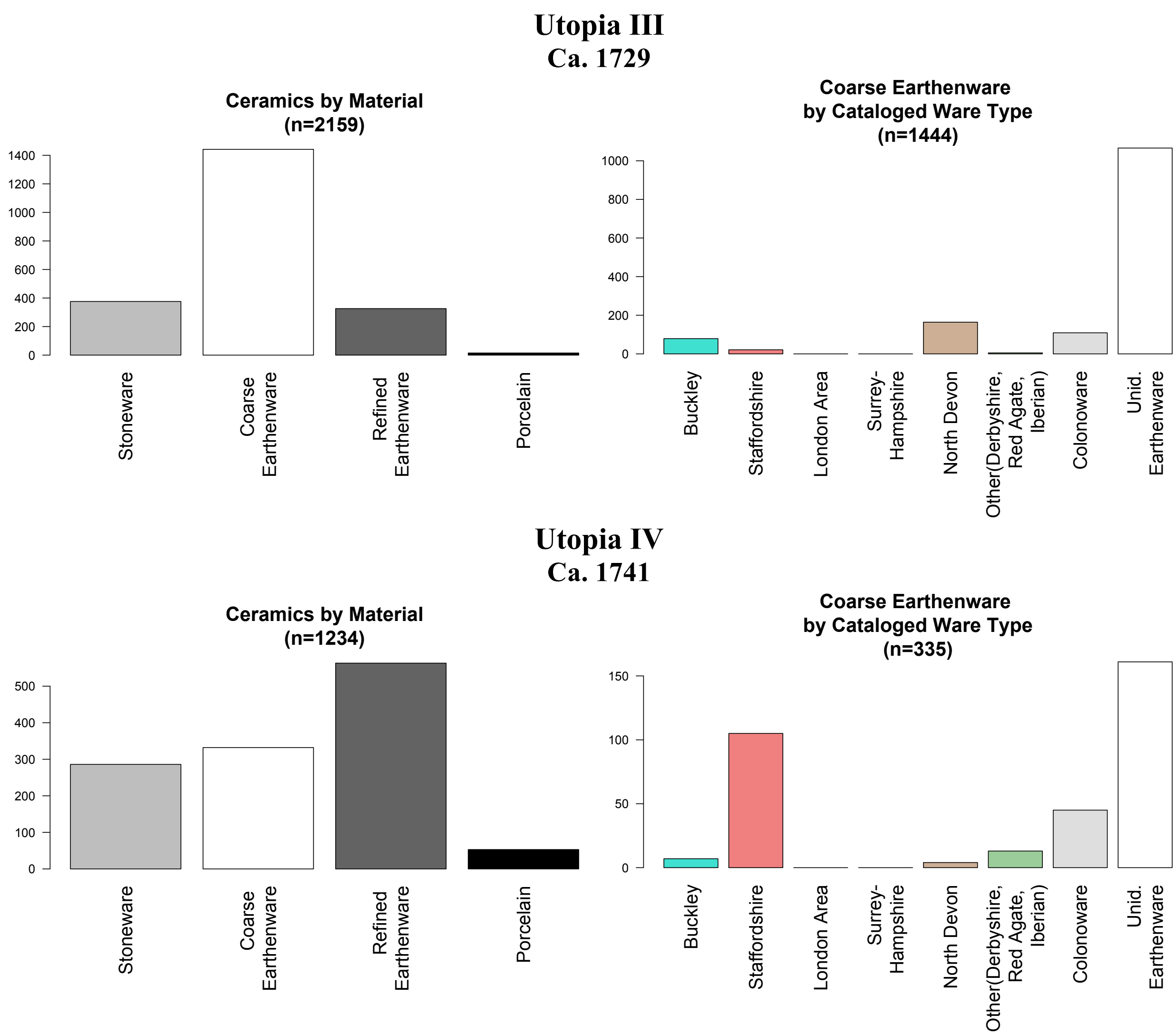


Figure 6.15. Assemblage totals for Utopia, by material and cataloged coarse earthenware type. Catalogers' notes in DAACS indicate that many of the sherds cataloged generically were thought to be locally made products from nearby Yorktown.

This temporal variation is also reflected in the sourcing results (Figure 6.16). While the proportion of domestically made wares is the equivalent for both assemblages, the predicted assignments from other sources points to different procurement options. Ware types with earlier dates, Surrey-Hampshire Border ware and London Area redware, are found only in Utopia III, while sherds from Philadelphia are found only in the Utopia IV assemblage. Utopia III has a large number of samples (5) that are "Shenandoah Valley-like," indicating a discrete coarse earthenware source from all other Coastal Plain assemblages. These sherds had been previously identified as products of William Roger's Yorktown pottery (Fesler 2004), and the distinctive clay source indicated by the elemental analysis provides additional evidence that they are products from the same source. However, no verified Roger's wasters have been included in this study.

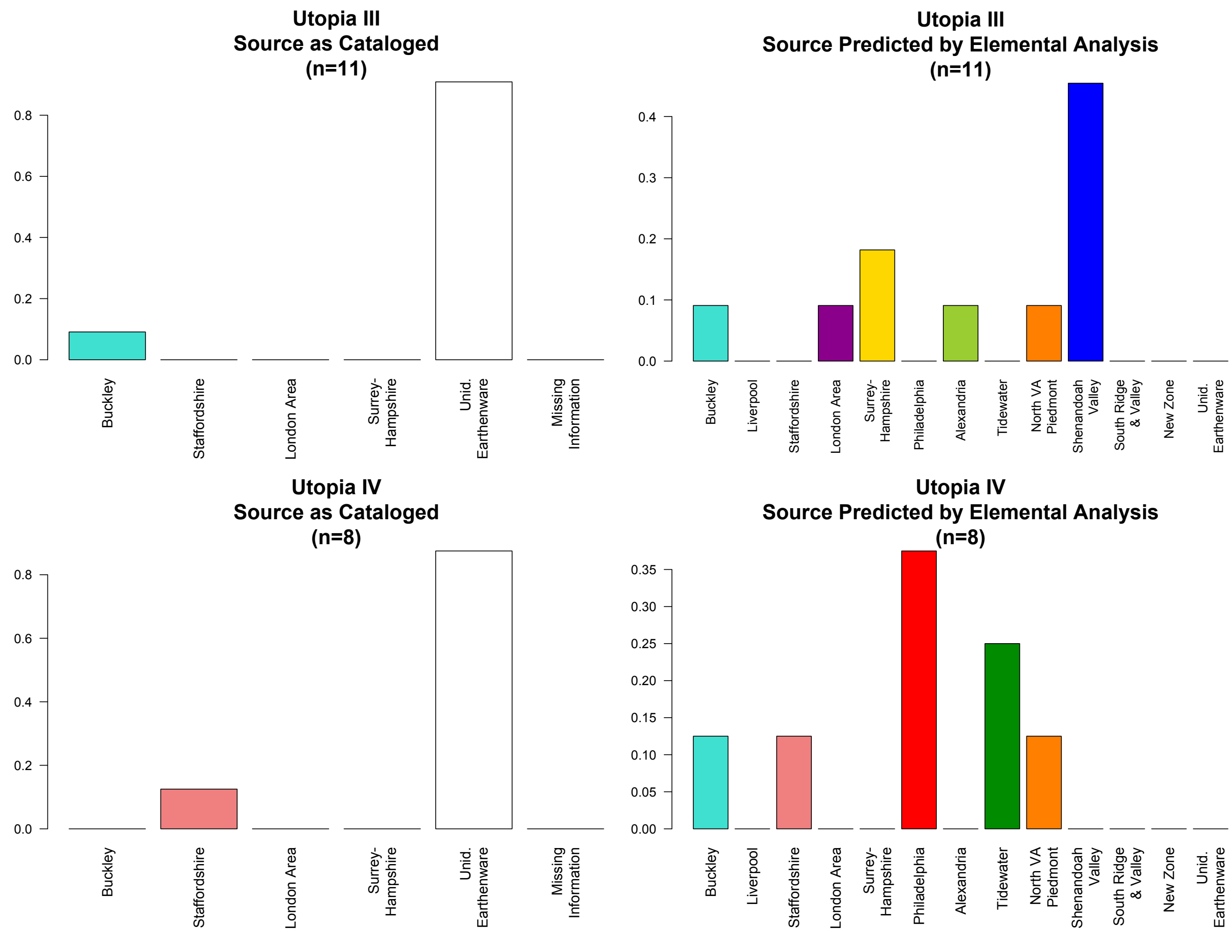


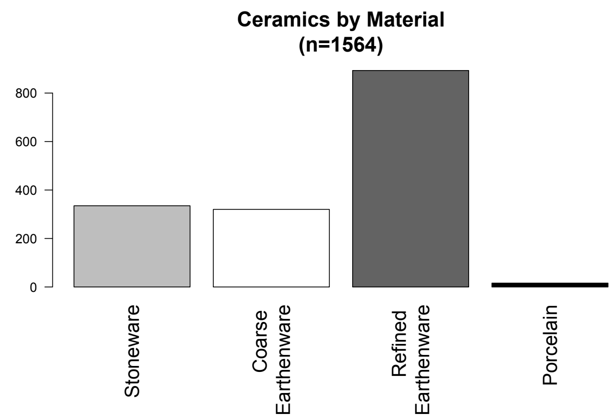
Figure 6.16. Cataloged identification of the sampled sherds from Utopia III and Utopia IV assemblages compared to the elemental sourcing results.

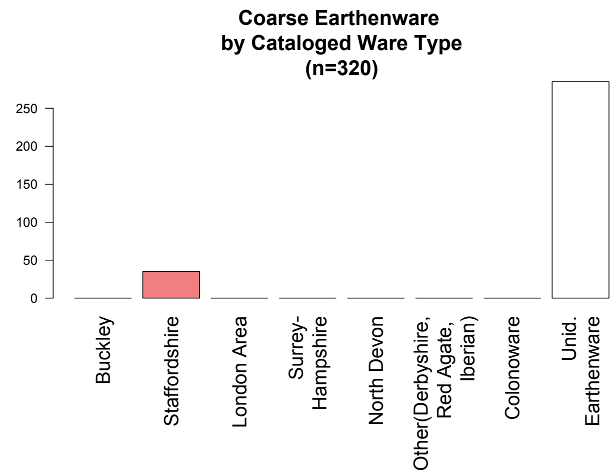
Monticello

Monticello, the Piedmont plantation of Thomas Jefferson, is located in Albemarle County, Virginia, along the Southwest Mountains. Beginning as a quarter farm for Shadwell, the adjacent Jefferson family home, the land comprising Monticello was occupied as early as the 1750s by an overseer and group of enslaved field hands. Monticello became Thomas Jefferson's home farm after 1768. Site 7, the initial dwelling location and neighboring Site 8 were discovered during systematic shovel test survey of the plantation undertaken by the Monticello Department of Archaeology (Bon-Harper 2006a, 2006b). More than 10 years of subsequent excavation resulted in evidence for at least one structure on Site 7 and four structures on Site 8. Given the impermanent log construction of the quarters, subfloor pits have been used to identify the locations of dwellings. The location of Site 7 is consistent with notations made by Jefferson about an overseer's house on the property. Two occupation phases at Site 7, including one associated with an overseer occupation, were included in this study. Site 8 was occupied slightly later, with contexts dating from ca. 1770-1800. Both sites were demolished circa1800 in order to turn the land over to agricultural fields.

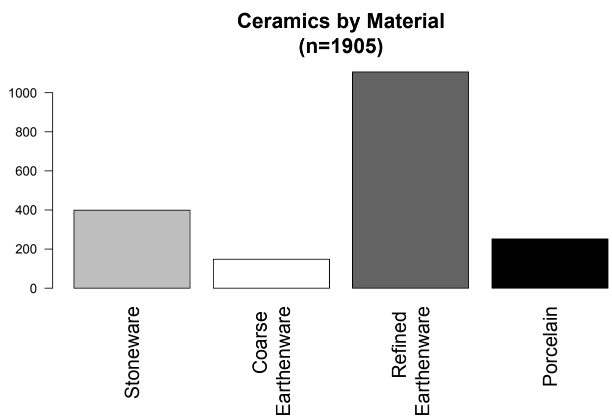
Monticello mansion is located a half-mile from Sites 7 and 8, on the mountaintop. During the first phase of house construction, beginning in 1770, Jefferson had what he referred to as a "Dry Well" excavated into the ground for storage. Located south of the current South Dependency wing, it was completely excavated in 1980-1981. This massive feature was approximately 16 feet deep, and dateable artifacts suggest it was likely filled in by the early 1780s (Bates *et al.* 2013). Samples recovered from the Dry Well are presumed to be largely the result of Jefferson household activities, though refuse from nearby enslaved households may also be included.

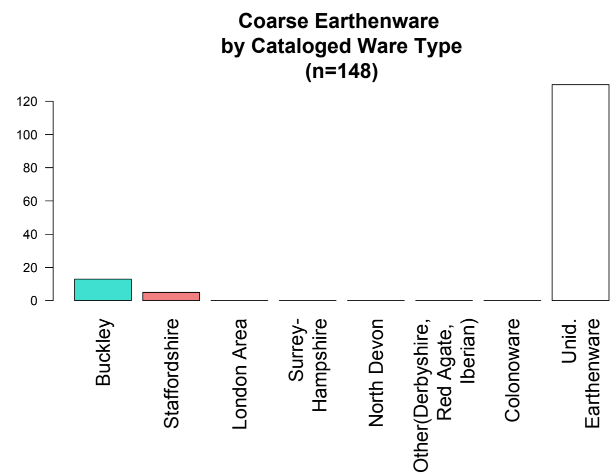
Monticello Site 7
Ca. 1761





Monticello Dry Well
Ca. 1778





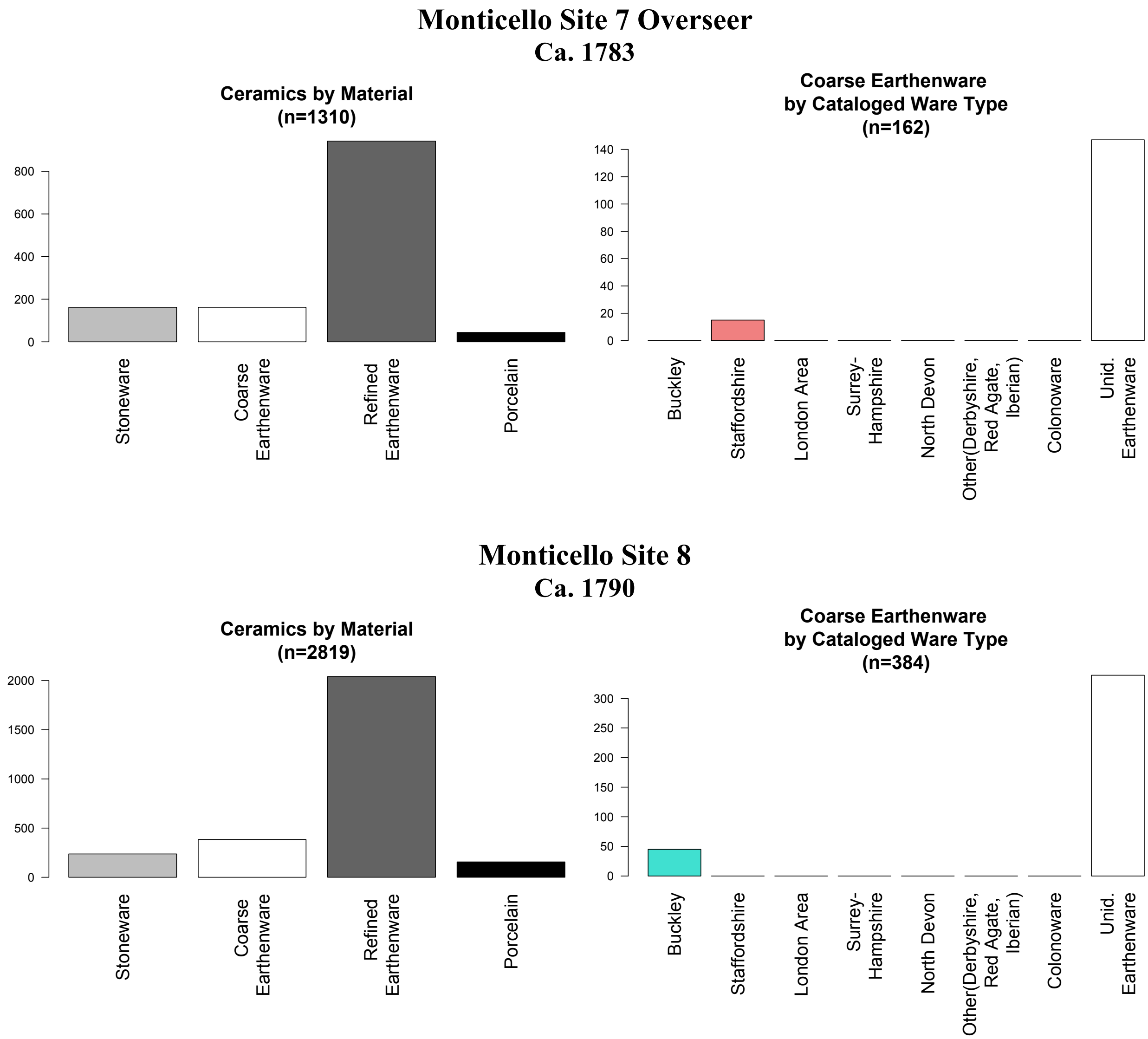
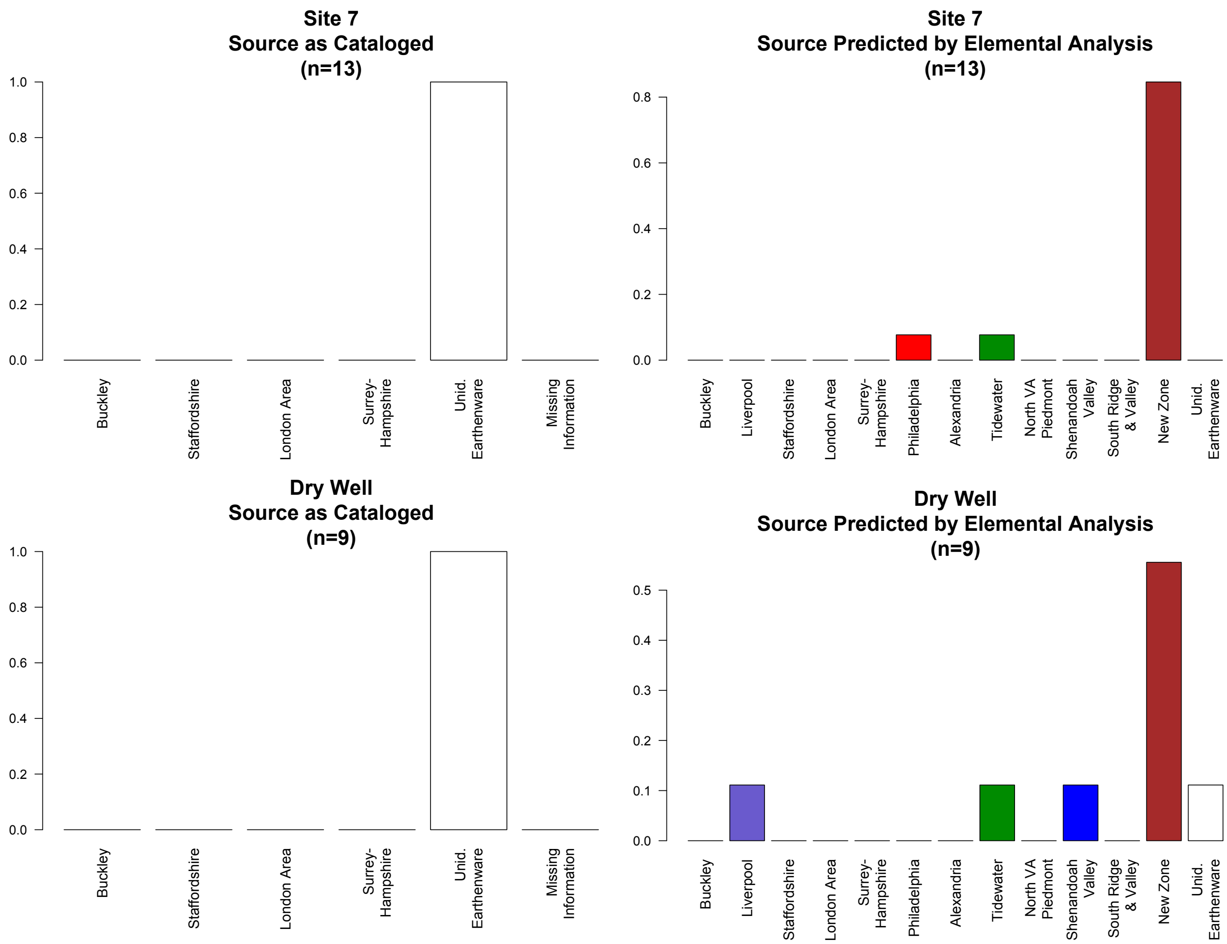


Figure 6.17. Assemblage totals for Monticello assemblages, by material and cataloged coarse earthenware type.

The assemblages from Monticello are dominated by refined earthenwares, with a noticeable decrease in the proportion of coarse earthenwares and stonewares over time (Figure 6.17). The coarse earthenware components of the assemblages are primarily generic wares. However, the sourcing results indicate that the vast majority of earthenwares were likely locally produced (Figure 6.18). Sherds from the new zone that is presumed to be the Central Virginia Piedmont dominate all of the sampled assemblages. The only British-sourced sherds sampled here have predicted assignment to Liverpool, suggesting that Liverpool was the main exporter of the goods that reached Monticello. Three of the four assemblages contain sherds predicted to be from the Coastal Plain, suggesting ongoing ties to the east. Intercolonial trade with Pennsylvania is also signaled by the presence of a few samples with predicted assignment to Philadelphia.



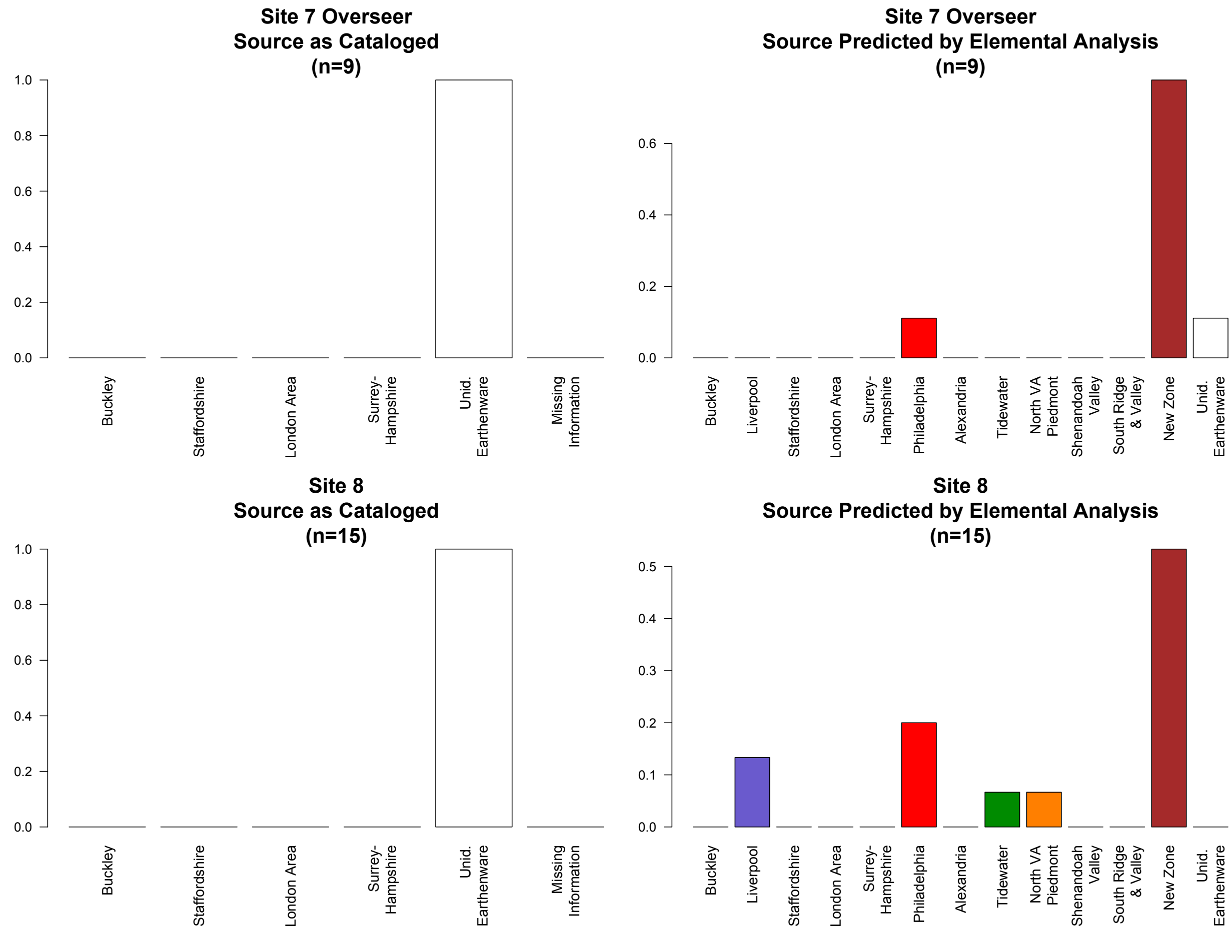


Figure 6.18. Cataloged identification of the sampled sherds from Monticello assemblages compared to the elemental sourcing results.

Poplar Forest

Poplar Forest, Thomas Jefferson's retreat in Bedford County, Virginia, was willed to him by his father-in-law John Wayles in 1773. Jefferson did not begin construction of his octagonal house there until 1806, but managed the operations of the plantations from afar in the intervening years. Two slave quarters were discovered on the property dating to the late eighteenth century, during survey archaeology in advance of landscaping during the mid 1990s. The first, located within the boundaries of the "Old Plantation" core area, has been named North Hill and contained subsurface remains consistent with a single structure occupied during the late eighteenth century (Heath 2007b). No documentary evidence has been discovered relating to this site or its occupants, who likely worked as plantation field hands for tobacco agriculture. The second site, known simply as the Quarter site, is located approximately 600 feet east of the mansion and within the “Tomahawk” quarter farm (Heath 2007c). During excavation, evidence was uncovered for three structures, each of which likely served a domestic purpose. By 1812, documentary records suggest that the residents of this quarter had moved elsewhere to facilitate a reorganization of the landscape in tandem with the home construction.

Jefferson designed a dependency he termed his “Wing of Offices” to extend from the east side of the home, which was constructed in 1814. It was demolished in the early 1840s. During excavation prior to reconstruction of the wing, excavators encountered contexts consistent with the early nineteenth century occupation and mid-nineteenth century destruction of this architectural feature (Kelso *et al.* 1991). The samples taken from the Wing of Offices are from these early contexts and thus should be related, in part, to Jefferson family occupation of the site, which continued until 1828.

As with the assemblages at Monticello, the Poplar Forest assemblages are dominated by refined earthenwares (Figure 6.19). There is also low richness in the cataloged Poplar Forest coarse earthenwares, indicating that the wares lack geographically significant visual differences. In spite of this, the subset of analyzed sherds shows several distinct sources for the wares in each assemblage (Figure 6.20). The samples are overwhelmingly local, with examples from the Piedmont and the Shenandoah Valley, which lies nearby on the other side of the Blue Ridge Mountains. Poplar Forest is the furthest west and the latest of the plantations sampled. It is the only site to contain sherds from the South Ridge and Valley zone, also located nearby. As at Monticello, the only imported wares are from the Coal Measures region, primarily served by the port of Liverpool.

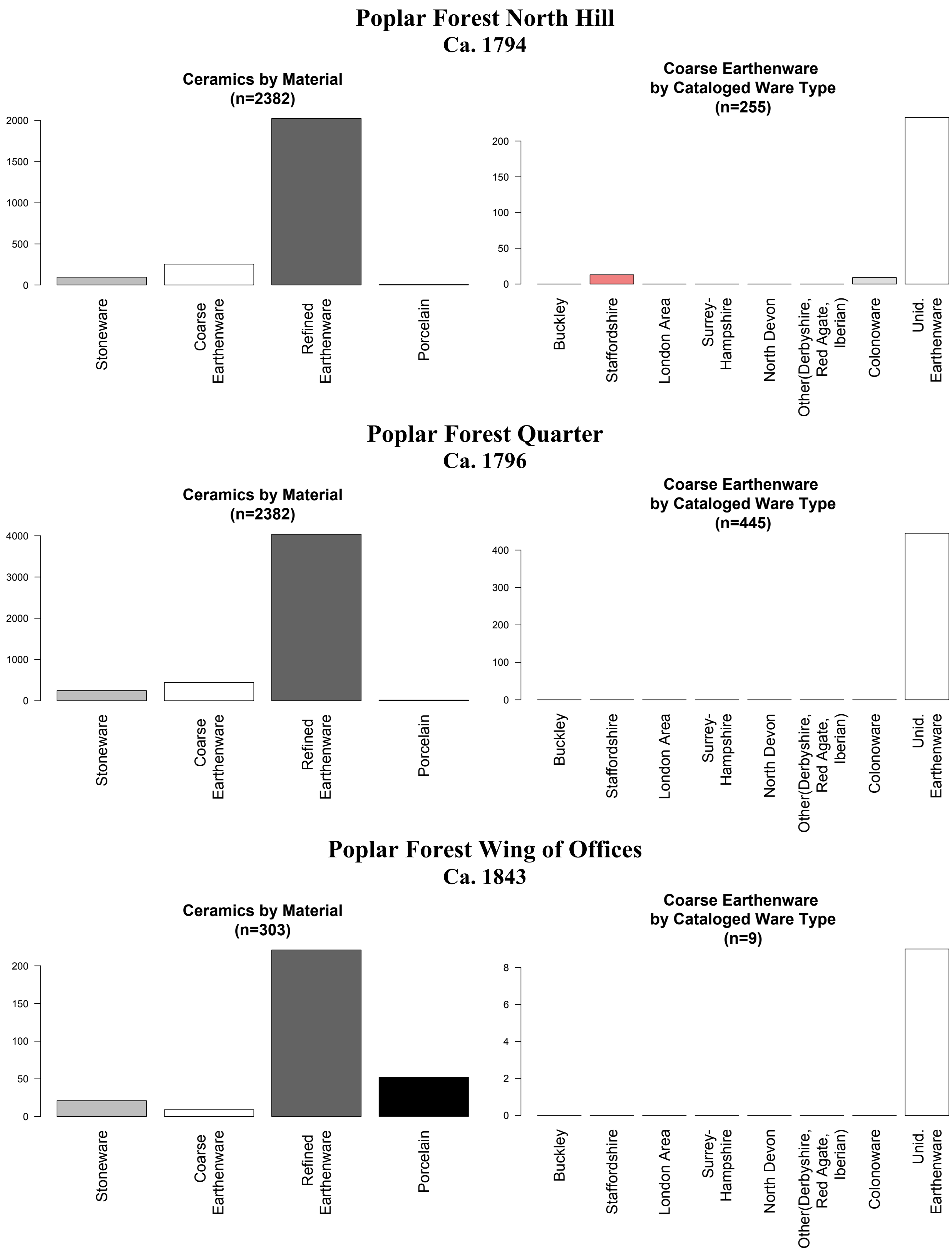


Figure 6.19. Assemblage totals for Poplar Forest assemblages, by material and cataloged coarse earthenware type.

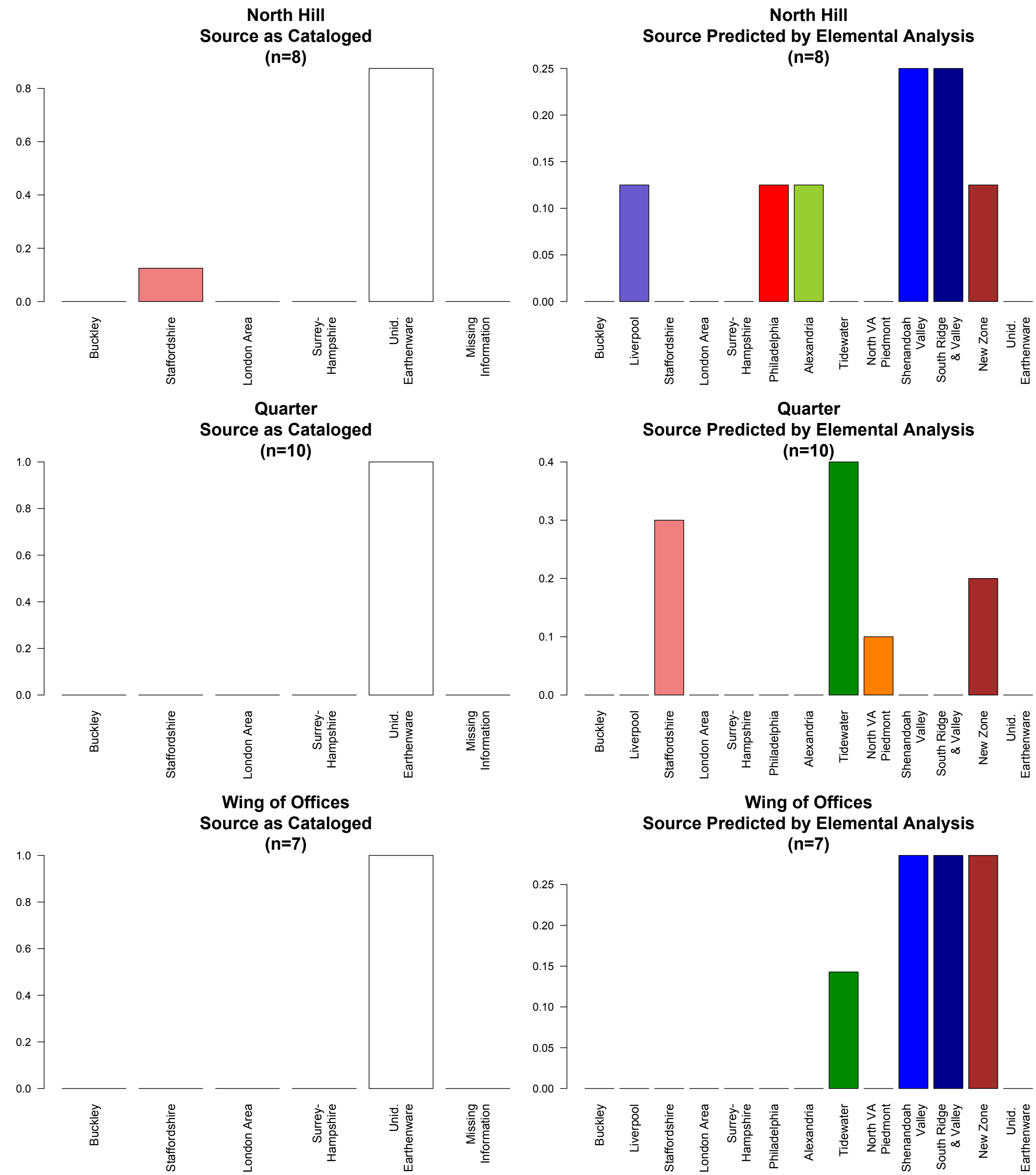


Figure 6.20. Cataloged identification of the sampled sherds from Poplar Forest assemblages compared to the elemental sourcing results.

Broad Patterns

These sourcing results demonstrate that there is a startling heterogeneity of coarse earthenware sources lurking within eighteenth century Chesapeake ceramic assemblages. When considering the results by assemblage date, several clear trends emerge that demonstrate the shift in availability or desirability of wares from particular sources over time. Firstly, there was a precipitous drop in imported wares over the course of the eighteenth century. Table 6.2 shows the phased sourcing results by continent. While in the first quarter of the eighteenth century the proportion of imported to domestic wares were nearly equal, by midcentury just over 10% of the sampled sherds were imported. Figure 6.21 shows the predicted assignments for each production zone by phase.

Table 6.2. Predicted Earthenware Source by Continent, Phase Totals

Occupation Phase	Europe		North America		Unassigned		Phase Total
	Count	*%*	Count	*%*	Count	*%*	
Phase I (Pre-1730)	16	*51.6*	14	*45.2*	1	*3.2*	31
Phase II (1730-1760)	21	*36.8*	34	*59.6*	2	*3.5*	57
Phase III (1761-1780)	5	*11.6*	35	*81.4*	3	*7.0*	43
Phase IV (Post-1780)	6	*12.2*	42	*85.7*	1	*2.0*	49
TOTAL	48	*26.1*	129	*70.1*	7	*3.8*	184

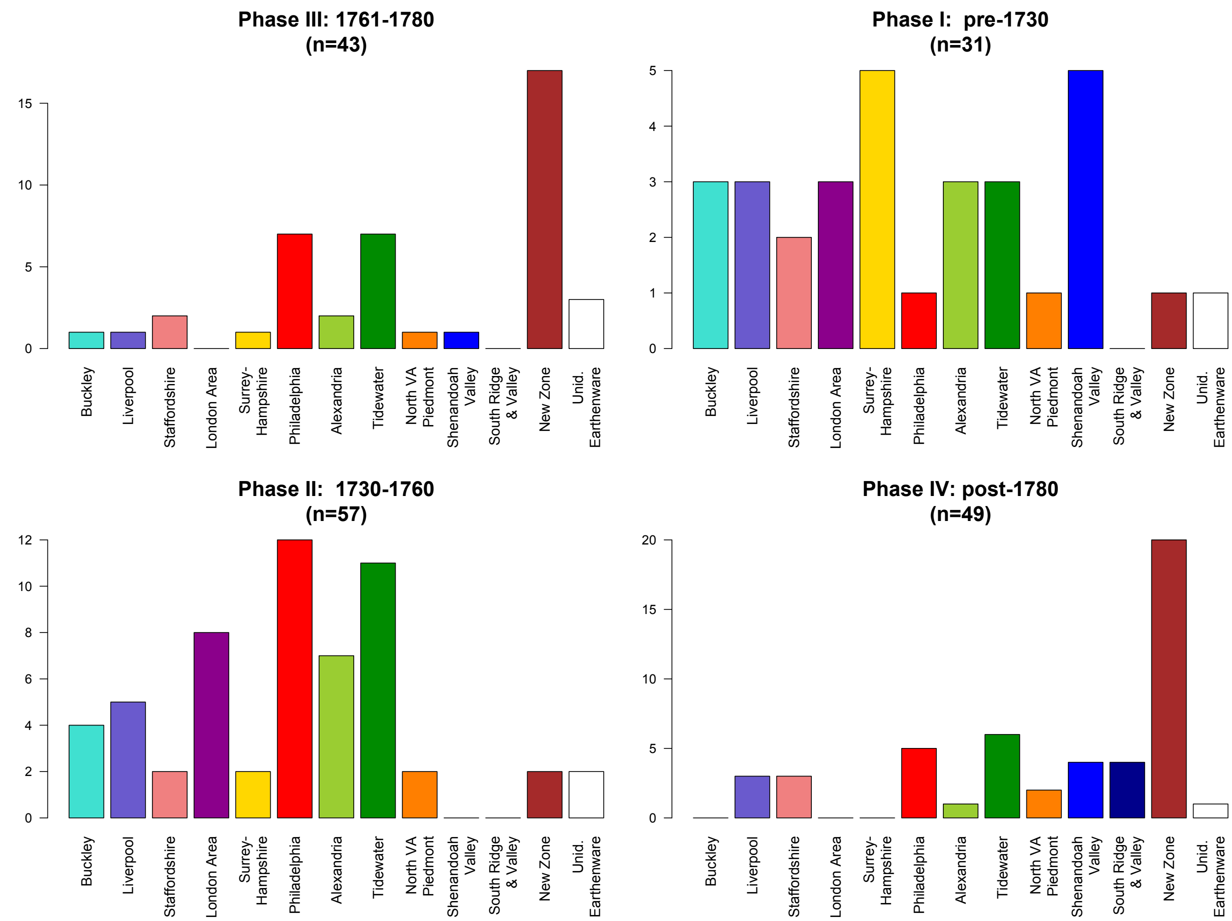


Figure 6.21. Sources for sampled sherds, by phase.

The Philadelphia area is the only interregional production zone that was represented in the domestic assemblages. It is notable that earthenware from this zone was found in the earliest phase (pre-1720), as the Philadelphia industry was still nascent at this time (Bower 1985). Over the course of the eighteenth century it grew sharply, and became known throughout the colonies as quality product. While Philadelphia potters produced both utilitarian forms and tableware forms, Bower (1985) has suggested that potters marketed the utilitarian wares specifically to rural areas, presumably because they had greater need for food storage.

Philadelphia earthenware clearly had name recognition. Thomas Baker of Maryland boasted that his workshop produced wares just as fine, as he had potters from Philadelphia working for him (Figure 2.7). Philadelphia earthenwares make up a sizable proportion of the sampled sherds from Phases II and III, but wanes by Phase IV. This temporal trend may also be regional in scope, as the Piedmont assemblages that comprise Phases III and IV have few sherds attributed to Philadelphia. The intercolonial trade of coarse earthenwares was largely coastwise. It may be that the transportation costs from Philadelphia through the Bay and upriver to the Virginia Piedmont were too high when there were readily available local goods.

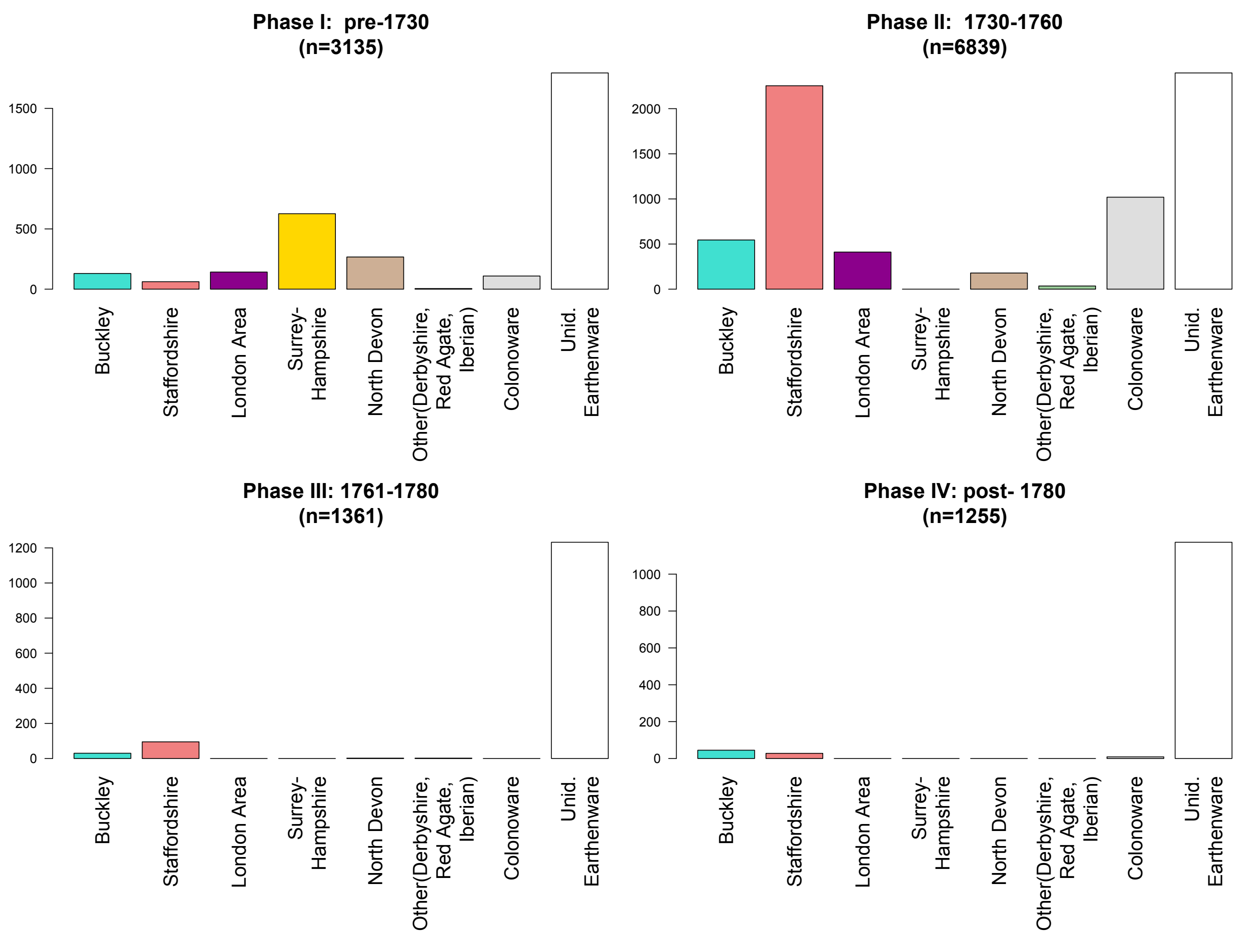


Figure 6.22. Overall ware counts for earthenware assemblages, by phase.

