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Sourcing the Sherds: An Analysis of the Coarse Earthenware Ceramics from Trents Plantation in Barbados

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An Analysis of the Coarse Earthenware Ceramics of Trents Plantation in Barbados

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Abstract

Trents, originally known as Fort Plantation, was one of the five initial plantations established by the English in 1627. Since 2012, three different loci at Trents have been excavated: an outbuilding to the main house (Locus 1), enslaved laborers' living quarters (Locus 2), and a cave site (Locus 3). Locus 1 is well stratified with clear divides between material dating to the pre-sugar era in the early 17th century and the following period from mid-17th to early 18th century. 18th and 19th century deposits cap this locus. Locus 2 dates from the mid-17th to early 19th century. Distinct floor areas date to the earlier period, but the majority of the data date to the later 18th century. Surface material across the site date from the middle of the 18th century until emancipation in 1838. The material from Locus 3 date primarily to the 18th century.

The material culture at Trents displays the economic shift from small plantations to large-scale sugar manufacturing in a British Caribbean colonial context. Changes in the site's material culture overtime chronicle this shift to sugar. The array of domestic and industrial coarse earthenware recovered from the site constitute an important data set that has the potential to yield significant information about the site and those who lived there from the early 17th to mid-19th century. A standard system of analysis was developed for the study of all of the coarse earthenware. This system identified the basic characteristics of each sherd including paste color, inclusion characteristics, and form type, which allowed for a distribution analysis of the earthenware excavated within the entire site to compare assemblage characteristics between loci. This distribution analysis provides insight to the various economic, domestic, and social usages of distinct spaces within the plantation.

Until recently, the combination of the industrial nature of sugar wares and the use of glaze and wheel turned production resulted in interpretations that emphasized a reliance on the importation of European manufactured earthenware. However, recent research in Barbados provides archaeological and documentary evidence that there is a history of on-island coarse earthenware ceramic production since at least the 17th century. Though these potteries mainly produced industrial wares, archaeological research at the Codrington Estate pottery found that as much as 10% of the annual production was for domestic wares (Scheid 2015).

This thesis serves as a background study to a series of scientific assessments aimed at determining which ceramic vessels were made in Barbados and which were made in England or elsewhere. Two analytical systems, Instrumental Neutron Activation Analysis (INAA) and Laser-Ablation Inductively Coupled Mass Spectrometry (LA-ICP-MS), were selected to compare the chemical composition of a representative sample of the artifacts excavated, Barbadian clay samples, and known British ceramic samples. A third analytical system, X-ray fluorescence spectrometry (XRF) will be performed on a subset of the representative sample in order to gather chemical information on the various glazes found within the assemblage. This study presents an overall examination of the coarse earthenware as well as a description of the samples that have been sent out for scientific investigation. Upon the return of the data from these external analyses, potential relationships and multivariate groupings of the samples will indicate if the vessels were imported or locally produced.

Executive Summary

Trents, originally known as Fort Plantation, was one of the five initial plantations established by the English in 1627. This plantation is one of the earliest archaeological sites in Barbados, displaying the economic shift from small plantations to large-scale sugar manufacturing in a British Colonial Caribbean context. I have participated in the excavation of Trents Plantation in Barbados under the direction of Professor Douglas Armstrong of Syracuse University for the summers of 2013 to 2015. For my Capstone project, I have continued my research with Professor Armstrong as my advisor. I have utilized a variety of analytical methods to qualitatively and quantitatively describe the coarse earthenware ceramic artifacts recovered from this site in order to determine if some of them were locally produced. This information will help elucidate the trade and manufacturing patterns of the area.

Excavations at Trents Plantation uncovered material from the 17th century from discrete early contexts, but the bulk of the material dates to the 18th and 19th centuries. Since 2012, three different loci at Trents have been excavated: an outbuilding to the main house (Locus 1), enslaved laborers' living quarters (Locus 2), and a cave site (Locus 3). Locus 1 is well stratified with clear divides between material dating to the pre-sugar era in the early 17th century and the following period from mid-17th to early 18th century. 18th and 19th century deposits cap this locus. Locus 2 dates from the mid-17th to early 19th century. Distinct floor areas date to the earlier period, but the majority of the data date to the later 18th century. Surface material across the site date from the middle of the 18th century to emancipation in 1838. The material from Locus 3 date primarily to the 18th century.