Combining the overall ceramic assemblages by phase, only two coarse earthenware types were consistently cataloged: Buckley and Staffordshire (Figure 6.22). North Devon, both gravel tempered and plain, was present prior to 1760, but is not found in later assemblages. Surrey-Hampshire Border ware and London Area redware were cataloged only in the first two phases as well. While they are temporally bounded wares more common prior to midcentury, these two types were not included as separate ware types in all assemblages, so their presence at other sites cannot be precluded without a reassessment of all the collections. Overall, the proportion of named ware types drops precipitously by the end of the eighteenth century, and the only imported ware types consistently identified are those from the Coal Measures region. Wares from this region include Buckley, Staffordshire, and Red Agate. This region was primarily served by the port of Liverpool, which rose to prominence over the course of the eighteenth century through engagement in the slave trade.

The shift in ware types may also be seen as a shift in the primary ports exporting coarse earthenware from Great Britain. Figure 6.23 focuses on ceramics from British ports of origin, showing the proportion of coarse earthenware from each, based on cataloged assemblage totals grouped by phase. Wares commonly shipped via London and other southeastern ports include Surrey-Hamphire Border ware and London Area redware. North Devon wares came via Bidewell and Barnstaple, which were important ports for Chesapeake trade in the seventeenth century, but began to lag in the eighteenth century (Watkins 1960). Liverpool, on the west coast of England, exported wares produced locally as well as from North Wales (Buckley) and Staffordshire. A canal connecting Stoke-on-Trent to the Mersey River and Liverpool was constructed beginning in the 1760s, largely advocated for by Josiah Wedgwood (Dolan 2004; Staffordshire County Council Education Committee 1981), and it greatly facilitated exports of Staffordshire wares to the world.

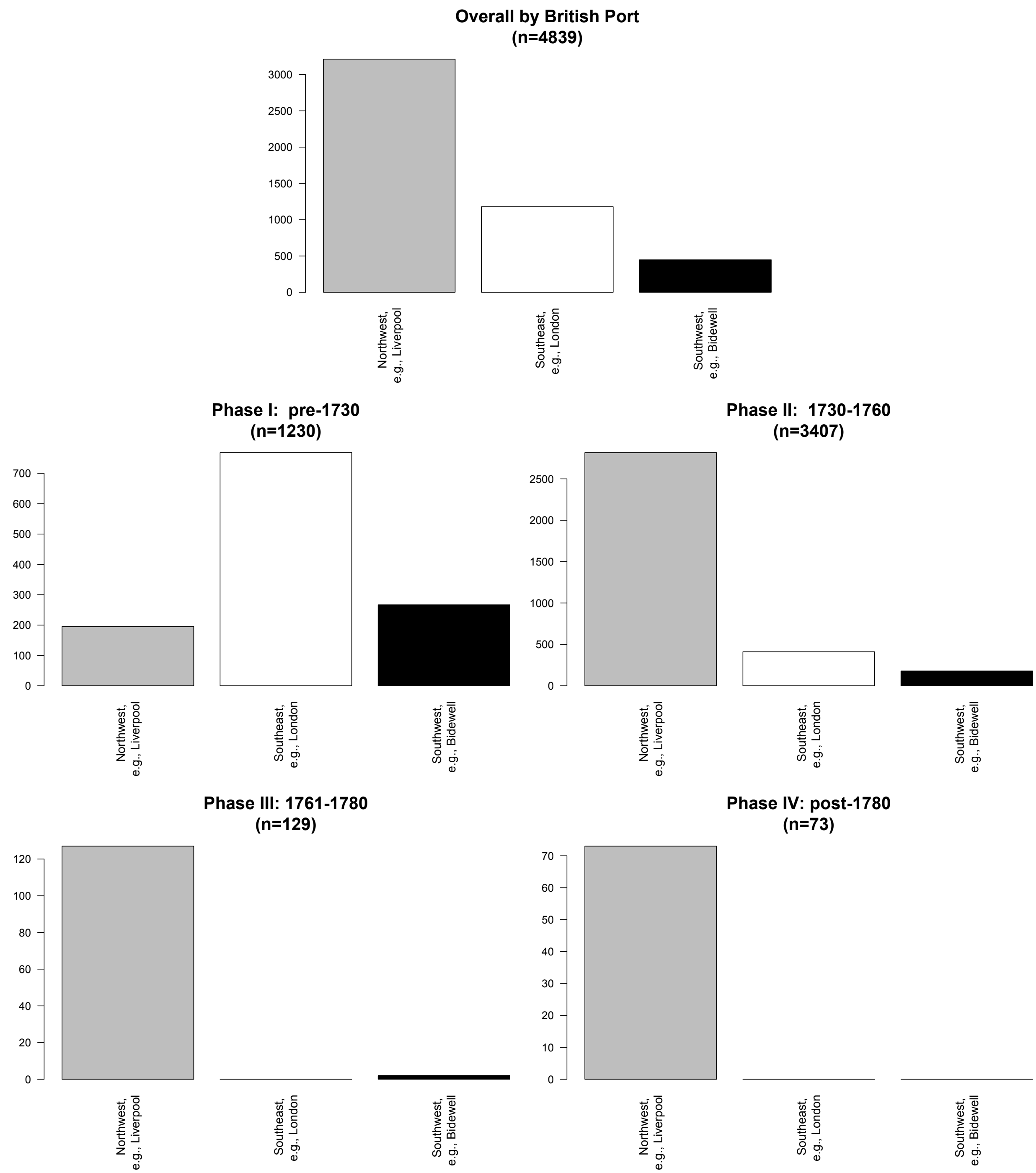


Figure 6.23. Subset of British coarse earthenwares from Chesapeake region assemblages, by primary British ports. Compiled from assemblage-level coarse earthenware counts, Appendix E.

This shrinking of British coarse earthenware export sources mirrors in the sourcing results by phase (Figure 6.23). Wares originating in Southeastern England are common in assemblages of the first two phases, but rare or absent in Phase III and are not represented in

Phase IV. Samples originating in the Coal Measures on the other hand, are present in all four phases, in part explained by the centrality of the port of Liverpool to the late eighteenth century Atlantic world. The proportion of British coarse earthenwares by the end of the century, however, is very small. It has been suggested that by the mid-eighteenth century, production and export of British coarse earthenwares for the American colonies tapered off in order to shift production towards refined wares (Gibble 2001). However, the transition away from coarse earthenware production in Great Britain went hand in hand with burgeoning domestic production in the colonies. The market for these wares continued, but the needs of consumers were met by American products from a number of distinct domestic production zones.

While the temporal patterning for the Chesapeake as a whole is clear and compelling, it is difficult to disentangle the temporal and spatial patterning of the Piedmont and Coastal Plain provinces within the Chesapeake. In part this is because the latest assemblage dates are all from Piedmont plantations. Furthermore, these two plantations, Poplar Forest and Monticello, were owned by a single individual. As would be expected following the criterion of abundance, the most common American-made wares in each assemblage tend to be from the production zone in which the site was located. This trend is magnified between physiographic provinces, as wares found on Piedmont sites are almost exclusively American-made and from the local zone, while in the Coastal Plain imported wares make up a sizable proportion in most assemblages (Figure 6.24). When the Coastal Plain is further divided by colony, there is a striking similarity between the composition of Maryland and Virginia coarse earthenware assemblages.

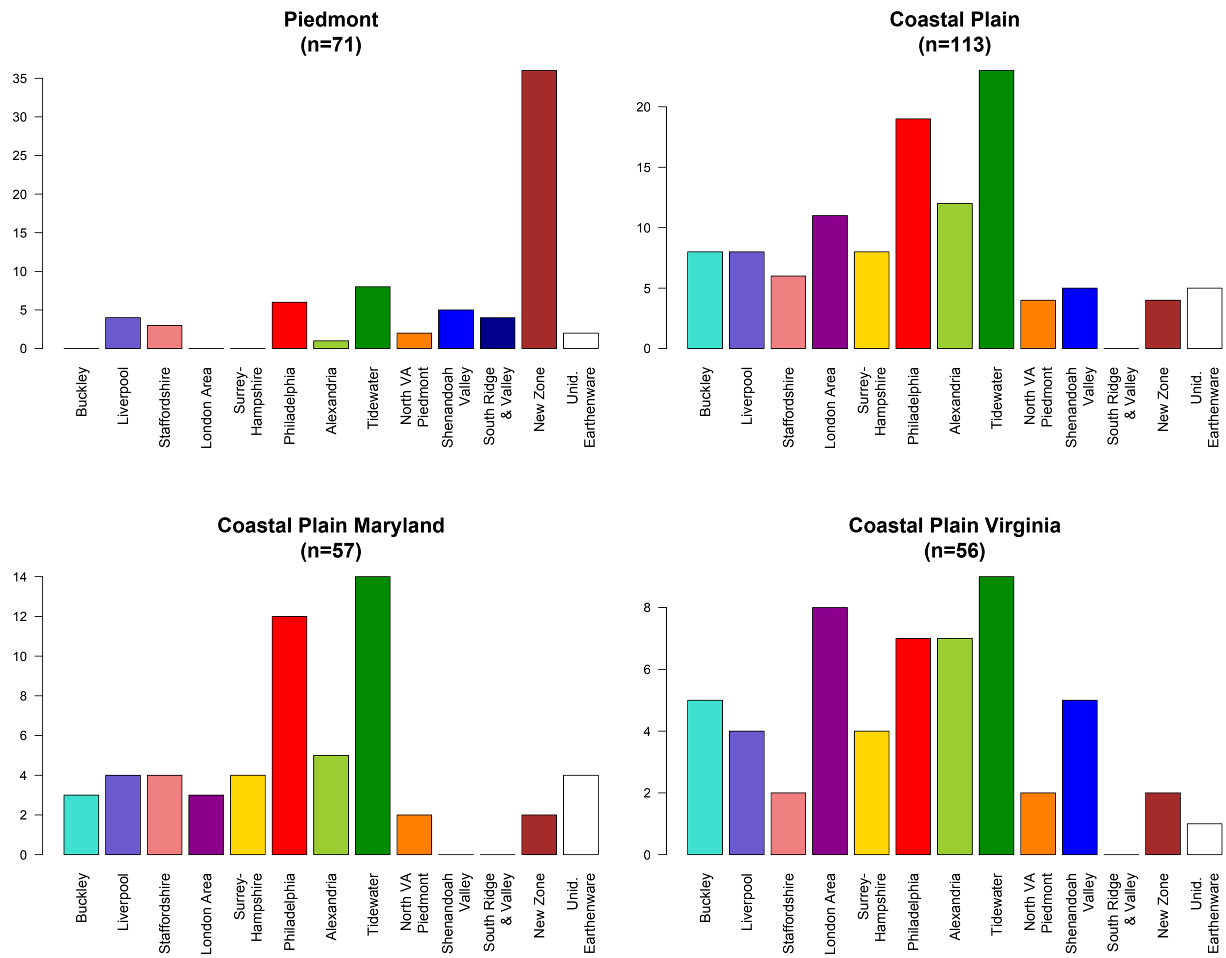


Figure 6.24. Source predicted by elemental analysis, samples divided by physiographic province. Coastal Plain Chesapeake is further divided by colony.

Summary

The results of elemental sourcing outlined here transform our understandings of the generically defined earthenwares within archaeological collections across the region. The representation of local production in every area sampled, and especially the evidence for a newly identified production zone in the Central Virginia Piedmont was unexpected, given the patchy nature of archaeological and documentary evidence of pottery production in the region. In addition to the implications for future cataloging methods, these results provide a valuable starting point for discussing the broader social and economic history of the Chesapeake, and the ways in which plantation residents participated in consumption practices. In the following chapter, I bring together the data, history, and theory to expand upon these general results, discussing the social meanings of the patterns uncovered in coarse earthenware distribution and use across the region.

CHAPTER 7: DISCUSSION

In this study I have investigated colonial systems of exchange in the historic Chesapeake region of Maryland and Virginia, focusing on lead-glazed coarse earthenware. In Chapter 2, I presented an introduction to the economic history of the Chesapeake, and in Chapter 3, contextualized coarse earthenware production and consumption within this context. The methods for ceramic sourcing, from sampling strategies to data analysis, were described in Chapters 4 and 5. In Chapter 6, I communicated the results of the elemental analysis, linking earthenware sherds found in plantation contexts to specific production zones.

Having identified the primary production sources and defined general temporal and regional trends in the distribution of coarse earthenwares, we must now contextualize this information more fully within the social and economic history of the region. At the outset, I introduced coarse earthenwares as a class of artifact distinctively able to speak to the nature of trade in the historic Chesapeake. Unlike many other material goods at the time, which were solely imported, coarse earthenwares were also produced domestically. As such, they are material evidence of the friction between British mercantilist aims and colonial economic goals. Historical narratives provide a framework for the Chesapeake that emphasizes a staple economy and the dominance and necessity of British imports for colonists of the region. However, this view conflicts with the numerous physical remains of coarse earthenware production sites and the presence of locally made coarse earthenware in every assemblage sampled in this study. Rather than verifying the dominance of transatlantic sources of coarse earthenware, the results presented here demonstrate that locally made wares were necessary tools, even for those heavily engaged in the consignment trade. In order to understand why this might be, we must resume a discussion of the functions of coarse earthenware, considered in light of the sourcing results.

Fragmentation has made it difficult to determine the form for the majority of these wares; only 14 of the 184 sherds sampled have been cataloged as part of a specific vessel form (Table 7.1). These include items such as milk pans (n=7) and storage vessels (n=3). Eighty-eight sherds, or 52% were identified at the level of "Unid: Utilitarian," nine (5%) as "Unid: Tableware," and a single sherd was identified as "Unid: Teaware" (<1%). The remaining seventy-two sherds (42%), were deemed "Unidentifiable," or were missing that level of cataloging information. Considering only the sherds that were cataloged with some degree of specificity, approximately 90% represent utilitarian wares such as milk pans, butter pots, and general storage vessels.

Table 7.1. Vessel Form Identification for Sampled Domestic Sherds

Vessel Form		Count	%
Teaware			
	Unid: Teaware	1	0.5
Tableware			
	Mug/Can	1	0.5
	Serving Dish	1	0.5
	Unid: Tableware	9	4.9
Utilitarian			
	Milk Pan	7	3.8
	Storage Vessel	3	1.6
	Water Cooler	1	0.5
	Chamberpot	1	0.5
	Unid: Utilitarian	88	47.8
Unidentifiable		46	25.0
Missing Information		26	14.1
	Total	184	100.0

Vessel form categories from DAACS.

Utilitarian ceramics served basic functions of food preparation and storage in the eighteenth century. To fully understand the role of coarse earthenwares in the colonial economy, we must integrate them more explicitly into household strategies. Though other more ephemeral or less expensive items were available, such as barrels, baskets, gourds, sacks, and leather, an outlay in ceramic signaled an investment in long-term food storage or the need for storing a specific type of food. Certain foodstuffs, especially liquids, could best be stored in ceramic. Large-mouthed storage vessels could store both dry goods and liquid items, providing a pest and moisture resistant container for daily and long-term storage. Given the difficulties of climate control, ceramics provided a sealed environment that was better for keeping food fresh than other vessels made of organic materials. Bottles of ceramic or glass could be used to store liquids as well as small solids, such as fruits and preserves, as evidenced by the cherries and cranberries found in wine bottles in Monticello's Dry Well (Kelso 1997). A circa 1700 recipe book from Virginia outlines the process for preserving a variety of fruits, ending each by putting into "potts" and covering with paper (Harbury 2004). Especially during winter months when fresh produce was scarce, the ability to store fruits and vegetables would have improved the nutritional content and variety of meals within households. Storage was the primary purpose for coarse earthenwares.

Some earthenwares were not initially purchased for the vessel itself, but as carriers for other goods. Butter is one such commodity that was often sold in the pot. A 1662 Act of English Parliament regulated the size and weight of butter pots, stipulating, "a pot of butter must weigh 20lbs out of which the pot must weigh not more than 6lbs" (Staffordshire County Council Education Committee 1981), and similar controls followed in the colonies. The ledger of John Epperson's store on August 18, 1801 recorded the sale to John Oliver of "1 pott of Butter gross

19lbs. net 11” at the cost of 11 shillings, or one shilling per pound of butter. The pot, accounting for the remaining eight pounds, was included in the price. Butter pots sold empty are easily distinguished in store ledgers from those sold full, by the price difference. Rum, molasses, and other liquids were also sold in reusable containers of glass or ceramic, with a surcharge added for the container if a customer did not supply their own. An unidentified 1760s account book from Virginia lists a number of such purchases, “1 qt rum and bottle” for the price of two shillings. An empty bottle cost 7 ½ pence.

Coarse earthenwares were also used for food preparation. The two main activities were dairying and cooking. Dairying required wide, shallow pans for separating the cream, churns, and pots for storing the finished products. While during the eighteenth century metal wares were commonly available for cooking, footed pipkins and other earthenware cooking vessels were used for certain dishes. “Virginia Housewife,” Mary Randolph penned a cookbook in the early nineteenth century, in which she specifically recommends the use of “earthen” pots or dishes for preparing recipes such as okra soup and ducks with onion sauce (Randolph 1838 [1824]). Food cooked in earthenware is cooked at a lower temperature and more slowly than in metal (Skibo and Schiffer 2008:15). This method retains more moisture and allows more time for the softening of meat and vegetables and the blending of flavors. It is notable that Randolph chose to include okra soup in her cookbook, as okra, an African vegetable, came into Southern cuisine from enslaved Africans. Leland Ferguson has investigated the cultural significance of earthenware vessels for preserving traditional African foodways on plantations through archaeological evidence (Ferguson 1992). Food preparation in coarse earthenware became less common over the course of the eighteenth century, but was retained for specialized and culturally specific uses.

Earthenware in Plantation Contexts

The plantations of the Chesapeake in the eighteenth century were more economically diverse than their seventeenth century counterparts. For the larger plantations represented here, we have documentary evidence that the planters engaged in a variety of agricultural and business ventures, including Utopia, Fairfield, Mount Vernon, Monticello, and Poplar Forest. For the planter and his household, utilitarian ceramics were especially important for activities such as dairying and alcohol production. For slaves and wage laborers on plantations, who did not own large livestock, coarse earthenware likely served more generalized purposes of storage and food preparation.

It is notable that every assemblage sampled had wares from a variety of sources; furthermore, there were no sharp differences in the richness of sources represented among households of varying social status (Table 6.2). At the individual plantation level, assemblages associated with lower-status households of indentured servants or slaves had similar numbers of coarse earthenware sources represented as assemblages associated with planter households. Both were equally likely to contain locally made wares.

Regionally, the intra-plantation pattern holds, as there is greater similarity in richness within plantations than within contexts of shared social status across plantations. Greater differences in richness are seen among plantations. This trend is broadly temporal: plantations with earlier occupation have more sources than plantations with later occupations. Assemblages from the first half of the century, according to BLUE MCD, have an average of 5.75 discrete coarse earthenware sources represented in the samples. Assemblages from the second half have an average of 4.4. As discussed in Chapter 6, one of the main driving forces for this pattern is the diminishment of unique British sources over time (Figure 6.22), and the general transition away from coarse earthenwares to other utilitarian materials.

Table 7.2. Richness of Plantation Coarse Earthenware Assemblages from Results of Elemental Analysis

Plantation/Assemblage		Region	Primary Household Type	BLUE MCD	Count of Predicted Sources
King's Reach		Coastal MD			
	King's Reach		Planter	1708	8
	King's Reach Quarter		Servant/slave	1709	6
Fairfield		Coastal VA			
	Fairfield Midden		Planter/slave	1757	6
	Fairfield Quarter		Slave	1725	7
Mount Vernon		Coastal VA			
	South Grove		Planter	1746	4
	House for Families		Slave	1747	4
Ashcomb's Quarter		Coastal MD	Servant/slave/tenant	1746	6
Utopia		Coastal VA			
	Utopia III		Slave	1729	6
	Utopia IV		Slave	1741	5
Chapline Place		Coastal MD	Slave/tenant	1769	6
Mattapany-Sewall		Coastal MD			
	Mattapany Manor		Planter	-	1
	NAVAIR		Slave/tenant	1768	4
Monticello		Piedmont VA			
	Site 7		Slave	1761	3
	Site 7 Overseer		Overseer	1783	2
	Dry Well		Planter	1778	4
	Site 8		Slave	1790	5
Poplar Forest		Piedmont VA			
	North Hill		Slave	1794	6
	Quarter		Slave	1796	4
	Wing of Offices		Planter	1843	4

Unassigned samples were excluded.

Some of the variability in assemblage richness may be due to sample size biases. For example, excavations at King's Reach main house yielded more than three times as many ceramics as excavations of King's Reach Quarter. Moving beyond sheer presence and absence, it is generally very difficult to compare the amount of coarse earthenwares in each household assemblage, as coarse earthenwares do not behave in the same way as refined wares. The durability of utilitarian wares, which made them serve so well in the kitchens and pantries of yesteryear, means that proportionally less utilitarian ware entered the archaeological record in contrast to thinner, more delicate tablewares. Ethnoarchaeological studies have shown that storage vessels within the household remain unbroken for far longer than regularly moved and used tablewares (David 1972; DeBoer 1974; Foster 1960; Shott 1996). The result is that the proportions of earthenwares found archaeologically are not necessarily reliable indicators of a household's full assemblage. Without knowledge of the occupation span of an assemblage it is a challenge to directly compare the frequency of these wares across sites. For this reason, I focus more on general trends than absolute counts in these analyses.

Overall, the similarity of coarse earthenware assemblages within plantations suggests that there was shared access to these wares. Planter households and slave households made use of pots from the same sources, indicating no status-based differences associated with wares from specific places. Did enslaved individuals individually purchase these wares, or were they part of plantation provisioning strategies?

Not much has been recorded about the provisioning of non-food or textile related goods on Chesapeake plantations, but it must be considered as a potential route of access to these wares for enslaved members of the plantation community. Slaves in the Chesapeake were typically provided with weekly food rations, and yearly cloth or clothing allotments. Other items such as beds and blankets were less frequently provided (Jefferson 1987). While iron pots were sometimes given out (Jefferson 1987), provisioning of coarse earthenware or ceramics more generally was not noted in plantation accounts.

On the other hand, there is a large body of evidence demonstrating that enslaved Chesapeake residents were active patrons of stores (*e.g.*, Heath 1997; Martin 2008). They commonly purchased personal adornment items, tools, and a variety of other goods, and certainly could have afforded these inexpensive wares. Yet, in a search of 20 Virginia store accounts from the eighteenth century I documented a single reference possibly associating the purchase of coarse earthenware to an enslaved person (Figure 7.1). This case is ambiguous, as the sale was recorded on the account of Barn. Lipscomb, the likely slave's owner. The Lipscomb family was a longstanding landholder in the area (Lee 1926). Was the item bought on an errand for the planter, or for the use of the enslaved person? As this entry comes from a daybook, it does not include how the item was paid for, or who paid for it. The question of how coarse earthenwares entered slave households in the Chesapeake requires further research.


Delaware Febry 22d. 1770
Mr. Edwd. Valentine Dr
To 1 Gall Rum pr yr Order
Mr. Barn: Lipscomb Dr
To Earthen Ware to a Negro . . . 7½

Figure 7.1. Store account book February 22nd, 1770, recording "Earthen ware to a Negro". Frazer and Tremlett store daybook, Delaware Town, Virginia. Image courtesy the Virginia Historical Society (Mss1 G8626 c 17).

In addition to potential redistribution, wholesale purchase of ceramics by planters through local or transatlantic trade signaled significant labor allocation and storage capacity on the plantation. The "conspicuous production" of foodstuffs, such as beer in the case of Thomas Jefferson, was materialized through functional goods like ceramics. Orders and invoices from George Washington in the early 1760s document his plantation's need for large quantities of milk pans, of which he ordered over 200 in earthenware, stoneware, and tinware during this brief period (Breen 2012; Figure 7.2). Interestingly, he specifically requested several dozen "Welch" milk pans in these orders, indicating that Welch, meaning Buckley, milk pans were a distinct class of coarse earthenware product recognized by colonial customers. As the Mount Vernon archaeologists note, the vast quantity (n=244) ordered by Washington from his English factor was equal to or greater than the number sold in a nearby store during the same period, suggesting that Washington's outlay in these goods for his plantation was equivalent to the needs of a local retail market. Clearly, Washington's plantation management included significant investment in dairying. In 1765, he also ordered "2 dozn large stone Butter Pots of a size to hold 40 & 50 lbs," large stoneware vessels to store the products of his dairy (Mount Vernon Archaeology Department 2012).

Figure 7.2 Buckley milk pan from Utopia III. Similar to those found in South Grove Midden deposit. Image courtesy DAACS, Thomas Jefferson Foundation, Monticello.

In this project, three milk pans were sampled from the South Grove Midden deposit. Of those, one was London Area redware and one was Buckley—one of the "Welch" pans. These two are very likely part of one of Washington's orders from his English factor. The third milk pan, on the other hand, has a predicted assignment to the Alexandria area, local to Mount Vernon. It is surprising to consider that even with hundreds of milk pans arriving via consignment, Washington's dairy required further resources from local sources. Furthermore, no local potter has yet been identified at work this early in Alexandria's history. The purchases recorded in Washington's invoices and orders do not account for additional trade conducted locally or interregionally. What drove the need for locally produced wares at Mount Vernon: shipping delays, transatlantic breakage, or heavy wear and tear? Lacking documentary evidence we cannot say for sure, but it was likely a combination of factors such as these. Local products offered a readily available solution for maintaining productivity of the dairying operation.

Mount Vernon is an outlier in this study, as Washington's strong engagement in consignment trade resulted in coarse earthenware assemblages that exhibit relatively low richness and greater quantities of imported wares than other plantations sampled. Long-term relationships with English factors may explain why earthenware from the same sources was sent repeatedly to Mount Vernon. Contemporary assemblages from Fairfield, Utopia, and Ashcomb's Quarter, on the other hand, have more sources represented, and contain higher proportions of domestically produced wares. As these plantations represent varying levels of planter wealth and status, these results suggest that the consumption pattern for coarse earthenware was not tied to plantation wealth. Rather, it was typical for Chesapeake residents of all social status to utilize local systems of commerce, at least for everyday goods

The presence of locally made wares explicitly signals local trade, either through stores or directly from potters. Still, there is a troubling issue of equifinality in understanding local purchasing behavior, as goods from local, intercolonial, and global sources could all be purchased from local merchants. The presence of British pots in an assemblage does not necessarily confirm global trade at the plantation or individual household level, though it does suggest a general reliance on imported goods. Lacking documentary evidence, such as Washington's invoices and orders, the distribution mechanisms of these imported wares remain uncertain for most assemblages.

The decrease over time in the consumption of imported coarse earthenwares can be visualized inversely as an increase in local economic relationships. The growth of pottery industries in towns like Alexandria and Philadelphia over the course of the eighteenth century, and the spread of production to newly settled reaches of the region, assured residents a steady supply of these necessary domestic tools. At the same, imports of refined earthenwares for the table continued unabated and actually increased during this time, so the shift towards local ceramic products was largely specific to coarse earthenwares. This pattern challenges the idea that there was a real or perceived inferiority of local products. Had that been the case, consumers could have demanded continued importation of coarse earthenwares from their merchants. Instead, the omnipresence of locally made coarse earthenwares is evidence that customers recognized the practical strengths of local production: allowing for frequent replacement, custom orders, and local credit.

As discussed in Chapter 3, the credit offered through local sources was more flexible than that carried via tobacco consignment. Additionally, the scale of the purchases in stores was much smaller than that seen in Washington's orders and invoices. While it was not unheard of for patrons to purchase a dozen milk pans at a time from a store, merchant accounts more commonly list sales of one or two earthenware vessels at a time. This small-scale purchasing behavior suggests that most households purchased these everyday items on an as-needed basis. The presence of local potters maintained a ready supply of necessary objects such as these. I challenge the simplistic statement that because their goods were economically trivial in comparison to agricultural products, artisans and craftsmen were not important to the economy of the Chesapeake. On the contrary, their cheap and accessible goods made it possible for planters and others to maintain household industry, a self-sufficiency that was highly valued by Chesapeake citizens.

Methodological Implications

This study makes several steps forward in the study of historic artifacts. At the most basic level, it answers fundamental questions about the origins of these wares. Elemental analysis for the sourcing of historic artifacts has been less commonly employed than in prehistoric contexts. The rise of industrialization in the historic period supported centralized production for certain types of artifacts, and documentary records can be used to verify those locations. In other cases, the objects themselves bear physical markers of origin, from writing to distinctive decorative techniques, or an identified relationship to raw materials from a particular source. Yet, there are many types of historic artifacts for which significant ambiguity still exists regarding origin, including items such as glass, tobacco pipes, and bricks (*e.g.*, Armitage *et al*. 2006). As this study demonstrates, chemical characterization provides an independent line of evidence that can be used to uncover unknown information; or it can verify or challenge our existing classifications. Elemental analysis will almost always be implemented as a sampling strategy, rather than as an expected part of cataloging individual artifacts. Its value lies in the ability to take the results and apply them to additional artifacts in the collection, and to see how the results fit or do not fit current classificatory structures. By using the elemental results in tandem with macroscopic analysis, it becomes possible to recognize important distinguishing attributes or constellations of attributes that may have gone unnoticed. These results allow us to identify the sampled sherds with greater specificity than was possible before.

In this study, I have independently verified the classification of several source-defined ware types, as well as uncovered latent sources that had not been distinguished via macroscopic analysis. Of particular interest was the discovery of an unanticipated production zone that is likely associated with the Central Virginia Piedmont. Two main factors guide the attribution of these wares to the Central Virginia Piedmont. The first is the elemental similarity to other Piedmont production zones sampled. Furthermore, the bulk of domestic samples that have predicted assignment to this zone are from this part of the Piedmont. The criterion of abundance suggests that wares will be most common in the assemblages that are closest to production. Lacking documentary or archaeological evidence for production in this area, until now scholars of the region had assumed that the coarse earthenwares found at sites like Monticello and Poplar Forest were all produced elsewhere, either in other production zones of the Chesapeake or from interregional or imported sources. While the assemblages from these plantations do include wares from these other sources, they are dominated by these locally produced wares.

This research included the investigation of several ware types that have been applied unevenly to historical contexts in the region. These include Buckley ware, Surrey-Hampshire Border Ware, and London Area redware, also called London Area Post-Medieval Redware. The results of this project have in some instances complicated our existing definitions of these wares, but at the same time offer independent lines of evidence to conceptualize new groups. Some ware types, such as Buckley, have been applied too broadly. Others have been poorly defined in the Chesapeake context, such as London-Area redware. Below, I outline the ways in which my results change or refine these existing types of coarse earthenware. Following these refinements, coarse earthenware types will become more useful analytically.

Buckley ware has long been defined in the Chesapeake by its marbled paste of red and buff clays, dark glazes, and bulky forms. Ivor Noël Hume, in *The Artifacts of Colonial America* 1969:133), still the primary resource for historical archaeologists, defined Buckley by "purplish-red bodies which, when broken, show an agatelike section of yellow and red clays, and which are coated with a thick, black glaze. The potting itself is as ponderous as the ware." While he noted that the wares were exported to the colonies through Liverpool in the eighteenth century, he did not mention that similar wares were also being produced in Liverpool and being shipped to America. These wares too have agatized bodies and frequently black glazing. Like Staffordshire, the other main production zone in the Coal Measures geological province, the wares of both Liverpool and Buckley have limestone inclusions as well.

Within the sampled assemblages, six sherds were cataloged based on visual inspection as Buckley or Buckley-type, and three sherds were cataloged as Staffordshire/North Midlands Slip ware. Neither DAACS nor any of the institutions included in this study currently identify Liverpool as a source for coarse earthenware. In contrast to the nine sherds cataloged as coming from the Coal Measures, the sourcing results identify more than triple that number—29 sherds—as coming from these three production zones (Appendix D). Four of the sherds identified in the cataloging as Buckley are elementally more consistent with Liverpool. None of the sherds identified as Staffordshire have highest predicted assignment to Staffordshire. Two of the three instead have higher predicted assignments to either Buckley or Liverpool.

These results point to a major issue. The visual markers used to discriminate Buckley wares and Staffordshire earthenwares wares are not as geographically specific as their names suggest. For example, the marbling and limestone inclusions are characteristics that reliably distinguish sherds from the Coal Measures, but not from Buckley specifically. The categories of Buckley and Staffordshire have been applied too broadly, conflating vessels that are from the same macro region and thus share similar visual characteristics. As a consequence of this, assemblage analyses that rely upon ceramic type frequencies and ceramic-based dating methods are affected. If these wares cannot be reliably distinguished via visual inspection to specific parts of the Coal Measures, we must re-evaluate the specificity of cataloging sherds with these characteristics to a specific zone and instead consider a more general, but more accurate, attribution to the Coal Measures. The term Buckley-type (Maryland Archaeological Conservation Laboratory) may suffice, inherently acknowledging the defining characteristics but not limiting attribution to a narrow place of origin.

Buckley has been defined within the American colonies with a date range of approximately 1720-1775, while Staffordshire slipwares have a longer date range, from 1670-1795 (DAACS 2015b). At sites such as Rainford, Liverpool area potters made similar wares in the seventeenth century and continued through the eighteenth century. Significantly, the date ranges used in America indicate not the limits of production for these wares, which began in the seventeenth century in Buckley at sites such as Brookhill, but rather the agreed-upon limits of importation to America, in part determined by the occupation dates of the sites on which these wares are found. For example, the start date used for Buckley ware in America comes from Noël

Hume (1969:133), who wrote, “I have yet to see this ware in contexts dating earlier than 1720.” This method for delimiting production ranges can quickly become a circular argument, when ceramics are then used as dating tools for sites. Our use of date ranges must become more critical, and more transparent. By using elemental data to document the presence of particular wares at particular sites, we can refine the dating tools at our disposal.

Surrey-Hampshire Border ware is not currently identified in DAACS, though the type is used at the Maryland Archaeological Conservation Lab where King’s Reach and King’s Reach Quarter collections were cataloged. In part, the omission of Surrey-Hampshire Border ware is due to the eighteenth century focus of DAACS, as Border ware was more prevalent in the seventeenth century. Five sherds from the two King’s Reach sites were cataloged as Border ware, based on characteristics that include a fine buff paste or red paste, and a clear glaze that appears yellow to tan (Maryland Archaeological Conservation Laboratory 2011). Certain attributes of Surrey-Hampshire Border ware seem clearly distinctive, such as the copper green glaze on buff paste, known as Tudor Green. However, there is a range of glaze colors, paste colors and surface treatments (see Pearce 1992) that defies easy categorization when attempting to visually identify sherds within a heterogeneous assemblage.

Two of the King’s Reach sherds cataloged as Border ware have predicted assignment to this production zone. The remaining three are likely from this zone as well, but the existing model was not able to reliably distinguish the paste, due to the small sample size of wasters sampled from this zone, coming from only one site. In addition to King’s Reach, the sourcing results predict several sherds from Chapline Place, Fairfield, and Utopia to be from the Surrey-Hampshire border zone. The assigned sherds from these sites are visually consistent, most with a yellowish glaze and buff body, and are clearly related to production site samples from the production zone. More work is needed to create a robust definition of Surrey-Hampshire Border ware in the Chesapeake. The addition of Surrey-Hampshire Border ware to classificatory schemes would be analytically useful, as it has a narrower date range than generic coarse earthenwares. In early assemblages of the Chesapeake, which like King's Reach can be dominated by coarse earthenwares, the separation of Surrey-Hampshire Border ware from general categories of redware or coarse earthenware, unid., would provide better ceramic-based chronologies.

London Area Redware is another English earthenware type that has not been broadly adopted in the Chesapeake. It was recently added to DAACS, but so far has only been applied to the South Grove Midden assemblage at Mount Vernon. There is, however, a ware type within DAACS called "Red Sandy Ware" that has been used infrequently. In Britain, Red Sandy Ware refers specifically to medieval or earlier wares, but sites like St. Mary's City have defined wares from seventeenth century contexts as Red Sandy Ware (Hurry and Miller 1989). Both London Area redware and Red Sandy Ware are defined by a sandy and oxidized paste, often with a clear lead glaze that appears orange to brown. I suggest that they are in fact different names for the same ware type.

Five of the analyzed sherds from King's Reach and South Grove Midden were initially cataloged as London Area redware. Three of these sherds have a predicted assignment to London. Additionally, eight other sherds from early eighteenth century sites, including Ashcomb's Quarter and Utopia, have sherds with assigned predictions to the London area. Along with the sandy paste, most of these sherds also share a reduced firing core (Figure 7.3). In Harlow, one of the locations that served as a reference group for this type of ware, the reduced cores have been explained as the result of firing the products in an informal kiln, with poor airflow. The explicit addition of this paste criterion to definitions of London Area redware should increase a cataloger's ability to successfully identify this ware. As the results here show, London Area redware dates primarily to pre-1750s contexts, so reclassifying generically cataloged wares as London Area redware would increase the temporal resolution in earthenware assemblages.

Figure 7.3. Rim fragment cross-section of London Area redware from King's Reach site, with distinct dark firing core. Image courtesy the Maryland Historical Trust, Jefferson Patterson Park & Museum, Maryland Archaeological Conservation Laboratory.

Furthermore, within the Coastal Plain, some catalogers have identified the presence of locally made wares based on certain attributes, especially the presence of iron oxide nodules in the ceramic paste. The sourcing results largely verify that these wares have a local source in the Chesapeake. For example, within the Utopia assemblages, six out of seven of the sherds identified as local products by visual inspection had elemental concentrations consistent with production in the broader Chesapeake. At the same time, the presence of inclusions alone cannot be trusted as a criterion of discrimination. These inclusions are not specific to the Tidewater, but instead are found in clay bodies throughout the region, and are a common feature of British coarse earthenwares as well (Table 7.3). Overall, hematite nodules were present in 73% of the 366 production site samples used as reference data. While this clearly indicates that the presence of hematite nodules is not specific to the Chesapeake, in some cases suites of inclusions may be useful discriminators of production zones. For example, sherds from the Coal Measures (Buckley, Liverpool, and Staffordshire, tend to contain hematite, sand, and white rock (limestone) inclusions in the same ware bodies.

Table 7.3. Visible Paste Inclusions in Production Samples

Production Zone	Total Samples	Inclusions				
		Hematite	Quartz	Rock, white	Voids	Mica
Buckley	24	92%	13%	92%	-	-
Liverpool	27	93%	89%	81%	-	-
Staffordshire	18	100%	50%	89%	-	-
London Area	56	45%	23%	27%	-	-
Surrey-Hampshire Border	18	22%	-	-	11%	-
Philadelphia	16	88%	94%	-	-	-
Alexandria	34	68%	15%	3%	-	-
Tidewater	53	79%	49%	8%	6%	4%
North Virginia Piedmont	14	93%	7%	7%	7%	-
Shenandoah Valley	70	84%	29%	23%	1%	-
South Ridge & Valley	13	92%	62%	69%	-	-
North Carolina	23	52%	61%	9%	-	-
Total Samples	366	73%	38%	30%	2%	1%

Inclusion types defined by DAACS, viewed at 10x magnification.

From visual inspection, ceramics local to the Tidewater are also more often light in color than products from other Chesapeake production zones, although the full range of paste colors is present in production site samples. Unfortunately, barring distinctive shape or glazing characteristics that have been identified to a potter (Straube 1995), there are no easy visual indicators that differentiate sherds from distinct production zones within the Chesapeake.

Similarly, the wares from Philadelphia exhibit a variety of pastes, glazes, and decorations that defy macroscopic attribution at the sherd level. Producers of Philadelphia earthenwares are known to have used slipped decoration on their vessels, while decorated examples are found less frequently in Chesapeake pottery production assemblages. This has led to a tendency to identify slip-decorated redwares as products of Philadelphia. Four sherds from Utopia were identified as

Philadelphia coarse earthenware by catalogers, but only one had elemental concentrations consistent with that zone. Instead, two were assigned to British production zones and the remaining one to the Chesapeake. It must be emphasized that slip decoration and the use of engobes was a widely practiced technique across European and Euro-American production zones. When working with fragmentary assemblages, where one cannot identify a distinctive decorative motif, slip decoration cannot be used as a primary basis of attribution.

Next Steps

The work completed in this study addresses several gaps in our knowledge about the basic character of lead-glazed coarse earthenwares found on historical sites in the Chesapeake, and the temporal, spatial, and social patterns in its use. At the same time, the results provoke new questions that require a shift in scope and methodology. These questions concern, on the one hand, historical questions about production, distribution, and consumption. On the other hand, we must stringently interrogate our methods of classifying and interpreting coarse earthenware in archaeological assemblages.

Further testing of production sites in the Chesapeake is needed, especially of those from the Coastal Plain. Given the ambiguities of the secondary clays used for production in the Coastal Plain, which sometimes more closely resemble upland clays, it would be instructive to obtain better coverage of the production zones. By including additional production site samples it may be possible to develop more concrete elemental fingerprints that distinguish the Coastal Plain and its sub-regions.

This project also emphasizes the inadequacy of documentary sources for understanding the spatial extent and intensity of pottery production in the Chesapeake. Pottery production was more widespread, temporally and across the region, than would be expected from historical sources. The archaeological record has the potential to tell us a great deal more. In particular, further research is needed to explain the evidence that coarse earthenware was being produced in the Central Virginia Piedmont. The presence of an unexpected production zone consistent with production in this area is provocative and warrants archaeological and documentary investigation. In the absence of direct archaeological evidence of pottery production, one potential avenue of research to verify the assignment of this group to the Central Virginia Piedmont would be to analyze other fired clay artifacts made in the region, such as bricks or daub. Bricks were produced throughout the Piedmont using the abundant red clay and are commonly recovered archaeologically. Chemical characterization would reveal whether the clays used for brickmaking and for pottery production were elementally similar and whether the Central Virginia Piedmont clay is consistent with the earthenware samples of unknown origin.

Furthermore, it would be worthwhile to expand the scope of the project to additional production zones in adjacent colonies, and to other European production zones. While British pottery formed the majority of earthenwares imported to the British colonies of North America, Dutch, Spanish, French, and Italian earthenwares were also imported. By broadening the reference set of production sites across the wider Atlantic world, it may be possible to refine our definition of these wares based on visual inspection as well. Adding additional production zones would also increase the relevance of these data for scholars working in other parts of the Atlantic. A stated goal of this project is create an open-access reference for the elemental data of coarse earthenwares. As the elemental database increases, the questions that can be addressed will grow as well, fostering productive research into this heretofore under-analyzed artifact.

At the same time, more research can be done at the intra-zone level to investigate the elemental variations within groups that are characteristic of certain sources of raw material and specific potters' recipes. There is also work to be done to define the geographic boundaries of production zones. Especially in cases such as Philadelphia or Surrey-Hampshire, where a single production site has defined the elemental character of the zone, the incorporation of additional sites is needed to ensure a representative elemental signature has been obtained. By sharpening the focus to concentrate on individual zones and the sites within them, it will be possible to gain better temporal resolution for the potters active at a given time, which has interpretive value for understanding local consumption patterns.

Given the sampling constraints of this project, it is difficult to translate the sourcing results from semi-quantitative presence/absence of wares from various sources to quantitative measures of frequency. By re-evaluating the collections sampled in light of these results it will be possible to increase the specificity with which samples are cataloged. This is especially true for collections currently in DAACS that contain Surrey-Hampshire Border ware and London Area redware that have not been identified as such. However, these results can also be applied to archaeological assemblages not included in the current study.

The development of online and physical study materials that clearly define historical coarse earthenware types via macroscopic attributes is one of the primary projected outcomes of this research. This will be accomplished in collaboration with DAACS. Existing classifications and descriptions of coarse earthenwares need refinement, as this project demonstrates. By providing clear and exclusive attributes or correlated suites of attributes for coarse earthenwares such as London Area redware, researchers can reevaluate their collections. At a basic level, this will facilitate better chronological control over ceramic assemblages. It will also explicitly incorporate earthenware source as an analytically useful attribute. As I have shown, there are coherent patterns to the consumption of coarse earthenware that warrant further exploration. Given that most institutions are not able to elementally analyze their collections, it is critical to share the results of this research in ways that can be applied by scholars working in a variety of conditions.

Conclusions

Consumption of coarse earthenwares has been an expected and unremarkable aspect of household archaeology in the Chesapeake. Yet in dismissing these ceramics as a generic artifact class, we lose sight of potentially meaningful data. These utilitarian wares are equally as representative of producers' strategies and consumers' choices as more decorative or showy artifacts, but our analytical methods have not been adept at recovering this information. Though historical archaeology is inextricably tied to historical narratives, in this study I have demonstrated that historical models fall short when it comes to understanding the economy of coarse earthenware in the colonial and early Federal Chesapeake. By substantiating the presence of distinct products within specific sites and times, this project illuminates social and economic strategies that were unexpected. In particular, these results foreground the significance of a largely undocumented local and interregional ceramic trade to Chesapeake households, and situate potters as important community members providing a necessary service. Were these wares "Made in America?" Absolutely.

This project demonstrates the benefits and possibilities of elemental analysis for historical archaeology, especially for objects with standardized production and manifold sources. Craft production has waned as an area of interest in historical archaeology over the past few decades, for reasons that are not entirely clear. Yet, increasingly available analytical technologies such as LA-ICP-MS revitalizes the study of craft, offering new avenues for identifying the products and markets of craftspeople and situating them as strategic participants in the world of goods. While temporally and regionally focused, the implications of this study are relevant to scholars working in a variety of locations and times, offering a historical view of the intersections of local, regional, and global economic systems.

APPENDIX A: SAMPLE CATALOG

This appendix contains abbreviated catalog information for production site samples and domestic samples from plantation assemblages. Production samples were cataloged by the author, following the protocols outlined in the DAACS cataloging manual (Aultman *et al.* 2014). Most domestic assemblages were cataloged by DAACS; samples from King's Reach, Mattapany, the Fairfield Midden, and Poplar Forest's Wing of Offices were cataloged by the author. The complete catalog of ceramic attributes is available upon request.

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
BBH01	1700-BRC-U1-2-NRD--00001	Brookhill	BRC-U1-2	Redware
BBH02	1700-BRC-U1-2-NRD--00002	Brookhill	BRC-U1-2	Redware
BBH03	1700-BRC-U1-2-NRD--00003	Brookhill	BRC-U1-2	Redware
BBH04	1700-BRC-U1-2-NRD--00004	Brookhill	BRC-U1-2	Redware
BBH05	1700-BRC-U1-2-NRD--00005	Brookhill	BRC-U1-2	Redware
BBH06	1700-BR4-DRS--00001	Brookhill	BR4	Redware
BBH07	1700-BR4-DRS--00002	Brookhill	BR4	Redware
BBH08	1700-BR4-DRS--00003	Brookhill	BR4	Redware
BBH09	1700-BR4-DRS--00004	Brookhill	BR4	Redware
BBH10	1700-BR4-DRS--00005	Brookhill	BR4	Redware
BBH11	1700-BRC-U7-NRD--00001	Brookhill	BRC-U7	Redware
BBH12	1700-BRC-U7-NRD--00002	Brookhill	BRC-U7	Redware
BBH13	1700-BRC-U1-2-NRD--00013	Brookhill	BRC-U1-2	Redware
BBH14	1700-BRC-U11-NRD--00001	Brookhill	BRC-U11	Redware
BPL01	1701-UNSTRAT-NRD--00001	Pinfold Lane	UNSTRAT	Buckley
BPL02	1701-UNSTRAT-NRD--00004	Pinfold Lane	UNSTRAT	Redware
BPL03	1701-UNSTRAT-NRD--00003	Pinfold Lane	UNSTRAT	Buckley
BPL04	1701-15-1-NRD--00001	Pinfold Lane	15-1	Buckley
BPL05	1701-UNSTRAT-NRD--00002	Pinfold Lane	UNSTRAT	Buckley
BPL06	1701-13-NRD--00001	Pinfold Lane	13	Buckley
BPL07	1701-UNSTRAT-NRD--00005	Pinfold Lane	UNSTRAT	Redware
BPL08	1701-UNSTRAT-NRD--00008	Pinfold Lane	UNSTRAT	Redware
BPL09	1701-UNSTRAT-NRD--00007	Pinfold Lane	UNSTRAT	Redware
BPL10	1701-UNSTRAT-NRD--00006	Pinfold Lane	UNSTRAT	Redware
BPL11	1701-UNSTRAT-NRD--00009	Pinfold Lane	UNSTRAT	Redware
BPL12	1701-10-NRD--00001	Pinfold Lane	10	Redware
BPL13	1701-10-NRD--00002	Pinfold Lane	10	Redware
BPL14	1701-10-NRD--00003	Pinfold Lane	10	Redware
BPL15	1701-15-1-NRD--00002	Pinfold Lane	15-1	Redware
BPT01	1702-3-NRD--00002	Prescot	3	Buckley
BPT02	1702-3-NRD--00004	Prescot	3	Buckley
BPT03	1702-3-NRD--00001	Prescot	3	Redware
BPT04	1702-3-NRD--00005	Prescot	3	Redware
BPT05	1702-3-NRD--00003	Prescot	3	Coarse EWare, unid.
BPT06	1702-7-NRD--00004	Prescot	7	Buckley
BPT07	1702-7-NRD--00002	Prescot	7	Buckley

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
BBH01	Hollow	Unid: Tableware	5.46	2.5YR 5/4	Lead Glaze	Glaze, unid.
BBH02	Hollow	Unid: Tableware	4.48	2.5YR 4/8	Lead Glaze	Lead Glaze
BBH03	Hollow	Unid: Tableware	4.48	2.5YR 6/4	Lead Glaze	Lead Glaze
BBH04	Hollow	Unid: Tableware	5.83	2.5YR 6/4	Lead Glaze	Lead Glaze
BBH05	Hollow	Milk Pan	10.42	2.5YR 6/6	Unglazed	Lead Glaze
BBH06	Hollow	Bowl	7.15	2.5YR 5/6	Unglazed	Lead Glaze
BBH07	Unid.	Unidentifiable	8.82	2.5YR 6/6	Unglazed	Lead Glaze
BBH08	Hollow	Bowl	6.23	2.5YR 6/6	Unglazed	Lead Glaze
BBH09	Unid.	Unidentifiable	7.6	2.5YR 6/6	Unglazed	Lead Glaze
BBH10	Unid.	Unidentifiable	6.47	2.5YR 6/6	Unglazed	Lead Glaze
BBH11	Hollow	Storage Vessel	4.56	10R 4/6	Lead Glaze	Lead Glaze
BBH12	Hollow	Storage Vessel	7.6	10R 4/4	Lead Glaze	Lead Glaze
BBH13	Unid.	Unid: Utilitarian	6.51	10R 4/4	Unglazed	Lead Glaze
BBH14	Unid.	Unidentifiable	8.93	2.5YR 5/6	Unglazed	Lead Glaze
BPL01	Unid.	Unidentifiable	5.26	Not Applicable	Lead Glaze	Lead Glaze
BPL02	Unid.	Unid: Utilitarian	9.41	2.5YR 6/6	Lead Glaze	Lead Glaze
BPL03	Unid.	Unidentifiable	7.41	Not Applicable	Lead Glaze	Lead Glaze
BPL04	Unid.	Unidentifiable	5.94	Not Applicable	Lead Glaze	Lead Glaze
BPL05	Unid.	Unidentifiable	6.43	Not Applicable	Lead Glaze	Lead Glaze
BPL06	Hollow	Unid: Utilitarian	5.02	2.5YR 5/6	Lead Glaze	Lead Glaze
BPL07	Hollow	Unidentifiable	5.18	2.5YR 6/6	Unglazed	Lead Glaze
BPL08	Unid.	Unidentifiable	6.78	2.5YR 6/6	Unglazed	Lead Glaze
BPL09	Hollow	Unid: Tableware	4.91	5YR 6/4	Unglazed	Lead Glaze
BPL10	Unid.	Unidentifiable	4.92	2.5YR 6/4	Unglazed	Lead Glaze
BPL11	Hollow	Unid: Tableware	4.26	2.5YR 6/6	Lead Glaze	Lead Glaze
BPL12	Hollow	Unidentifiable	5.77	2.5YR 5/4	Lead Glaze	Lead Glaze
BPL13	Hollow	Unid: Utilitarian	5.23	2.5YR 6/6	Lead Glaze	Lead Glaze
BPL14	Unid.	Unidentifiable	6.17	10R 5/6	Unglazed	Lead Glaze
BPL15	Flat	Plate	7.01	5YR 7/4	Unglazed	Lead Glaze
BPT01	Unid.	Unidentifiable	6.35	2.5YR 6/6	Unglazed	Lead Glaze
BPT02	Hollow	Unidentifiable	5.88	10R 4/6	Lead Glaze	Lead Glaze
BPT03	Hollow	Storage Vessel	10.01	2.5YR 6/6	Unglazed	Lead Glaze
BPT04	Hollow	Unidentifiable	7.29	10R 5/6	Lead Glaze	Lead Glaze
BPT05	Hollow	Storage Vessel	8.14	7.5YR 7/4	Lead Glaze	Lead Glaze
BPT06	Hollow	Unid: Utilitarian	11.09	2.5YR 6/6	Unglazed	Lead Glaze
BPT07	Hollow	Unid: Utilitarian	7.99	2.5YR 6/6	Unglazed	Lead Glaze

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
BPT08	1702-7-NRD--00003	Prescot	7	Buckley
BPT09	1702-7-NRD--00001	Prescot	7	Buckley
BPT10	1702-8-NRD--00001	Prescot	8	Redware
BPT11	1702-8-NRD--00002	Prescot	8	Redware
BPT12	1702-8-NRD--00003	Prescot	8	Redware
BPT13	1702-54-NRD--00001	Prescot	54	Coarse EWare, unid.
BPT14	1702-7-NRD--00005	Prescot	7	Coarse EWare, unid.
BRF01	1703-2391-NRD--00001	Rainford	2391	Buckley
BRF02	1703-2391-NRD--00002	Rainford	2391	Buckley
BRF03	1703-2391-NRD--00003	Rainford	2391	Buckley
BRF04	1703-2391-NRD--00004	Rainford	2391	Buckley
BRF05	1703-2391-NRD--00005	Rainford	2391	Buckley
BRF06	1703-2377-NRD--00001	Rainford	2377	Redware
BRF07	1703-2376-NRD--00001	Rainford	2376	Redware
BRF08	1703-2376-NRD--00002	Rainford	2376	Redware
BRF09	1703-2376-NRD--00003	Rainford	2376	Redware
BRF10	1703-2376-NRD--00004	Rainford	2376	Redware
BRF11	1703-3832-NRD--00001	Rainford	3832	Buckley
BRF12	1703-3832-NRD--00002	Rainford	3832	Redware
BRF13	1703-3832-NRD--00003	Rainford	3832	Redware
BRF14	1703-R1-3-NRD--00001	Rainford	R1-3	Coarse EWare, unid.
CES01	1704-A1-NRD--00005	Eden Street Kiln	A1	Redware
CES02	1704-A1-NRD--00003	Eden Street Kiln	A1	Red Agate, coarse
CES03	1704-A1-NRD--00004	Eden Street Kiln	A1	Redware
CES04	1704-A1-NRD--00001	Eden Street Kiln	A1	Redware
CES05	1704-A1-NRD--00002	Eden Street Kiln	A1	Redware
CES06	1704-A1-NRD--00006	Eden Street Kiln	A1	Redware
CES07	1704-A1-NRD--00007	Eden Street Kiln	A1	Redware
CES08	1704-A1-NRD--00008	Eden Street Kiln	A1	Coarse EWare, unid.
CES09	1704-A1-NRD--00009	Eden Street Kiln	A1	Redware
CES10	1704-A1-NRD--00010	Eden Street Kiln	A1	Redware
CES11	1704-A2-NRD--00001	Eden Street Kiln	A2	Redware
CES12	1704-A2-NRD--00002	Eden Street Kiln	A2	Redware
CFP01	1705-SURFACE-NRD--00001	Fisher Pottery	SURFACE	Redware
CFP02	1705-SURFACE-NRD--00002	Fisher Pottery	SURFACE	Redware

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
BPT08	Hollow	Bowl	8.54	2.5YR 5/6	Unglazed	Lead Glaze
BPT09	Hollow	Milk Pan	14.12	2.5YR 6/6	Unglazed	Lead Glaze
BPT10	Hollow	Unid: Tableware	4.57	10R 5/6	Lead Glaze	Lead Glaze
BPT11	Hollow	Unid: Tableware	4.84	10R 5/4	Lead Glaze	Lead Glaze
BPT12	Hollow	Unid: Utilitarian	4.55	10R 4/6	Unglazed	Lead Glaze
BPT13	Hollow	Storage Vessel	30.41	10YR 7/4	Lead Glaze	Lead Glaze
BPT14	Hollow	Milk Pan	10.87	10YR 8/3	Unglazed	Lead Glaze
BRF01	Hollow	Unid: Tableware	3.16	Unid, Reduced	Lead Glaze	Lead Glaze
BRF02	Hollow	Unid: Utilitarian	8.83	10R 5/6	Unglazed	Unglazed
BRF03	Hollow	Unid: Utilitarian	6.17	10R 5/6	Lead Glaze	Lead Glaze
BRF04	Hollow	Unid: Utilitarian	8.84	Unid, Reduced	Lead Glaze	Lead Glaze
BRF05	Hollow	Unid: Utilitarian	5.59	10R 5/6	Lead Glaze	Lead Glaze
BRF06	Hollow	Unid: Utilitarian	8.68	Not Applicable	Lead Glaze	Lead Glaze
BRF07	Hollow	Unid: Utilitarian	6.52	2.5YR 5/8	Unglazed	Lead Glaze
BRF08	Hollow	Unidentifiable	6.33	2.5YR 6/6	Lead Glaze	Lead Glaze
BRF09	Hollow	Unid: Utilitarian	9.78	2.5YR 5/6	Lead Glaze	Unglazed
BRF10	Hollow	Unid: Utilitarian	4.69	2.5YR 5/6	Lead Glaze	Lead Glaze
BRF11	Hollow	Storage Vessel	6.92	10R 5/8	Lead Glaze	Lead Glaze
BRF12	Hollow	Unidentifiable	7.68	10R 4/4	Unglazed	Unglazed
BRF13	Hollow	Unid: Utilitarian	6.39	10R 5/6	Lead Glaze	Lead Glaze
BRF14	Unid.	Unidentifiable	6.22	7.5YR 7/3	Unglazed	Lead Glaze
CES01	Flat	Plate	6.2	2.5YR 6/6	Unglazed	Lead Glaze
CES02	Hollow	Storage Vessel	7.58	2.5YR 5/6	Unglazed	Lead Glaze
CES03	Hollow	Milk Pan	14.46	2.5YR 6/6	Unglazed	Lead Glaze
CES04	Hollow	Storage Jar	8.99	2.5YR 5/6	Lead Glaze	Lead Glaze
CES05	Hollow	Storage Vessel	9.88	2.5YR 5/6	Lead Glaze	Lead Glaze
CES06	Hollow	Unid: Utilitarian	9.18	2.5YR 6/6	Unglazed	Unglazed
CES07	Hollow	Unid: Utilitarian	5.86	2.5YR 6/6	Unglazed	Lead Glaze
CES08	Hollow	Unid: Utilitarian	9.98	7.5YR 8/4	Unglazed	Lead Glaze
CES09	Flat	Unid: Tableware	6.76	5YR 6/6	Unglazed	Lead Glaze
CES10	Hollow	Unid: Utilitarian	9.57	2.5YR 5/8	Unglazed	Lead Glaze
CES11	Hollow	Storage Vessel	9.19	5YR 6/6	Unglazed	Lead Glaze
CES12	Hollow	Unid: Utilitarian	8.7	2.5YR 6/6	Unglazed	Lead Glaze
CFP01	Hollow	Unid: Utilitarian	11.95	2.5YR 5/6	Unglazed	Lead Glaze
CFP02	Hollow	Unid: Utilitarian	7.22	2.5YR 6/8	Unglazed	Lead Glaze

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
CFP03	1705-SURFACE-NRD--00003	Fisher Pottery	SURFACE	Redware
CFP04	1705-SURFACE-NRD--00004	Fisher Pottery	SURFACE	Red Agate, coarse
CFP05	1705-SURFACE-NRD--00005	Fisher Pottery	SURFACE	Redware
CFP06	1705-SURFACE-NRD--00006	Fisher Pottery	SURFACE	Redware
CFP07	1705-SURFACE-NRD--00007	Fisher Pottery	SURFACE	Redware
CFP08	1705-SURFACE-NRD--00008	Fisher Pottery	SURFACE	Coarse EWare, unid.
CGL01	1706-GL6-C1-NRD--00001	Gloucester	GL6-C1	Redware
CGL02	1706-GL6-C1-NRD--00002	Gloucester	GL6-C1	Redware
CGL03	1706-GL6-C1-NRD--00003	Gloucester	GL6-C1	Redware
CGL04	1706-GL6-C1-NRD--00004	Gloucester	GL6-C1	Redware
CGL05	1706-GL6-C1-NRD--00005	Gloucester	GL6-C1	Redware
CGL09	1706-GL6E-NRD--00001	Gloucester	GL6E	Coarse EWare, unid.
CGL10	1706-GL6E-NRD--00002	Gloucester	GL6E	Redware
CGL11	1706-GL6-G-NRD--00001	Gloucester	GL6-G	Redware
CGL12	1706-GL6-G-NRD--00002	Gloucester	GL6-G	Redware
CGL13	1706-GL6-G-NRD--00003	Gloucester	GL6-G	Coarse EWare, unid.
CGL14	1706-GL6-G-NRD--00004	Gloucester	GL6-G	Redware
CGL15	1706-GL6-G-NRD--00005	Gloucester	GL6-G	Redware
CGL18	1706-GL6-F-NRD--00001	Gloucester	GL6-F	Redware
CGL19	1706-GL6-F-NRD--00002	Gloucester	GL6-F	Coarse EWare, unid.
CGL20	1706-GL6-F-NRD--00003	Gloucester	GL6-F	Coarse EWare, unid.
CGL21	1706-GL6-F-NRD--00004	Gloucester	GL6-F	Coarse EWare, unid.
CHP01	1707-1-NRD--00001	Henry Piercy	1	Redware
CHP02	1707-3-NRD--00001	Henry Piercy	3	Redware
CHP03	1707-14-NRD--00001	Henry Piercy	14	Redware
CHP04	1707-10-NRD--00002	Henry Piercy	10	Redware
CHP05	1707-13-NRD--00001	Henry Piercy	13	Redware
CHP06	1707-10-NRD--00001	Henry Piercy	10	Redware
CHP07	1707-12-NRD--00001	Henry Piercy	12	Redware
CHP08	1707-2-NRD--00001	Henry Piercy	2	Redware
CHP09	1707-7-NRD--00001	Henry Piercy	7	Redware
CHP10	1707-10-NRD--00003	Henry Piercy	10	Coarse EWare, unid.
CLC01	1708-UNPROV-NRD--00001	Lawnes Creek	UNPROV	Coarse EWare, unid.
CLC02	1708-UNPROV-NRD--00002	Lawnes Creek	UNPROV	Coarse EWare, unid.
CLC03	1708-UNPROV-NRD--00003	Lawnes Creek	UNPROV	Coarse EWare, unid.
CLC04	1708-UNPROV-NRD--00004	Lawnes Creek	UNPROV	Coarse EWare, unid.

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
CFP03	Hollow	Unid: Utilitarian	6.55	5YR 6/6	Unglazed	Lead Glaze
CFP04	Hollow	Unid: Utilitarian	4.54	2.5YR 6/8	Lead Glaze	Lead Glaze
CFP05	Hollow	Unid: Utilitarian	10.06	2.5YR 6/8	Lead Glaze	Lead Glaze
CFP06	Hollow	Unid: Utilitarian	5.41	5YR 6/6	Unglazed	Lead Glaze
CFP07	Hollow	Unid: Utilitarian	10.45	5YR 6/6	Unglazed	Lead Glaze
CFP08	Unid.	Unidentifiable	7.76	10YR 8/3	Unglazed	Lead Glaze
CGL01	Hollow	Unid: Utilitarian	7.55	2.5YR 5/6	Unglazed	Lead Glaze
CGL02	Unid.	Unidentifiable	7.65	5YR 6/6	Unglazed	Lead Glaze
CGL03	Hollow	Unid: Utilitarian	9.12	2.5YR 5/6	Unglazed	Lead Glaze
CGL04	Hollow	Unid: Utilitarian	6.8	5YR 5/6	Unglazed	Lead Glaze
CGL05	Hollow	Milk Pan	15.47	2.5YR 5/6	Unglazed	Lead Glaze
CGL09	Hollow	Unid: Utilitarian	7.91	10YR 7/3	Unglazed	Lead Glaze
CGL10	Hollow	Milk Pan	9.18	5YR 5/6	Unglazed	Lead Glaze
CGL11	Hollow	Unid: Tableware	6.92	5YR 6/6	Unglazed	Lead Glaze
CGL12	Hollow	Milk Pan	14.77	5YR 6/6	Missing	Lead Glaze
CGL13	Hollow	Milk Pan	9.33	10YR 8/3	Unglazed	Lead Glaze
CGL14	Hollow	Milk Pan	12.71	5YR 6/6	Unglazed	Lead Glaze
CGL15	Hollow	Unid: Tableware	3.83	5YR 6/4	Lead Glaze	Lead Glaze
CGL18	Hollow	Milk Pan	19.18	2.5YR 5/6	Unglazed	Lead Glaze
CGL19	Hollow	Milk Pan	8.19	10YR 8/3	Unglazed	Lead Glaze
CGL20	Hollow	Milk Pan	10.62	10YR 8/3	Lead Glaze	Lead Glaze
CGL21	Hollow	Milk Pan	7.37	10YR 8/3	Unglazed	Lead Glaze
CHP01	Flat	Plate	7.27	2.5YR 6/8	Unglazed	Lead Glaze
CHP02	Flat	Plate	6.59	2.5YR 6/8	Unglazed	Lead Glaze
CHP03	Hollow	Storage Vessel	7.15	2.5YR 6/6	Lead Glaze	Lead Glaze
CHP04	Hollow	Unid: Tableware	6	2.5YR 6/8	Lead Glaze	Lead Glaze
CHP05	Hollow	Unidentifiable	5.34	5YR 6/6	Lead Glaze	Lead Glaze
CHP06	Hollow	Unid: Tableware	3.38	2.5YR 6/8	Lead Glaze	Lead Glaze
CHP07	Hollow	Unid: Tableware	4.38	5YR 7/6	Lead Glaze	Lead Glaze
CHP08	Hollow	Unid: Tableware	4.36	2.5YR 5/8	Lead Glaze	Lead Glaze
CHP09	Flat	Plate	6.24	2.5YR 5/8	Unglazed	Lead Glaze
CHP10	Flat	Plate	7.06	7.5YR 8/4	Unglazed	Lead Glaze
CLC01	Hollow	Unid: Utilitarian	7.51	10YR 8/2	Unglazed	Lead Glaze
CLC02	Hollow	Unid: Utilitarian	6.59	10YR 8/2	Unglazed	Lead Glaze
CLC03	Unid.	Unid: Utilitarian	6.5	10YR 5/2	Unglazed	Lead Glaze
CLC04	Unid.	Unidentifiable	9.32	10YR 8/3	Unglazed	Lead Glaze

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
CLC05	1708-UNPROV-NRD--00005	Lawnes Creek	UNPROV	Coarse EWare, unid.
CLP01	1709-2F-NRD--00001	Linton-Perine	2F	Redware
CLP02	1709-2F-NRD--00002	Linton-Perine	2F	Redware
CLP03	1709-2F-NRD--00003	Linton-Perine	2F	Redware
CLP04	1709-2F-NRD--00004	Linton-Perine	2F	Redware
CLP05	1709-2F-NRD--00005	Linton-Perine	2F	Redware
CLP06	1709-2F-NRD--00006	Linton-Perine	2F	Redware
CLP07	1709-2F-NRD--00007	Linton-Perine	2F	Redware
CLP08	1709-2F-NRD--00008	Linton-Perine	2F	Redware
CLP09	1709-2F-NRD--00009	Linton-Perine	2F	Redware
CLP10	1709-2F-NRD--00010	Linton-Perine	2F	Redware
CLP11	1709-2A-FE1-NRD--00001	Linton-Perine	2A-FE1	Redware
CLP12	1709-2A-FE1-NRD--00002	Linton-Perine	2A-FE1	Coarse EWare, unid.
CLP13	1709-2A-FE1-NRD--00003	Linton-Perine	2A-FE1	Redware
CLP14	1709-2E-1-NRD--00001	Linton-Perine	2E-1	Redware
CLP15	1709-N4E1-9-NRD--00001	Linton-Perine	N4E1-9	Redware
CLP16	1709-1-2-NRD--00003	Linton-Perine	1-2	Redware
CMJ01	1710-5A-NRD--00001	Morgan Jones	5A	Coarse EWare, unid.
CMJ02	1710-5A-NRD--00002	Morgan Jones	5A	Coarse EWare, unid.
CMJ03	1710-5A-NRD--00003	Morgan Jones	5A	Coarse EWare, unid.
CMJ04	1710-5A-NRD--00004	Morgan Jones	5A	Coarse EWare, unid.
CMJ05	1710-5A-NRD--00005	Morgan Jones	5A	Coarse EWare, unid.
CMJ06	1710-UNPROV-NRD--00001	Morgan Jones	UNPROV	Coarse EWare, unid.
CMJ07	1710-UNPROV-NRD--00002	Morgan Jones	UNPROV	Coarse EWare, unid.
CMJ08	1710-UNPROV-NRD--00003	Morgan Jones	UNPROV	Coarse EWare, unid.
CMJ09	1710-UNPROV-NRD--00004	Morgan Jones	UNPROV	Coarse EWare, unid.
CMJ10	1710-5A-NRD--00006	Morgan Jones	5A	Coarse EWare, unid.
CMJ11	1710-5A-NRD--00007	Morgan Jones	5A	Coarse EWare, unid.
CMJ12	1710-5A-NRD--00008	Morgan Jones	5A	Coarse EWare, unid.
CMJ13	1710-5A-NRD--00009	Morgan Jones	5A	Coarse EWare, unid.
CMJ14	1710-5A-NRD--00010	Morgan Jones	5A	Coarse EWare, unid.
CMJ15	1710-1J-NRD--00001	Morgan Jones	1J	Coarse EWare, unid.
CPP01	1711-CN2-NRD--00001	Plum Pottery	CN2	Redware
CPP02	1711-CN2-NRD--00002	Plum Pottery	CN2	Redware
CPP03	1711-CN1-NRD--00001	Plum Pottery	CN1	Redware

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
CLC05	Hollow	Unid: Utilitarian	5.93	10YR 7/2	Unglazed	Lead Glaze
CLP01	Hollow	Milk Pan	13.29	5YR 7/4	Unglazed	Lead Glaze
CLP02	Hollow	Storage Vessel	11.32	2.5YR 5/6	Unglazed	Unglazed
CLP03	Hollow	Storage Vessel	11.16	2.5YR 6/6	Unglazed	Lead Glaze
CLP04	Hollow	Unid: Tableware	8.53	2.5YR 6/6	Lead Glaze	Lead Glaze
CLP05	Hollow	Unidentifiable	5.27	5YR 6/6	Lead Glaze	Lead Glaze
CLP06	Hollow	Unid: Tableware	4.46	5YR 5/3	Lead Glaze	Lead Glaze
CLP07	Hollow	Unid: Utilitarian	7.94	2.5YR 6/8	Unglazed	Lead Glaze
CLP08	Hollow	Unid: Utilitarian	5.82	5YR 6/6	Unglazed	Lead Glaze
CLP09	Hollow	Unid: Utilitarian	8.96	2.5YR 5/6	Unglazed	Lead Glaze
CLP10	Hollow	Flower Pot	8.43	2.5YR 6/8	Unglazed	Unglazed
CLP11	Hollow	Unid: Utilitarian	4.94	5YR 6/8	Unglazed	Lead Glaze
CLP12	Hollow	Unid: Utilitarian	7.99	7.5YR 7/3	Unglazed	Lead Glaze
CLP13	Hollow	Unid: Utilitarian	6.77	2.5YR 6/8	Unglazed	Unglazed
CLP14	Hollow	Unid: Utilitarian	9	2.5YR 6/6	Unglazed	Lead Glaze
CLP15	Hollow	Flower Pot	5.89	5YR 7/4	Unglazed	Unglazed
CLP16	Unid.	Unidentifiable	-	5YR 6/6	Unglazed	Unglazed
CMJ01	Hollow	Milk Pan	16.48	10YR 7/3	Unglazed	Lead Glaze
CMJ02	Hollow	Milk Pan	10.91	10YR 8/2	Unglazed	Lead Glaze
CMJ03	Hollow	Unid: Utilitarian	14.51	5YR 7/4	Unglazed	Lead Glaze
CMJ04	Hollow	Milk Pan	16.34	10YR 8/3	Unglazed	Lead Glaze
CMJ05	Hollow	Milk Pan	17.01	10YR 8/4	Unglazed	Lead Glaze
CMJ06	Unid.	Unidentifiable	-	10YR 8/3	Missing	Unid.
CMJ07	Hollow	Unid: Utilitarian	9.74	10YR 8/2	Unglazed	Lead Glaze
CMJ08	Hollow	Storage Vessel	8.87	5YR 8/4	Unglazed	Lead Glaze
CMJ09	Hollow	Unid: Utilitarian	10.27	10YR 8/3	Unglazed	Lead Glaze
CMJ10	Hollow	Milk Pan	16.41	10YR 8/3	Unglazed	Unid.
CMJ11	Hollow	Unid: Utilitarian	10.09	7.5YR 8/4	Unglazed	Unglazed
CMJ12	Hollow	Unid: Utilitarian	9.12	10YR 8/2	Unglazed	Lead Glaze
CMJ13	Hollow	Unid: Utilitarian	12.22	10YR 8/3	Unglazed	Lead Glaze
CMJ14	Hollow	Unid: Utilitarian	6.03	10YR 8/3	Unglazed	Lead Glaze
CMJ15	Hollow	Milk Pan	16.75	10YR 7/3	Unglazed	Lead Glaze
CPP01	Hollow	Unid: Utilitarian	4.2	2.5YR 5/6	Unglazed	Unglazed
CPP02	Hollow	Flower Pot	6.32	5YR 7/6	Unglazed	Unglazed
CPP03	Hollow	Unid: Utilitarian	10.56	7.5YR 7/4	Unglazed	Unglazed

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
CPP04	1711-CN1-NRD--00002	Plum Pottery	CN1	Redware
CPP05	1711-CN1-NRD--00003	Plum Pottery	CN1	Redware
CPP06	1711-CN1-NRD--00006	Plum Pottery	CN1	Redware
CSS01	1712-SS1-2-NRD--00001	Swann-Smith-Milburn	SS1-2	Redware
CSS02	1712-SS1-2-NRD--00002	Swann-Smith-Milburn	SS1-2	Redware
CSS03	1712-SS1-2-NRD--00003	Swann-Smith-Milburn	SS1-2	Coarse EWare, unid.
CSS04	1712-SS1-2-NRD--00004	Swann-Smith-Milburn	SS1-2	Redware
CSS05	1712-3A-NRD--00001	Swann-Smith-Milburn	3A	Redware
CSS06	1712-3A-NRD--00002	Swann-Smith-Milburn	3A	Redware
CTE01	1713-31-4-NRD--00001	Tildon Easton	31-4	Redware
CTE02	1713-UNPROV-NRD--00001	Tildon Easton	UNPROV	Redware
CTE03	1713-38-12-NRD--00001	Tildon Easton	38-12	Coarse EWare, unid.
CTE04	1713-31-NRD--00001	Tildon Easton	31	Redware
CTE05	1713-38-11-NRD--00001	Tildon Easton	38-11	Coarse EWare, unid.
CTE06	1713-31-12-NRD--00001	Tildon Easton	31-12	Redware
CTE07	1713-UNPROV-NRD--00002	Tildon Easton	UNPROV	Redware
CTE08	1713-UNPROV-NRD--00003	Tildon Easton	UNPROV	Redware
CTE09	1713-UNPROV-NRD--00004	Tildon Easton	UNPROV	Redware
CTE10	1713-28-NRD--00001	Tildon Easton	28	Redware
CTE11	1713-31-3-NRD--00001	Tildon Easton	31-3	Redware
LFH01	1714-0-9 DRAIN-NRD--00001	Farnborough Hill	0-9 DRAIN	Surrey-Hampshire
LFH02	1714-0-9 DRAIN-NRD--00002	Farnborough Hill	0-9 DRAIN	Surrey-Hampshire
LFH03	1714-0-9 DRAIN-NRD--00003	Farnborough Hill	0-9 DRAIN	Surrey-Hampshire
LFH04	1714-0-9 DRAIN-NRD--00004	Farnborough Hill	0-9 DRAIN	Surrey-Hampshire
LFH05	1714-0-9 DRAIN-NRD--00005	Farnborough Hill	0-9 DRAIN	Surrey-Hampshire
LFH06	1714-UNPROV-NRD--00001	Farnborough Hill	UNPROV	Surrey-Hampshire
LFH07	1714-UNPROV-NRD--00002	Farnborough Hill	UNPROV	Surrey-Hampshire
LFH08	1714-UNPROV-NRD--00003	Farnborough Hill	UNPROV	Surrey-Hampshire
LFH09	1714-KIIB-NRD--00001	Farnborough Hill	KIIB	Surrey-Hampshire
LFH10	1714-KIIB-NRD--00002	Farnborough Hill	KIIB	Surrey-Hampshire
LFH11	1714-KIIB-NRD--00003	Farnborough Hill	KIIB	Surrey-Hampshire
LFH12	1714-KIIB-NRD--00004	Farnborough Hill	KIIB	Surrey-Hampshire
LFH13	1714-MT DUMP-NRD--00001	Farnborough Hill	MT DUMP	Surrey-Hampshire
LFH14	1714-MT DUMP-NRD--00002	Farnborough Hill	MT DUMP	Surrey-Hampshire
LFH15	1714-B1-2-NRD--00001	Farnborough Hill	B1-2	Surrey-Hampshire
LFH16	1714-UNPROV-NRD--00004	Farnborough Hill	UNPROV	Surrey-Hampshire

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
CPP04	Hollow	Unid: Utilitarian	6.85	2.5YR 5/6	Unglazed	Unglazed
CPP05	Hollow	Unid: Utilitarian	8.65	5YR 6/6	Unglazed	Unglazed
CPP06	Hollow	Flower Pot	6.27	2.5YR 6/6	Unglazed	Unglazed
CSS01	Hollow	Unid: Utilitarian	9.5	2.5YR 6/8	Unglazed	Lead Glaze
CSS02	Hollow	Storage Vessel	7.94	2.5YR 5/6	Unglazed	Lead Glaze
CSS03	Hollow	Storage Vessel	13.53	10YR 8/3	Unglazed	Lead Glaze
CSS04	Hollow	Unid: Utilitarian	8.31	2.5YR 6/8	Unglazed	Lead Glaze
CSS05	Hollow	Storage Vessel	8.62	2.5YR 6/8	Unglazed	Lead Glaze
CSS06	Hollow	Unid: Utilitarian	7.96	2.5YR 6/6	Unglazed	Unglazed
CTE01	Hollow	Storage Vessel	8.78	2.5YR 6/6	Unglazed	Lead Glaze
CTE02	Hollow	Unid: Utilitarian	7.11	2.5YR 5/6	Unglazed	Lead Glaze
CTE03	Hollow	Unid: Utilitarian	9.42	7.5YR 7/4	Missing	Lead Glaze
CTE04	Hollow	Unid: Utilitarian	11.63	5YR 7/6	Unglazed	Lead Glaze
CTE05	Hollow	Unid: Utilitarian	11.8	7.5YR 7/4	Unglazed	Lead Glaze
CTE06	Hollow	Unid: Utilitarian	9.88	5YR 6/6	Unglazed	Lead Glaze
CTE07	Hollow	Unid: Utilitarian	6.5	5YR 7/4	Unglazed	Lead Glaze
CTE08	Hollow	Storage Vessel	8.3	5YR 6/4	Unglazed	Lead Glaze
CTE09	Hollow	Unid: Utilitarian	13.41	5YR 6/6	Unglazed	Lead Glaze
CTE10	Hollow	Unid: Utilitarian	13.54	2.5YR 4/6	Unglazed	Unglazed
CTE11	Hollow	Unid: Utilitarian	18.02	2.5YR 5/8	Unglazed	Unglazed
LFH01	Hollow	Unid: Utilitarian	4.86	10YR 8/3	Unglazed	Lead Glaze
LFH02	Hollow	Unid: Utilitarian	5.35	10YR 7/3	Unglazed	Lead Glaze
LFH03	Hollow	Unid: Utilitarian	5.06	10YR 6/2	Unglazed	Lead Glaze
LFH04	Hollow	Unidentifiable	4.48	10YR 8/2	Lead Glaze	Unglazed
LFH05	Hollow	Unid: Tableware	2.98	10YR 7/1	Lead Glaze	Lead Glaze
LFH06	Hollow	Pipkin	4.01	10YR 8/1	Unglazed	Lead Glaze
LFH07	Hollow	Unidentifiable	6.29	10YR 8/2	Lead Glaze	Lead Glaze
LFH08	Hollow	Unidentifiable	5.55	2.5YR 5/6	Unglazed	Unglazed
LFH09	Hollow	Pipkin	6.9	10YR 7/2	Unglazed	Lead Glaze
LFH10	Hollow	Unid: Utilitarian	5.33	10YR 8/2	Lead Glaze	Unglazed
LFH11	Hollow	Unid: Utilitarian	5.17	10YR 7/3	Unglazed	Lead Glaze
LFH12	Hollow	Unid: Utilitarian	3.53	10YR 8/2	Unglazed	Lead Glaze
LFH13	Hollow	Unid: Utilitarian	6.66	2.5YR 5/6	Unglazed	Lead Glaze
LFH14	Hollow	Unid: Utilitarian	6.37	2.5YR 5/8	Unglazed	Lead Glaze
LFH15	Hollow	Chafing Dish	6.3	5YR 6/6	Unglazed	Unglazed
LFH16	Hollow	Unid: Utilitarian	4.67	10YR 8/2	Lead Glaze	Unglazed

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
LFH17	1714-UNPROV-NRD--00005	Farnborough Hill	UNPROV	Surrey-Hampshire
LFH18	1714-UNPROV-NRD--00006	Farnborough Hill	UNPROV	Surrey-Hampshire
LFH19	1714-UNPROV-NRD--00007	Farnborough Hill	UNPROV	Surrey-Hampshire
LFH20	1714-UNPROV-NRD--00008	Farnborough Hill	UNPROV	Coarse EWare, unid.
LHA01	1715-UNPROV-NRD--00001	S1 Latton Ridding	UNPROV	Redware
LHA02	1715-UNPROV-NRD--00002	S1 Latton Ridding	UNPROV	Redware
LHA03	1715-UNPROV-NRD--00003	S1 Latton Ridding	UNPROV	Redware
LHA04	1715-UNPROV-NRD--00004	S1 Latton Ridding	UNPROV	Redware
LHA05	1715-UNPROV-NRD--00005	S1 Latton Ridding	UNPROV	Redware
LHA06	1715-UNPROV-NRD--00006	S1 Latton Ridding	UNPROV	Redware
LHA09	1715-UNPROV-NRD--00009	S1 Latton Ridding	UNPROV	Redware
LHA10	1715-UNPROV-NRD--00010	S1 Latton Ridding	UNPROV	Redware
LHA11	1715-UNPROV-NRD--00011	S1 Latton Ridding	UNPROV	Redware
LHA12	1715-UNPROV-NRD--00012	S1 Latton Ridding	UNPROV	Redware
LHA13	1715-UNPROV-NRD--00013	S1 Latton Ridding	UNPROV	Redware
LHB01	1716-KILN B-NRD--00001	Mill Street	KILN B	Redware
LHB02	1716-KILN B-NRD--00002	Mill Street	KILN B	Redware
LHB03	1716-KILN B-NRD--00003	Mill Street	KILN B	Redware
LHB04	1716-KILN B-NRD--00004	Mill Street	KILN B	Redware
LHB05	1716-KILN B-NRD--00005	Mill Street	KILN B	Redware
LHB06	1716-KILN B-NRD--00006	Mill Street	KILN B	Redware
LHB07	1716-KILN B-NRD--00007	Mill Street	KILN B	Redware
LHB08	1716-KILN B-NRD--00008	Mill Street	KILN B	Redware
LHB09	1716-UNSTRAT-NRD--00001	Mill Street	UNSTRAT	Redware
LHB10	1716-UNSTRAT-NRD--00002	Mill Street	UNSTRAT	Redware
LHB11	1716-UNSTRAT-NRD--00003	Mill Street	UNSTRAT	Redware
LHB12	1716-UNSTRAT-NRD--00004	Mill Street	UNSTRAT	Redware
LHC01	1717-UNPROV-NRD--00001	Carters Mead	UNPROV	Redware
LHC02	1717-UNPROV-NRD--00002	Carters Mead	UNPROV	Redware
LHC03	1717-UNPROV-NRD--00003	Carters Mead	UNPROV	Redware
LHC04	1717-UNPROV-NRD--00004	Carters Mead	UNPROV	Redware
LHD01	1718-5704-NRD--00001	Latton Street Scout Hall	5704	Redware
LHD02	1718-5704-NRD--00003	Latton Street Scout Hall	5704	Redware
LHD03	1718-5704-NRD--00002	Latton Street Scout Hall	5704	Redware
LHD04	1718-HMB5567-NRD--00001	Latton Street Scout Hall	HMB5567	Redware