Each locus features a different assemblage of coarse earthenware with various purposes from domestic to industrial. Coarse earthenware in Barbados is typically characterized by its red

to buff color, the presence of temper (inclusions) within the clay paste, and relatively low firing temperatures. The artifact assemblage from the midden pit of the main house structure includes early industrial sugar wares, ceramic sherds, and different types of glass. This locus has a significant amount of early, pre-sugar strata and later, post-sugar contexts. Thus, some domestic earthenware, especially cooking pots were found in the earliest contexts, but following the shift to sugar, this locus featured a high percentage of industrial sugar ware. The second area of excavation at Trents is the enslaved laborer living area. The earthenware of this area varies depending on house area, but the assemblage as a whole includes some industrial earthenware that was likely repurposed for domestic use and a higher amount of domestic earthenware than Locus 1. The third locus is a cave site. The earthenware ceramics from the cave site only compose a small fraction of the overall earthenware sample.

Until recently, the combination of the industrial nature of sugar wares and the use of glaze and wheel turned production resulted in interpretations that emphasized a reliance on the importation of European manufactured earthenware. However, recent research in Barbados provides archaeological and documentary evidence that there is a history of on-island coarse earthenware ceramic production since the late 17th century (Handler 1963; Handler and Lange 1978; Scheid 2015). Though these potteries mainly produced industrial wares, archaeological research at the Codrington Estate pottery found that as much as 10% of the annual production was for domestic wares (Scheid 2015).

To determine if some vessels excavated at Trents were locally produced, two analytical systems, Instrumental Neutron Activation Analysis (INAA) and Laser-Ablation Inductively Coupled Mass Spectrometry (LA-ICP-MS), were selected to compare the chemical composition of a representative sample of the artifacts excavated, Barbadian clay samples, and known British ceramic samples. The success of differentiating the origins of various earthenware samples is based on the Provenance Postulate, stating that measurable and identifiable chemical differences between artifacts can only be determined if the difference between source materials (i.e. clay from Barbados and clay from the U.K.) exceeds the variation within a single source material. Since Barbados and the United Kingdom have an extremely different geological formation history, it is likely that there is a distinct difference in chemical signatures of the paste body of ceramics from the two respective islands.

A standard analysis of all of the coarse earthenware was completed by Professor Armstrong and myself, which identified the basic characteristics of each sherd including paste color, inclusion characteristics, and form type. This analytical system was developed in consultation with several archaeologists working in the region, integrating data from previous research in Barbados (Armstrong 1990; Farmer 2013; Scheid 2015), and it also is designed to facilitate comparisons with data from other islands of the Caribbean including Jamaica (Armstrong 1990, 2011; Hauser 2008), Dominica (Hauser 2013), Guadeloupe and Martinique (Kelly et al. 2009). This analysis was entered into a database, which allowed for a distribution analysis of the earthenware excavated within the entire site to compare assemblage characteristics between loci. Generally the assemblage from the enslaved laborer settlement included a higher percentage of domestic earthenware than the assemblage from the midden of the main house, which was dominantly industrial. This distribution analysis provides insight to the various economic, domestic, and social usages of distinct spaces within the plantation.

Using the information from basic analysis, a representative sample of roughly 120 artifacts was selected for further analysis. This representative sample included industrial and domestic artifacts from all three loci, and included all form and glaze types. This representative sample has been sent for an external Instrumental Neutron Activation Analysis (INAA) at the University of Missouri Research Reactor Center (MURR)**.** This analysis will give whole body quantitative data of approximately 35 different elements, so the major chemical composition of the earthenware paste can be determined. The second analysis of this representative sample will be Laser-Ablation Inductively Coupled Mass Spectrometry (LA-ICP-MS) completed by Dr. Lindsay Bloch using equipment at University of North Carolina at Chapel Hill. This analytical method has the ability to provide quantitative information of over 120 different potential isotopes within the sample at a specific point, which allows us to target glaze and inclusion composition. These two analyses in conjunction will provide the information to group the artifacts based on similar chemical compositions, which can then be compared to the Barbadian clay composition and known imported samples. A third analytical system, X-ray fluorescence spectrometry (XRF) will be performed on a subset (27 sherds) of the representative sample in order to gather chemical information on the various glazes found within the assemblage. Upon the return of the data from these external analyses, potential relationships and groupings of the samples will indicate if the vessels were imported or locally produced.