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
LFH17	Hollow	Pipkin	6.82	10YR 7/3	Lead Glaze	Lead Glaze
LFH18	Hollow	Unid: Utilitarian	8.37	10YR 8/1	Unglazed	Lead Glaze
LFH19	Hollow	Unid: Utilitarian	10.22	2.5YR 6/8	Unglazed	Lead Glaze
LFH20	Hollow	Unidentifiable	7.94	10YR 8/3	Lead Glaze	Lead Glaze
LHA01	Hollow	Unid: Utilitarian	9.52	2.5YR 5/8	Unglazed	Lead Glaze
LHA02	Hollow	Unid: Utilitarian	12.59	2.5YR 5/6	Unglazed	Lead Glaze
LHA03	Hollow	Unid: Tableware	9.59	2.5YR 5/6	Lead Glaze	Lead Glaze
LHA04	Hollow	Unid: Utilitarian	5.62	2.5YR 5/8	Unglazed	Lead Glaze
LHA05	Hollow	Unidentifiable	7.22	2.5YR 4/4	Lead Glaze	Lead Glaze
LHA06	Hollow	Unid: Tableware	8.38	2.5YR 5/8	Lead Glaze	Lead Glaze
LHA09	Hollow	Unid: Tableware	3.66	2.5YR 5/6	Unglazed	Lead Glaze
LHA10	Hollow	Unidentifiable	7.76	2.5YR 4/4	Lead Glaze	Lead Glaze
LHA11	Unid.	Unid: Tableware	12.41	2.5YR 5/6	Unglazed	Lead Glaze
LHA12	Unid.	Unid: Tableware	8.07	2.5YR 5/6	Unglazed	Lead Glaze
LHA13	Hollow	Mug/Can	5.24	2.5YR 5/8	Lead Glaze	Lead Glaze
LHB01	Unid.	Unidentifiable	6.53	2.5YR 5/8	Unglazed	Lead Glaze
LHB02	Hollow	Unidentifiable	5.37	2.5YR 4/4	Unglazed	Unglazed
LHB03	Hollow	Unidentifiable	4.73	2.5YR 5/6	Unglazed	Unglazed
LHB04	Unid.	Unid: Utilitarian	6.75	5YR 5/6	Lead Glaze	Unglazed
LHB05	Hollow	Unidentifiable	6.06	10R 4/6	Unglazed	Unid.
LHB06	Hollow	Unidentifiable	4.74	2.5YR 5/6	Unglazed	Lead Glaze
LHB07	Hollow	Unidentifiable	6.66	10R 4/6	Unglazed	Unglazed
LHB08	Hollow	Unidentifiable	5.79	2.5YR 5/8	Unglazed	Unid.
LHB09	Hollow	Unidentifiable	5.68	2.5YR 5/8	Unglazed	Lead Glaze
LHB10	Hollow	Unid: Utilitarian	6.33	2.5YR 5/6	Unglazed	Lead Glaze
LHB11	Hollow	Unid: Utilitarian	6.78	2.5YR 5/8	Unglazed	Lead Glaze
LHB12	Hollow	Unid: Tableware	4.3	2.5YR 5/8	Lead Glaze	Unglazed
LHC01	Hollow	Unid: Tableware	6.24	2.5YR 5/8	Unglazed	Lead Glaze
LHC02	Hollow	Unid: Utilitarian	7.25	2.5YR 5/6	Unglazed	Lead Glaze
LHC03	Unid.	Unidentifiable	4.39	2.5YR 5/6	Unglazed	Lead Glaze
LHC04	Hollow	Unidentifiable	4.94	2.5YR 5/6	Unglazed	Lead Glaze
LHD01	Hollow	Bowl	13.03	10R 5/6	Lead Glaze	Lead Glaze
LHD02	Hollow	Bowl	17.8	2.5YR 5/6	Unglazed	Lead Glaze
LHD03	Hollow	Unid: Utilitarian	12.74	2.5YR 4/8	Lead Glaze	Lead Glaze
LHD04	Hollow	Unid: Utilitarian	4.41	2.5YR 5/8	Unglazed	Lead Glaze

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
LHD05	1718-HMB5567-NRD--00002	Latton Street Scout Hall	HMB5567	Redware
LHD06	1718-HMB5567-NRD--00003	Latton Street Scout Hall	HMB5567	Redware
LHD07	1718-HMB5567-NRD--00004	Latton Street Scout Hall	HMB5567	Redware
LHD08	1718-HMB5567-NRD--00005	Latton Street Scout Hall	HMB5567	Redware
LHD09	1718-HMB5567-NRD--00006	Latton Street Scout Hall	HMB5567	Redware
LHD10	1718-HMB5567-NRD--00007	Latton Street Scout Hall	HMB5567	Redware
LHD11	1718-HMB5567-NRD--00008	Latton Street Scout Hall	HMB5567	Redware
LHD12	1718-HMB5567-NRD--00009	Latton Street Scout Hall	HMB5567	Redware
LHD13	1718-HMB5567-NRD--00010	Latton Street Scout Hall	HMB5567	Redware
LHD14	1718-HMB5567-NRD--00011	Latton Street Scout Hall	HMB5567	Redware
LWW01	1719-2706-NRD--00001	Woolrich Teardrop	2706	Redware
LWW02	1719-2707-NRD--00001	Woolrich Teardrop	2707	Redware
LWW03	1719-1911-NRD--00001	Woolrich Teardrop	1911	Coarse EWare, unid.
LWW04	1719-2706-NRD--00002	Woolrich Teardrop	2706	Coarse EWare, unid.
LWW05	1719-2706-NRD--00003	Woolrich Teardrop	2706	Redware
LWW06	1719-2762-NRD--00001	Woolrich Teardrop	2762	Redware
LWW07	1719-734-NRD--00001	Woolrich Teardrop	734	Redware
LWW08	1719-314-NRD--00001	Woolrich Teardrop	314	Redware
LWW09	1721-THB09-70-NRD--00001	Thameslink	THB09-70	Redware
LWW10	1721-THB09-70-NRD--00002	Thameslink	THB09-70	Redware
LWW11	1720-242-NRD--00001	Royal Arsenal	242	Redware
LWW12	1720-242-NRD--00002	Royal Arsenal	242	Redware
LWW13	1720-242-NRD--00003	Royal Arsenal	242	Redware
LWW14	1720-242-NRD--00004	Royal Arsenal	242	Redware
LWW15	1720-242-NRD--00005	Royal Arsenal	242	Redware
MSB01	1723-UNPROV-NRD--00001	Swan Bank Pottery	UNPROV	Coarse EWare, unid.
MSB02	1723-UNPROV-NRD--00002	Swan Bank Pottery	UNPROV	Redware
MSB03	1723-UNPROV-NRD--00003	Swan Bank Pottery	UNPROV	Redware
MSB04	1723-UNPROV-NRD--00004	Swan Bank Pottery	UNPROV	Redware
MSB05	1723-UNPROV-NRD--00005	Swan Bank Pottery	UNPROV	N. Midlands/Staff.
MSB06	1723-UNPROV-NRD--00006	Swan Bank Pottery	UNPROV	Redware
MSB07	1723-UNPROV-NRD--00007	Swan Bank Pottery	UNPROV	Coarse EWare, unid.
MSB08	1723-UNPROV-NRD--00008	Swan Bank Pottery	UNPROV	Redware
MSB09	1723-UNPROV-NRD--00009	Swan Bank Pottery	UNPROV	Redware
MSB10	1723-UNPROV-NRD--00010	Swan Bank Pottery	UNPROV	Unidentifiable
MSB11	1723-UNPROV-NRD--00011	Swan Bank Pottery	UNPROV	Redware

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
LHD05	Hollow	Unid: Utilitarian	4.74	2.5YR 5/8	Unglazed	Lead Glaze
LHD06	Hollow	Unid: Utilitarian	6.15	2.5YR 5/6	Unglazed	Lead Glaze
LHD07	Hollow	Unid: Utilitarian	6.91	2.5YR 5/8	Unglazed	Lead Glaze
LHD08	Hollow	Unid: Utilitarian	7.14	2.5YR 5/6	Unglazed	Unglazed
LHD09	Hollow	Unid: Utilitarian	6.22	2.5YR 5/6	Unglazed	Lead Glaze
LHD10	Hollow	Unid: Utilitarian	5.87	2.5YR 4/8	Unglazed	Lead Glaze
LHD11	Hollow	Unid: Utilitarian	6.27	2.5YR 5/6	Unglazed	Unglazed
LHD12	Hollow	Unid: Utilitarian	6.55	2.5YR 5/6	Unglazed	Lead Glaze
LHD13	Hollow	Unid: Utilitarian	4.86	2.5YR 5/6	Unglazed	Lead Glaze
LHD14	Hollow	Unid: Utilitarian	5.2	2.5YR 5/8	Unglazed	Lead Glaze
LWW01	Unid.	Unidentifiable	-	5YR 6/4	Unglazed	Missing
LWW02	Hollow	Jug	8.2	5YR 5/6	Unglazed	Unglazed
LWW03	Hollow	Unid: Utilitarian	-	Unid, Reduced	Lead Glaze	Missing
LWW04	Hollow	Jug	8.34	Unid, Reduced	Wash	Unglazed
LWW05	Hollow	Unid: Utilitarian	5.78	5YR 5/2	Wash	Unglazed
LWW06	Hollow	Bowl	8.52	2.5YR 5/8	Lead Glaze	Lead Glaze
LWW07	Hollow	Bowl	6.68	5YR 4/6	Unglazed	Lead Glaze
LWW08	Hollow	Unid: Utilitarian	6.35	2.5YR 5/6	Unglazed	Lead Glaze
LWW09	Hollow	Unid: Utilitarian	8.19	2.5YR 5/8	Unglazed	Lead Glaze
LWW10	Hollow	Pipkin	7.88	2.5YR 5/8	Unglazed	Lead Glaze
LWW11	Hollow	Unid: Utilitarian	5.78	2.5YR 5/8	Unglazed	Lead Glaze
LWW12	Hollow	Pipkin	5.17	2.5YR 4/8	Unglazed	Lead Glaze
LWW13	Hollow	Pipkin	8.15	2.5YR 5/8	Unglazed	Lead Glaze
LWW14	Hollow	Unid: Utilitarian	7.59	2.5YR 5/8	Lead Glaze	Lead Glaze
LWW15	Hollow	Bowl	9.02	2.5YR 4/6	Unglazed	Lead Glaze
MSB01	Hollow	Unid: Utilitarian	6.51	7.5YR 7/4	Unglazed	Lead Glaze
MSB02	Flat	Plate	6.76	2.5YR 6/6	Unglazed	Lead Glaze
MSB03	Hollow	Milk Pan	10.45	2.5YR 5/6	Unglazed	Unglazed
MSB04	Hollow	Storage Vessel	9.77	5YR 6/6	Unglazed	Lead Glaze
MSB05	Flat	Plate	7.23	10YR 8/2	Unglazed	Lead Glaze
MSB06	Hollow	Storage Vessel	10.38	5YR 6/6	Unglazed	Lead Glaze
MSB07	Hollow	Unidentifiable	6.55	7.5YR 7/4	Unglazed	Unglazed
MSB08	Flat	Plate	10.71	2.5YR 6/6	Unglazed	Unglazed
MSB09	Hollow	Unid: Utilitarian	8.57	2.5YR 6/4	Unglazed	Unid.
MSB10	Hollow	Unid: Utilitarian	8.43	Unid, Reduced	Unglazed	Unglazed
MSB11	Hollow	Storage Vessel	7.84	2.5YR 5/6	Unglazed	Lead Glaze

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
MSB12	1723-UNPROV-NRD--00012	Swan Bank Pottery	UNPROV	N. Midlands/Staff.
MSB13	1723-UNPROV-NRD--00013	Swan Bank Pottery	UNPROV	Buckley
MSB14	1723-UNPROV-NRD--00014	Swan Bank Pottery	UNPROV	Redware
MSB15	1723-UNPROV-NRD--00015	Swan Bank Pottery	UNPROV	Coarse EWare, unid.
MSB16	1723-UNPROV-NRD--00016	Swan Bank Pottery	UNPROV	Redware
MSB17	1723-UNPROV-NRD--00017	Swan Bank Pottery	UNPROV	Unidentifiable
MSB18	1723-UNPROV-NRD--00018	Swan Bank Pottery	UNPROV	Unidentifiable
NHL01	1724-558-NRD--00001	Henry Loy/Jacob Albright	558	Coarse EWare, unid.
NHL02	1724-558-NRD--00002	Henry Loy/Jacob Albright	558	Coarse EWare, unid.
NHL03	1724-558-NRD--00003	Henry Loy/Jacob Albright	558	Redware
NHL04	1724-558-NRD--00004	Henry Loy/Jacob Albright	558	Coarse EWare, unid.
NHL05	1724-558-NRD--00005	Henry Loy/Jacob Albright	558	Coarse EWare, unid.
NHL06	1724-558-NRD--00006	Henry Loy/Jacob Albright	558	Redware
NHL07	1724-558-NRD--00007	Henry Loy/Jacob Albright	558	Redware
NHL08	1724-558-NRD--00008	Henry Loy/Jacob Albright	558	Redware
NJL01	1725-SURFACE-NRD--00001	Joseph Loy	SURFACE	Redware
NJL02	1725-SURFACE-NRD--00002	Joseph Loy	SURFACE	Redware
NJL03	1725-SURFACE-NRD--00003	Joseph Loy	SURFACE	Redware
NJL04	1725-SURFACE-NRD--00004	Joseph Loy	SURFACE	Redware
NJL05	1725-SURFACE-NRD--00005	Joseph Loy	SURFACE	Redware
NSL01	1726-W25N15-1-NRD--00001	Solomon Loy	W25N15-1	Coarse EWare, unid.
NSL02	1726-W25N10-1-NRD--00001	Solomon Loy	W25N10-1	Coarse EWare, unid.
NSL03	1726-W25N15-1-NRD--00002	Solomon Loy	W25N15-1	Coarse EWare, unid.
NWD01	1727-WILLIAM-NRD--00001	William Dennis	WILLIAM	Redware
NWD02	1727-WILLIAM-NRD--00002	William Dennis	WILLIAM	Redware
NWD03	1727-WILLIAM-NRD--00003	William Dennis	WILLIAM	Redware
NWD04	1727-WILLIAM-NRD--00004	William Dennis	WILLIAM	Redware
NWD05	1727-THOMAS-NRD--00001	Thomas Dennis	THOMAS	Redware
NWD06	1727-THOMAS-NRD--00002	Thomas Dennis	THOMAS	Redware
NWD07	1727-THOMAS-NRD--00003	Thomas Dennis	THOMAS	Redware
PSR01	1728-4A-1-NRD--00001	Sycolin Road	4A-1	Redware
PSR02	1728-4A-1-NRD--00002	Sycolin Road	4A-1	Redware
PSR03	1728-4A-1-NRD--00003	Sycolin Road	4A-1	Redware
PSR04	1728-4A-1-NRD--00004	Sycolin Road	4A-1	Redware
PSR05	1728-4A-1-NRD--00005	Sycolin Road	4A-1	Redware

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
MSB12	Flat	Plate	5.95	10YR 7/4	Unglazed	Lead Glaze
MSB13	Hollow	Unid: Utilitarian	7.04	2.5YR 6/6	Unglazed	Lead Glaze
MSB14	Hollow	Unid: Utilitarian	5.84	2.5YR 5/6	Unglazed	Lead Glaze
MSB15	Hollow	Unid: Utilitarian	8.13	5YR 7/4	Unglazed	Lead Glaze
MSB16	Hollow	Plate	9.09	5YR 7/4	Unglazed	Lead Glaze
MSB17	Hollow	Unid: Utilitarian	4.56	Unid, Reduced	Unglazed	Unglazed
MSB18	Hollow	Unidentifiable	4.86	Unid, Reduced	Unglazed	Lead Glaze
NHL01	Hollow	Unid: Utilitarian	15.1	10YR 8/1	Unglazed	Unglazed
NHL02	Unid.	Unid: Utilitarian	12.12	10YR 8/2	Unglazed	Unglazed
NHL03	Hollow	Unid: Utilitarian	10.66	5YR 6/6	Unglazed	Unglazed
NHL04	Unid.	Unidentifiable	5.75	Not Applicable	Unglazed	Lead Glaze
NHL05	Unid.	Unidentifiable	5.62	Not Applicable	Unglazed	Lead Glaze
NHL06	Flat	Plate	7.15	Not Applicable	Unglazed	Lead Glaze
NHL07	Hollow	Storage Vessel	10.18	Not Applicable	Unglazed	Lead Glaze
NHL08	Hollow	Storage Vessel	12.93	Not Applicable	Unglazed	Lead Glaze
NJL01	Unid.	Unid: Utilitarian	8.26	5YR 6/6	Unglazed	Unglazed
NJL02	Unid.	Unid: Utilitarian	6.69	5YR 6/6	Unglazed	Unglazed
NJL03	Hollow	Unid: Utilitarian	7.88	5YR 6/8	Unglazed	Unglazed
NJL04	Unid.	Unid: Utilitarian	9.12	5YR 6/6	Unglazed	Unglazed
NJL05	Hollow	Unidentifiable	5.53	5YR 6/6	Unglazed	Unglazed
NSL01	Hollow	Unid: Utilitarian	8.56	7.5YR 8/4	Unglazed	Unglazed
NSL02	Hollow	Unid: Utilitarian	5.29	10YR 8/2	Unglazed	Unglazed
NSL03	Hollow	Unid: Utilitarian	7.53	7.5YR 8/4	Unglazed	Lead Glaze
NWD01	Hollow	Unidentifiable	9.21	5YR 7/6	Unglazed	Unglazed
NWD02	Hollow	Unidentifiable	6.65	2.5YR 5/6	Unglazed	Unglazed
NWD03	Hollow	Unid: Utilitarian	6.71	5YR 6/6	Unglazed	Unglazed
NWD04	Hollow	Unidentifiable	5.36	5YR 7/6	Unglazed	Unglazed
NWD05	Hollow	Unidentifiable	9.51	2.5YR 6/6	Unglazed	Unglazed
NWD06	Hollow	Unidentifiable	6.44	5YR 6/4	Unglazed	Unglazed
NWD07	Hollow	Unid: Utilitarian	7.19	5YR 5/6	Unglazed	Unglazed
PSR01	Hollow	Storage Vessel	9.41	Not Applicable	Unglazed	Lead Glaze
PSR02	Hollow	Storage Vessel	6.99	Not Applicable	Unglazed	Lead Glaze
PSR03	Hollow	Storage Vessel	9.11	Not Applicable	Unglazed	Lead Glaze
PSR04	Hollow	Storage Vessel	8.56	Not Applicable	Unglazed	Lead Glaze
PSR05	Hollow	Unid: Utilitarian	6.63	Not Applicable	Unglazed	Lead Glaze

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
PSR06	1728-4A-1-NRD--00006	Sycolin Road	4A-1	Redware
PSR07	1728-4A-1-NRD--00007	Sycolin Road	4A-1	Redware
PSR08	1728-4A-1-NRD--00008	Sycolin Road	4A-1	Redware
PSR09	1728-4A-1-NRD--00009	Sycolin Road	4A-1	Redware
PSR10	1728-4A-2-NRD--00018	Sycolin Road	4A-2	Redware
PSR11	1728-4A-2-NRD--00014	Sycolin Road	4A-2	Redware
PSR12	1728-4A-2-NRD--00015	Sycolin Road	4A-2	Redware
PSR13	1728-4A-2-NRD--00016	Sycolin Road	4A-2	Redware
PSR14	1728-4A-2-NRD--00017	Sycolin Road	4A-2	Redware
PSR18	1728-4A-1-NRD--00011	Sycolin Road	4A-1	Redware
SAB01	1729-SURFACE-NOS--00001	Anthony Baecher	SURFACE	Redware
SAB02	1729-SURFACE-NOS--00002	Anthony Baecher	SURFACE	Redware
SAB03	1729-SURFACE-NOS--00003	Anthony Baecher	SURFACE	Redware
SAB04	1729-SURFACE-NOS--00004	Anthony Baecher	SURFACE	Redware
SAB05	1729-SURFACE-NOS--00005	Anthony Baecher	SURFACE	Redware
SAB06	1729-SURFACE-NOS--00006	Anthony Baecher	SURFACE	Redware
SAB07	1729-SURFACE-NOS--00007	Anthony Baecher	SURFACE	Redware
SAB08	1729-SURFACE-NOS--00008	Anthony Baecher	SURFACE	Redware
SAB09	1729-SURFACE-NOS--00009	Anthony Baecher	SURFACE	Redware
SAB10	1729-SURFACE-NOS--00010	Anthony Baecher	SURFACE	Redware
SAB11	1729-SURFACE-NOS--00011	Anthony Baecher	SURFACE	Redware
SAB12	1729-SURFACE-NOS--00012	Anthony Baecher	SURFACE	Redware
SAB13	1729-SURFACE-NOS--00013	Anthony Baecher	SURFACE	Redware
SAP01	1730-299B-NRD--00001	Andrew Pitman Pottery	299B	Redware
SAP02	1730-299B-NRD--00002	Andrew Pitman Pottery	299B	Redware
SAP03	1730-299B-NRD--00003	Andrew Pitman Pottery	299B	Redware
SAP04	1730-299B-NRD--00004	Andrew Pitman Pottery	299B	Redware
SAP05	1730-299B-NRD--00005	Andrew Pitman Pottery	299B	Redware
SAP06	1730-299C-NRD--00001	Andrew Pitman Pottery	299C	Redware
SAP07	1730-299C-NRD--00002	Andrew Pitman Pottery	299C	Redware
SAP08	1730-299C-NRD--00003	Andrew Pitman Pottery	299C	Redware
SAP09	1730-299C-NRD--00004	Andrew Pitman Pottery	299C	Redware
SAP10	1730-UNSTRAT-NRD--00001	Andrew Pitman Pottery	UNSTRAT	Redware
SAP11	1730-UNSTRAT-NRD--00002	Andrew Pitman Pottery	UNSTRAT	Redware
SAP12	1730-UNSTRAT-NRD--00003	Andrew Pitman Pottery	UNSTRAT	Redware
SAP13	1730-UNSTRAT-NRD--00004	Andrew Pitman Pottery	UNSTRAT	Redware

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
PSR06	Hollow	Storage Vessel	9.46	Not Applicable	Unglazed	Lead Glaze
PSR07	Hollow	Storage Vessel	6.65	Not Applicable	Unglazed	Lead Glaze
PSR08	Hollow	Unid: Utilitarian	9.17	Not Applicable	Unglazed	Lead Glaze
PSR09	Hollow	Storage Vessel	11.31	Not Applicable	Unglazed	Lead Glaze
PSR10	Hollow	Unid: Utilitarian	10.01	2.5YR 6/6	Unglazed	Lead Glaze
PSR11	Hollow	Unid: Utilitarian	12	2.5YR 6/6	Unglazed	Lead Glaze
PSR12	Hollow	Milk Pan	12.03	2.5YR 5/6	Unglazed	Lead Glaze
PSR13	Hollow	Unid: Utilitarian	11.14	2.5YR 5/6	Unglazed	Lead Glaze
PSR14	Hollow	Unid: Utilitarian	10.7	2.5YR 6/6	Unglazed	Lead Glaze
PSR18	Flat	Unid: Tableware	7.89	Not Applicable	Unglazed	Unid.
SAB01	Hollow	Storage Vessel	11.84	5YR 6/6	Unglazed	Unglazed
SAB02	Hollow	Storage Vessel	15.05	5YR 5/3	Unglazed	Lead Glaze
SAB03	Hollow	Storage Vessel	15.37	2.5YR 5/6	Unglazed	Lead Glaze
SAB04	Hollow	Storage Vessel	13.04	5YR 6/6	Unglazed	Lead Glaze
SAB05	Hollow	Storage Vessel	10.04	5YR 6/6	Unglazed	Lead Glaze
SAB06	Hollow	Storage Vessel	13.55	5YR 6/6	Unglazed	Lead Glaze
SAB07	Hollow	Unid: Utilitarian	8.31	7.5YR 7/4	Unglazed	Lead Glaze
SAB08	Hollow	Unid: Utilitarian	9.38	5YR 6/6	Unglazed	Unglazed
SAB09	Hollow	Storage Vessel	14.76	2.5YR 5/6	Unglazed	Lead Glaze
SAB10	Hollow	Unid: Utilitarian	5.45	2.5YR 5/6	Unglazed	Lead Glaze
SAB11	Hollow	Unid: Utilitarian	9.74	5YR 6/6	Unglazed	Lead Glaze
SAB12	Hollow	Unid: Utilitarian	12.18	5YR 6/6	Unglazed	Lead Glaze
SAB13	Hollow	Unid: Utilitarian	9.05	5YR 6/6	Unglazed	Lead Glaze
SAP01	Flat	Unid: Utilitarian	9.85	5YR 6/8	Unglazed	Lead Glaze
SAP02	Hollow	Storage Vessel	7.49	5YR 6/4	Unglazed	Lead Glaze
SAP03	Unid.	Unid: Tableware	11.96	5YR 6/6	Unglazed	Lead Glaze
SAP04	Hollow	Unid: Tableware	3.95	2.5YR 5/6	Lead Glaze	Lead Glaze
SAP05	Hollow	Unid: Utilitarian	9.91	2.5YR 6/6	Unglazed	Lead Glaze
SAP06	Hollow	Milk Pan	7.83	2.5YR 6/6	Unglazed	Lead Glaze
SAP07	Hollow	Unid: Utilitarian	7.02	2.5YR 6/8	Unglazed	Lead Glaze
SAP08	Hollow	Unid: Utilitarian	7.25	2.5YR 6/8	Unglazed	Lead Glaze
SAP09	Unid.	Unidentifiable	6.41	2.5YR 6/6	Unglazed	Lead Glaze
SAP10	Hollow	Unid: Utilitarian	6.03	5YR 6/4	Unglazed	Lead Glaze
SAP11	Hollow	Unidentifiable	5.35	2.5YR 5/6	Unglazed	Lead Glaze
SAP12	Hollow	Storage Vessel	15.67	2.5YR 5/6	Unglazed	Lead Glaze
SAP13	Hollow	Unid: Utilitarian	7.01	2.5YR 6/6	Unglazed	Lead Glaze

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
SAP14	1730-UNSTRAT-NRD--00005	Andrew Pitman Pottery	UNSTRAT	Redware
SAP15	1730-UNSTRAT-NRD--00006	Andrew Pitman Pottery	UNSTRAT	Redware
SAP16	1730-UNSTRAT-NRD--00007	Andrew Pitman Pottery	UNSTRAT	Redware
SFB01	1731-14-2-NRD--00001	Firebaugh	14-2	Redware
SFB02	1731-14-2-NRD--00002	Firebaugh	14-2	Redware
SFB03	1731-14-2-NRD--00003	Firebaugh	14-2	Coarse EWare, unid.
SFB04	1731-14-2-NRD--00004	Firebaugh	14-2	Redware
SFB05	1731-14-2-NRD--00005	Firebaugh	14-2	Coarse EWare, unid.
SFB06	1731-14-2-NRD--00006	Firebaugh	14-2	Coarse EWare, unid.
SFB07	1731-14-2-NRD--00007	Firebaugh	14-2	Unidentifiable
SFB08	1731-14-2-NRD--00008	Firebaugh	14-2	Coarse EWare, unid.
SFB09	1731-14-2-NRD--00009	Firebaugh	14-2	Redware
SFB10	1731-14-2-NRD--00010	Firebaugh	14-2	Redware
SFB11	1731-14-2-NRD--00011	Firebaugh	14-2	Redware
SFB12	1731-14-2-NRD--00012	Firebaugh	14-2	Coarse EWare, unid.
SFB13	1731-14-2-NRD--00015	Firebaugh	14-2	Coarse EWare, unid.
SFB14	1731-14-2-NRD--00013	Firebaugh	14-2	Redware
SFB15	1731-14-2-NRD--00014	Firebaugh	14-2	Redware
SFB16	1731-14-2-NRD--00018	Firebaugh	14-2	Coarse EWare, unid.
SFC01	1732-3-1-NRD--00001	Fincastle	3-1	Unidentifiable
SFC02	1732-3-1-NRD--00002	Fincastle	3-1	Redware
SFC03	1732-3-1-NRD--00003	Fincastle	3-1	Redware
SFC04	1732-3-1-NRD--00004	Fincastle	3-1	Redware
SFC05	1732-3-1-NRD--00005	Fincastle	3-1	Redware
SFC06	1732-4-2-NRD--00001	Fincastle	4-2	Redware
SFC07	1732-4-2-NRD--00002	Fincastle	4-2	Redware
SFC08	1732-4-2-NRD--00003	Fincastle	4-2	Redware
SFC09	1732-4-1-NRD--00002	Fincastle	4-1	Redware
SFC10	1732-4-1-NRD--00001	Fincastle	4-1	Redware
SFC11	1732-UNPROV-NRD--00001	Fincastle	UNPROV	Redware
SFC12	1732-UNPROV-NRD--00002	Fincastle	UNPROV	Redware
SFC13	1732-UNPROV-NRD--00003	Fincastle	UNPROV	Redware
SFC14	1732-UNPROV-NRD--00004	Fincastle	UNPROV	Redware
SHW01	1733-UNPROV-NRD--00001	Heatwole	UNPROV	Redware
SHW02	1733-UNPROV-NRD--00002	Heatwole	UNPROV	Redware

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
SAP14	Hollow	Storage Vessel	11.54	2.5YR 7/8	Unglazed	Lead Glaze
SAP15	Hollow	Storage Vessel	6.11	2.5YR 6/6	Unglazed	Lead Glaze
SAP16	Hollow	Unid: Utilitarian	7.28	2.5YR 6/6	Unglazed	Lead Glaze
SFB01	Hollow	Storage Vessel	13.77	2.5YR 5/6	Unglazed	Lead Glaze
SFB02	Hollow	Storage Vessel	9.19	5YR 6/6	Unglazed	Lead Glaze
SFB03	Hollow	Storage Vessel	9.94	7.5YR 7/4	Unglazed	Lead Glaze
SFB04	Hollow	Storage Vessel	9.89	2.5YR 6/6	Unglazed	Lead Glaze
SFB05	Hollow	Unidentifiable	7.37	7.5YR 7/6	Unglazed	Lead Glaze
SFB06	Hollow	Unid: Utilitarian	6.76	7.5YR 7/6	Unglazed	Lead Glaze
SFB07	Hollow	Unidentifiable	5.09	2.5YR 3/1	Unglazed	Lead Glaze
SFB08	Hollow	Storage Vessel	12.13	5YR 7/6	Unglazed	Lead Glaze
SFB09	Hollow	Storage Vessel	8.24	2.5YR 6/6	Unglazed	Lead Glaze
SFB10	Hollow	Storage Vessel	6.2	2.5YR 5/6	Unglazed	Lead Glaze
SFB11	Hollow	Unid: Utilitarian	7.97	2.5YR 6/8	Unglazed	Lead Glaze
SFB12	Hollow	Unidentifiable	6.16	7.5YR 7/4	Unglazed	Unglazed
SFB13	Hollow	Storage Vessel	6.33	7.5YR 6/4	Unglazed	Lead Glaze
SFB14	Hollow	Storage Vessel	4.55	2.5YR 6/6	Unglazed	Lead Glaze
SFB15	Hollow	Unid: Utilitarian	7	5YR 6/6	Unglazed	Lead Glaze
SFB16	Hollow	Unidentifiable	5.29	10YR 8/4	Unglazed	Lead Glaze
SFC01	Hollow	Unid: Utilitarian	6.24	7.5YR 4/2	Unglazed	Lead Glaze
SFC02	Hollow	Unid: Utilitarian	7.24	2.5YR 5/6	Unglazed	Lead Glaze
SFC03	Unid.	Unid: Utilitarian	7.76	5YR 6/6	Unglazed	Lead Glaze
SFC04	Hollow	Unid: Utilitarian	5.04	2.5YR 5/6	Unglazed	Lead Glaze
SFC05	Hollow	Unidentifiable	10.09	2.5YR 4/3	Unid.	Unid.
SFC06	Hollow	Storage Vessel	7.47	5YR 5/6	Unglazed	Lead Glaze
SFC07	Hollow	Unid: Utilitarian	9.02	5YR 6/8	Unglazed	Lead Glaze
SFC08	Hollow	Unid: Utilitarian	5.94	2.5YR 5/6	Lead Glaze	Lead Glaze
SFC09	Hollow	Unid: Utilitarian	6.29	2.5YR 6/6	Unglazed	Unglazed
SFC10	Hollow	Storage Vessel	7.57	10R 4/6	Unglazed	Unglazed
SFC11	Hollow	Storage Vessel	6.3	2.5YR 5/4	Lead Glaze	Lead Glaze
SFC12	Hollow	Storage Vessel	18.04	5YR 6/8	Unglazed	Lead Glaze
SFC13	Hollow	Milk Pan	7.33	5YR 6/8	Unglazed	Lead Glaze
SFC14	Hollow	Unid: Utilitarian	7.53	5YR 6/8	Lead Glaze	Missing
SHW01	Unid.	Unid: Utilitarian	9.48	5YR 6/4	Unglazed	Unglazed
SHW02	Hollow	Storage Vessel	9.64	5YR 6/8	Unglazed	Lead Glaze

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
SHW03	1733-UNPROV-NRD--00003	Heatwole	UNPROV	Redware
SHW04	1733-UNPROV-NRD--00004	Heatwole	UNPROV	Redware
SHW05	1733-UNPROV-NRD--00005	Heatwole	UNPROV	Redware
SHW06	1733-UNPROV-NRD--00006	Heatwole	UNPROV	Redware
SHW07	1733-UNPROV-NRD--00007	Heatwole	UNPROV	Redware
SHW08	1733-UNPROV-NRD--00008	Heatwole	UNPROV	Redware
SHW09	1733-UNPROV-NRD--00009	Heatwole	UNPROV	Redware
SRB01	1734-25-2-NRD--00002	Rockbridge Baths	25-2	Redware
SRB02	1734-25-2-NRD--00003	Rockbridge Baths	25-2	Redware
SRB03	1734-25-2-NRD--00004	Rockbridge Baths	25-2	Redware
SRB04	1734-34-2-NRD--00002	Rockbridge Baths	34-2	Redware
SRB05	1734-34-2-NRD--00003	Rockbridge Baths	34-2	Redware
SRB06	1734-25-2-NRD--00001	Rockbridge Baths	25-2	Redware
SRB07	1734-21-2-NRD--00001	Rockbridge Baths	21-2	Coarse EWare, unid.
SRB08	1734-21-2-NRD--00002	Rockbridge Baths	21-2	Redware
SRB09	1734-21-1-NRD--00001	Rockbridge Baths	21-1	Redware
SRB10	1734-34-2-NRD--00001	Rockbridge Baths	34-2	Redware
SSU01	1735-UNPROV-NRD--00001	Emmanuel Suter	UNPROV	Redware
SSU02	1735-UNPROV-NRD--00002	Emmanuel Suter	UNPROV	Redware
SSU03	1735-UNPROV-NRD--00003	Emmanuel Suter	UNPROV	Redware
SSU04	1735-UNPROV-NRD--00004	Emmanuel Suter	UNPROV	Redware
SSU05	1735-UNPROV-NRD--00005	Emmanuel Suter	UNPROV	Redware
SSU06	1735-UNPROV-NRD--00006	Emmanuel Suter	UNPROV	Redware
SSU07	1735-UNPROV-NRD--00007	Emmanuel Suter	UNPROV	Redware
SSU08	1735-UNPROV-NRD--00008	Emmanuel Suter	UNPROV	Redware
YTM01	1736-16-D-NRD--00002	Topham-Miller Pottery	16-D	Redware
YTM02	1736-25-C2-NRD--00002	Topham-Miller Pottery	25-C2	Coarse EWare, unid.
YTM03	1736-25-C2-NRD--00003	Topham-Miller Pottery	25-C2	Redware
YTM04	1736-5-1-C-NRD--00001	Topham-Miller Pottery	5-1-C	Redware
YTM05	1736-27-C2-NRD--00004	Topham-Miller Pottery	27-C2	Redware
YTM06	1736-27-C2-NRD--00001	Topham-Miller Pottery	27-C2	Redware
YTM07	1736-25-D-NRD--00001	Topham-Miller Pottery	25-D	Redware
YTM08	1736-27-C2-NRD--00003	Topham-Miller Pottery	27-C2	Redware
YTM09	1736-27-C2-NRD--00002	Topham-Miller Pottery	27-C2	Redware
YTM10	1736-5-1-E4-NRD--00001	Topham-Miller Pottery	5-1-E4	Redware
YTM11	1736-5A-NRD--00001	Topham-Miller Pottery	5A	Redware

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
SHW03	Hollow	Storage Vessel	11.09	2.5YR 4/2	Unglazed	Lead Glaze
SHW04	Hollow	Storage Vessel	15.25	2.5YR 5/8	Unglazed	Lead Glaze
SHW05	Hollow	Unid: Utilitarian	15.41	2.5YR 5/6	Unglazed	Lead Glaze
SHW06	Hollow	Storage Vessel	9.13	5YR 6/6	Unglazed	Lead Glaze
SHW07	Hollow	Unid: Utilitarian	9.98	5YR 6/6	Unglazed	Lead Glaze
SHW08	Hollow	Storage Vessel	10.62	2.5YR 5/6	Unglazed	Lead Glaze
SHW09	Hollow	Unid: Utilitarian	10.22	2.5YR 4/2	Unglazed	Lead Glaze
SRB01	Hollow	Unid: Utilitarian	5.13	2.5YR 5/8	Unglazed	Lead Glaze
SRB02	Hollow	Storage Vessel	10.42	2.5YR 5/8	Unglazed	Lead Glaze
SRB03	Hollow	Unid: Utilitarian	6.44	2.5YR 5/8	Unglazed	Lead Glaze
SRB04	Hollow	Storage Vessel	12.81	2.5YR 6/8	Unglazed	Lead Glaze
SRB05	Hollow	Unid: Utilitarian	6.19	Orange	Unglazed	Lead Glaze
SRB06	Hollow	Unid: Utilitarian	11.31	2.5YR 6/6	Unglazed	Lead Glaze
SRB07	Hollow	Unid: Utilitarian	13.9	10YR 8/1	Unglazed	Lead Glaze
SRB08	Hollow	Unid: Utilitarian	13.01	2.5YR 5/8	Unglazed	Lead Glaze
SRB09	Hollow	Milk Pan	10	2.5YR 6/6	Unglazed	Unglazed
SRB10	Hollow	Unid: Utilitarian	10.73	2.5YR 5/6	Unglazed	Unglazed
SSU01	Hollow	Storage Vessel	8.57	5YR 6/8	Unglazed	Lead Glaze
SSU02	Hollow	Storage Vessel	11.11	2.5YR 6/8	Lead Glaze	Lead Glaze
SSU03	Hollow	Storage Vessel	16.55	2.5YR 6/6	Unglazed	Lead Glaze
SSU04	Hollow	Storage Vessel	7.33	2.5YR 5/4	Unglazed	Lead Glaze
SSU05	Hollow	Storage Vessel	10.59	2.5YR 6/6	Unglazed	Lead Glaze
SSU06	Hollow	Storage Vessel	7.77	5YR 6/4	Unglazed	Lead Glaze
SSU07	Hollow	Storage Vessel	16.52	5YR 6/6	Unglazed	Lead Glaze
SSU08	Hollow	Storage Vessel	6.61	2.5YR 5/6	Unglazed	Lead Glaze
YTM01	Hollow	Bowl	4.73	2.5YR 6/8	Lead Glaze	Lead Glaze
YTM02	Hollow	Unidentifiable	7.15	7.5YR 6/4	Lead Glaze	Lead Glaze
YTM03	Hollow	Unidentifiable	7.14	5YR 6/8	Lead Glaze	Lead Glaze
YTM04	Hollow	Unid: Tableware	4.24	2.5YR 6/4	Lead Glaze	Lead Glaze
YTM05	Hollow	Unid: Utilitarian	6.82	5YR 6/8	Unglazed	Lead Glaze
YTM06	Flat	Plate	8.91	5YR 6/6	Unglazed	Lead Glaze
YTM07	Hollow	Storage Vessel	9.38	2.5YR 6/6	Lead Glaze	Unglazed
YTM08	Hollow	Unid: Tableware	3.98	10R 5/6	Lead Glaze	Lead Glaze
YTM09	Hollow	Unid: Tableware	4.74	2.5YR 5/6	Lead Glaze	Lead Glaze
YTM10	Hollow	Unid: Utilitarian	7.82	2.5YR 6/6	Unglazed	Lead Glaze
YTM11	Hollow	Unid: Tableware	4.7	2.5YR 5/6	Lead Glaze	Lead Glaze

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
YTM12	1736-5A-NRD--00002	Topham-Miller Pottery	5A	Coarse EWare, unid.
YTM13	1736-17-D-NRD--00002	Topham-Miller Pottery	17-D	Redware
YTM14	1736-27-D-NRD--00001	Topham-Miller Pottery	27-D	Redware
YTM15	1736-16-D-NRD--00001	Topham-Miller Pottery	16-D	Redware
YTM16	1736-17-D-NRD--00001	Topham-Miller Pottery	17-D	Redware
YTM17	1736-25-C2-NRD--00001	Topham-Miller Pottery	25-C2	Redware
YTM18	1736-27-C2-NRD--00005	Topham-Miller Pottery	27-C2	Redware
YTM19	1736-5-1-E4-NRD--00002	Topham-Miller Pottery	5-1-E4	Redware
YTM20	1736-UNPROV-NRD--00001	Topham-Miller Pottery	UNPROV	Redware

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
YTM12	Hollow	Milk Pan	9.72	5YR 7/6	Unglazed	Lead Glaze
YTM13	Hollow	Unid: Utilitarian	6.52	10R 5/6	Unglazed	Lead Glaze
YTM14	Hollow	Milk Pan	11.99	5YR 5/6	Unglazed	Lead Glaze
YTM15	Hollow	Unid: Utilitarian	6.54	10R 5/6	Lead Glaze	Lead Glaze
YTM16	Hollow	Unid: Utilitarian	6.7	2.5YR 5/6	Unglazed	Lead Glaze
YTM17	Hollow	Storage Vessel	10.57	2.5YR 5/6	Unglazed	Lead Glaze
YTM18	Hollow	Bowl	5.08	2.5YR 5/6	Unglazed	Lead Glaze
YTM19	Hollow	Unid: Utilitarian	8.07	2.5YR 5/8	Unglazed	Unglazed
YTM20	Hollow	Unid: Utilitarian	7.26	2.5YR 6/8	Unglazed	Unglazed

KING'S REACH

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
DKQ01	1034-4138A-DRS--00001	King's Reach Qtr.	4138A	Redware
DKQ02	1034-4240A-DRS--00001	King's Reach Qtr.	4240A	Surrey-Hampshire
DKQ03	1034-4528A-DRS--00001	King's Reach Qtr.	4528A	Coarse EWare, unid.
DKQ04	1034-4830A-DRS--00001	King's Reach Qtr.	4830A	Redware
DKQ05	1034-4831A-DRS--00001	King's Reach Qtr.	4831A	Coarse EWare, unid.
DKQ06	1034-4944A-DRS--00001	King's Reach Qtr.	4944A	Coarse EWare, unid.
DKQ07	1034-5032A-DRS--00001	King's Reach Qtr.	5032A	Buckley
DKQ08	1034-5138A-DRS--00001	King's Reach Qtr.	5138A	Surrey-Hampshire
DKR01	1033-183D-DRS--00001	King's Reach	183D	Coarse EWare, unid.
DKR02	1033-196A-DRS--00001	King's Reach	196A	Redware
DKR03	1033-196C-DRS--00001	King's Reach	196C	Surrey-Hampshire
DKR04	1033-198C-DRS--00001	King's Reach	198C	Buckley
DKR05	1033-166B-DRS--00001	King's Reach	166B	Coarse EWare, unid.
DKR06	1033-200B-DRS--00001	King's Reach	200B	Redware
DKR07	1033-213P-DRS--00001	King's Reach	213P	Coarse EWare, unid.
DKR08	1033-183D-DRS--00002	King's Reach	183D	Redware
DKR09	1033-229C-DRS--00001	King's Reach	229C	Coarse EWare, unid.
DKR10	1033-169B-DRS--00001	King's Reach	169B	Redware
DKR11	1033-225C-DRS--00001	King's Reach	225C	Redware
DKR12	1033-186B-DRS--00001	King's Reach	186B	Redware

ASHCOMB'S QUARTER

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
DAQ01	1019-02.3-DRS--00060	Ashcomb's Qtr.	2.3	Redware
DAQ02	1019-04.1-DRS--00035	Ashcomb's Qtr.	4.1	Buckley
DAQ03	1019-20.3-DRS--00004	Ashcomb's Qtr.	20.3	Redware
DAQ04	1019-29.1-DRS--00047	Ashcomb's Qtr.	29.1	Redware
DAQ05	1019-29.2-DRS--00049	Ashcomb's Qtr.	29.2	Redware
DAQ06	1019-33.2-DRS--00020	Ashcomb's Qtr.	33.2	Redware
DAQ07	1019-34.II.4-DRS--00028	Ashcomb's Qtr.	34.II.4	Coarse EWare, unid.
DAQ08	1019-35.7-DRS--00011	Ashcomb's Qtr.	35.7	Redware
DAQ09	1019-38.3-DRS--00030	Ashcomb's Qtr.	38.3	Redware
DAQ10	1019-38.4-DRS--00030	Ashcomb's Qtr.	38.4	Redware
DAQ11	1019-46.2-DRS--00026	Ashcomb's Qtr.	46.2	Redware
DAQ12	1019-F13.SE-DRS--00040	Ashcomb's Qtr.	F13.SE	Coarse EWare, unid.