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Preface:

Connecting with the Past through Earthenware

The excavation at Trents Plantation in Barbados has uncovered a great wealth of archeological material. One day specifically will forever be etched in my memory due to the shear amount of incredible finds within a two square meter area. We were excavating at a well-stratified midden that was downhill from several enslaved laborer house-sites and adjacent to a house platform. After carefully excavating down about half a meter, we reached a context in which it seemed that there were more artifacts than dirt. In this area, we had uncovered large amounts of the typical artifacts that we had been finding elsewhere at the site including sherds of imported ceramic slipware and creamware dishes and dark green bottle glass. We had also found two glass beads and an amethyst glass gem that were used for personal adornment by the enslaved laborers. Iron keys, door latches and hinges were also found. While these rare finds were exciting and revealing, they were not my favorite finds from that area of the excavation. Instead, my favorite artifact was the base of a coarse earthenware pot, which in another context may be considered a simple industrial ware due to its bulk and coarseness. The flat base of this vessel was relatively complete with several sherds mending together, but the most exciting feature of this base was the imprints on the inner surface. These impressions were the fingermarks of the maker, and my hand fit into them perfectly.

This particular base had such an impact on me because it was a physical reminder that those who used this object two hundred years ago were living people who should be acknowledged as individuals rather than solely being identified by their forced social positions as slaves. They had varied interactions with others and their environment just as I do. During excavation, we risk placing more value on the objects found over the information these objects provide about human activity. While artifacts may be of value just for what they are, I believe that the true value of artifacts is the story they can tell about the people who made and used them. At the point of discovery, I did not know if these fingerprints were from an enslaved African potter working in a Barbadian pothouse or a free laboring potter working in an English pothouse. However, I could tell by the object's form that it had been made to serve as a drip jar in the production of sugar. The object was later modified for reuse, perhaps by the occupants of the adjacent house site, to serve as a basin or bowl. Embedded within this single artifact was a complex and incomplete story that compelled me to learn more. This humble find acted as a reminder to me that we were researching the lives of real people. Though our excavations could tell us about their living conditions and economic status, there will forever be much about the enslaved laborers that I cannot know, from what they thought to how they felt. To assume that archaeological research can tell us everything about individuals is to belittle the complexity of humankind throughout history.

To many people, the sight of little fragments of red earthenware is not exciting. After days of analyzing these artifacts with the fear that my fingers would forever retain a red-orange hue from continually handling them, I too experienced earthenware fatigue, but these humble artifacts provide important information about the domestic life of enslaved laborers and economic practices of a sugar plantation. Coarse earthenware also provides a relatively unique opportunity to examine the question of local manufacturing practices of a colonial island. Refined earthenware objects from this colonial period were inevitably imported, but coarse earthenware manufacturing technologies were achievable and practiced in Barbados.

To this day, there is a cottage industry of domestic earthenware manufacture practiced in Barbados, and one only has to venture up the steep and narrow roads of Chalky Mount in the Scotland District to witness it. A small sign hangs over a table laden with earthenware mugs, monkey jars, and vases, indicating that John Springer's pottery shop is open. Within his shop, a small room twice as long as it is wide, Mr. Springer has a pottery wheel where he happily gives a potting demonstration. With the ease of many years of practice, Mr. Springer molds a lump of clay that he has dug and prepared himself into a vase, all the while explaining his process. Lucky visitors may even get a tour of the kiln where Mr. Springer explains the glazing and firing process. The goods created by Mr. Springer and other Chalky Mount potters are now largely for tourist consumption, but their potting practice extends generations when the goods had a more utilitarian purpose, both domestically and industrially. These practicing Chalky Mount potters are evidence of a long tradition of on-island earthenware production in Barbados, reinforcing the distinct possibility—or even probability—that some of the coarse earthenware vessels excavated at Trents were manufactured on island. Just as the base of a coarse earthenware pot with fingermarks linked the past to the present, the current practice of pottery at Chalky Mount links the present of Barbados to its history. Certain aspects of this island's history are being further examined through archaeological research including the research conducted at Trents Plantation in which my project is just a small facet of the rich history of the island and its inhabitants.

My project examines the features of the coarse earthenware sherds that comprise the artifact assemblage from several field seasons of archaeological excavation. This examination not only informs us of the characteristics of the earthenware assemblage, but it aims to better understand the people of Trents Plantation through the lens of the use of pottery. Examining the pottery of the enslaved laborers village tells us about their domestic life. Examining the industrial wares from the main house area informs us of the economic practices of the plantation. Determining the origin of some of the wares clarifies the trade and manufacturing patterns that individuals participated in. Thus, this study of coarse earthenware is not only an examination of artifacts, but also an examination of the lives of those who interacted with these wares.

Chapter 1: Introduction

The Significance of Coarse Earthenware Ceramics in a Caribbean Plantation Setting

Barbados played a significant role in the shift in economic and social systems in the Atlantic World. From initial settlement by the English in 1627, the settlement was a corporately sponsored venture focusing on agricultural production of crops like tobacco, indigo, and cotton aimed to yield a profit in English and European markets. However, the shift to the production of sugar beginning in 1643 dramatically altered the scale and scope of production that set in motion a shift to a capitalistic mode of production and a dramatic shift towards agro-industrial production relying on enslaved laborers from Africa (Armstrong 2013, Armstrong and Reilly 2014). The economic success of sugar production and the shift to a reliance on enslaved laborer had a dramatic impact on the historical trajectory of the island, region, and broader Atlantic World as the agricultural and laborer systems rapidly spread through the Caribbean and North America.

Trents, originally known as Fort Plantation, was one of the five initial plantations established by the English in 1627. This plantation is one of the earliest archaeological sites in Barbados, displaying the economic shift from small plantations to large-scale sugar manufacturing in a British Colonial Caribbean context. The excavation at Trents Plantation has provided a wealth of information about various aspects of Caribbean plantation life. Coarse earthenware ceramic artifacts, including both domestic wares and industrial sugar wares, compromise a significant portion of the artifact assemblage from Trents Plantation. Though examination of this artifact class is only one portion of a larger research project, the distribution of coarse earthenware ceramic across the site and determining the manufacturing origin of these artifacts provide valuable insight concerning the land usage patterns and economic relationships of various actors in this plantation setting.

This study presents data on the distribution and quantification of domestic and industrial earthewares from all three loci at Trents Plantation. It also presents an overview of the potential of three analytical techniques aimed at defining the chemical characteristics of ceramics in order to determine where the pottery was made and the composition of the clays and glazes that were used. Samples of ceramic are being tested using Instrumental Neutron Activation Analysis (INAA) at the University of Missouri Research Reactor Center (MURR)**.** This analysis of 119 sherds selected to represent the variation of ceramic times within the collection of nearly 7000 coarse earthenware sherds excavated at Trents Plantation and will generate quantitative data of on the chemical composition of the earthenware paste. Laser-Ablation Inductively Coupled Mass Spectrometry (LA-ICP-MS) is also being carried out. LA-ICP-MS testing of samples broken off the same sherds sent out for INAA is being run by Dr. Lindsay Bloch using equipment at the University of North Carolina at Chapel Hill. This analysis will provide a second, independent set of quantitative data that is derived from the examination of specific points on each sherd. Two LA-ICP-MS tests will be done on glazed sherds to test the body paste and the glaze (which is removed and not tested using INAA). These analyses will be used to characterize the chemical composition of the sherds and to define clustered groupings. The Barbados sample will be compared with samples form Virginia and England to assist in determining if the sherds were made in Barbados, England, or perhaps some other locality. A third analytical system, X-ray fluorescence spectrometry (XRF) will be performed on sherds with glazes (27 sherds). This will allow us to characterize the composition of lead glazes from the site. The data will be compared with LA-ICP-MS tests of glazes from the same set of sherds. When the INAA, LA-ICP-MS, and XRF testing is complete the data will be used to assess the composition and manufacturing origins of these artifacts and the broader pattern of sources of manufacture of ceramics from within the broader ceramic assemblage.