KING'S REACH

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
DKQ01	Hollow	Unidentifiable	4.53	2.5YR 7/4	Unglazed	Lead Glaze
DKQ02	Unid.	Unid: Utilitarian	5.39	10YR 8/2	Unglazed	Lead Glaze
DKQ03	Unid.	Unidentifiable	5.72	10YR 8.5/2	Unglazed	Lead Glaze
DKQ04	Hollow	Unid: Utilitarian	7.98	5YR 6/4	Unglazed	Lead Glaze
DKQ05	Hollow	Unidentifiable	5.59	2.5YR 8/4	Unglazed	Lead Glaze
DKQ06	Unid.	Unidentifiable	6.47	7.5YR 9/2	Unglazed	Lead Glaze
DKQ07	Hollow	Unid: Utilitarian	6.93	10r 4/6	Lead Glaze	Lead Glaze
DKQ08	Unid.	Unid: Utilitarian	6.56	7.5YR 9.5/2	Unglazed	Lead Glaze
DKR01	Hollow	Unid: Tableware	5.54	5YR 7/4	Lead Glaze	Lead Glaze
DKR02	Unid.	Unid: Utilitarian	8.38	5YR 6/6	Unglazed	Lead Glaze
DKR03	Hollow	Unid: Utilitarian	7.27	7.5YR 9/2	Lead Glaze	Lead Glaze
DKR04	Hollow	Unid: Utilitarian	5.87	10r 4/6	Lead Glaze	Lead Glaze
DKR05	Hollow	Unidentifiable	5.35	2.5YR 7/4	Unglazed	Lead Glaze
DKR06	Hollow	Unid: Utilitarian	6.48	2.5YR 6/6	Lead Glaze	Lead Glaze
DKR07	Hollow	Unidentifiable	4.52	7.5YR 9/2	Unglazed	Lead Glaze
DKR08	Hollow	Storage Vessel	7.92	2.5YR 6/6	Unglazed	Lead Glaze
DKR09	Hollow	Unid: Utilitarian	-	7.5YR 8/4	Missing	Lead Glaze
DKR10	Hollow	Unidentifiable	5.31	10r 5/4	Lead Glaze	Lead Glaze
DKR11	Unid.	Unidentifiable	10.33	2.5YR 5/6	Lead Glaze	Lead Glaze
DKR12	Hollow	Unid: Utilitarian	7.89	2.5YR 5/8	Lead Glaze	Lead Glaze

ASHCOMB'S QUARTER

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
DAQ01	Hollow	Unid: Utilitarian	-	2.5YR 6/6	Wash	Lead Glaze
DAQ02	Hollow	Unid: Utilitarian	7.35	2.5YR 4/6	Wash	Lead Glaze
DAQ03	Hollow	Unidentifiable	4.98	2.5YR 5/8	Lead Glaze	Lead Glaze
DAQ04	Hollow	Unid: Utilitarian	5.16	5YR 6/4	Lead Glaze	Lead Glaze
DAQ05	Hollow	Unid: Utilitarian	9.17	5YR 5/6	Wash	Lead Glaze
DAQ06	Hollow	Unid: Utilitarian	8.7	2.5YR 5/6	Lead Glaze	Lead Glaze
DAQ07	Hollow	Unidentifiable	9.2	7.5YR 6/4	Wash	Lead Glaze
DAQ08	Hollow	Unidentifiable	-	5YR 6/6	Missing	Lead Glaze
DAQ09	Hollow	Unidentifiable	5.25	5YR 6/6	Lead Glaze	Lead Glaze
DAQ10	Hollow	Unidentifiable	5.37	2.5YR 6/6	Lead Glaze	Lead Glaze
DAQ11	Hollow	Unid: Utilitarian	4.78	2.5YR 6/6	Lead Glaze	Lead Glaze
DAQ12	Hollow	Unid: Utilitarian	5.47	7.5YR 9/2	Unglazed	Lead Glaze

CHAPLINE PLACE

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
DCP01	1018-05C-S-DRS--00007	Chapline Place	05C-S	Redware
DCP02	1018-07G-S-DRS--00003	Chapline Place	07G-S	Redware
DCP03	Not in DAACS	Chapline Place	Surface	Redware
DCP04	1018-02.03-DRS--00039	Chapline Place	2.03	Redware
DCP05	1018-02.03-DRS--00038	Chapline Place	2.03	Redware
DCP06	1018-04.02-DRS--00065	Chapline Place	4.02	Redware
DCP07	1018-08.02-DRS--00038	Chapline Place	8.02	Redware
DCP08	1018-11.03-DRS--00045	Chapline Place	11.03	Coarse EWare, unid.
DCP09	1018-20.B-DRS--00041	Chapline Place	20.B	Redware
DCP10	1018-19.A-DRS--00012	Chapline Place	19.A	Redware

NAVAIR/MATTAPANY

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
DMY01	Not in DAACS	Manor	N2475/E1025	Redware
DMY02	Not in DAACS	Manor	N2600/E1075	Redware
DMY03	Not in DAACS	Manor	N2725/E1250	Coarse EWare, unid.
DMY04	Not in DAACS	Manor	2775/E1125	Redware
DNV01	1021-U1L1-DRS--00011	NAVAIR	U1L1	Redware
DNV02	1021-U2L1-DRS--00005	NAVAIR	U2L1	Redware
DNV03	1021-U2L2-DRS--00006	NAVAIR	U2L2	Redware
DNV04	1021-U6L2-DRS--00027	NAVAIR	U6L2	Redware
DNV05	1021-08-DRS--00021	NAVAIR	8	Redware
DNV06	1021-10-DRS--00009	NAVAIR	10	Redware
DNV07	1021-10-DRS--00014	NAVAIR	10	Redware
DNV08	1021-HOUSEBLOCK-DRS--00274	NAVAIR	HOUSEBLOCK	Redware
DNV09	1021-HOUSEBLOCK-DRS--00357	NAVAIR	HOUSEBLOCK	Redware
DNV10	1021-F16L5-DRS--00003	NAVAIR	F16L5	Redware
DNV11	1021-F16SH-DRS--00013	NAVAIR	F16SH	Redware

CHAPLINE PLACE

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
DCP01	Hollow	Unid: Utilitarian	6.19	5YR 6/8	Lead Glaze	Lead Glaze
DCP02	Hollow	Unidentifiable	4.12	2.5YR 6/6	Lead Glaze	Lead Glaze
DCP03	Hollow	Unid: Utilitarian	10.51	2.5YR 5/6	Unglazed	Lead Glaze
DCP04	Flat	Unid: Tableware	8.62	2.5YR 5/6	Unglazed	Lead Glaze
DCP05	Hollow	Unid: Tableware	6.25	5YR 7/6	Lead Glaze	Lead Glaze
DCP06	Hollow	Unid: Utilitarian	4.13	2.5YR 6/4	Lead Glaze	Lead Glaze
DCP07	Hollow	Unidentifiable	4.58	2.5YR 5/6	Lead Glaze	Lead Glaze
DCP08	Hollow	Unidentifiable	5.56	2.5YR 6/8	Wash	Lead Glaze
DCP09	Hollow	Unid: Utilitarian	8.4	5YR 7/6	Wash	Lead Glaze
DCP10	Hollow	Unid: Utilitarian	13.26	5YR 6/6	Lead Glaze	Lead Glaze

NAVAIR/MATTAPANY

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
DMY01	Hollow	Unid: Utilitarian	10.91	2.5YR 7/6	Lead Glaze	Lead Glaze
DMY02	Flat	unid: tableware	-	5YR 6/8	Missing	Lead Glaze
DMY03	Unid.	Unidentifiable	7.19	7.5YR 7/4	Unglazed	Lead Glaze
DMY04	Hollow	Unid: Utilitarian	9.78	2.5YR 5/6	Lead Glaze	Lead Glaze
DNV01	Hollow	Unid: Utilitarian	6.92	5YR 5/6	Unglazed	Lead Glaze
DNV02	Unid.	Unidentifiable	3.83	5YR 7/6	Lead Glaze	Lead Glaze
DNV03	Hollow	Unidentifiable	4.96	2.5YR 5/6	Lead Glaze	Lead Glaze
DNV04	Hollow	Unid: Tableware	4.57	5YR 6/6	Lead Glaze	Lead Glaze
DNV05	Hollow	Unidentifiable	6.17	5YR 7/3	Lead Glaze	Lead Glaze
DNV06	Hollow	Unid: Tableware	3.08	5YR 6/6	Lead Glaze	Lead Glaze
DNV07	Hollow	Unidentifiable	6.43	2.5YR 5/6	Lead Glaze	Lead Glaze
DNV08	Hollow	Unid: Utilitarian	6.12	5YR 6/8	Wash	Lead Glaze
DNV09	Hollow	Unidentifiable	2.54	5YR 7/6	Lead Glaze	Lead Glaze
DNV10	Unid.	Unidentifiable	3.37	5YR 7/6	Lead Glaze	Lead Glaze
DNV11	Hollow	Unidentifiable	4.12	2.5YR 5/6	Lead Glaze	Lead Glaze

MOUNT VERNON

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
DHF 01	1007-40CC-WTS--00125	House for Fam.	40CC	Redware
DHF 02	1007-40CC-WTS--00128	House for Fam.	40CC	Redware
DHF 03	1007-40E-WTS--00429	House for Fam.	40E	Redware
DHF 04	1007-40E-WTS--00443	House for Fam.	40E	Redware
DHF 05	1007-40E-WTS--00472	House for Fam.	40E	Redware
DHF 06	1007-47E-FLT--00037	House for Fam.	47E	Redware
DSG 01	1025-309HH-FLT-1/4--00125	South Grove Mid.	309HH	London Area Redware
DSG 02	1025-309X-DRS--00017	South Grove Mid.	309X	N. Midlands/Staff.
DSG 03	1025-310H-DRS--00119	South Grove Mid.	310H	Coarse EWare, unid.
DSG 04	1025-310J-DRS--00091	South Grove Mid.	310J	London Area Redware
DSG 05	1025-328J-FLT-1/4--00036	South Grove Mid.	328J	Buckley
DSG 06	1025-328M-WTS-1/4--00058	South Grove Mid.	328M	Redware
DSG 07	1025-329F-DRS--00092	South Grove Mid.	329F	Redware
DSG 08	1025-330H-DRS--00074	South Grove Mid.	330H	Coarse EWare, unid.

FAIRFIELD

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
DFF 01	Not in DAACS	Midden	558A	Coarse EWare, unid.
DFF 02	Not in DAACS	Midden	558A	Redware
DFF 03	Not in DAACS	Midden	575A	Redware
DFF 04	Not in DAACS	Midden	575A	Redware
DFF 05	Not in DAACS	Midden	576A	Coarse EWare, unid.
DFF 06	Not in DAACS	Midden	576A	Redware
DFF 07	Not in DAACS	Midden	576A	Coarse EWare, unid.
DFF 08	Not in DAACS	Midden	576A	Redware
DFF 09	Not in DAACS	Midden	591A	Coarse EWare, unid.
DFF 10	Not in DAACS	Midden	591A	Coarse EWare, unid.
DFF 11	Not in DAACS	Midden	591A	Coarse EWare, unid.
DFF 12	Not in DAACS	Midden	591A	Redware
DFF 13	Not in DAACS	Midden	591A	Coarse EWare, unid.
DFQ 01	1020-146A-DRS--00430	Quarter	146A	Redware
DFQ 02	1020-147A-DRS--00095	Quarter	147A	Redware
DFQ 03	1020-147A-DRS--00106	Quarter	147A	Redware

MOUNT VERNON

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
DHF 01	Hollow	Unid: Utilitarian	8.6	2.5YR 6/6	Lead Glaze	Lead Glaze
DHF 02	Flat	Unid: Tableware	4.18	5YR 8/4	Unglazed	Lead Glaze
DHF 03	Hollow	Unid: Utilitarian	4.11	2.5YR 6/6	Lead Glaze	Lead Glaze
DHF 04	Hollow	Unid: Tableware	4.36	10r 5/6	Lead Glaze	Lead Glaze
DHF 05	Hollow	Unid: Teaware	3.5	2.5YR 7/6	Lead Glaze	Lead Glaze
DHF 06	Unid.	Unid: Tableware	6.32	5YR 6/6	Unglazed	Lead Glaze
DSG 01	Hollow	Water Cooler	11.16	2.5YR 6/8	Unglazed	Unglazed
DSG 02	Hollow	Chamberpot	5.63	5YR 4/4	Lead Glaze	Lead Glaze
DSG 03	Unid.	Unidentifiable	10.33	5YR 8/4	Unglazed	Lead Glaze
DSG 04	Hollow	Milk Pan	8.62	2.5YR 5/8	Unglazed	Lead Glaze
DSG 05	Hollow	Milk Pan	6.8	2.5YR 6/6	Unglazed	Lead Glaze
DSG 06	Hollow	Mug/Can	3.09	2.5YR 6/6	Lead Glaze	Lead Glaze
DSG 07	Hollow	Unid: Utilitarian	4.85	2.5YR 3/3	Lead Glaze	Lead Glaze
DSG 08	Hollow	Milk Pan	5.12	5YR 8/4	Unglazed	Lead Glaze

FAIRFIELD

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
DFF 01	Unid.	Unidentifiable	6.89	10YR 8/3	Lead Glaze	Lead Glaze
DFF 02	Unid.	Unidentifiable	-	5YR 7/4	Missing	Lead Glaze
DFF 03	Unid.	Unidentifiable	7.09	2.5YR 6/6	Unglazed	Lead Glaze
DFF 04	Unid.	Unid: Utilitarian	14.38	2.5YR 5/6	Unglazed	Lead Glaze
DFF 05	Unid.	Unid: Utilitarian	-	7.5YR 8/4	Missing	Lead Glaze
DFF 06	Hollow	Unid: Utilitarian	8.75	2.5YR 4/4	Unglazed	Lead Glaze
DFF 07	Hollow	Unid: Utilitarian	-	7.5YR 8/4	Missing	Lead Glaze
DFF 08	Hollow	Unidentifiable	4.62	2.5YR 5/6	Unglazed	Lead Glaze
DFF 09	Hollow	Unid: Tableware	4.91	10YR 6/6	Lead Glaze	Lead Glaze
DFF 10	Hollow	Unidentifiable	11.33	7.5YR 7/3	Lead Glaze	Lead Glaze
DFF 11	Hollow	Unidentifiable	5.3	7.5YR 7/2	Lead Glaze	Lead Glaze
DFF 12	Hollow	Unid: Utilitarian	7.85	5YR 6/6	Lead Glaze	Lead Glaze
DFF 13	Hollow	Unid: Utilitarian	-	7.5YR 8/3	Missing	Lead Glaze
DFQ 01	Unid.	Unid: Utilitarian	-	5YR 8/3	Lead Glaze	Missing
DFQ 02	Hollow	Unidentifiable	10.75	5YR 6/4	Unglazed	Lead Glaze
DFQ 03	Hollow	Unid: Utilitarian	-	5YR 7/2	Missing	Lead Glaze

DFQ 04	1020-148A-DRS--00215	Quarter	148A	Coarse EWare, unid.
DFQ 05	1020-148A-DRS--00218	Quarter	148A	Redware
DFQ 06	1020-149A-DRS--00416	Quarter	149A	Redware
DFQ 07	1020-149A-DRS--00428	Quarter	149A	Coarse EWare, unid.
DFQ 08	1020-201A-DRS--00118	Quarter	201A	Coarse EWare, unid.
DFQ 09	1020-235A-DRS--00129	Quarter	235A	Buckley
DFQ 10	1020-237A-DRS--00098	Quarter	237A	Redware

UTOPIA

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
DUB 01	Not in DAACS	Utopia III	100-062	Redware
DUB 02	Not in DAACS	Utopia III	100-Surface	Redware
DUB 03	1013-061-DRS--00041	Utopia III	61	Redware
DUB 04	1013-061-1/8B-DRS--00032	Utopia III	061-1/8B	Redware
DUB 05	1013-061-1A-DRS--00006	Utopia III	061-1A	Redware
DUB 06	1013-061-5B-DRS--00014	Utopia III	061-5B	Redware
DUB 07	1013-061-8B-DRS--00061	Utopia III	061-8B	Redware
DUB 08	1013-062-3B/C-DRS--00106	Utopia III	062-3B/C	Redware
DUB 09	1013-062-4A-DRS--00049	Utopia III	062-4A	Coarse EWare, unid.
DUB 10	1013-BBB26C-DRS--00051	Utopia III	BBB26C	Redware
DUB 11	1013-IV32B-DRS--00008	Utopia III	IV32B	Buckley
DUC 01	Not in DAACS	Utopia IV	100- Surface	Coarse EWare, unid.
DUC 02	Not in DAACS	Utopia IV	100- Surface	Coarse EWare, unid.
DUC 03	1014-12T-DRS--00051	Utopia IV	12T	Redware
DUC 04	1014-14B-DRS--00095	Utopia IV	14B	N. Midlands/Staff.
DUC 05	1014-23A-DRS--00011	Utopia IV	23A	Redware
DUC 06	1014-24C-DRS--00122	Utopia IV	24C	Redware
DUC 07	1014-35A-DRS--00207	Utopia IV	35A	Coarse EWare, unid.
DUC 08	1014-41A-DRS--00021	Utopia IV	41A	Coarse EWare, unid.

MONTICELLO

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
PMC01	107-036A-DRS--00012	Site 7	036A	Redware
PMC02	107-050E-DRS--00023	Site 7	050E	Redware
PMC03	107-058A-DRS--00045	Site 7	058E	Redware

DFQ 04	Flat	Unid: Utilitarian	7.82	5YR 7/6	Unglazed	Lead Glaze
DFQ 05	Unid.	Unid: Utilitarian	8.02	2.5YR 5/6	Unglazed	Lead Glaze
DFQ 06	Hollow	Unid: Utilitarian	6.2	2.5YR 6/8	Lead Glaze	Lead Glaze
DFQ 07	Hollow	Unid: Utilitarian	6.44	7.5YR 6/2	Lead Glaze	Lead Glaze
DFQ 08	Flat	Unidentifiable	4.54	5YR 7/4	Unglazed	Lead Glaze
DFQ 09	Hollow	Unid: Utilitarian	9.27	2.5YR 6/6	Unglazed	Lead Glaze
DFQ 10	Hollow	Unidentifiable	4.11	2.5YR 6/4	Lead Glaze	Lead Glaze

UTOPIA

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
DUB 01	Hollow	Unid: Utilitarian	6.51	2.5YR 7/3	Lead Glaze	Lead Glaze
DUB 02	Hollow	Unid: Utilitarian	7.89	2.5YR 5/8	Unglazed	Lead Glaze
DUB 03	Hollow	Unid: Utilitarian	8.23	2.5YR 7/6	Lead Glaze	Lead Glaze
DUB 04	Hollow	Milk Pan	6.18	5YR 7/4	Unglazed	Lead Glaze
DUB 05	Hollow	Unid: Utilitarian	15.04	2.5YR 7/6	Lead Glaze	Lead Glaze
DUB 06	Hollow	Unidentifiable	7	2.5YR 6/6	Missing	Lead Glaze
DUB 07	Hollow	Milk Pan	7.89	5YR 8/3	Lead Glaze	Lead Glaze
DUB 08	Hollow	Unid: Utilitarian	8.61	2.5YR 8/4	Lead Glaze	Lead Glaze
DUB 09	Hollow	Unidentifiable	-	10YR 8.5/2	Lead Glaze	Missing
DUB 10	Unid.	Unidentifiable	4.86	2.YR 6/6	Unglazed	Lead Glaze
DUB 11	Unid.	Unid: Utilitarian	4.9	10r 5/6	Lead Glaze	Lead Glaze
DUC 01	Unid.	Unid: Utilitarian	8.76	5YR 7/4	Unglazed	Lead Glaze
DUC 02	Hollow	Unid: Utilitarian	8.17	5YR 7/4	Lead Glaze	Lead Glaze
DUC 03	Unid.	Unid: Utilitarian	4.72	2.5YR 5/4	Lead Glaze	Lead Glaze
DUC 04	Hollow	Unid: Utilitarian	5.45	2.5YR 5/8	Lead Glaze	Lead Glaze
DUC 05	Hollow	Unid: Utilitarian	4.62	2.5YR 5/8	Lead Glaze	Lead Glaze
DUC 06	Hollow	Milk Pan	5.83	5YR 6/6	Unglazed	Lead Glaze
DUC 07	Hollow	Unid: Utilitarian	7.54	5YR 7/3	Lead Glaze	Lead Glaze
DUC 08	Hollow	Unid: Utilitarian	12.63	7.5YR 6/2	Lead Glaze	Lead Glaze

MONTICELLO

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
PMC01	Hollow	Unid: Utilitarian	5.06	2.5YR 5/6	Lead Glaze	Lead Glaze
PMC02	Flat	Unid: Utilitarian	6.2	2.5YR 6/8	Unglazed	Lead Glaze
PMC03	Hollow	Unid: Utilitarian	7.66	2.5YR 6/8	Unglazed	Lead Glaze

PMC04	107-295A-DRS--00028	Site 7	295A	Redware
PMC05	107-063A-DRS--00016	Site 7	063A	Redware
PMC06	107-075A-DRS--00013	Site 7	075A	Redware
PMC07	107-076A-DRS--00010	Site 7	076A	Redware
PMC08	107-097A-DRS--00014	Site 7	097A	Redware
PMC09	107-104B-DRS--00006	Site 7	104B	Redware
PMC10	107-105A-DRS--00009	Site 7	105A	Redware
PMC11	107-113A-DRS--00014	Site 7	113A	Coarse EWare, unid.
PMC12	107-113A-DRS--00015	Site 7	113A	Redware
PMC13	107-002B-DRS--00005	Site 7- Overseer	002B	Redware
PMC14	107-007D-DRS--00006	Site 7- Overseer	007D	Redware
PMC15	107-024A-DRS--00006	Site 7- Overseer	024A	Redware
PMC16	107-038A-DRS--00007	Site 7- Overseer	038A	Redware
PMC17	107-048A-DRS--00018	Site 7- Overseer	048A	Redware
PMC18	107-055B-DRS--00012	Site 7- Overseer	055B	Redware
PMC19	107-001A-DRS--00018	Site 7- Overseer	001A	Coarse EWare, unid.
PMC20	107-001A-DRS--00025	Site 7- Overseer	001A	Redware
PMC21	107-059A-DRS--00017	Site 7- Overseer	059A	Redware
PMC22	107-022A-DRS--00009	Site 7	022A	Redware
PMC23	108-310A-DRS--00026	Site8	310A	Redware
PMC24	108-310B-DRS--00026	Site8	310B	Redware
PMC25	108-310B-DRS--00028	Site8	310B	Redware
PMC26	108-311A-DRS--00012	Site8	311A	Redware
PMC27	108-367B-DRS--00022	Site8	367B	Redware
PMC28	108-152B-DRS--00011	Site8	152B	Coarse EWare, unid.
PMC29	108-126B-DRS--00031	Site8	126B	Coarse EWare, unid.
PMC30	108-271B-DRS--00006	Site8	271B	Redware
PMC31	108-272B-DRS--00001	Site8	272B	Redware
PMC32	108-318B-DRS--00027	Site8	318B	Redware
PMC33	108-148A-DRS--00046	Site8	148A	Redware
PMC34	108-257B-DRS--00027	Site8	257B	Redware
PMC35	108-260B-DRS--00002	Site8	260B	Redware
PMC36	108-315A-DRS--00027	Site8	315A	Redware
PMC37	108-315B-DRS--00026	Site8	315B	Redware
PMC40	104-352AC-NOS--00032	Dry Well	352AC	Coarse EW
PMC41	104-352L-NOS--00274	Dry Well	352L	Redware

PMC04	Hollow	Unidentifiable	5.97	2.5YR 6/8	Unglazed	Lead Glaze
PMC05	Hollow	Unid: Utilitarian	7.5	2.5YR 6/8	Unglazed	Lead Glaze
PMC06	Hollow	Unid: Utilitarian	5.03	2.5YR 5/6	Lead Glaze	Lead Glaze
PMC07	Hollow	Unid: Utilitarian	6.49	2.5YR 6/8	Unglazed	Lead Glaze
PMC08	Hollow	Unidentifiable	5.18	2.5YR 5/6	Lead Glaze	Lead Glaze
PMC09	Hollow	Unidentifiable	4.53	2.5YR 6/8	Lead Glaze	Lead Glaze
PMC10	Hollow	Unid: Utilitarian	3.66	2.5YR 5/6	Lead Glaze	Lead Glaze
PMC11	Hollow	Unid: Utilitarian	5.71	7.5YR 8/4	Lead Glaze	Lead Glaze
PMC12	Hollow	Unid: Utilitarian	6.76	2.5YR 6/8	Unglazed	Lead Glaze
PMC13	Hollow	Unidentifiable	3	2.5YR 5/6	Lead Glaze	Lead Glaze
PMC14	Hollow	Unid: Utilitarian	6.09	2.5YR 6/8	Unglazed	Lead Glaze
PMC15	Hollow	Unidentifiable	6.16	2.5YR 7/6	Unglazed	Lead Glaze
PMC16	Hollow	Unid: Utilitarian	8.16	2.5YR 6/8	Unglazed	Lead Glaze
PMC17	Hollow	Unid: Utilitarian	5.61	2.5YR 5/6	Unglazed	Lead Glaze
PMC18	Hollow	Unid: Utilitarian	6.37	2.5YR 5/6	Unglazed	Lead Glaze
PMC19	Unid.	Unidentifiable	5	10YR 8/2	Unglazed	Unglazed
PMC20	Hollow	Unid: Utilitarian	5.52	2.5YR 6/8	Unglazed	Lead Glaze
PMC21	Hollow	Unidentifiable	8.5	5YR 5/4	Lead Glaze	Lead Glaze
PMC22	Hollow	Unidentifiable	3.87	2.5YR 6/8	Lead Glaze	Lead Glaze
PMC23	Hollow	Unid: Utilitarian	3.33	2.5YR 6/8	Unglazed	Lead Glaze
PMC24	Hollow	Unidentifiable	3.08	2.5YR 6/8	Lead Glaze	Lead Glaze
PMC25	Hollow	Unid: Utilitarian	6.11	7.5YR 4/2	Lead Glaze	Lead Glaze
PMC26	Hollow	Unid: Utilitarian	6.62	2.5YR 6/8	Unglazed	Lead Glaze
PMC27	Hollow	Unid: Utilitarian	6.93	5YR 6/4	Unglazed	Lead Glaze
PMC28	Hollow	Unid: Utilitarian	5.57	7.5YR 7/4	Lead Glaze	Lead Glaze
PMC29	Hollow	Unidentifiable	-	7.5YR 7/4	Lead Glaze	Missing
PMC30	Hollow	Jug	4.62	2.5YR 6/6	Lead Glaze	Lead Glaze
PMC31	Hollow	Milk Pan	8.56	2.5YR 6/6	Lead Glaze	Lead Glaze
PMC32	Hollow	Unidentifiable	6.89	2.5YR 6/6	Unglazed	Lead Glaze
PMC33	Hollow	Flower Pot	4.36	7.5YR 7/3	Lead Glaze	Unglazed
PMC34	Hollow	Unidentifiable	3.79	2.6YR 5/8	Lead Glaze	Lead Glaze
PMC35	Hollow	Unidentifiable	5.01	2.5YR 4/4	Lead Glaze	Lead Glaze
PMC36	Unid.	Unidentifiable	3.17	5YR 7/6	Lead Glaze	Lead Glaze
PMC37	Hollow	Unidentifiable	4.69	2.5YR 6/6	Lead Glaze	Lead Glaze
PMC40	Hollow	Unid: Utilitarian	7.09	2.5YR 6/6	Unglazed	Lead Glaze
PMC41	Hollow	Unidentifiable	6.2	2.5YR 4/4	Lead Glaze	Lead Glaze

PMC42	104-352L-NOS--00283	Dry Well	352L	Coarse EWare, unid.
PMC43	104-356C-NOS--00093	Dry Well	356C	Coarse EW
PMC44	104-356E-NOS--00184	Dry Well	356E	Redware
PMC45	104-356E-NOS--00188	Dry Well	356E	Redware
PMC46	104-356G-NOS--00151	Dry Well	356G	Redware
PMC47	104-468E-NOS--00194	Dry Well	468E	Coarse EW
PMC48	104-468E-NOS--00418	Dry Well	468E	Redware

POPLAR FOREST

Sample ID	DAACS Artifact ID	Project Name	Context	Ware Type
PNH01	1011-1696A1-DRS--00011	North Hill	1696A1	Coarse EWare, unid.
PNH02	1011-1734A2-DRS--00017	North Hill	1734A2	Redware
PNH03	1011-1736A3-DRS--00025	North Hill	1736A3	Redware
PNH04	1011-1738C4-DRS--00009	North Hill	1738C4	Coarse EWare, unid.
PNH05	1011-1739A3-DRS--00005	North Hill	1739A3	Redware
PNH06	1011-1739C-DRS--00010	North Hill	1739C	Redware
PNH07	1011-1741G3-DRS--00006	North Hill	1741G3	Redware
PNH08	1011-1807A4-DRS--00022	North Hill	1807A4	N. Midlands/Staff.
PPQ01	1010-828A1-DRS--00040	Quarter	828A1	Redware
PPQ02	1010-829A-DRS--00002	Quarter	829A	Redware
PPQ03	1010-1003C-DRS--00002	Quarter	1003C	Redware
PPQ04	1010-1103A1-DRS--00022	Quarter	1103A1	Redware
PPQ05	1010-1122A1-DRS--00002	Quarter	1122A1	Redware
PPQ06	1010-1127A4-DRS--00021	Quarter	1127A4	Redware
PPQ07	1010-1206A3-DRS--00022	Quarter	1206A3	Coarse EWare, unid.
PPQ08	1010-1207C-DRS--00011	Quarter	1207C	Redware
PPQ09	1010-1295A4-DRS--00016	Quarter	1295A4	Redware
PPQ10	1010-1376E1-DRS--00007	Quarter	13760	Redware
PWW01	Not in DAACS	Wing of Offices	245	Coarse EWare, unid.
PWW02	Not in DAACS	Wing of Offices	247	Redware
PWW03	Not in DAACS	Wing of Offices	244E	Redware
PWW04	Not in DAACS	Wing of Offices	246M	Coarse EWare, unid.
PWW05	Not in DAACS	Wing of Offices	256E/3	Coarse EWare, unid.
PWW06	Not in DAACS	Wing of Offices	300D	Redware
PWW07	Not in DAACS	Wing of Offices	732H	Redware

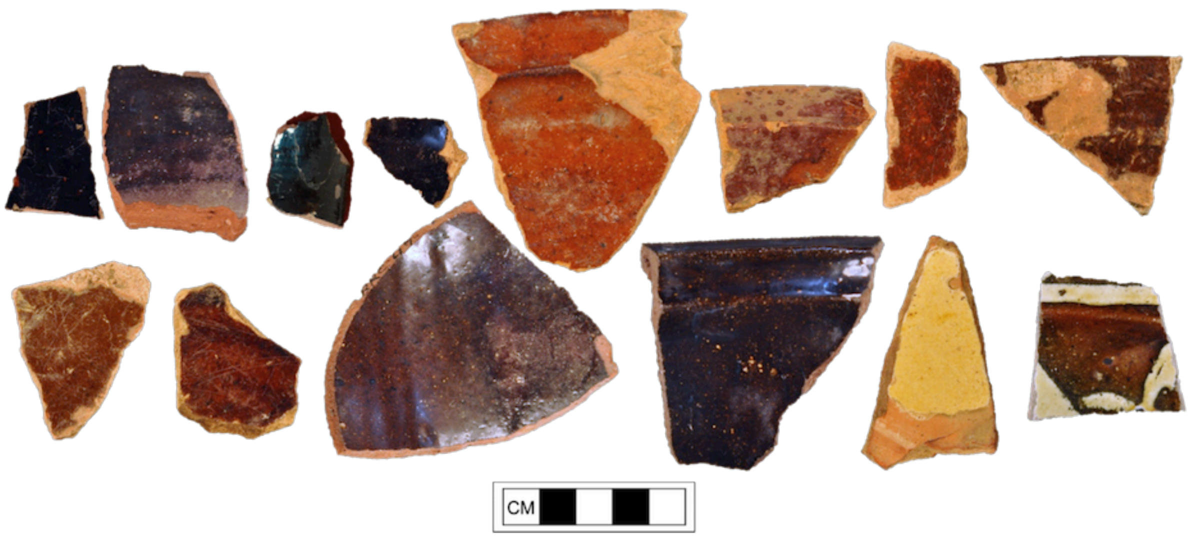
PMC42	Hollow	Unid: Utilitarian	7.13	10YR 7/3	Unglazed	Lead Glaze
PMC43	Hollow	Unid: Utilitarian	9.33	2.5YR 6/6	Unglazed	Lead Glaze
PMC44	Hollow	Unid: Utilitarian	8.11	2.5YR 6/6	Unglazed	Lead Glaze
PMC45	Hollow	Unid: Utilitarian	7.37	2.5YR 6/6	Unglazed	Lead Glaze
PMC46	Hollow	Unidentifiable	5.21	2.5YR 6/6	Lead Glaze	Unglazed
PMC47	Hollow	Serving Dish, misc.	5.59	5YR 7/4	Wash	Lead Glaze
PMC48	Hollow	Unid: Utilitarian	4.15	2.5YR 5/6	Lead Glaze	Lead Glaze

POPLAR FOREST

Sample ID	Vessel Category	Form	Sherd Thickness	Paste Color	Exterior Surface	Interior Surface
PNH01	Hollow	Unid: Utilitarian	6.45	7.5YR 8/4	Lead Glaze	Wash
PNH02	Hollow	Unidentifiable	5.27	5YR 7/6	Lead Glaze	Lead Glaze
PNH03	Hollow	Unid: Utilitarian	4.45	2.5YR 5/8	Lead Glaze	Lead Glaze
PNH04	Hollow	Unid: Utilitarian	5.08	7.5YR 8/3	Lead Glaze	Lead Glaze
PNH05	Hollow	Unid: Utilitarian	4.95	2.5YR 6/8	Lead Glaze	Unglazed
PNH06	Hollow	Unid: Utilitarian	5.65	5YR 7/6	Lead Glaze	Lead Glaze
PNH07	Hollow	Unid: Utilitarian	6.28	5YR 7/6	Lead Glaze	Lead Glaze
PNH08	Unid.	Unid: Utilitarian	8.43	2.5YR 4/6	Unglazed	Lead Glaze
PPQ01	Hollow	Unid: Utilitarian	4.29	5YR 6/6	Unglazed	Lead Glaze
PPQ02	Hollow	Storage Vessel	-	5YR 5/6	Unglazed	Lead Glaze
PPQ03	Hollow	Unid: Utilitarian	4.8	2.5YR 5/6	Lead Glaze	Lead Glaze
PPQ04	Hollow	Unid: Utilitarian	3.89	5YR 5/4	Lead Glaze	Lead Glaze
PPQ05	Hollow	Unid: Utilitarian	5.6	Neutrals, medium	Lead Glaze	Lead Glaze
PPQ06	Hollow	Unid: Utilitarian	11.04	2.5YR 5/6	Unglazed	Lead Glaze
PPQ07	Hollow	Unid: Utilitarian	3.95	5YR 7/4	Lead Glaze	Lead Glaze
PPQ08	Hollow	Unid: Utilitarian	4.33	5YR 5/6	Lead Glaze	Lead Glaze
PPQ09	Hollow	Unid: Utilitarian	3.93	5YR 5/4	Lead Glaze	Lead Glaze
PPQ10	Hollow	Unid: Utilitarian	5.05	2.5YR 5/6	Lead Glaze	Lead Glaze
PWW01	Hollow	Unid: Utilitarian	5.34	5YR 6/6	Lead Glaze	Lead Glaze
PWW02	Hollow	Unid: Utilitarian	7.18	2.5YR 5/6	Lead Glaze	Lead Glaze
PWW03	Hollow	Storage Vessel	6.31	5YR 5/4	Unglazed	Lead Glaze
PWW04	Flat	Unid: Utilitarian	6.35	5YR 6/4	Unglazed	Lead Glaze
PWW05	Hollow	unid: tableware	3.45	5YR 7/6	Lead Glaze	Lead Glaze
PWW06	Hollow	Unid: Utilitarian	6.24	5YR 6/6	Lead Glaze	Lead Glaze
PWW07	Hollow	Storage Vessel	7.44	2.5YR 5/6	Unglazed	Lead Glaze

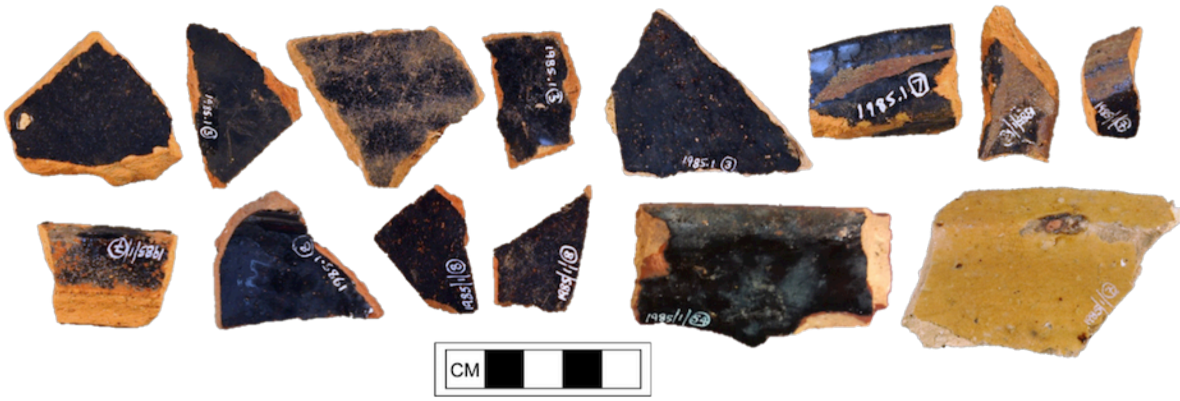
APPENDIX B: SAMPLE IMAGES

Images of production site samples and domestic samples, by assemblage. Interior surfaces shown. Images of the prepared sample slides, showing cross-sections of the ceramic paste for the production site samples are included.



Buckley. Brookhill Pottery, Buckley, N. Wales. Left-to-right, top row: BBH01-BBH08, bottom row: BBH09- BBH14. Images courtesy Museum of Liverpool.

Buckley. Pinfold Lane, Buckley, N. Wales. Left-to-right, top row: BPL01-BPL08, bottom row: BPL09-15. Images courtesy Museum of Liverpool.



Liverpool. Prescot, Merseyside, England. Left-to-right, top row: BPT01-BPT08, bottom row: BPT09-BPT14. Images courtesy Museum of Liverpool.

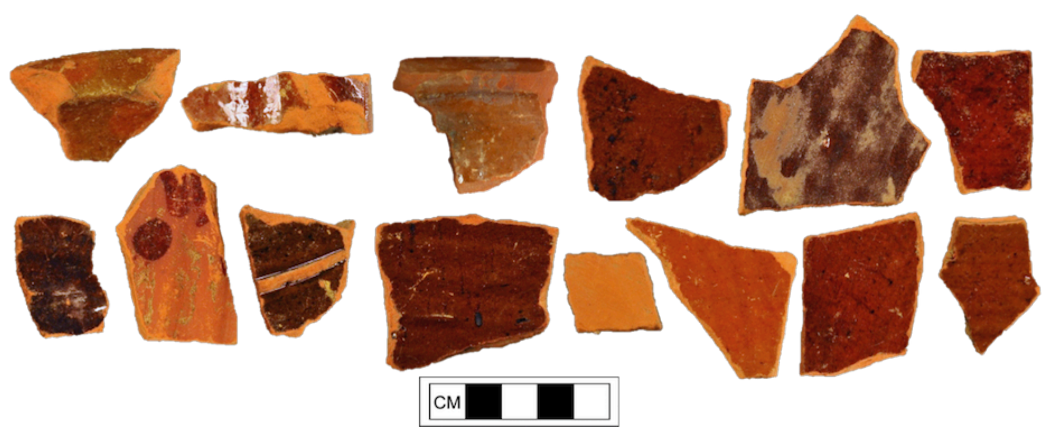
Liverpool. Rainford, Merseyside, England. Left-to-right, top row: BRF01-BRF07, bottom row: BRF08-BRF14. Images courtesy Museum of Liverpool.

Staffordshire. Swan Bank Pottery, Burslem, Staffordshire, England. Left-to-right, top row: MSB01-MSB05, middle row: MSB06-MSB10, bottom row: MSB11-MSB18. Images courtesy Stoke-on-Trent Museum Archaeological Society.

London Area. Samples recovered from Teardrop Pottery and Royal Arsenal site, Woolwich, and Thameslink site, Southwark, England. Left-to-right, top row: Teardrop samples LWW01-LWW07, bottom row: Teardrop sample LWW08, Royal Arsenal samples LWW09-LWW13, Thameslink samples LWW14-LWW15. Images courtesy Oxford Archaeology.

London Area. Mill Street Pottery, Harlow, Essex, England. Left-to-right, top row: LHB01-LHB06, bottom row: LHB07-LHB12. Images courtesy Harlow Museum.

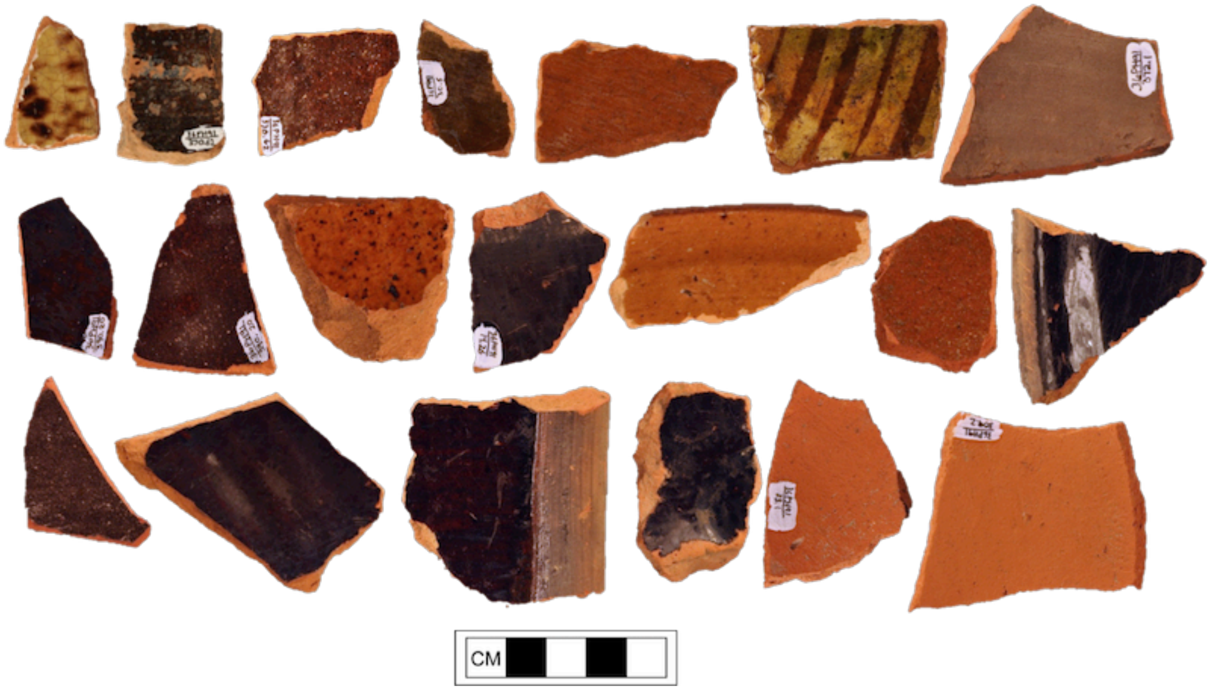
London Area. Carter’s Mead Pottery, Harlow, Essex, England. Left-to-right, LHC01-LHC04. Images courtesy Harlow Museum.



London Area. Latton Street Scout Hall Pottery, Harlow, Essex, England. Left-to-right, top row: LHD01-LHD06, bottom row: LHD07-LHD14. Images courtesy Harlow Museum.

London Area. S1 Latton Ridding Pottery, Harlow, Essex, England. Left-to-right, top row: LHA01-LHA05, bottom row: LHA06, LHA09-LHA13. Images courtesy Harlow Museum.

Surrey-Hampshire Border. Farnborough Hill Pottery, Hampshire, England. Left-to-right, top row: LFH01-LFH07, middle row: LFH08-LFH14, bottom row: LFH15-20. Images courtesy Guildford Borough Council, Guildford Museum.



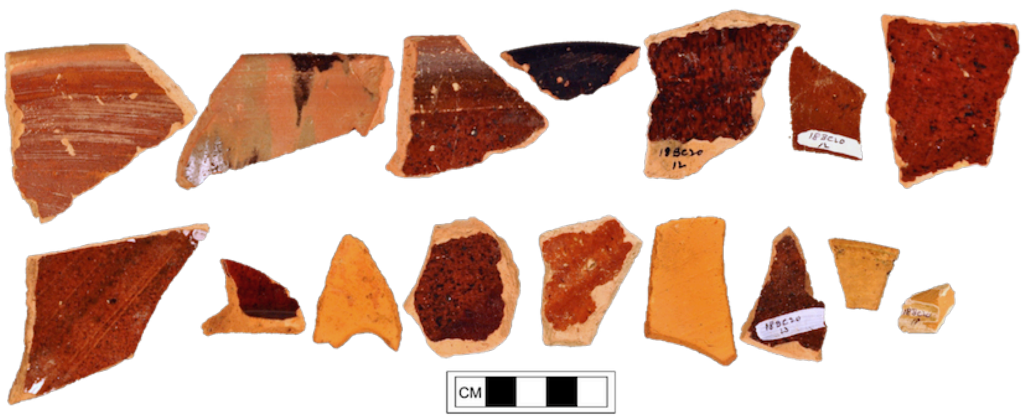
Philadelphia. Topham-Miller Pottery, Philadelphia, PA. Left-to-right, top row: YTM01-YTM07, middle row: YTM08-YTM14, bottom row: YTM15-YTM20. Images courtesy the State Museum of Pennsylvania, Pennsylvania Historical and Museum Commission.

Tidewater. Morgan Jones Pottery, Westmoreland County, VA. Left-to-right, top row: CMJ01-CMJ05, middle row: CMJ06-CMJ10, bottom row: CMJ11-CMJ15. Images courtesy the Virginia Department of Historic Resources.

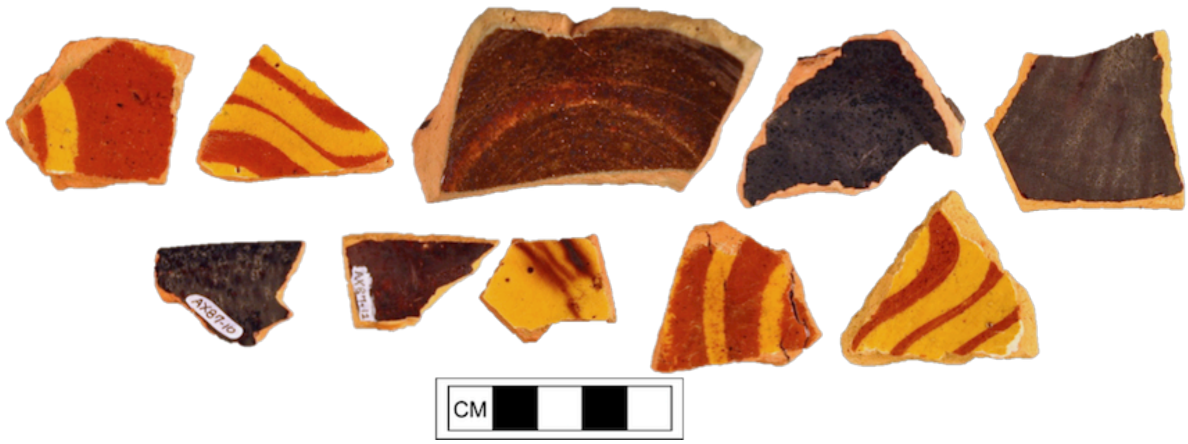
Tidewater. Lawnes Creek Pottery, Isle of Wight County, VA. Left-to-right, CLC01-CLC05. Images courtesy Archaeological & Cultural Solutions, Inc.

Tidewater. Gloucester Point, Gloucester County, VA. Left-to-right, top row: CGL01-CGL05, CGL09, middle row: CGL10-CGL14, CGL15, bottom row: CGL18-CGL21. Images courtesy Gloucester County Archaeology Project, Gloucester, Virginia.

Tidewater. Eden Street Pottery, Baltimore, MD. Left-to-right, Top row: CES01-CES05, bottom row: CES06-CES12. Images courtesy Maryland Historical Trust, Jefferson Patterson Park & Museum, Maryland Archaeological Conservation Laboratory.



Tidewater. Linton-Perine Pottery, Baltimore, MD. Left-to-right, top row: CLP01-CLP07, bottom row: CLP08-CLP16. Images courtesy Maryland Historical Trust, Jefferson Patterson Park & Museum, Maryland Archaeological Conservation Laboratory.



Alexandria. Henry Piercy Pottery, Alexandria, Virginia. Left-to-right, Top row: CHP01-CHP05, bottom row: CHP06-CHP10. Images courtesy Alexandria Archaeology, City of Alexandria, Virginia.

Alexandria. Fisher Pottery, Alexandria, VA. Left-to-right, CFP01-CFP08. Images courtesy Alexandria Archaeology, City of Alexandria, Virginia.

Alexandria. Plum Pottery, Alexandria, VA. Left-to-right, CPP01-CPP06. Images courtesy Alexandria Archaeology, City of Alexandria, Virginia.

Alexandria. Swann-Smith-Milburn Pottery, Alexandria, VA. Left-to-right, CSS01-CSS06. Images courtesy Alexandria Archaeology, City of Alexandria, Virginia.

Alexandria. Tildon-Easton Pottery, Alexandria, VA. Left-to-right, top row: CTE01-CTE06, bottom row: CTE07-CTE11. Images courtesy Alexandria Archaeology, City of Alexandria, Virginia.

Shenandoah Valley. Andrew Pitman Pottery and home, Stephen's City, VA. Left-to-right, top row: SAP01-SAP05, middle row: SAP06-SAP10, bottom row: SAP11-SAP16. Private collection.

Shenandoah Valley. Anthony Baecher Pottery, Frederick County, VA. Left-to-right, top row: SAB01-SAB05, middle row: SAB06-SAB10, bottom row: SAB11-SAB13. Images courtesy the Virginia Department of Historic Resources.

Shenandoah Valley. Heatwole Pottery, Rockingham County, VA. Left-to-right, top row: SHW01-SHW04, bottom row: SHW05-SHW09. Private collection.

Shenandoah Valley. Emanuel Suter Pottery in Rockingham County, VA. Left-to-right, top row: SSU01-SSU03, bottom row: SSU04-SSU08. Private collection.

Shenandoah Valley. Rockbridge Baths Pottery, Rockbridge County, VA. Left-to-right, top row: SRB01-SRB05, bottom row: SRB06-SRB10. Images courtesy the Anthropology Laboratory, Washington and Lee University.

Shenandoah Valley. Firebaugh Pottery, Rockbridge County, VA. Left-to-right, top row: SFB01-SFB05, middle row: SFB06-SFB12, bottom row: SFB13-SFB16. Images courtesy the Anthropology Laboratory, Washington and Lee University.

South Ridge & Valley. Fincastle Pottery, Botetourt County, VA. Left-to-right, top row: SFC01-SFC07, bottom row: SFC08-SFC14. Images courtesy the Anthropology Laboratory, Washington and Lee University.

North Virginia Piedmont. Sycolin Road Pottery, Loudoun County, VA. Left-to-right, top row: PSR01-PSR07, middle row: PSR08-PSR13, bottom row: PSR14-PSR15. Images courtesy the Virginia Department of Historic Resources.

Piedmont North Carolina. Henry Loy/Jacob Albright Pottery, Alamance County, NC. Left-to-right, top row: NHL01-NHL03, bottom row: NHL04-08. Images courtesy the Research Laboratories of Archaeology, UNC-CH.

Piedmont North Carolina. Solomon Loy Pottery, Alamance County, NC. Left-to-right: NSL01-NSL03. Images courtesy the Research Laboratories of Archaeology, UNC-CH.

Piedmont North Carolina. Joseph Loy Pottery, Person County, NC. Left-to-right, NJL01-NJL05. Private collection.

Piedmont North Carolina. William Dennis and Thomas Dennis Potteries, Randolph County, NC. Left-to-right, William Dennis NWD01-NWD04, Thomas Dennis NWD05-NWD07. Private collection.

King’s Reach and King’s Reach Quarter, Calvert County, MD. Left-to-right, top row: King’s Reach samples DKR01-DKR06, middle row: King’s Reach samples DKR07-DKR12, bottom row: King’s Reach Quarter DKQ01-DKQ08. Images courtesy the Maryland Historical Trust, Jefferson Patterson Park & Museum, Maryland Archaeological Conservation Laboratory.

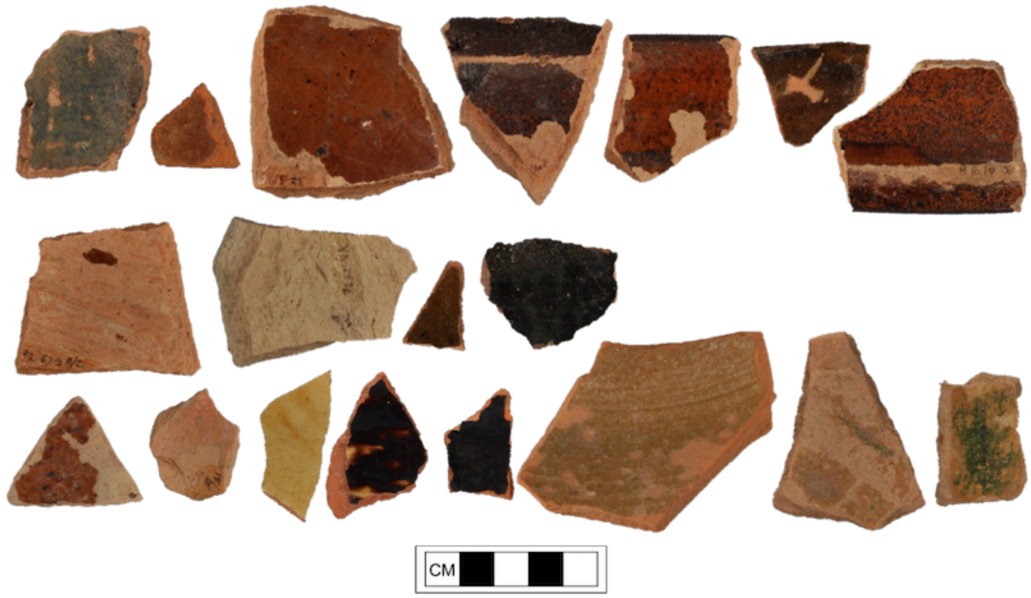
Ashcomb’s Quarter, Calvert County, MD. Left-to-right, top row: DAQ01-DAQ05, bottom row: DAQ06-DAQ11. Images courtesy Naval District Washington, Solomon's Complex.

Chapline Place, Calvert County, MD. Left-to-right, top row: DCP01-DCP05, bottom row: DCP06-DCP10. Images courtesy The Maryland Historical Trust, Jefferson Patterson Park & Museum, Maryland Archaeological Conservation Laboratory.

Mattapany Sewall plantation, St. Mary's County, MD. Left-to-right, top row: Mattapany manor samples DMY01-DMY04, middle row: NAVAIR samples DNV01-DNV06, bottom row: NAVAIR samples DNV07-DNV11. Images courtesy Naval Air Station Patuxent River, Naval District Washington.

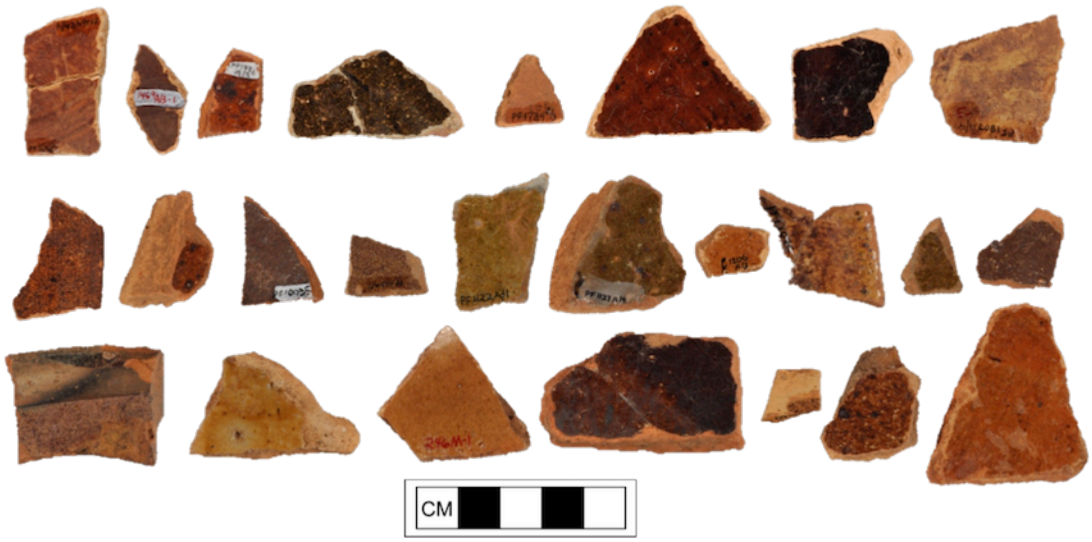
Mount Vernon plantation, Fairfax County, VA. Left-to-right, top row: House for Families samples DHF01-DHF06, bottom row: South Grove Midden samples DSG01-DSG08. Images courtesy Mount Vernon Ladies' Association.

Fairfield plantation, Gloucester County, VA. Left-to-right, top row: Fairfield Midden samples DFF01-DFF07, second row: Fairfield Midden samples DFF08-DFF13, third row: Fairfield Quarter DFQ01-DFQ06, bottom row: DFQ07-DFQ10. Images courtesy the Fairfield Foundation.



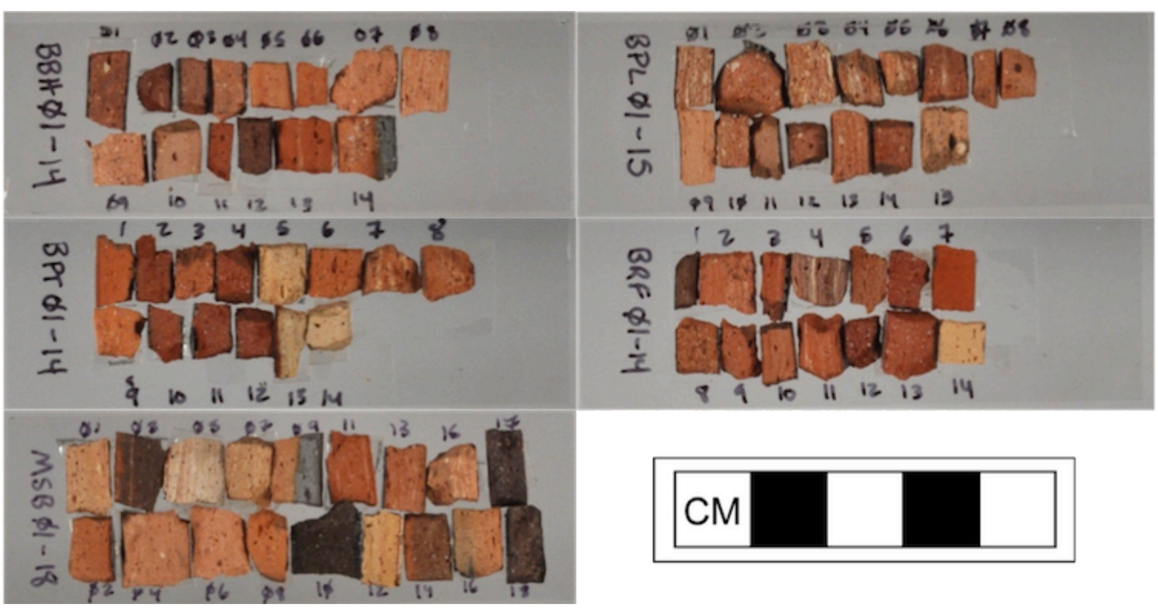
Utopia plantation, James City County, VA. Left-to-right, top row: Utopia III samples DUB01-DUB07, middle row: Utopia III samples DUB08-DUB11, bottom row: Utopia IV samples DUC01-DUC08. Images courtesy James River Institute for Archaeology.

Monticello plantation, Albemarle County, VA. Left-to-right. Top row: Site 7 samples PMC01-PMC12, second row: Site 7 overseer samples PMC13-PMC21, Site 7 sample PMC22, Site 8 samples PMC23-PMC25, third row: Site 8 samples PMC26-PMC37, bottom row: Dry well samples PMC40-PMC48. Image courtesy the Archaeology Department of the Thomas Jefferson Foundation, Monticello.

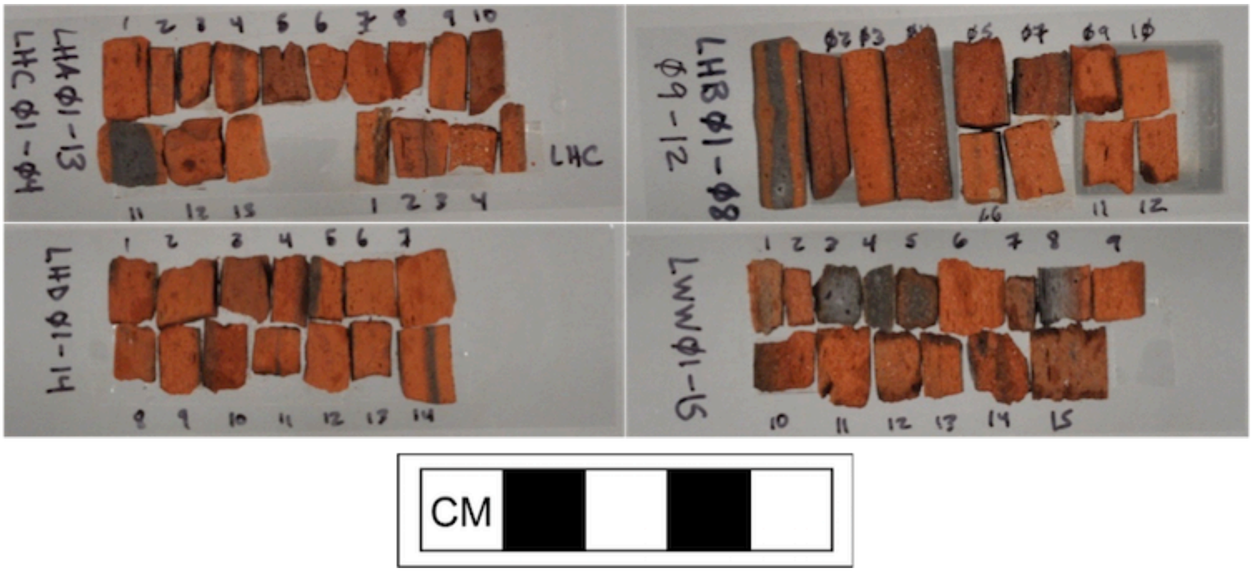


Poplar Forest plantation, Bedford County, VA. Left-to-right, top row: North Hill samples PNH01-PNH08, middle row: Quarter samples PPQ01-PPQ10, bottom row: Wing of Offices samples PWW01-PWW06. Images courtesy Thomas Jefferson's Poplar Forest Department of Archaeology and Landscapes.

Prepared Slides



Coal Measures samples. Left-to-right, top row: Brookhill (BBH) and Pinfold Lane (BPL), middle row: Prescot (BPT) and Rainford (BRF), images courtesy Museum of Liverpool. Bottom row: Swan Bank (MSB), courtesy the Stoke-on-Trent Museum Archaeological Society.

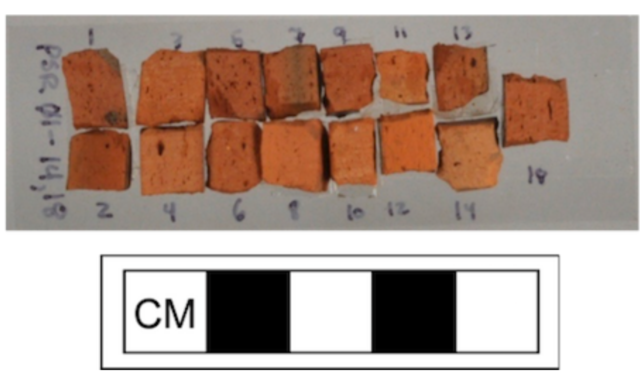


London Area samples. Left-to-right, top row: S1 Latton Ridding (LHA), Carter's Mead (LHC) and Mill Street (LHB), images courtesy Museum of Harlow. Bottom row: Latton Street Scout Hall (LHD), courtesy of Museum of Harlow, and Woolwich Teardrop, Royal Arsenal, and Thameslink (LWW), courtesy Oxford Archaeology.

Surrey-Hampshire Border ware samples. Farnborough Hill (LFH). Image courtesy the Guildford Borough Council, Guildford Museum.

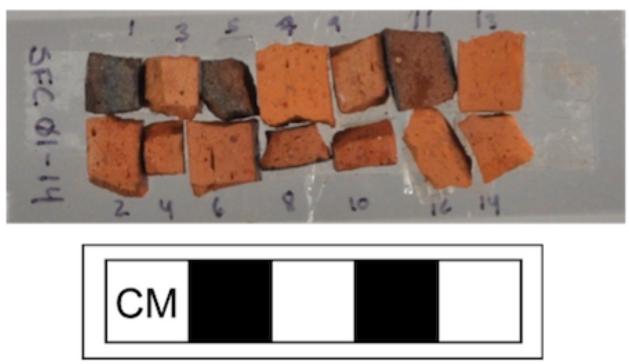
Philadelphia samples. Topham-Miller (YTM). Image courtesy the State Museum of Pennsylvania, Pennsylvania Historical and Museum Commission.

Chesapeake Coastal Plain samples. Left-to-right, top row: Eden Street (CES) and Linton Perine (CLP), courtesy Maryland Historical Trust, Jefferson Patterson Park & Museum, Maryland Archaeological Conservation Laboratory. Second row: Morgan Jones (CMJ), courtesy the Virginia Department of Historic Resources, and Gloucester Point (CGL), courtesy Gloucester County Archaeological Project, Gloucester, Virginia. Third row: Lawnes Creek (CLC), courtesy Archaeological & Cultural Solutions, and Henry Piercy (CHP) and Plum pottery (CPP), courtesy Alexandria Archaeology, City of Alexandria, Virginia. Bottom row: Fisher pottery (CFP), Tildon Easton (CTE), and Swann-Smith-Milburn (CSS), courtesy Alexandria Archaeology, City of Alexandria, Virginia.



North Virginia Piedmont samples. Sycolin Road pottery (PSR), courtesy Virginia Department of Historic Resources.

Shenandoah Valley Samples. Left-to-right, top row: Andrew Pitman (SAP), Anthony Baecher (SAB), courtesy Virginia Department of Historic Resources and Heatwole (SHW). Bottom row: Emanuel Suter (SSU), Firebaugh (SFB) and Rockbridge Baths (SRB), both courtesy Washington and Lee.



South Ridge & Valley samples. Fincastle pottery (SFC), courtesy Washington and Lee.

Piedmont North Carolina samples: Henry Loy (NHL) and Solomon Loy (NSL), courtesy Research Laboratories of Archaeology, UNC-CH; Joseph Loy (NJL), William Dennis and Thomas Dennis (NWD).

APPENDIX C: Relative Standard Deviation (%RSD) for Brick Clay Standard

These values are based on the average of 76 runs conducted over 15 days of analysis between May 2014 and October 2014. Abnormal runs were removed, and up to 5 anomalous values were removed for each element, as per Niziolek 2011.

ELEMENT	AVERAGE CONCENTRATION (PPM)	% RSD
Li	87.5	11
Na	2098.3	14
Al	136860.5	4
Si	255922.0	3
K	25340.3	8
Ca	1802.4	14
Sc	26.5	9
Ti	5998.9	7
V	191.0	7
Cr	128.8	8
Fe	97181.2	7
Mn	1661.2	18
Co	28.1	9
Ni	*73.0*	*19*
Cu	38.8	8
Zn	167.6	11
Rb	240.0	6
Sr	78.7	11
Y	35.7	18
Zr	145.2	21

ELEMENT	AVERAGE CONCENTRATION (PPM)	% RSD
Nb	19.2	13
Mo	*1.3*	*19*
Sn	5.0	11
Cs	12.0	6
Ba	469.7	5
La	53.0	14
Ce	105.3	14
Nd	63.2	13
Sm	9.4	13
Eu	1.8	12
Tb	1.1	15
Dy	6.7	16
Yb	3.8	18
Lu	*0.6*	*20*
Ta	1.4	16
Bi	0.4	12
Pb	*33.3*	*9*
Th	15.7	9
U	3.0	13

Italicized elements were not included in analyses

APPENDIX D: Mahalanobis Distance Probabilities of Group Membership

Sample ID	Site	Production Zone	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
CFP01	Fisher	Alexandria	91.3	0.0	8.8	0.0	0.0	0.0
CFP02	Fisher	Alexandria	94.9	0.0	44.0	0.0	0.0	0.0
CFP03	Fisher	Alexandria	22.3	0.2	99.2	0.0	11.4	0.0
CFP04	Fisher	Alexandria	99.9	0.0	23.7	0.0	0.0	0.0
CFP05	Fisher	Alexandria	95.3	0.0	41.2	0.0	0.0	0.0
CFP06	Fisher	Alexandria	93.2	4.6	100.0	0.2	44.2	0.0
CFP07	Fisher	Alexandria	96.2	0.0	50.5	0.0	6.7	0.0
CFP08	Fisher	Alexandria	63.5	0.0	3.2	0.0	0.0	0.0
CHP01	Piercy	Alexandria	98.9	0.0	37.0	0.0	0.0	0.0
CHP02	Piercy	Alexandria	99.9	0.0	14.8	0.0	0.0	0.0
CHP03	Piercy	Alexandria	47.6	0.0	0.0	0.0	0.0	0.0
CHP04	Piercy	Alexandria	5.3	0.0	7.9	0.0	0.0	0.0
CHP05	Piercy	Alexandria	99.9	0.0	28.0	0.0	0.0	0.0
CHP06	Piercy	Alexandria	11.9	0.0	49.3	0.0	0.2	0.0
CHP07	Piercy	Alexandria	94.1	0.0	10.6	0.0	0.0	0.0
CHP08	Piercy	Alexandria	96.0	0.0	1.5	0.0	0.0	0.0
CHP09	Piercy	Alexandria	94.7	0.0	2.8	0.0	0.0	0.0
CHP10	Piercy	Alexandria	97.8	0.0	21.5	0.0	0.0	0.0
CPP01	Plum	Alexandria	94.5	0.0	6.6	0.0	0.0	0.0
CPP02	Plum	Alexandria	96.7	0.0	14.5	0.0	0.0	0.0
CPP03	Plum	Alexandria	93.7	0.0	10.0	0.0	0.0	0.0
CPP04	Plum	Alexandria	93.2	0.0	1.1	0.0	0.0	0.0
CPP05	Plum	Alexandria	71.4	0.0	1.7	0.0	0.0	0.0
CPP06	Plum	Alexandria	98.0	0.0	17.0	0.0	0.0	0.0
CSS01	Swann Smith	Alexandria	99.6	0.0	19.4	0.0	0.0	0.0
CSS02	Swann Smith	Alexandria	94.7	0.0	10.1	0.0	0.0	0.0
CSS03	Swann Smith	Alexandria	78.2	0.0	2.0	0.0	0.0	0.0
CSS04	Swann Smith	Alexandria	88.3	0.0	0.7	0.0	0.0	0.0
CSS05	Swann Smith	Alexandria	94.2	0.0	1.5	0.0	0.0	0.0
CSS06	Swann Smith	Alexandria	75.8	0.0	0.1	0.0	0.0	0.0
CTE01	Tildon Easton	Alexandria	70.1	0.0	0.1	0.0	0.0	0.0
CTE02	Tildon Easton	Alexandria	14.3	0.0	0.0	0.0	0.0	0.0
CTE03	Tildon Easton	Alexandria	74.2	2.2	95.2	0.1	68.5	0.0
CTE04	Tildon Easton	Alexandria	79.3	0.0	8.8	0.0	0.0	0.0
CTE05	Tildon Easton	Alexandria	99.2	0.0	51.1	0.0	0.0	0.0
CTE06	Tildon Easton	Alexandria	35.0	0.0	3.6	0.0	0.0	0.0
CTE07	Tildon Easton	Alexandria	6.1	0.0	0.1	0.0	0.0	0.0
CTE08	Tildon Easton	Alexandria	1.7	0.0	0.0	0.0	0.0	0.0
CTE09	Tildon Easton	Alexandria	67.5	0.0	38.5	0.0	0.0	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
CFP01	0.0	0.0	0.1	0.0	0.0	0.0	0.0	Alexandria
CFP02	0.0	0.1	1.5	0.0	0.0	0.0	0.0	Alexandria
CFP03	27.0	15.4	63.4	0.1	19.9	0.4	0.0	Unassigned
CFP04	0.0	0.0	20.2	0.0	0.0	0.0	0.0	Alexandria
CFP05	0.0	0.0	3.6	0.0	0.0	0.0	0.0	Alexandria
CFP06	10.9	74.3	90.2	1.9	17.2	1.5	0.0	Unassigned
CFP07	22.3	46.0	84.8	0.3	4.9	0.1	0.0	Unassigned
CFP08	0.0	0.0	20.2	0.0	0.0	0.0	0.0	Alexandria
CHP01	0.0	0.0	19.4	0.0	0.0	0.0	0.0	Alexandria
CHP02	0.0	0.0	11.5	0.0	0.0	0.0	0.0	Alexandria
CHP03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Alexandria
CHP04	49.7	23.9	1.8	0.0	14.8	0.0	10.9	Unassigned
CHP05	0.0	0.0	3.2	0.0	0.0	0.0	0.0	Alexandria
CHP06	49.0	66.2	8.0	0.0	9.2	0.0	0.6	Unassigned
CHP07	0.0	0.0	0.3	0.0	0.0	0.0	0.0	Alexandria
CHP08	0.0	0.0	6.6	0.0	0.0	0.0	0.0	Alexandria
CHP09	0.0	0.0	21.7	0.0	0.0	0.0	0.0	Alexandria
CHP10	0.0	0.0	6.6	0.0	0.0	0.0	0.0	Alexandria
CPP01	0.0	0.0	5.1	0.0	0.0	0.0	0.0	Alexandria
CPP02	0.0	0.0	21.0	0.0	0.0	0.0	0.0	Alexandria
CPP03	0.0	0.0	0.2	0.0	0.0	0.0	0.0	Alexandria
CPP04	0.0	0.0	0.3	0.0	0.0	0.0	0.0	Alexandria
CPP05	0.0	0.0	0.7	0.0	0.0	0.0	0.0	Alexandria
CPP06	0.0	0.0	1.9	0.0	0.0	0.0	0.0	Alexandria
CSS01	0.0	0.0	0.3	0.0	0.0	0.0	0.0	Alexandria
CSS02	0.0	0.0	26.4	0.0	0.0	0.0	0.0	Alexandria
CSS03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Alexandria
CSS04	0.0	0.0	37.5	0.0	0.0	0.0	0.0	Alexandria
CSS05	0.0	0.0	0.2	0.0	0.0	0.0	0.0	Alexandria
CSS06	0.0	0.0	0.1	0.0	0.0	0.0	0.0	Alexandria
CTE01	0.0	0.0	3.4	0.0	0.0	0.0	0.0	Alexandria
CTE02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Alexandria
CTE03	51.2	76.2	97.4	7.9	11.4	5.1	0.0	Unassigned
CTE04	0.0	0.1	19.2	0.0	0.0	0.0	0.0	Alexandria
CTE05	0.0	0.1	16.5	0.0	0.0	0.0	0.0	Alexandria
CTE06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Alexandria
CTE07	0.0	0.0	1.5	0.0	0.0	0.0	0.0	Alexandria
CTE08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Alexandria
CTE09	0.0	1.7	3.5	0.0	0.0	0.0	0.0	Alexandria

Sample ID	Site	Production Zone	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
CTE10	Tildon Easton	Alexandria	99.5	0.0	1.3	0.0	0.0	0.0
CTE11	Tildon Easton	Alexandria	24.3	4.5	11.7	2.7	15.7	0.0
BBH01	Brookhill	Buckley	0.0	56.6	0.0	54.0	0.0	0.0
BBH02	Brookhill	Buckley	1.9	32.7	0.1	99.1	15.0	0.0
BBH03	Brookhill	Buckley	0.0	48.3	0.0	10.6	0.0	0.0
BBH04	Brookhill	Buckley	0.0	92.3	0.0	0.0	0.0	0.0
BBH05	Brookhill	Buckley	0.0	1.6	0.0	1.6	0.0	0.0
BBH06	Brookhill	Buckley	0.0	1.0	0.0	0.0	0.0	0.0
BBH07	Brookhill	Buckley	0.0	34.1	0.0	0.0	0.0	0.0
BBH08	Brookhill	Buckley	0.0	25.4	0.0	0.0	0.0	0.0
BBH09	Brookhill	Buckley	0.0	67.2	0.0	0.0	0.0	0.0
BBH10	Brookhill	Buckley	3.7	76.2	0.5	88.0	10.6	0.0
BBH11	Brookhill	Buckley	0.2	13.9	0.1	84.6	10.8	0.0
BBH12	Brookhill	Buckley	0.0	8.4	0.0	38.3	5.1	0.0
BBH13	Brookhill	Buckley	0.0	39.1	0.0	13.8	0.0	0.0
BBH14	Brookhill	Buckley	0.0	83.0	0.0	0.0	0.0	0.0
BPL01	Pinfold Lane	Buckley	0.0	10.0	0.0	0.0	0.0	0.0
BPL02	Pinfold Lane	Buckley	0.0	96.9	0.0	0.5	0.0	0.0
BPL03	Pinfold Lane	Buckley	0.0	100.0	0.0	2.1	0.0	0.0
BPL04	Pinfold Lane	Buckley	0.0	0.0	0.0	0.0	0.0	0.0
BPL05	Pinfold Lane	Buckley	0.0	67.7	0.0	0.1	0.0	0.0
BPL06	Pinfold Lane	Buckley	0.0	84.6	0.0	0.2	0.0	0.0
BPL07	Pinfold Lane	Buckley	0.0	46.7	0.0	0.0	0.0	0.0
BPL08	Pinfold Lane	Buckley	0.0	57.8	0.0	0.0	0.0	0.0
BPL09	Pinfold Lane	Buckley	0.0	68.7	0.0	3.7	0.0	0.0
BPL10	Pinfold Lane	Buckley	0.0	92.6	0.0	5.0	0.0	0.0
BPL11	Pinfold Lane	Buckley	0.0	48.3	0.0	13.1	0.0	0.0
BPL12	Pinfold Lane	Buckley	0.0	32.2	0.0	2.6	0.0	0.0
BPL13	Pinfold Lane	Buckley	0.0	64.9	0.0	0.1	0.0	0.0
BPL14	Pinfold Lane	Buckley	0.0	99.4	0.0	0.8	0.0	0.0
BPL15	Pinfold Lane	Buckley	0.0	80.7	0.0	0.3	0.0	0.0
CES01	Eden Street	Ches. Tidewater	19.4	0.0	98.9	0.0	0.0	0.0
CES02	Eden Street	Ches. Tidewater	0.1	0.0	24.9	0.0	0.0	0.0
CES03	Eden Street	Ches. Tidewater	7.6	0.0	87.5	0.0	0.0	0.0
CES04	Eden Street	Ches. Tidewater	1.7	0.0	14.8	0.0	0.0	0.0
CES05	Eden Street	Ches. Tidewater	4.5	0.0	98.7	0.0	0.0	0.0
CES06	Eden Street	Ches. Tidewater	0.2	0.0	87.2	0.0	0.0	0.0
CES07	Eden Street	Ches. Tidewater	18.3	0.0	67.0	0.0	0.0	0.0
CES08	Eden Street	Ches. Tidewater	0.8	0.0	8.1	0.0	0.0	0.0
CES09	Eden Street	Ches. Tidewater	39.7	0.0	75.5	0.0	0.0	0.0
CES10	Eden Street	Ches. Tidewater	5.8	0.0	60.9	0.0	0.0	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
CTE10	0.0	0.0	1.7	0.0	0.0	0.0	0.0	Alexandria
CTE11	0.0	0.5	3.0	0.0	0.0	3.0	0.0	Unassigned
BBH01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BBH02	0.0	0.0	3.0	0.0	0.0	2.2	0.0	Unassigned
BBH03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BBH04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BBH05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BBH06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BBH07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BBH08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BBH09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BBH10	0.0	0.0	5.8	0.0	0.0	0.5	0.0	Unassigned
BBH11	0.0	0.0	0.9	0.0	0.0	0.6	0.0	Unassigned
BBH12	0.0	0.0	0.3	0.3	0.0	0.3	0.0	Unassigned
BBH13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BBH14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Unassigned
BPL05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
BPL15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
CES01	0.0	0.6	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CES02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CES03	0.4	27.6	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CES04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CES05	0.1	7.2	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CES06	0.8	2.2	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CES07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CES08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CES09	0.0	0.1	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CES10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater

Sample ID	Site	Production Zone	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
CES11	Eden Street	Ches. Tidewater	0.2	0.0	72.6	0.0	0.0	0.0
CES12	Eden Street	Ches. Tidewater	0.8	0.0	6.7	0.0	0.0	0.0
CGL01	Gloucester	Ches. Tidewater	9.2	58.4	9.9	18.1	85.9	0.0
CGL02	Gloucester	Ches. Tidewater	0.1	0.0	28.4	0.0	0.0	0.0
CGL03	Gloucester	Ches. Tidewater	79.1	6.9	46.9	0.5	98.6	0.0
CGL04	Gloucester	Ches. Tidewater	93.2	2.1	93.0	0.1	93.4	0.0
CGL05	Gloucester	Ches. Tidewater	90.4	12.9	67.1	3.8	99.7	0.0
CGL09	Gloucester	Ches. Tidewater	0.9	0.0	33.5	0.0	0.0	0.0
CGL10	Gloucester	Ches. Tidewater	4.6	0.8	0.8	0.0	10.6	0.0
CGL11	Gloucester	Ches. Tidewater	23.6	0.0	59.1	0.0	5.6	0.0
CGL12	Gloucester	Ches. Tidewater	65.4	0.7	96.2	0.0	29.3	0.0
CGL13	Gloucester	Ches. Tidewater	0.0	0.0	3.6	0.0	0.0	0.0
CGL14	Gloucester	Ches. Tidewater	0.0	0.0	1.2	0.0	0.0	0.0
CGL15	Gloucester	Ches. Tidewater	0.7	0.0	89.8	0.0	0.0	0.0
CGL18	Gloucester	Ches. Tidewater	94.8	2.8	49.7	0.2	86.8	0.0
CGL19	Gloucester	Ches. Tidewater	0.0	0.0	3.6	0.0	0.0	0.0
CGL20	Gloucester	Ches. Tidewater	0.2	0.0	72.9	0.0	0.0	0.0
CGL21	Gloucester	Ches. Tidewater	0.1	0.0	5.8	0.0	0.0	0.0
CLC01	Lawnes Creek	Ches. Tidewater	1.1	0.0	10.0	0.0	0.0	0.0
CLC02	Lawnes Creek	Ches. Tidewater	0.0	0.0	10.7	0.0	0.0	0.0
CLC03	Lawnes Creek	Ches. Tidewater	0.0	0.0	66.7	0.0	0.0	0.0
CLC04	Lawnes Creek	Ches. Tidewater	11.5	0.0	54.0	0.0	0.0	0.0
CLC05	Lawnes Creek	Ches. Tidewater	0.0	0.0	22.1	0.0	0.0	0.0
CLP01	Linton Perine	Ches. Tidewater	7.1	0.0	74.9	0.0	0.0	0.0
CLP02	Linton Perine	Ches. Tidewater	57.4	0.0	98.6	0.0	0.0	0.0
CLP03	Linton Perine	Ches. Tidewater	24.8	0.0	99.9	0.0	0.0	0.0
CLP04	Linton Perine	Ches. Tidewater	5.4	0.0	67.8	0.0	0.0	0.0
CLP05	Linton Perine	Ches. Tidewater	38.2	0.0	76.5	0.0	0.0	0.0
CLP06	Linton Perine	Ches. Tidewater	35.1	0.0	60.0	0.0	0.0	0.0
CLP07	Linton Perine	Ches. Tidewater	40.2	0.0	95.7	0.0	0.0	0.0
CLP08	Linton Perine	Ches. Tidewater	4.4	0.0	83.2	0.0	0.0	0.0
CLP09	Linton Perine	Ches. Tidewater	57.9	0.0	85.0	0.0	0.0	0.0
CLP10	Linton Perine	Ches. Tidewater	25.8	0.0	86.3	0.0	0.0	0.0
CLP11	Linton Perine	Ches. Tidewater	3.0	0.0	14.4	0.0	0.0	0.0
CLP12	Linton Perine	Ches. Tidewater	0.7	0.0	8.6	0.0	0.0	0.0
CLP13	Linton Perine	Ches. Tidewater	1.8	0.0	63.3	0.0	0.0	0.0
CLP14	Linton Perine	Ches. Tidewater	14.3	0.0	86.3	0.0	0.0	0.0
CLP15	Linton Perine	Ches. Tidewater	2.2	0.0	89.2	0.0	0.0	0.0
CLP16	Linton Perine	Ches. Tidewater	99.4	27.0	90.2	1.8	72.1	0.0
CMJ01	Morgan Jones	Ches. Tidewater	0.0	0.0	80.2	0.0	0.0	0.0
CMJ02	Morgan Jones	Ches. Tidewater	99.4	0.4	88.1	0.0	37.2	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
CES11	0.0	0.5	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CES12	0.1	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CGL01	0.0	0.6	26.2	1.8	0.0	8.7	0.0	Unassigned
CGL02	0.0	0.1	1.3	0.0	0.0	0.0	0.0	Ches. Tidewater
CGL03	0.7	5.9	71.0	2.4	6.3	9.8	0.0	Unassigned
CGL04	38.1	70.2	88.3	1.1	28.9	2.9	0.0	Unassigned
CGL05	6.7	25.9	86.7	5.2	4.7	17.7	0.0	Unassigned
CGL09	0.0	0.0	0.2	0.0	0.0	0.0	0.0	Ches. Tidewater
CGL10	7.9	14.7	9.2	0.1	1.1	0.2	0.0	Unassigned
CGL11	83.7	99.9	38.3	0.6	6.7	0.0	0.0	Unassigned
CGL12	77.7	99.6	74.5	1.4	5.2	1.7	0.0	Unassigned
CGL13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CGL14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CGL15	0.0	0.6	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CGL18	15.9	17.5	93.7	5.1	36.7	8.8	0.0	Unassigned
CGL19	0.0	0.0	0.1	0.0	0.0	0.0	0.0	Ches. Tidewater
CGL20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CGL21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CLC01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CLC02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CLC03	0.0	0.3	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CLC04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CLC05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP01	0.0	0.1	3.2	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP02	0.0	6.3	2.1	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP03	0.0	4.2	0.2	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP04	0.0	21.6	0.4	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP05	0.0	0.1	0.2	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP06	0.0	0.0	0.2	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP07	0.0	2.6	0.5	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP09	0.0	0.2	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP10	0.1	3.0	0.8	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP11	0.0	0.0	0.2	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP13	0.0	0.0	0.4	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP15	0.0	1.7	0.3	0.0	0.0	0.0	0.0	Ches. Tidewater
CLP16	12.6	36.1	97.5	5.1	18.1	52.9	0.0	Unassigned
CMJ01	0.0	0.1	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ02	1.0	41.1	61.4	0.2	1.3	0.3	0.0	Unassigned

Sample ID	Site	Production Zone	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
CMJ03	Morgan Jones	Ches. Tidewater	0.2	0.0	87.3	0.0	0.0	0.0
CMJ04	Morgan Jones	Ches. Tidewater	1.2	0.0	65.2	0.0	0.0	0.0
CMJ05	Morgan Jones	Ches. Tidewater	0.1	0.0	18.7	0.0	0.0	0.0
CMJ06	Morgan Jones	Ches. Tidewater	0.0	0.0	42.9	0.0	0.0	0.0
CMJ07	Morgan Jones	Ches. Tidewater	0.4	0.0	90.7	0.0	0.0	0.0
CMJ08	Morgan Jones	Ches. Tidewater	6.6	0.0	90.1	0.0	0.0	0.0
CMJ09	Morgan Jones	Ches. Tidewater	10.7	0.0	100.0	0.0	0.0	0.0
CMJ10	Morgan Jones	Ches. Tidewater	0.0	0.0	56.8	0.0	0.0	0.0
CMJ11	Morgan Jones	Ches. Tidewater	7.2	0.0	44.6	0.0	0.0	0.0
CMJ12	Morgan Jones	Ches. Tidewater	92.5	0.1	57.8	0.1	6.4	0.0
CMJ13	Morgan Jones	Ches. Tidewater	0.0	0.0	42.0	0.0	0.0	0.0
CMJ14	Morgan Jones	Ches. Tidewater	0.2	0.0	10.9	0.0	0.0	0.0
CMJ15	Morgan Jones	Ches. Tidewater	0.6	0.0	81.1	0.0	0.0	0.0
BPT01	Prescot	Liverpool	0.0	0.1	0.0	80.9	0.0	0.0
BPT02	Prescot	Liverpool	0.0	0.0	0.0	32.3	0.0	0.0
BPT03	Prescot	Liverpool	0.0	1.5	0.0	68.6	0.0	0.0
BPT04	Prescot	Liverpool	0.0	0.1	0.0	78.8	0.0	0.0
BPT05	Prescot	Liverpool	0.0	24.9	0.0	87.5	0.0	0.0
BPT06	Prescot	Liverpool	0.0	0.0	0.0	1.3	0.0	0.0
BPT07	Prescot	Liverpool	0.0	0.0	0.0	9.5	0.0	0.0
BPT08	Prescot	Liverpool	0.0	0.0	0.0	2.6	0.0	0.0
BPT09	Prescot	Liverpool	0.0	0.0	0.0	0.0	0.0	0.0
BPT10	Prescot	Liverpool	0.0	0.8	0.0	63.6	0.0	0.0
BPT11	Prescot	Liverpool	0.0	0.0	0.0	77.9	0.0	0.0
BPT12	Prescot	Liverpool	0.0	0.0	0.0	70.6	0.0	0.0
BPT13	Prescot	Liverpool	0.0	6.7	0.0	51.7	0.0	0.0
BPT14	Prescot	Liverpool	0.0	0.0	0.0	50.5	0.0	0.0
BRF01	Rainford	Liverpool	0.0	0.8	0.0	25.4	0.0	0.0
BRF03	Rainford	Liverpool	0.0	2.3	0.0	46.8	0.0	0.0
BRF04	Rainford	Liverpool	0.0	0.2	0.0	37.5	0.0	0.0
BRF05	Rainford	Liverpool	0.0	0.1	0.0	13.2	0.0	0.0
BRF06	Rainford	Liverpool	0.0	21.2	0.0	85.5	0.0	0.0
BRF07	Rainford	Liverpool	3.7	0.0	0.1	0.9	0.7	0.0
BRF08	Rainford	Liverpool	0.0	0.1	0.0	78.9	0.0	0.0
BRF09	Rainford	Liverpool	0.0	1.4	0.0	88.9	0.0	0.0
BRF10	Rainford	Liverpool	0.0	0.2	0.0	59.8	0.0	0.0
BRF11	Rainford	Liverpool	0.0	11.5	0.0	85.2	0.0	0.0
BRF12	Rainford	Liverpool	0.0	0.1	0.0	43.4	0.0	0.0
BRF13	Rainford	Liverpool	0.0	0.1	0.0	81.9	0.0	0.0
BRF14	Rainford	Liverpool	0.0	0.0	0.0	1.0	0.0	0.0
BRFO2	Rainford	Liverpool	0.0	0.9	0.0	43.6	0.0	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
CMJ03	0.0	0.1	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ04	0.0	0.5	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ07	0.0	8.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ08	0.0	0.4	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ09	0.0	2.3	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ10	0.0	1.2	0.1	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ11	0.0	0.3	0.2	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ12	10.0	27.5	60.6	0.2	3.0	0.2	0.0	Unassigned
CMJ13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Ches. Tidewater
CMJ15	0.0	2.4	0.1	0.0	0.0	0.0	0.0	Ches. Tidewater
BPT01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BPT14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF07	0.0	0.1	0.2	0.0	0.0	0.1	0.0	Unassigned
BRF08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
BRF14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool

Sample ID	Site	Production Zone	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
LHA01	Latton Ridding	London Area	0.0	0.0	0.0	0.0	62.3	0.0
LHA02	Latton Ridding	London Area	0.0	0.0	0.0	0.0	18.0	0.0
LHA03	Latton Ridding	London Area	0.0	0.0	0.0	0.0	88.2	0.0
LHA04	Latton Ridding	London Area	0.0	0.0	0.0	0.0	97.6	0.0
LHA05	Latton Ridding	London Area	0.0	0.0	0.0	0.0	85.5	0.0
LHA06	Latton Ridding	London Area	0.0	0.0	0.0	0.0	99.3	0.0
LHA09	Latton Ridding	London Area	0.0	0.0	0.0	0.0	66.9	0.0
LHA10	Latton Ridding	London Area	0.0	0.0	0.0	0.0	98.8	0.0
LHA11	Latton Ridding	London Area	0.0	0.0	0.0	0.0	99.2	0.0
LHA12	Latton Ridding	London Area	0.0	0.0	0.0	0.0	61.7	0.0
LHA13	Latton Ridding	London Area	0.0	0.0	0.0	0.0	99.1	0.0
LHB01	Mill Street	London Area	0.0	0.0	0.0	0.0	72.5	0.0
LHB02	Mill Street	London Area	0.0	0.0	0.0	0.0	91.6	0.0
LHB03	Mill Street	London Area	0.0	0.0	0.0	0.0	99.6	0.0
LHB04	Mill Street	London Area	0.0	0.0	0.0	0.0	65.0	0.0
LHB05	Mill Street	London Area	0.0	0.0	0.0	0.0	97.7	0.0
LHB06	Mill Street	London Area	0.0	0.0	0.0	0.0	98.3	0.0
LHB07	Mill Street	London Area	0.0	0.0	0.0	0.0	98.4	0.0
LHB08	Mill Street	London Area	0.0	0.0	0.0	0.0	94.5	0.0
LHB09	Mill Street	London Area	0.0	0.0	0.0	0.0	94.9	0.0
LHB10	Mill Street	London Area	0.0	0.0	0.0	0.0	1.0	0.0
LHB11	Mill Street	London Area	0.0	0.0	0.0	0.0	99.3	0.0
LHB12	Mill Street	London Area	0.0	0.0	0.0	0.0	97.3	0.0
LHC01	Carters Mead	London Area	0.0	0.0	0.0	0.0	89.6	0.0
LHC02	Carters Mead	London Area	0.0	0.0	0.0	0.0	97.2	0.0
LHC03	Carters Mead	London Area	0.0	0.0	0.0	0.0	85.4	0.0
LHC04	Carters Mead	London Area	0.0	0.0	0.0	0.0	98.8	0.0
LHD01	Scout Hall	London Area	0.0	0.0	0.0	0.0	69.6	0.0
LHD02	Scout Hall	London Area	0.0	0.0	0.0	0.0	97.8	0.0
LHD03	Scout Hall	London Area	0.0	0.0	0.0	0.0	0.1	0.0
LHD04	Scout Hall	London Area	0.0	0.0	0.0	0.0	43.0	0.0
LHD05	Scout Hall	London Area	0.0	0.0	0.0	0.0	8.2	0.0
LHD06	Scout Hall	London Area	0.0	0.0	0.0	0.0	76.8	0.0
LHD07	Scout Hall	London Area	0.0	0.0	0.0	0.0	100.0	0.0
LHD08	Scout Hall	London Area	0.0	0.0	0.0	0.0	7.1	0.0
LHD09	Scout Hall	London Area	0.0	0.0	0.0	0.0	0.0	0.0
LHD10	Scout Hall	London Area	0.0	0.0	0.0	0.0	88.1	0.0
LHD11	Scout Hall	London Area	0.0	0.0	0.0	0.0	90.5	0.0
LHD12	Scout Hall	London Area	0.0	0.0	0.0	0.0	91.2	0.0
LHD13	Scout Hall	London Area	0.0	0.0	0.0	0.0	51.2	0.0
LHD14	Scout Hall	London Area	0.0	0.0	0.0	0.0	92.2	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
LHA01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHA02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHA03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHA04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHA05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHA06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHA09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHA10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHA11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHA12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHA13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHB12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHC01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHC02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHC03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHC04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LHD14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area

Sample ID	Site	Production Zone	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
LWW01	Woolwich	London Area	0.0	0.0	0.0	0.0	16.1	0.0
LWW02	Woolwich	London Area	0.0	0.0	0.0	0.0	97.4	0.0
LWW03	Woolwich	London Area	0.0	0.0	0.0	0.0	83.3	0.0
LWW04	Woolwich	London Area	0.0	0.0	0.0	0.0	11.7	0.0
LWW05	Woolwich	London Area	0.0	0.0	0.0	0.0	39.7	0.0
LWW06	Woolwich	London Area	0.0	0.0	0.0	0.0	98.7	0.0
LWW07	Woolwich	London Area	0.0	0.0	0.0	0.0	0.3	0.0
LWW08	Woolwich	London Area	0.0	0.0	0.0	0.0	83.7	0.0
LWW09	Woolwich	London Area	0.0	0.0	0.0	0.0	93.5	0.0
LWW10	Woolwich	London Area	0.0	0.0	0.0	0.0	66.0	0.0
LWW11	Woolwich	London Area	0.0	0.0	0.0	0.0	79.6	0.0
LWW12	Woolwich	London Area	0.0	0.0	0.0	0.0	25.7	0.0
LWW13	Woolwich	London Area	0.0	0.0	0.0	0.0	82.7	0.0
LWW14	Woolwich	London Area	0.0	0.0	0.0	0.0	86.9	0.0
LWW15	Woolwich	London Area	0.0	0.0	0.0	0.0	92.1	0.0
PSR01	Sycolin Road	N. VA Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
PSR02	Sycolin Road	N. VA Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
PSR03	Sycolin Road	N. VA Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
PSR04	Sycolin Road	N. VA Piedmont	0.0	0.0	0.1	0.0	0.0	0.0
PSR05	Sycolin Road	N. VA Piedmont	0.0	0.0	0.1	0.0	0.0	0.0
PSR06	Sycolin Road	N. VA Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
PSR07	Sycolin Road	N. VA Piedmont	0.0	0.0	9.8	0.0	0.0	0.0
PSR08	Sycolin Road	N. VA Piedmont	8.9	0.0	71.0	0.0	0.6	0.0
PSR09	Sycolin Road	N. VA Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
PSR10	Sycolin Road	N. VA Piedmont	0.0	0.0	3.3	0.0	0.0	0.0
PSR11	Sycolin Road	N. VA Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
PSR12	Sycolin Road	N. VA Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
PSR13	Sycolin Road	N. VA Piedmont	0.0	0.0	0.3	0.0	0.0	0.0
PSR14	Sycolin Road	N. VA Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
PSR18	Sycolin Road	N. VA Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
NHL01	Henry Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	18.8
NHL02	Henry Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.2
NHL03	Henry Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
NHL04	Henry Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	6.5
NHL05	Henry Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
NHL06	Henry Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	1.8
NHL07	Henry Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	65.8
NHL08	Henry Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
NJL01	Joseph Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
NJL02	Joseph Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	1.2
NJL03	Joseph Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
LWW01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW07	0.0	0.1	0.0	0.0	0.0	0.0	0.0	London Area
LWW08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
LWW15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	London Area
PSR01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR02	6.6	0.0	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR03	2.5	0.0	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR04	20.5	4.3	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR05	13.6	0.0	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR06	84.6	0.3	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR07	22.0	18.1	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR08	19.7	49.7	19.6	0.0	5.2	0.0	0.2	Unassigned
PSR09	75.8	0.0	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR10	9.0	3.9	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR11	20.5	3.9	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR12	56.7	0.0	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR13	47.2	0.1	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR14	8.6	0.0	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
PSR18	82.3	0.0	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
NHL01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NHL02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NHL03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NHL04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NHL05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NHL06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NHL07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NHL08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NJL01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NJL02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NJL03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont

Sample ID	Site	Production Zone	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
NJL04	Joseph Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	6.2
NJL05	Joseph Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	2.5
NSL01	Solomon Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	12.9
NSL02	Solomon Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	13.7
NSL03	Solomon Loy	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
NWD01	Dennis	NC Piedmont	0.0	0.0	0.0	0.0	0.0	60.6
NWD02	Dennis	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
NWD03	Dennis	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
NWD04	Dennis	NC Piedmont	0.0	0.0	0.0	0.0	0.0	9.3
NWD05	Dennis	NC Piedmont	0.0	0.0	0.0	0.0	0.0	19.4
NWD06	Dennis	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.4
NWD07	Dennis	NC Piedmont	0.0	0.0	0.0	0.0	0.0	0.0
YTM01	Topham Miller	Philadelphia	0.0	0.0	2.1	0.0	0.0	0.0
YTM02	Topham Miller	Philadelphia	0.0	0.0	0.2	0.0	0.0	0.0
YTM03	Topham Miller	Philadelphia	0.0	0.0	0.1	0.0	0.0	0.0
YTM04	Topham Miller	Philadelphia	18.7	0.0	87.6	0.0	3.8	0.0
YTM05	Topham Miller	Philadelphia	0.0	0.0	0.4	0.0	0.0	0.0
YTM06	Topham Miller	Philadelphia	0.0	0.0	0.7	0.0	0.0	0.0
YTM07	Topham Miller	Philadelphia	0.1	0.0	1.2	0.0	0.0	0.0
YTM08	Topham Miller	Philadelphia	0.0	0.0	0.0	0.0	0.0	0.0
YTM09	Topham Miller	Philadelphia	0.0	0.0	0.0	0.0	0.0	0.0
YTM10	Topham Miller	Philadelphia	0.0	0.0	2.5	0.0	0.0	0.0
YTM11	Topham Miller	Philadelphia	0.1	0.0	19.3	0.0	0.0	0.0
YTM12	Topham Miller	Philadelphia	0.0	0.0	0.0	0.0	0.0	0.0
YTM13	Topham Miller	Philadelphia	0.0	0.0	0.0	0.0	0.0	0.0
YTM14	Topham Miller	Philadelphia	0.0	0.0	0.0	0.0	0.0	0.0
YTM15	Topham Miller	Philadelphia	0.0	0.0	0.0	0.0	0.0	0.0
YTM16	Topham Miller	Philadelphia	0.0	0.0	4.8	0.0	0.0	0.0
YTM17	Topham Miller	Philadelphia	0.0	0.0	0.2	0.0	0.0	0.0
YTM18	Topham Miller	Philadelphia	0.0	0.0	0.8	0.0	0.0	0.0
YTM19	Topham Miller	Philadelphia	13.5	18.4	2.9	0.5	93.9	0.0
YTM20	Topham Miller	Philadelphia	70.0	25.2	17.3	6.0	96.3	0.0
SFC01	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC02	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC03	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC04	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC05	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC06	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC07	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC08	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC09	Fincastle	S. Ridge & Valley	66.6	0.1	9.5	0.0	1.4	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
NJL04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NJL05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NSL01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NSL02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NSL03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NWD01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NWD02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NWD03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NWD04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NWD05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NWD06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
NWD07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC Piedmont
YTM01	0.1	99.4	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM02	1.1	94.8	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM03	0.0	49.2	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM04	2.1	29.9	11.6	0.1	1.8	0.0	0.0	Unassigned
YTM05	0.3	94.5	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM06	0.0	95.6	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM07	0.0	70.4	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Unassigned
YTM09	0.1	6.8	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM10	0.0	56.3	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM11	0.1	69.7	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM12	0.1	91.8	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM13	1.7	63.7	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM14	9.6	32.3	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM15	0.0	34.1	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM16	0.0	32.3	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM17	0.0	59.1	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM18	0.1	67.4	0.0	0.0	0.0	0.0	0.0	Philadelphia
YTM19	0.1	0.8	19.8	0.2	0.1	1.5	0.0	Unassigned
YTM20	0.1	4.1	26.6	0.6	0.3	27.3	0.0	Unassigned
SFC01	0.0	0.0	0.0	20.4	0.0	0.0	0.0	S. Ridge & Valley
SFC02	0.0	0.0	0.0	35.5	0.0	0.0	0.0	S. Ridge & Valley
SFC03	0.0	0.0	0.0	1.8	0.0	0.0	0.0	S. Ridge & Valley
SFC04	0.0	0.0	0.0	90.8	0.0	0.0	0.0	S. Ridge & Valley
SFC05	0.0	0.0	0.0	80.1	0.0	0.0	0.0	S. Ridge & Valley
SFC06	0.0	0.0	0.0	22.9	0.0	0.0	0.0	S. Ridge & Valley
SFC07	0.0	0.0	0.0	2.8	0.0	0.0	0.0	S. Ridge & Valley
SFC08	0.0	0.0	0.0	12.8	0.0	0.0	0.0	S. Ridge & Valley
SFC09	11.4	11.6	67.5	1.6	1.7	0.1	0.0	Unassigned

Sample ID	Site	Production Zone	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
SFC10	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC11	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC12	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC13	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFC14	Fincastle	S. Ridge & Valley	0.0	0.0	0.0	0.0	0.0	0.0
SAB01	Baecher	Shen. Valley	0.2	0.0	0.0	0.0	0.0	0.0
SAB02	Baecher	Shen. Valley	0.1	0.0	0.0	0.0	0.0	0.0
SAB03	Baecher	Shen. Valley	1.2	0.0	0.0	0.0	0.0	0.0
SAB04	Baecher	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SAB05	Baecher	Shen. Valley	47.6	0.0	3.3	0.0	0.0	0.0
SAB06	Baecher	Shen. Valley	8.1	0.0	0.7	0.0	0.0	0.0
SAB07	Baecher	Shen. Valley	0.4	0.0	0.0	0.0	0.0	0.0
SAB08	Baecher	Shen. Valley	0.9	0.0	0.0	0.0	0.0	0.0
SAB09	Baecher	Shen. Valley	0.1	0.0	0.0	0.0	0.0	0.0
SAB10	Baecher	Shen. Valley	0.2	0.0	0.0	0.0	0.0	0.0
SAB11	Baecher	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SAB12	Baecher	Shen. Valley	0.8	0.0	0.0	0.0	0.0	0.0
SAB13	Baecher	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SAP01	Andrew Pitman	Shen. Valley	7.0	0.0	0.1	0.0	0.0	0.0
SAP02	Andrew Pitman	Shen. Valley	45.5	0.0	2.3	0.0	0.0	0.0
SAP03	Andrew Pitman	Shen. Valley	0.1	0.0	0.0	0.0	0.0	0.0
SAP04	Andrew Pitman	Shen. Valley	14.5	0.0	0.8	0.0	0.0	0.0
SAP05	Andrew Pitman	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SAP06	Andrew Pitman	Shen. Valley	3.1	0.0	0.0	0.0	0.0	0.0
SAP07	Andrew Pitman	Shen. Valley	29.8	0.0	1.3	0.0	0.0	0.0
SAP08	Andrew Pitman	Shen. Valley	2.3	0.0	0.1	0.0	0.0	0.0
SAP09	Andrew Pitman	Shen. Valley	15.4	0.0	4.5	0.0	0.0	0.0
SAP10	Andrew Pitman	Shen. Valley	1.0	0.0	0.0	0.0	0.0	0.0
SAP11	Andrew Pitman	Shen. Valley	1.9	0.0	0.0	0.0	0.0	0.0
SAP12	Andrew Pitman	Shen. Valley	11.9	0.0	0.4	0.0	0.0	0.0
SAP13	Andrew Pitman	Shen. Valley	98.4	5.6	80.7	2.4	52.3	0.0
SAP14	Andrew Pitman	Shen. Valley	0.3	0.0	0.0	0.0	0.0	0.0
SAP15	Andrew Pitman	Shen. Valley	96.4	1.0	76.1	0.0	54.9	0.0
SAP16	Andrew Pitman	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFB01	Firebaugh	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFB02	Firebaugh	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFB03	Firebaugh	Shen. Valley	0.1	0.0	0.0	0.0	0.0	0.0
SFB04	Firebaugh	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFB05	Firebaugh	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFB06	Firebaugh	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFB07	Firebaugh	Shen. Valley	5.7	0.0	3.2	0.0	0.0	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
SFC10	0.0	0.0	0.0	99.1	0.0	0.0	0.0	S. Ridge & Valley
SFC11	0.0	0.0	0.0	4.3	0.0	0.0	0.0	S. Ridge & Valley
SFC12	0.0	0.0	0.0	21.2	0.0	0.0	0.0	S. Ridge & Valley
SFC13	0.0	0.0	0.0	90.0	0.0	0.0	0.0	S. Ridge & Valley
SFC14	0.0	0.0	0.0	3.0	0.0	0.0	0.0	S. Ridge & Valley
SAB01	0.0	0.0	63.3	0.0	0.0	0.0	0.0	Shen. Valley
SAB02	0.0	0.0	93.4	0.0	0.0	0.0	0.0	Shen. Valley
SAB03	0.0	0.0	88.2	0.0	0.0	0.0	0.0	Shen. Valley
SAB04	0.0	0.0	29.2	0.0	0.0	0.0	0.0	Shen. Valley
SAB05	0.0	0.0	72.9	0.0	0.0	0.0	0.0	Shen. Valley
SAB06	0.0	0.0	77.2	0.0	0.0	0.0	0.0	Shen. Valley
SAB07	0.0	0.0	64.5	0.0	0.0	0.0	0.0	Shen. Valley
SAB08	0.0	0.0	89.3	0.0	0.0	0.0	0.0	Shen. Valley
SAB09	0.0	0.0	94.9	0.0	0.0	0.0	0.0	Shen. Valley
SAB10	0.0	0.0	92.0	0.0	0.0	0.0	0.0	Shen. Valley
SAB11	0.0	0.0	1.5	0.0	0.0	0.0	0.0	Shen. Valley
SAB12	0.0	0.0	74.8	0.0	0.0	0.0	0.0	Shen. Valley
SAB13	0.0	0.0	59.2	0.0	0.0	0.0	0.0	Shen. Valley
SAP01	0.0	0.0	42.2	0.0	0.0	0.0	0.0	Shen. Valley
SAP02	0.0	0.1	82.6	0.0	0.0	0.0	0.0	Shen. Valley
SAP03	0.0	0.0	1.8	0.0	0.0	0.0	0.0	Shen. Valley
SAP04	0.0	0.0	68.1	0.0	0.0	0.0	0.0	Shen. Valley
SAP05	0.0	0.0	4.8	0.0	0.0	0.0	0.0	Shen. Valley
SAP06	0.0	0.0	28.2	0.0	0.0	0.0	0.0	Shen. Valley
SAP07	0.0	0.0	50.0	0.0	0.0	0.0	0.0	Shen. Valley
SAP08	0.0	0.0	44.4	0.0	0.0	0.0	0.0	Shen. Valley
SAP09	0.0	0.0	24.7	0.0	0.0	0.0	0.0	Shen. Valley
SAP10	0.0	0.0	78.3	0.0	0.0	0.0	0.0	Shen. Valley
SAP11	0.0	0.0	86.7	0.0	0.0	0.0	0.0	Shen. Valley
SAP12	0.0	0.0	78.7	0.0	0.0	0.0	0.0	Shen. Valley
SAP13	26.0	53.3	99.6	2.2	8.5	1.5	0.0	Unassigned
SAP14	0.0	0.0	22.2	0.0	0.0	0.0	0.0	Shen. Valley
SAP15	9.7	15.9	96.6	1.2	66.3	0.6	0.0	Unassigned
SAP16	0.0	0.0	0.2	0.0	0.0	0.0	0.0	Shen. Valley
SFB01	0.0	0.0	6.3	0.0	0.0	0.0	0.0	Shen. Valley
SFB02	0.0	0.0	0.8	0.0	0.0	0.0	0.0	Shen. Valley
SFB03	0.0	0.0	28.1	0.0	0.0	0.0	0.0	Shen. Valley
SFB04	0.0	0.0	0.8	0.0	0.0	0.0	0.0	Shen. Valley
SFB05	0.0	0.0	57.6	0.0	0.0	0.0	0.0	Shen. Valley
SFB06	0.0	0.0	1.4	0.0	0.0	0.0	0.0	Shen. Valley
SFB07	0.1	0.6	46.5	0.0	0.0	0.0	0.0	Shen. Valley

Sample ID	Site	Production Zone	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
SFB08	Firebaugh	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFB09	Firebaugh	Shen. Valley	0.1	0.0	0.0	0.0	0.0	0.0
SFB10	Firebaugh	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFB11	Firebaugh	Shen. Valley	0.5	0.0	0.0	0.0	0.0	0.0
SFB12	Firebaugh	Shen. Valley	0.1	0.0	0.4	0.0	0.0	0.0
SFB13	Firebaugh	Shen. Valley	15.7	0.0	8.2	0.0	0.0	0.0
SFB14	Firebaugh	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SFB15	Firebaugh	Shen. Valley	0.0	0.0	0.1	0.0	0.0	0.0
SFB16	Firebaugh	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SHW01	Heatwole	Shen. Valley	0.7	0.0	0.0	0.0	0.0	0.0
SHW02	Heatwole	Shen. Valley	3.6	0.0	0.0	0.0	0.0	0.0
SHW03	Heatwole	Shen. Valley	24.1	0.0	0.3	0.0	0.0	0.0
SHW04	Heatwole	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SHW05	Heatwole	Shen. Valley	11.3	0.0	0.1	0.0	0.0	0.0
SHW06	Heatwole	Shen. Valley	1.6	0.0	0.0	0.0	0.0	0.0
SHW07	Heatwole	Shen. Valley	16.4	0.0	0.0	0.0	0.0	0.0
SHW08	Heatwole	Shen. Valley	23.4	0.0	0.0	0.0	0.0	0.0
SHW09	Heatwole	Shen. Valley	0.9	0.0	0.0	0.0	0.0	0.0
SRB01	Rockbridge	Shen. Valley	16.5	0.0	16.2	0.0	0.0	0.0
SRB02	Rockbridge	Shen. Valley	9.7	0.0	2.4	0.0	0.0	0.0
SRB03	Rockbridge	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SRB04	Rockbridge	Shen. Valley	0.1	0.0	0.0	0.0	0.0	0.0
SRB05	Rockbridge	Shen. Valley	0.2	0.0	0.3	0.0	0.0	0.0
SRB06	Rockbridge	Shen. Valley	0.7	0.0	0.4	0.0	0.0	0.0
SRB07	Rockbridge	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SRB08	Rockbridge	Shen. Valley	1.8	0.0	0.5	0.0	0.0	0.0
SRB09	Rockbridge	Shen. Valley	17.8	0.0	0.0	0.0	0.0	0.0
SRB10	Rockbridge	Shen. Valley	2.4	0.0	0.4	0.0	0.0	0.0
SSU01	Suter	Shen. Valley	0.4	0.0	0.0	0.0	0.0	0.0
SSU02	Suter	Shen. Valley	0.2	0.0	1.1	0.0	0.0	0.0
SSU03	Suter	Shen. Valley	1.9	0.0	0.4	0.0	0.0	0.0
SSU04	Suter	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
SSU05	Suter	Shen. Valley	0.4	0.0	0.0	0.0	0.0	0.0
SSU06	Suter	Shen. Valley	0.2	0.0	0.0	0.0	0.0	0.0
SSU07	Suter	Shen. Valley	0.1	0.0	0.0	0.0	0.0	0.0
SSU08	Suter	Shen. Valley	0.0	0.0	0.0	0.0	0.0	0.0
MSB01	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB02	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB03	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB04	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB05	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
SFB08	0.0	0.0	19.4	0.0	0.0	0.0	0.0	Shen. Valley
SFB09	0.0	0.0	80.5	0.0	0.0	0.0	0.0	Shen. Valley
SFB10	0.0	0.0	17.8	0.0	0.0	0.0	0.0	Shen. Valley
SFB11	0.0	0.0	32.3	0.0	0.0	0.0	0.0	Shen. Valley
SFB12	0.0	0.0	26.4	0.0	0.0	0.0	0.0	Shen. Valley
SFB13	0.0	0.0	91.8	0.0	0.0	0.0	0.0	Shen. Valley
SFB14	0.0	0.0	19.2	0.0	0.0	0.0	0.0	Shen. Valley
SFB15	0.0	0.0	57.9	0.0	0.0	0.0	0.0	Shen. Valley
SFB16	0.0	0.0	3.4	0.0	0.0	0.0	0.0	Shen. Valley
SHW01	0.0	0.0	50.3	0.0	0.0	0.0	0.0	Shen. Valley
SHW02	0.0	0.0	5.6	0.0	0.0	0.0	0.0	Shen. Valley
SHW03	0.0	0.0	94.5	0.0	0.0	0.0	0.0	Shen. Valley
SHW04	0.0	0.0	0.6	0.0	0.0	0.0	0.0	Shen. Valley
SHW05	0.0	0.0	40.2	0.0	0.0	0.0	0.0	Shen. Valley
SHW06	0.0	0.0	94.1	0.0	0.0	0.0	0.0	Shen. Valley
SHW07	0.0	0.0	56.0	0.0	0.0	0.0	0.0	Shen. Valley
SHW08	0.0	0.0	62.0	0.0	0.0	0.0	0.0	Shen. Valley
SHW09	0.0	0.0	60.9	0.0	0.0	0.0	0.0	Shen. Valley
SRB01	0.0	0.0	91.1	0.0	0.0	0.0	0.0	Shen. Valley
SRB02	0.0	0.0	99.2	0.0	0.0	0.0	0.0	Shen. Valley
SRB03	0.0	0.0	66.1	0.0	0.0	0.0	0.0	Shen. Valley
SRB04	0.0	0.0	18.7	0.0	0.0	0.0	0.0	Shen. Valley
SRB05	0.0	0.0	32.4	0.0	0.1	0.0	0.0	Shen. Valley
SRB06	0.0	0.0	83.6	0.0	0.0	0.0	0.0	Shen. Valley
SRB07	0.0	0.0	57.1	0.0	0.0	0.0	0.0	Shen. Valley
SRB08	0.0	0.0	86.6	0.0	0.0	0.0	0.0	Shen. Valley
SRB09	0.0	0.0	65.3	0.0	0.0	0.0	0.0	Shen. Valley
SRB10	0.0	0.0	13.6	0.0	0.0	0.0	0.0	Shen. Valley
SSU01	0.0	0.0	99.4	0.0	0.0	0.0	0.0	Shen. Valley
SSU02	0.0	0.0	90.1	0.0	0.0	0.0	0.0	Shen. Valley
SSU03	0.0	0.0	97.1	0.0	0.0	0.0	0.0	Shen. Valley
SSU04	0.0	0.0	0.1	0.0	0.0	0.0	0.0	Shen. Valley
SSU05	0.0	0.0	98.6	0.0	0.0	0.0	0.0	Shen. Valley
SSU06	0.0	0.0	92.8	0.0	0.0	0.0	0.0	Shen. Valley
SSU07	0.0	0.0	88.9	0.0	0.0	0.0	0.0	Shen. Valley
SSU08	0.0	0.0	8.9	0.0	0.0	0.0	0.0	Shen. Valley
MSB01	0.0	0.0	0.0	0.0	99.5	0.0	0.0	Staffordshire
MSB02	0.0	0.0	0.0	0.0	15.3	0.0	0.0	Staffordshire
MSB03	0.0	0.0	0.0	0.0	71.3	0.0	0.0	Staffordshire
MSB04	0.0	0.0	0.0	0.0	95.7	0.0	0.0	Staffordshire
MSB05	0.0	0.0	0.0	0.0	98.4	0.0	0.0	Staffordshire

Sample ID	Site	Production Zone	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
MSB06	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB07	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB08	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB09	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB10	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB11	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB12	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB13	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB14	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB15	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB16	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB17	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
MSB18	Swan Bank	Staffordshire	0.0	0.0	0.0	0.0	0.0	0.0
LFH01	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH02	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH03	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH04	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH05	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH06	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH07	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH08	Farnborough	Surrey-Hamp.	26.4	0.0	10.2	0.0	9.6	0.0
LFH09	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH10	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH11	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH12	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH13	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH14	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH15	Farnborough	Surrey-Hamp.	48.9	0.0	31.5	0.0	0.7	0.0
LFH16	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH17	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH18	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH19	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0
LFH20	Farnborough	Surrey-Hamp.	0.0	0.0	0.0	0.0	0.0	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
MSB06	0.0	0.0	0.0	0.0	72.9	0.0	0.0	Staffordshire
MSB07	0.0	0.0	0.0	0.0	66.4	0.0	0.0	Staffordshire
MSB08	0.0	0.0	0.0	0.0	97.2	0.0	0.0	Staffordshire
MSB09	0.0	0.0	0.0	0.0	95.3	0.0	0.0	Staffordshire
MSB10	0.0	0.0	0.0	0.0	94.7	0.0	0.0	Staffordshire
MSB11	0.0	0.0	0.0	0.0	37.3	0.0	0.0	Staffordshire
MSB12	0.0	0.0	0.0	0.0	73.4	0.0	0.0	Staffordshire
MSB13	0.0	0.0	0.0	0.0	38.8	0.0	0.0	Staffordshire
MSB14	0.0	0.0	0.0	0.0	75.4	0.0	0.0	Staffordshire
MSB15	0.0	0.0	0.0	0.0	63.5	0.0	0.0	Staffordshire
MSB16	0.0	0.0	0.0	0.0	83.5	0.0	0.0	Staffordshire
MSB17	0.0	0.0	0.0	0.0	60.2	0.0	0.0	Staffordshire
MSB18	0.0	0.0	0.0	0.0	0.3	0.0	0.0	Staffordshire
LFH01	0.0	0.0	0.0	0.0	0.0	61.1	0.0	Surrey-Hamp.
LFH02	0.0	0.0	0.0	0.0	0.0	21.6	0.0	Surrey-Hamp.
LFH03	0.0	0.0	0.0	0.0	0.0	0.3	0.0	Surrey-Hamp.
LFH04	0.0	0.0	0.0	0.0	0.0	1.2	0.0	Surrey-Hamp.
LFH05	0.0	0.0	0.0	0.0	0.0	15.1	0.0	Surrey-Hamp.
LFH06	0.0	0.0	0.0	0.0	0.0	87.9	0.0	Surrey-Hamp.
LFH07	0.0	0.0	0.0	0.0	0.0	38.0	0.0	Surrey-Hamp.
LFH08	55.1	2.7	67.6	0.0	21.1	0.4	0.0	Unassigned
LFH09	0.0	0.0	0.0	0.0	0.0	1.3	0.0	Surrey-Hamp.
LFH10	0.0	0.0	0.0	0.0	0.0	9.3	0.0	Surrey-Hamp.
LFH11	0.0	0.0	0.0	0.0	0.0	88.5	0.0	Surrey-Hamp.
LFH12	0.0	0.0	0.0	0.0	0.0	0.1	0.0	Surrey-Hamp.
LFH13	0.0	0.0	0.0	0.0	0.0	0.1	0.0	Surrey-Hamp.
LFH14	0.0	0.0	0.0	0.0	0.0	0.2	0.0	Surrey-Hamp.
LFH15	1.5	0.9	39.3	0.0	78.8	0.2	0.1	Unassigned
LFH16	0.0	0.0	0.0	0.0	0.0	99.0	0.0	Surrey-Hamp.
LFH17	0.0	0.0	0.0	0.0	0.0	97.2	0.0	Surrey-Hamp.
LFH18	0.0	0.0	0.0	0.0	0.0	0.1	0.0	Surrey-Hamp.
LFH19	0.0	0.0	0.0	0.0	0.0	0.1	0.0	Surrey-Hamp.
LFH20	0.0	0.0	0.0	0.0	0.0	56.0	0.0	Surrey-Hamp.

Sample ID	Plantation	Assemblage	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
DAQ01	Ashcombs Qtr.	Ashcombs	0.0	0.0	0.0	0.0	0.0	0.0
DAQ02	Ashcombs Qtr.	Ashcombs	26.2	68.9	2.3	84.7	47.2	0.0
DAQ03	Ashcombs Qtr.	Ashcombs	76.0	0.4	85.1	0.0	17.0	0.0
DAQ04	Ashcombs Qtr.	Ashcombs	0.0	0.0	0.0	0.0	0.1	0.0
DAQ05	Ashcombs Qtr.	Ashcombs	96.8	14.4	49.2	7.1	93.0	0.0
DAQ06	Ashcombs Qtr.	Ashcombs	36.1	17.2	13.4	1.0	99.3	0.0
DAQ07	Ashcombs Qtr.	Ashcombs	0.0	0.0	0.2	0.0	0.0	0.0
DAQ08	Ashcombs Qtr.	Ashcombs	0.0	0.0	0.0	0.1	0.1	0.0
DAQ09	Ashcombs Qtr.	Ashcombs	0.2	0.2	0.1	0.0	3.5	0.0
DAQ10	Ashcombs Qtr.	Ashcombs	3.1	0.0	11.8	0.0	7.4	0.0
DAQ11	Ashcombs Qtr.	Ashcombs	95.9	15.2	97.3	1.2	45.8	0.0
DAQ12	Ashcombs Qtr.	Ashcombs	0.4	0.0	8.5	0.0	0.4	0.0
DCP01	Chapline Place	Chapline	5.6	0.7	63.8	0.0	13.5	0.0
DCP02	Chapline Place	Chapline	1.7	1.0	0.0	0.5	1.8	0.0
DCP03	Chapline Place	Chapline	18.3	0.0	2.9	0.0	3.9	0.0
DCP04	Chapline Place	Chapline	93.2	0.3	43.5	0.0	65.2	0.0
DCP05	Chapline Place	Chapline	58.1	1.9	84.3	0.0	26.9	0.0
DCP06	Chapline Place	Chapline	0.0	0.1	0.0	0.0	0.0	0.0
DCP07	Chapline Place	Chapline	66.2	0.3	99.0	0.0	16.7	0.0
DCP08	Chapline Place	Chapline	9.8	17.6	25.5	3.0	32.9	0.0
DCP09	Chapline Place	Chapline	19.7	0.3	81.1	0.0	1.5	0.0
DCP10	Chapline Place	Chapline	3.6	30.7	0.1	3.3	6.6	0.0
DFF01	Fairfield	Midden	50.7	0.0	77.8	0.0	3.5	0.0
DFF02	Fairfield	Midden	64.6	1.0	64.2	0.1	8.3	0.0
DFF03	Fairfield	Midden	11.5	2.2	0.1	1.9	2.2	0.0
DFF04	Fairfield	Midden	0.2	1.4	0.2	0.0	12.7	0.0
DFF05	Fairfield	Midden	0.0	0.0	0.3	0.0	0.0	0.0
DFF06	Fairfield	Midden	86.1	0.0	37.2	0.0	15.0	0.0
DFF07	Fairfield	Midden	41.0	1.5	87.4	0.0	24.1	0.0
DFF08	Fairfield	Midden	51.7	3.7	14.5	0.9	97.2	0.0
DFF09	Fairfield	Midden	0.0	0.0	0.0	0.0	0.0	0.0
DFF10	Fairfield	Midden	71.7	3.5	91.2	0.3	36.2	0.0
DFF11	Fairfield	Midden	9.8	0.0	97.1	0.0	1.3	0.0
DFF12	Fairfield	Midden	13.8	0.0	85.2	0.0	6.0	0.0
DFF13	Fairfield	Midden	6.7	0.0	77.6	0.0	2.3	0.0
DFQ01	Fairfield	Quarter	74.4	0.1	33.4	0.0	5.2	0.0
DFQ02	Fairfield	Quarter	0.4	0.0	0.2	0.0	1.5	0.0
DFQ03	Fairfield	Quarter	0.2	0.0	0.3	0.0	0.8	0.0
DFQ04	Fairfield	Quarter	78.4	1.5	95.4	0.4	59.0	0.0
DFQ05	Fairfield	Quarter	63.6	0.0	17.6	0.0	5.7	0.0
DFQ06	Fairfield	Quarter	74.3	5.2	3.3	4.1	75.9	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
DAQ01	0.1	22.5	0.0	0.0	0.0	0.0	0.0	Philadelphia
DAQ02	0.0	1.9	19.3	0.2	0.0	0.6	0.0	Liverpool
DAQ03	64.5	99.9	63.4	0.3	2.5	0.4	0.0	Philadelphia
DAQ04	0.0	3.0	0.0	0.0	0.0	0.0	0.0	Philadelphia
DAQ05	3.6	17.0	90.2	0.8	2.2	1.6	0.0	Alexandria
DAQ06	3.2	12.2	57.4	0.3	0.5	1.8	0.0	London Area
DAQ07	1.3	0.1	0.0	0.0	0.0	0.0	0.0	N. VA Piedmont
DAQ08	0.0	0.1	0.0	0.0	0.0	0.0	0.0	Unassigned
DAQ09	0.5	34.5	0.4	0.0	0.0	0.0	0.0	Philadelphia
DAQ10	1.9	47.3	5.7	0.2	0.1	0.0	0.0	Philadelphia
DAQ11	6.2	60.6	83.2	2.0	3.9	3.2	0.0	Ches. Tidewater
DAQ12	0.0	0.0	0.2	0.0	0.0	5.7	0.0	Ches. Tidewater
DCP01	89.6	77.3	48.8	0.1	4.8	0.2	0.0	N. VA Piedmont
DCP02	0.0	0.0	0.2	0.0	0.0	82.2	0.0	Surrey-Hamp.
DCP03	0.5	2.1	8.8	1.0	8.0	0.0	0.0	Alexandria
DCP04	7.2	18.9	76.0	1.1	37.4	0.2	0.0	Alexandria
DCP05	66.7	95.6	69.2	0.7	62.7	0.5	0.0	Philadelphia
DCP06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Unassigned
DCP07	51.7	96.2	49.3	0.2	22.7	0.8	0.0	Ches. Tidewater
DCP08	4.2	52.7	25.7	9.6	0.0	0.4	0.0	Philadelphia
DCP09	0.7	66.1	6.8	0.4	2.4	0.0	0.0	Ches. Tidewater
DCP10	0.0	0.0	0.5	0.2	0.0	12.4	0.0	Buckley
DFF01	0.5	5.4	18.0	0.0	7.1	1.8	0.0	Ches. Tidewater
DFF02	50.2	96.3	48.8	0.5	1.4	12.4	0.0	Philadelphia
DFF03	0.0	0.0	1.0	0.1	0.0	74.5	0.0	Surrey-Hamp.
DFF04	0.1	7.6	0.6	0.0	0.0	0.0	0.0	London Area
DFF05	1.8	0.5	0.0	0.0	0.9	0.0	2.3	New Zone
DFF06	12.1	17.2	51.5	2.1	48.8	1.8	0.0	Alexandria
DFF07	15.8	71.0	43.5	0.6	7.7	1.3	0.0	Ches. Tidewater
DFF08	7.7	4.5	69.3	0.9	4.0	21.3	0.0	London Area
DFF09	0.0	0.0	0.0	0.0	0.0	0.0	34.9	New Zone
DFF10	1.4	42.6	61.1	2.3	7.0	0.8	0.0	Ches. Tidewater
DFF11	6.4	8.5	19.0	0.0	12.2	0.2	0.0	Ches. Tidewater
DFF12	22.6	9.3	37.0	0.0	60.4	0.5	0.0	Ches. Tidewater
DFF13	23.0	5.5	22.0	0.0	28.6	0.3	0.0	Ches. Tidewater
DFQ01	1.6	8.9	26.1	1.1	4.9	50.5	0.0	Alexandria
DFQ02	1.4	50.5	0.3	0.1	0.0	0.0	0.0	Philadelphia
DFQ03	0.7	45.3	0.2	0.2	0.0	0.0	0.0	Philadelphia
DFQ04	28.8	21.5	90.1	0.6	4.8	27.0	0.0	Ches. Tidewater
DFQ05	7.6	8.0	24.7	0.1	41.1	0.0	0.1	Alexandria
DFQ06	1.0	4.3	45.8	0.6	0.5	5.7	0.0	London Area

Sample ID	Plantation	Assemblage	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
DFQ07	Fairfield	Quarter	0.0	0.0	0.0	0.0	0.0	0.0
DFQ08	Fairfield	Quarter	7.2	0.0	12.6	0.0	0.0	0.0
DFQ09	Fairfield	Quarter	0.0	20.5	0.0	0.2	0.0	0.0
DFQ10	Fairfield	Quarter	8.7	3.5	0.5	0.2	3.7	0.0
DHF01	Mount Vernon	House for Families	0.0	35.6	0.0	91.8	1.3	0.0
DHF02	Mount Vernon	House for Families	61.2	0.8	40.9	0.0	13.7	0.0
DHF03	Mount Vernon	House for Families	0.0	0.0	0.0	0.0	1.4	0.0
DHF04	Mount Vernon	House for Families	24.9	0.0	49.6	0.0	4.5	0.0
DHF05	Mount Vernon	House for Families	0.0	0.0	0.0	38.2	0.0	0.0
DHF06	Mount Vernon	House for Families	33.1	34.8	6.2	44.6	98.8	0.0
DKQ01	Kings Reach	Quarter	0.3	6.4	0.2	0.1	1.4	0.0
DKQ02	Kings Reach	Quarter	0.8	0.0	0.8	0.0	0.0	0.0
DKQ03	Kings Reach	Quarter	21.7	0.7	93.6	0.0	12.8	0.0
DKQ04	Kings Reach	Quarter	1.2	0.0	1.0	0.0	0.0	0.0
DKQ05	Kings Reach	Quarter	28.3	58.3	25.0	3.3	29.7	0.0
DKQ06	Kings Reach	Quarter	38.0	0.1	29.8	0.0	2.4	0.0
DKQ07	Kings Reach	Quarter	0.0	29.3	0.0	98.3	1.7	0.0
DKQ08	Kings Reach	Quarter	30.7	3.6	61.4	0.0	21.1	0.0
DKR01	Kings Reach	Main	66.8	0.1	78.5	0.0	4.6	0.0
DKR02	Kings Reach	Main	43.7	0.0	1.3	0.0	2.0	0.0
DKR03	Kings Reach	Main	85.9	7.1	81.0	0.7	33.8	0.0
DKR04	Kings Reach	Main	2.3	70.5	0.1	99.4	9.6	0.0
DKR05	Kings Reach	Main	16.1	56.6	2.7	6.7	11.0	0.0
DKR06	Kings Reach	Main	2.6	0.2	0.7	0.0	5.1	0.0
DKR07	Kings Reach	Main	0.0	0.0	0.0	0.0	0.0	0.0
DKR08	Kings Reach	Main	28.3	51.3	9.2	5.0	29.2	0.0
DKR09	Kings Reach	Main	2.5	0.0	68.4	0.0	0.0	0.0
DKR10	Kings Reach	Main	25.3	50.3	0.6	84.1	17.1	0.0
DKR11	Kings Reach	Main	38.0	18.6	15.7	13.7	99.6	0.0
DKR12	Kings Reach	Main	79.1	4.7	15.9	3.1	97.9	0.0
DMY01	NAVAIR	Mattapany	14.5	0.2	94.8	0.0	8.0	0.0
DMY02	NAVAIR	Mattapany	73.9	0.0	97.2	0.0	6.2	0.0
DMY03	NAVAIR	Mattapany	0.2	0.0	33.4	0.0	0.4	0.0
DMY04	NAVAIR	Mattapany	75.0	0.0	80.0	0.0	6.5	0.0
DNV01	NAVAIR	NAVAIR	7.6	0.0	2.0	0.0	0.1	0.0
DNV02	NAVAIR	NAVAIR	82.2	1.0	99.3	0.0	14.8	0.0
DNV03	NAVAIR	NAVAIR	0.0	0.3	0.2	0.0	4.5	0.0
DNV04	NAVAIR	NAVAIR	0.0	0.0	0.1	0.0	0.0	0.0
DNV05	NAVAIR	NAVAIR	0.0	0.0	0.0	0.0	0.0	0.0
DNV06	NAVAIR	NAVAIR	0.1	0.0	0.5	0.0	0.0	0.0
DNV07	NAVAIR	NAVAIR	17.6	0.0	42.2	0.0	0.4	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
DFQ07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Unassigned
DFQ08	0.7	0.5	2.2	0.0	99.1	0.0	0.1	Staffordshire
DFQ09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Buckley
DFQ10	0.0	0.2	1.1	0.0	0.0	76.6	0.0	Surrey-Hamp.
DHF01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
DHF02	0.4	4.5	37.1	0.1	18.9	2.4	0.0	Alexandria
DHF03	0.0	0.6	0.1	0.0	0.0	0.0	0.0	London Area
DHF04	79.9	90.5	37.8	0.1	32.8	0.0	0.1	Philadelphia
DHF05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
DHF06	0.2	0.9	46.5	5.0	0.1	21.8	0.0	London Area
DKQ01	0.0	0.0	0.0	0.0	0.0	15.8	0.0	Surrey-Hamp.
DKQ02	0.0	0.0	0.1	0.0	0.7	0.0	0.8	New Zone
DKQ03	0.2	8.8	24.7	1.9	1.0	6.8	0.0	Ches. Tidewater
DKQ04	13.2	1.1	1.5	0.0	64.6	0.0	8.7	Staffordshire
DKQ05	0.2	2.1	26.7	4.7	0.2	91.4	0.0	Surrey-Hamp.
DKQ06	1.2	11.1	6.9	0.0	8.6	16.5	0.0	Alexandria
DKQ07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Liverpool
DKQ08	2.8	8.3	32.8	1.8	33.7	55.7	0.0	Ches. Tidewater
DKR01	33.8	33.4	59.6	0.0	92.2	0.4	0.0	Staffordshire
DKR02	3.8	0.9	18.3	0.0	4.5	0.0	0.0	Alexandria
DKR03	8.0	26.3	71.4	1.5	7.2	90.6	0.0	Surrey-Hamp.
DKR04	0.0	0.0	4.0	0.0	0.0	0.3	0.0	Liverpool
DKR05	0.0	0.3	5.5	0.2	0.0	52.0	0.0	Buckley
DKR06	0.2	57.7	1.3	0.2	0.0	0.0	0.0	Philadelphia
DKR07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Unassigned
DKR08	0.0	0.4	10.1	0.3	0.0	42.0	0.0	Buckley
DKR09	4.7	24.1	3.5	0.0	1.3	0.0	0.1	Ches. Tidewater
DKR10	0.0	0.1	4.4	0.0	0.0	0.7	0.0	Liverpool
DKR11	0.4	0.8	57.2	0.4	0.4	8.9	0.0	London Area
DKR12	1.5	2.5	80.6	0.7	2.8	4.0	0.0	London Area
DMY01	31.4	20.3	41.8	0.0	42.9	0.8	0.0	Ches. Tidewater
DMY02	39.2	80.4	51.1	0.4	23.4	0.2	0.2	Ches. Tidewater
DMY03	26.1	2.7	15.8	0.0	7.6	0.1	0.0	Ches. Tidewater
DMY04	0.1	3.1	24.1	0.0	3.6	0.4	0.0	Ches. Tidewater
DNV01	1.2	0.8	1.6	0.0	40.5	0.0	7.2	Staffordshire
DNV02	55.3	72.9	88.8	1.3	8.2	9.7	0.0	Ches. Tidewater
DNV03	0.7	4.8	0.1	0.0	0.0	0.1	0.0	Philadelphia
DNV04	0.7	0.3	0.0	0.0	9.3	0.0	4.1	Staffordshire
DNV05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Unassigned
DNV06	0.3	0.8	0.0	0.0	2.6	0.0	36.2	New Zone
DNV07	16.9	80.5	5.1	0.0	1.7	0.0	0.2	Philadelphia

Sample ID	Plantation	Assemblage	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
DNV08	NAVAIR	NAVAIR	0.2	5.3	1.5	0.0	20.4	0.0
DNV09	NAVAIR	NAVAIR	67.4	0.1	99.4	0.0	5.8	0.0
DNV10	NAVAIR	NAVAIR	8.3	0.0	78.4	0.0	0.8	0.0
DNV11	NAVAIR	NAVAIR	29.9	0.1	97.0	0.0	8.1	0.0
DSG01	Mount Vernon	S. Grove Midden	26.7	5.8	2.6	4.2	95.7	0.0
DSG02	Mount Vernon	S. Grove Midden	22.6	24.3	5.0	4.1	7.1	0.0
DSG03	Mount Vernon	S. Grove Midden	98.3	9.3	33.1	17.9	64.8	0.0
DSG04	Mount Vernon	S. Grove Midden	16.1	14.3	1.1	61.5	81.4	0.0
DSG05	Mount Vernon	S. Grove Midden	0.1	72.2	0.0	96.1	2.9	0.0
DSG06	Mount Vernon	S. Grove Midden	2.4	84.6	0.3	99.9	21.1	0.0
DSG07	Mount Vernon	S. Grove Midden	6.7	66.3	1.4	7.4	48.4	0.0
DSG08	Mount Vernon	S. Grove Midden	96.1	10.3	31.3	10.1	30.6	0.0
DUB01	Utopia	Utopia III	1.3	0.0	23.8	0.0	0.1	0.0
DUB02	Utopia	Utopia III	77.8	12.5	27.9	2.3	100.0	0.0
DUB03	Utopia	Utopia III	24.6	4.6	81.9	0.2	21.3	0.0
DUB04	Utopia	Utopia III	11.3	5.8	56.5	1.9	11.6	0.0
DUB05	Utopia	Utopia III	67.1	14.5	89.0	0.4	33.3	0.0
DUB06	Utopia	Utopia III	2.3	2.7	0.0	0.1	2.6	0.0
DUB07	Utopia	Utopia III	29.9	30.9	63.4	11.3	33.2	0.0
DUB08	Utopia	Utopia III	36.0	13.1	87.9	3.4	38.6	0.0
DUB09	Utopia	Utopia III	99.2	3.5	97.4	0.4	17.6	0.0
DUB10	Utopia	Utopia III	60.4	4.7	10.9	3.6	25.6	0.0
DUB11	Utopia	Utopia III	11.7	98.0	1.9	71.2	52.8	0.0
DUC01	Utopia	Utopia IV	60.6	23.0	98.7	0.9	54.0	0.0
DUC02	Utopia	Utopia IV	25.7	0.0	40.4	0.0	2.3	0.0
DUC03	Utopia	Utopia IV	35.7	61.1	23.2	37.4	44.0	0.0
DUC04	Utopia	Utopia IV	5.6	0.0	80.9	0.0	8.2	0.0
DUC05	Utopia	Utopia IV	50.6	1.6	91.3	0.0	50.5	0.0
DUC06	Utopia	Utopia IV	8.3	0.0	37.9	0.0	3.6	0.0
DUC07	Utopia	Utopia IV	0.0	0.0	0.1	0.0	0.0	0.0
DUC08	Utopia	Utopia IV	2.0	0.0	18.4	0.0	0.4	0.0
PMC01	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0
PMC02	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0
PMC03	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0
PMC04	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0
PMC05	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0
PMC06	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0
PMC07	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0
PMC08	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0
PMC09	Monticello	Site 7	6.1	0.0	54.3	0.0	3.4	0.0
PMC10	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
DNV08	7.6	22.8	4.8	0.2	0.0	0.0	0.0	Philadelphia
DNV09	36.5	77.1	64.1	0.1	21.0	0.2	0.0	Ches. Tidewater
DNV10	20.2	87.9	11.0	0.0	1.2	0.0	0.0	Philadelphia
DNV11	92.9	69.0	66.0	0.2	36.7	1.7	0.1	Ches. Tidewater
DSG01	0.1	0.7	17.4	0.0	0.0	22.5	0.0	London Area
DSG02	0.0	16.4	3.5	2.6	0.0	0.2	0.0	Buckley
DSG03	0.3	6.6	78.6	2.7	0.4	5.3	0.0	Alexandria
DSG04	0.0	0.2	14.8	0.1	0.0	3.2	0.0	London Area
DSG05	0.0	0.0	0.5	0.1	0.0	0.1	0.0	Liverpool
DSG06	0.0	0.0	3.0	0.3	0.0	1.0	0.0	Liverpool
DSG07	1.5	3.8	25.3	1.9	0.5	0.6	0.0	Buckley
DSG08	3.0	14.7	81.3	3.2	0.6	4.2	0.0	Alexandria
DUB01	33.3	2.0	11.9	0.0	23.0	0.0	0.3	N. VA Piedmont
DUB02	2.3	15.1	60.6	0.8	1.2	10.1	0.0	London Area
DUB03	19.6	5.5	89.8	0.9	42.9	1.6	0.0	Shen. Valley
DUB04	3.9	1.2	62.6	0.3	0.2	12.3	0.0	Shen. Valley
DUB05	24.4	36.6	94.6	3.0	64.2	2.8	0.0	Shen. Valley
DUB06	0.0	0.0	0.3	0.0	0.0	24.3	0.0	Surrey-Hamp.
DUB07	2.7	2.5	90.1	5.5	0.9	7.2	0.0	Shen. Valley
DUB08	8.0	7.3	92.7	0.8	3.9	5.9	0.0	Shen. Valley
DUB09	12.9	61.0	92.2	2.7	11.9	2.6	0.0	Alexandria
DUB10	0.3	5.1	13.5	0.4	0.1	75.7	0.0	Surrey-Hamp.
DUB11	0.0	0.6	11.0	1.0	0.0	19.7	0.0	Buckley
DUC01	12.9	28.0	90.2	10.6	28.0	7.7	0.0	Ches. Tidewater
DUC02	9.2	67.5	12.4	0.4	46.7	0.0	0.0	Philadelphia
DUC03	0.2	8.7	27.4	0.6	0.3	0.2	0.0	Buckley
DUC04	12.5	75.6	12.1	1.2	2.3	0.0	0.0	Ches. Tidewater
DUC05	14.0	98.8	53.4	2.4	2.4	0.2	0.0	Philadelphia
DUC06	92.9	99.9	15.5	0.0	1.2	0.1	0.0	Philadelphia
DUC07	2.4	0.0	0.3	0.0	0.9	0.0	0.0	N. VA Piedmont
DUC08	5.7	2.3	12.6	0.0	18.7	0.0	0.0	Staffordshire
PMC01	0.0	0.0	0.0	0.0	0.0	0.0	90.2	New Zone
PMC02	0.0	0.0	0.0	0.0	0.0	0.0	9.3	New Zone
PMC03	0.0	0.0	0.0	0.0	0.0	0.0	91.0	New Zone
PMC04	0.0	0.0	0.0	0.0	0.0	0.0	98.2	New Zone
PMC05	0.0	0.0	0.0	0.0	0.0	0.0	91.4	New Zone
PMC06	0.0	0.0	0.0	0.0	0.0	0.0	82.5	New Zone
PMC07	0.0	0.0	0.0	0.0	0.0	0.0	100.0	New Zone
PMC08	0.0	0.0	0.0	0.0	0.0	0.0	99.2	New Zone
PMC09	48.3	72.6	20.6	0.2	0.5	0.1	0.0	Philadelphia
PMC10	0.0	0.0	0.0	0.0	0.0	0.0	75.6	New Zone

Sample ID	Plantation	Assemblage	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
PMC11	Monticello	Site 7	13.9	0.5	30.3	2.4	3.3	0.0
PMC12	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0
PMC13	Monticello	Site 7-Overseer	0.0	0.0	0.0	0.0	0.0	0.0
PMC14	Monticello	Site 7-Overseer	0.0	0.0	0.0	0.0	0.0	0.0
PMC15	Monticello	Site 7-Overseer	0.0	0.0	0.0	0.0	0.0	0.0
PMC16	Monticello	Site 7-Overseer	0.0	0.0	0.7	0.0	0.0	0.0
PMC17	Monticello	Site 7-Overseer	0.0	0.0	0.0	0.0	0.0	0.0
PMC18	Monticello	Site 7-Overseer	0.0	0.0	0.0	0.0	0.0	0.0
PMC19	Monticello	Site 7-Overseer	0.8	0.5	1.0	1.4	0.3	0.0
PMC20	Monticello	Site 7-Overseer	0.0	0.0	0.0	0.0	0.0	0.0
PMC21	Monticello	Site 7-Overseer	0.0	0.0	0.0	0.0	0.0	0.0
PMC22	Monticello	Site 7	0.0	0.0	0.0	0.0	0.0	0.0
PMC23	Monticello	Site 8	0.0	0.0	0.0	0.0	0.0	0.0
PMC24	Monticello	Site 8	0.0	0.0	0.0	0.0	0.0	0.0
PMC25	Monticello	Site 8	0.0	0.0	0.0	0.0	0.0	0.0
PMC26	Monticello	Site 8	0.0	0.0	0.0	0.0	0.0	0.0
PMC27	Monticello	Site 8	0.0	0.0	0.0	0.0	0.0	0.0
PMC28	Monticello	Site 8	1.2	0.0	3.6	0.2	0.3	0.0
PMC29	Monticello	Site 8	0.2	0.0	0.8	2.4	0.2	0.0
PMC30	Monticello	Site 8	0.0	0.0	0.0	0.0	0.0	0.0
PMC31	Monticello	Site 8	0.0	0.0	0.0	0.0	0.0	0.0
PMC32	Monticello	Site 8	0.0	0.0	0.0	0.0	0.0	0.0
PMC33	Monticello	Site 8	5.6	0.2	46.6	0.4	3.5	0.0
PMC34	Monticello	Site 8	24.8	0.0	48.4	0.0	0.4	0.0
PMC35	Monticello	Site 8	0.3	0.0	8.1	0.0	0.0	0.0
PMC36	Monticello	Site 8	2.9	0.1	7.2	0.4	0.9	0.0
PMC37	Monticello	Site 8	0.1	20.5	0.0	98.2	3.0	0.0
PMC40	Monticello	Dry Well	0.0	0.0	0.0	0.0	0.0	0.0
PMC41	Monticello	Dry Well	0.0	0.0	0.0	0.0	0.0	0.0
PMC42	Monticello	Dry Well	0.0	0.0	0.0	0.0	0.0	0.0
PMC43	Monticello	Dry Well	0.6	21.5	0.0	92.9	3.7	0.0
PMC44	Monticello	Dry Well	0.0	0.0	0.0	0.0	0.0	0.0
PMC45	Monticello	Dry Well	0.0	0.0	0.0	0.0	0.0	0.0
PMC46	Monticello	Dry Well	0.0	0.0	0.0	0.0	0.0	0.0
PMC47	Monticello	Dry Well	75.2	13.8	54.2	9.1	60.4	0.0
PMC48	Monticello	Dry Well	38.7	0.0	76.5	0.0	20.2	0.0
PNH01	Poplar Forest	North Hill	1.5	0.2	0.1	0.0	1.0	0.0
PNH02	Poplar Forest	North Hill	0.0	0.0	0.0	0.0	0.1	0.0
PNH03	Poplar Forest	North Hill	1.1	0.0	9.4	0.0	0.0	0.0
PNH04	Poplar Forest	North Hill	0.0	0.0	0.0	0.0	0.0	0.0
PNH05	Poplar Forest	North Hill	46.2	4.4	44.0	0.3	4.1	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
PMC11	2.1	26.7	12.6	0.1	0.0	0.2	0.0	Ches. Tidewater
PMC12	0.0	0.0	0.0	0.0	0.0	0.0	91.2	New Zone
PMC13	0.0	0.0	0.0	0.0	0.0	0.0	45.0	New Zone
PMC14	0.0	0.0	0.0	0.0	0.0	0.0	96.3	New Zone
PMC15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Unassigned
PMC16	20.2	0.4	0.1	0.0	8.3	0.0	84.0	New Zone
PMC17	0.0	0.0	0.0	0.0	0.0	0.0	51.9	New Zone
PMC18	0.0	0.0	0.0	0.0	0.0	0.0	86.3	New Zone
PMC19	0.4	10.1	1.6	0.0	0.0	0.0	0.0	Philadelphia
PMC20	0.0	0.0	0.0	0.0	0.0	0.0	98.4	New Zone
PMC21	0.0	0.0	0.0	0.0	0.0	0.0	70.9	New Zone
PMC22	0.0	0.0	0.0	0.0	0.0	0.0	48.7	New Zone
PMC23	0.0	0.0	0.0	0.0	0.0	0.0	64.6	New Zone
PMC24	0.0	0.0	0.0	0.0	0.0	0.0	73.2	New Zone
PMC25	0.0	0.0	0.0	0.0	0.0	0.0	99.9	New Zone
PMC26	0.0	0.0	0.0	0.0	0.0	0.0	98.0	New Zone
PMC27	0.0	0.0	0.0	0.0	0.0	0.0	97.9	New Zone
PMC28	0.9	9.9	1.1	0.0	0.0	0.0	0.0	Philadelphia
PMC29	0.0	0.2	0.6	0.0	0.0	0.0	0.0	Liverpool
PMC30	0.0	0.0	0.0	0.0	0.0	0.0	99.7	New Zone
PMC31	0.0	0.0	0.0	0.0	0.0	0.0	71.6	New Zone
PMC32	0.0	0.0	0.0	0.0	0.0	0.0	88.8	New Zone
PMC33	3.3	17.3	19.8	0.2	0.1	0.0	0.0	Ches. Tidewater
PMC34	33.7	62.1	7.2	0.0	17.0	0.0	1.0	Philadelphia
PMC35	29.7	18.5	2.1	0.0	7.5	0.0	0.0	N. VA Piedmont
PMC36	0.7	20.9	2.3	0.1	0.0	0.0	0.0	Philadelphia
PMC37	0.0	0.0	0.1	0.0	0.0	0.2	0.0	Liverpool
PMC40	0.0	0.0	0.0	0.0	0.0	0.0	50.9	New Zone
PMC41	0.3	0.1	0.0	0.0	0.0	0.0	0.0	Unassigned
PMC42	0.0	0.0	0.0	0.0	0.0	0.0	61.3	New Zone
PMC43	0.0	0.0	0.4	0.4	0.0	0.0	0.0	Liverpool
PMC44	0.0	0.0	0.0	0.0	0.0	0.0	39.3	New Zone
PMC45	0.0	0.0	0.0	0.0	0.0	0.0	97.6	New Zone
PMC46	0.0	0.0	0.0	0.0	0.0	0.0	5.5	New Zone
PMC47	0.8	12.4	95.1	25.3	1.3	4.6	0.0	Shen. Valley
PMC48	8.5	32.1	56.9	1.8	0.4	0.6	0.0	Ches. Tidewater
PNH01	0.0	0.0	1.7	89.7	0.0	0.0	0.0	S. Ridge & Valley
PNH02	0.0	0.0	0.2	86.0	0.0	0.0	0.0	S. Ridge & Valley
PNH03	3.7	15.2	1.2	0.3	0.7	0.0	0.0	Philadelphia
PNH04	0.0	0.0	0.0	0.0	0.0	0.0	0.1	New Zone
PNH05	0.3	34.5	35.0	17.7	0.0	0.2	0.0	Alexandria

Sample ID	Plantation	Assemblage	Alexandria	Buckley	Ches. Tidewater	Liverpool	London Area	NC Piedmont
PNH06	Poplar Forest	North Hill	69.1	0.6	73.1	0.3	23.3	0.0
PNH07	Poplar Forest	North Hill	86.2	2.5	56.9	0.0	32.3	0.0
PNH08	Poplar Forest	North Hill	1.6	63.4	0.2	92.6	16.2	0.0
PPQ01	Poplar Forest	Quarter	5.2	0.0	44.2	0.0	0.0	0.0
PPQ02	Poplar Forest	Quarter	0.7	0.0	19.2	0.0	0.0	0.0
PPQ03	Poplar Forest	Quarter	0.5	0.0	9.1	0.0	0.0	0.0
PPQ04	Poplar Forest	Quarter	0.0	0.0	1.2	0.0	0.0	0.0
PPQ05	Poplar Forest	Quarter	0.1	0.0	5.8	0.0	0.0	0.0
PPQ06	Poplar Forest	Quarter	0.1	0.0	5.4	0.0	0.0	0.0
PPQ07	Poplar Forest	Quarter	2.7	0.0	19.0	0.0	0.0	0.0
PPQ08	Poplar Forest	Quarter	12.5	0.0	32.2	0.0	0.0	0.0
PPQ09	Poplar Forest	Quarter	0.0	0.0	5.8	0.0	0.0	0.0
PPQ10	Poplar Forest	Quarter	8.4	0.1	64.6	0.0	9.4	0.0
PWW01	Poplar Forest	Wing of Offices	0.4	0.0	0.0	0.0	0.1	0.0
PWW02	Poplar Forest	Wing of Offices	0.7	1.0	1.6	0.1	4.7	0.0
PWW03	Poplar Forest	Wing of Offices	2.3	0.0	18.1	0.0	1.5	0.0
PWW04	Poplar Forest	Wing of Offices	5.3	0.0	55.9	0.0	0.2	0.0
PWW05	Poplar Forest	Wing of Offices	65.1	0.1	41.1	0.0	3.3	0.0
PWW06	Poplar Forest	Wing of Offices	0.0	0.0	0.5	0.0	0.0	0.0
PWW07	Poplar Forest	Wing of Offices	0.0	0.0	0.0	0.0	0.0	0.0

Sample ID	N. VA Piedmont	Philadelphia	Shen. Valley	S. Ridge & Valley	Staffordshire	Surrey-Hamp.	New Zone	Assignment
PNH06	19.1	23.7	97.6	4.6	10.4	1.7	0.0	Shen. Valley
PNH07	22.3	29.5	100.0	3.4	25.0	0.3	0.0	Shen. Valley
PNH08	0.0	0.0	2.7	0.0	0.0	1.1	0.0	Liverpool
PPQ01	7.3	10.4	2.9	0.1	53.2	0.0	3.9	Staffordshire
PPQ02	12.7	5.6	1.3	0.0	63.4	0.0	10.4	Staffordshire
PPQ03	23.8	2.7	0.6	0.0	16.9	0.0	0.7	N. VA Piedmont
PPQ04	0.7	0.1	0.0	0.0	2.2	0.0	26.3	New Zone
PPQ05	9.0	0.2	0.5	0.0	20.5	0.0	14.6	Staffordshire
PPQ06	12.1	3.2	0.2	0.0	30.2	0.0	30.4	New Zone
PPQ07	3.0	12.2	2.0	0.8	1.1	0.0	0.0	Ches. Tidewater
PPQ08	5.0	13.4	2.1	0.1	8.5	0.0	2.8	Ches. Tidewater
PPQ09	5.0	0.2	0.5	0.0	5.8	0.0	0.3	Ches. Tidewater
PPQ10	7.0	4.4	24.6	2.5	15.5	0.3	0.0	Ches. Tidewater
PWW01	0.0	0.0	3.0	12.8	0.0	0.0	0.0	S. Ridge & Valley
PWW02	0.8	1.3	16.1	83.9	0.0	0.4	0.0	S. Ridge & Valley
PWW03	3.6	0.6	24.4	4.8	5.0	0.0	0.0	Shen. Valley
PWW04	7.3	27.5	7.0	0.7	14.1	0.0	0.0	Ches. Tidewater
PWW05	89.4	37.2	92.0	0.1	17.6	0.4	0.0	Shen. Valley
PWW06	0.2	0.0	0.0	0.0	1.0	0.0	44.3	New Zone
PWW07	0.0	0.0	0.0	0.0	0.0	0.0	2.5	New Zone

APPENDIX E. Assemblage Ceramic Ware Counts

This table includes counts of all wares types for the assemblages used for the dating procedures outlined in Chapter 5, and assemblage totals in Chapter 6. Ware types without production date ranges (DAACS 2015b) were not used for dating, but did contribute to assemblage totals.

Assemblage	Plantation	MCD	BLUEMCD	Phase	American Stoneware	Astbury-Type	Bennington/Rockingham	Black Basalt	British Stoneware	Buckley
King's Reach	King's Reach	1705	1709	I	0	0	0	0	210	50
King's Reach Quarter	King's Reach	1704	1708	I	0	0	0	0	3	1
Ashcomb's Quarter	Ashcomb's	1730	1741	II	3	0	1	0	26	72
Chapline Place	Chapline Place	1755	1769	III	10	11	1	0	87	6
NAVAIR	NAVAIR	1758	1768	III	1	0	0	0	8	11
House for Families	Mount Vernon	1741	1747	II	2	26	0	0	4	0
South Grove Midden	Mount Vernon	1744	1746	II	55	41	0	1	91	409
Fairfield Midden	Fairfield	1741	1757	II	6	0	1	0	3	22
Fairfield Quarter	Fairfield	1720	1725	III	93	7	2	42	432	35
Utopia III	Utopia	1719	1729	I	0	0	0	0	32	79
Utopia IV	Utopia	1730	1741	II	0	0	0	0	30	7
Dry Well	Monticello	1769	1778	III	2	0	0	0	33	13
Site 7	Monticello	1744	1761	III	4	3	0	0	73	0
Site 7-Overseer	Monticello	1774	1783	IV	2	0	0	0	58	0
Site 8	Monticello	1793	1790	IV	56	0	0	0	46	45
North Hill	Poplar Forest	1791	1794	IV	22	0	0	0	38	0
Quarter	Poplar Forest	1795	1796	IV	91	0	0	40	104	0
Wing of Offices	Poplar Forest	1859	1843	IV	13	0	0	0	0	0

Assemblage	Burslem	Canary Ware	Coarse Earthenware, unidentified	Colonoware	Creamware	Delftware, Dutch/British	Derbyshire	Faience	Frechen Brown	Fulham Type	German Stoneware	Iberian Ware	Ironstone/White Granite	Jackfield Type
King's Reach	0	0	55	0	0	727	0	0	1	0	270	0	0	0
King's Reach Quarter	0	0	24	0	1	39	0	0	0	0	28	0	0	0
Ashcomb's Quarter	0	0	67	0	82	64	0	0	1	6	0	0	4	0
Chapline Place	0	1	13	0	136	134	0	0	0	14	0	0	0	1
NAVAIR	0	1	51	0	98	28	0	0	0	0	0	0	0	2
House for Families	0	0	6	33	18	74	0	0	0	5	0	0	0	0
South Grove Midden	0	0	514	905	258	1632	0	0	0	279	0	10	29	0
Fairfield Midden	0	0	40	12	49	118	0	0	0	55	0	3	2	3
Fairfield Quarter	1	0	222	209	429	1197	2	3	9	616	38	1	37	2
Utopia III	0	0	178	109	0	201	3	2	1	3	1	0	0	0
Utopia IV	0	0	66	45	38	260	8	8	4	14	0	0	0	12
Dry Well	0	0	43	0	852	182	0	0	0	28	0	0	2	0
Site 7	0	0	40	0	318	168	0	0	0	3	3	0	1	2
Site 7-Overseer	0	0	32	0	730	32	0	0	0	3	0	0	1	4
Site 8	0	0	182	0	1220	88	0	0	0	17	3	0	0	2
North Hill	0	0	26	9	1020	22	0	0	0	25	1	0	0	0
Quarter	0	0	17	0	2176	2	0	0	0	0	0	0	0	0
Wing of Offices	0	0	6	0	5	0	0	0	0	0	0	0	61	1

Assemblage	N. Devon Gravel	N. Devon Plain	Nottingham	Pearlware	Porcelain, Chinese	Porcelain, English Bone China	Porcelain, English Soft Paste	Porcelain, unidentified	Porcellaneous/English Hard Paste	Red Agate, coarse	Red Agate, refined	Red Sandy Ware	Redware	Redware, Refined
King's Reach	49	54	0	0	0	0	0	0	0	0	0	141	458	0
King's Reach Quarter	0	0	0	1	0	0	0	0	0	0	0	1	191	0
Ashcomb's Quarter	24	56	2	45	15	0	0	0	1	0	0	0	398	0
Chapline Place	0	0	1	122	38	0	0	0	2	0	0	0	112	0
NAVAIR	2	0	0	3	3	0	0	0	0	2	10	0	641	0
House for Families	0	0	1	2	53	0	0	6	0	0	0	0	36	0
South Grove Midden	26	38	737	33	1556	0	0	20	2	0	0	405	147	0
Fairfield Midden	2	17	0	6	42	65	0	0	1	0	0	2	0	0
Fairfield Quarter	11	1	16	709	299	0	0	2	9	6	6	4	805	0
Utopia III	164	0	11	0	11	0	0	0	4	0	0	0	888	0
Utopia IV	4	0	7	0	53	0	0	0	0	2	34	0	95	0
Dry Well	0	0	0	12	245	1	0	1	5	0	0	0	87	0
Site 7	0	0	4	15	15	0	0	0	1	0	0	0	245	0
Site 7-Overseer	0	0	4	43	43	0	0	0	1	0	0	0	115	0
Site 8	0	0	9	232	120	0	0	5	31	0	0	0	157	0
North Hill	0	0	1	697	3	0	0	1	2	0	3	0	207	0
Quarter	0	0	0	1564	12	2	0	1	1	0	1	0	428	0
Wing of Offices	0	0	0	56	3	3	12	1	33	0	0	0	3	2

Assemblage	Refined Earthenware, modern	Refined Earthenware, unidentified	Refined Stoneware, unidentified	Slip Dip	Slipware, N. Midlands/Staffordshire	Staffordshire Brown Stoneware	Staffordshire Mottled Glaze	Stoneware, unidentified	Surrey-Hampshire	Tin-Enameled, unidentified
King's Reach	0	1	0	0	17	0	3	0	306	9
King's Reach Quarter	0	0	0	0	21	0	0	0	320	15
Ashcomb's Quarter	0	13	0	29	32	0	13	2	0	228
Chapline Place	0	29	0	8	7	1	4	2	0	119
NAVAIR	0	10	0	3	41	0	3	0	0	8
House for Families	0	9	0	0	108	0	13	11	0	13
South Grove Midden	3	14	0	286	1374	0	543	47	0	304
Fairfield Midden	74	0	14	0	0	15	1	0	0	4
Fairfield Quarter	2	132	0	23	60	5	5	37	0	788
Utopia III	0	1	0	13	14	0	7	10	0	121
Utopia IV	0	0	0	1	66	1	39	1	0	202
Dry Well	0	11	0	0	5	0	0	2	0	24
Site 7	0	87	0	0	35	0	0	9	0	251
Site 7-Overseer	1	66	2	0	12	0	3	4	0	43
Site 8	2	312	0	0	0	0	0	46	0	31
North Hill	2	242	0	0	13	0	0	4	0	28
Quarter	1	284	0	0	0	0	0	10	0	2
Wing of Offices	0	0	0	0	0	0	0	8	0	0

Assemblage	Turner-Type	Wedgwood Green	Westerwald/Rhenish	Whieldon-type Ware	White Salt Glaze	Whiteware	Yellow Ware	Yorktown
King's Reach	0	0	0	0	0	0	0	0
King's Reach Quarter	0	0	0	0	0	4	1	0
Ashcomb's Quarter	0	0	22	6	26	15	3	0
Chapline Place	0	2	31	3	104	13	1	0
NAVAIR	0	0	6	0	67	1	0	0
House for Families	0	0	26	8	155	0	0	0
South Grove Midden	0	2	397	0	1059	121	3	0
Fairfield Midden	30	0	0	0	37	1	51	0
Fairfield Quarter	0	0	151	0	249	371	62	0
Utopia III	0	0	112	0	72	1	0	121
Utopia IV	0	1	68	7	133	1	0	27
Dry Well	0	0	3	18	331	5	0	0
Site 7	0	0	58	45	181	3	0	0
Site 7-Overseer	0	0	36	23	53	0	0	0
Site 8	0	0	22	41	38	116	0	0
North Hill	0	0	4	0	1	13	0	0
Quarter	0	0	0	0	0	7	0	0
Wing of Offices	0	0	0	0	0	70	26	0

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