1.1 Trents Plantation, An Early Barbadian Sugar Plantation

What is today known as Trents Plantation was founded and christened (Charles) Fort Plantation in 1627 by John Powell, the original governor (Armstrong et al. 2012; Armstrong 2015a). The plantation was one of five original plantations established as part of the first European settlement in the Holetown area of Barbados (Armstrong 2015a). Originally, Trents was not a sugar plantation, instead it was a small farm that produced a variety of products including tobacco, cotton, and provisioning foods (Armstrong and Reilly 2014). In the late 1640s, it shifted to sugar production. This shift is evident in the archaeology of the site. The introduction of sugar to Barbados had a major impact on the economy of the island since it promised an impressive return on investment. Sugar plantations not only shaped the economy of the island—and the greater Caribbean—but they also shaped the physical landscape with larger plantations and major sugar works becoming the dominant features. Trents plantation is just one example of a larger trend in Barbados, so the archaeological research of this complex can provide greater insight into the economic and social shifts that coincide with the transition to a sugar plantocracy in Barbados.

During the pre-sugar period, laborers included a small group of 13-14 indentured Europeans and enslaved Africans who lived within the same housing complex as the planter (Armstrong 2013, 2015a). With the introduction of sugar, large numbers of enslaved laborers were purchased, and a separate laborer village was established. The enslaved laborer settlement area of the plantation complex was also a major focus of the archaeological research. This village area is situated on a hillside that was not suitable to agricultural production, so the area was never plowed. This left the material culture of the area relatively undisturbed since the period of emancipation, making the site an invaluable archaeological resource for insight about the living conditions of the enslaved laborers who worked on the sugar plantation.

1.2 A Definition of Coarse Earthenware Ceramics

Coarse earthenware ceramics are invariably present in the archaeology of plantation and enslaved laborer sites in the New World. In Barbados, the majority of industrial sugar ware and domestic earthenware are a red to buff color. This earthenware is also commonly characterized by the presence of temper (inclusions) within the clay paste, and relatively low firing temperatures. Coarse earthenware is very porous due to the low firing temperature. The manufacturing process makes this artifact class durable, which preserves them in the archaeological record. The unrefined nature of the clay body used in manufacture justifies the use of the term “coarse” in naming this artifact type when these ware are compared to the finely sorted clays used in wares like porcelain and refined earthenware. Throughout the Americas, various names are used to identify this class of artifacts, and in the American South these wares are generally referred to as colonoware. In some cases, names attribute a cultural group as the manufacturers, so for this project, the generic term coarse earthenware is used in order to prevent unsubstantiated claims of origin prior to corroborating analytical data.

Coarse earthenware artifacts can be further divided into different typologies. For this project there are two major typologies: industrial and domestic. The industrial earthenware forms include sugar wares that were integral to the process of extracting crystalline sugar from cane juice. Sugar cones and drip jars are the two forms of industrial earthenware identified on this site.

These two forms are thick bodied and bulky and are usually easily discernable from domestic coarse earthenware. Architectural earthenware (i.e. roof tiles) is thick-bodied and bulky like industrial earthenware. Depending on the size and form of the sherd, it can sometimes be difficult to differentiate between industrial and architectural sherds. However, architectural earthenware is not a major component of the total coarse earthenware assemblage for this project. The second major type of coarse earthenware is domestic earthenware. Domestic earthenware is typically thinner and less bulky, and the complete vessels were smaller and more diverse than industrial earthenware. Domestic earthenware is also more likely to be glazed. This ware type was used in households for tasks like food and water storage and cooking.

1.3 Research Goals and Questions

Trents Plantation as a whole provides a wide range of interesting and significant research opportunities due to the exceptional amount and range of material uncovered from various distinct areas of the complex. The expansive research of Trents Plantation has an overarching goal of providing information on various aspects of plantation life in Barbados. Depending on the specific research questions, different areas of plantation life can be examined. This project specifically focuses on the coarse earthenware recovered from the archaeological excavations of the site that occurred from 2012-2015. In 2012 and 2013, the excavations focused on the early settlement and later deposits associated with the mansion house. In 2014, studies shifted to the enslaved laborer settlement. In 2015, the examination of the laborer settlement continued, and a cave site was rediscovered and examined. In 2016, during a final field season, several additional units in select areas of the site will be excavated. Thus, this project encompasses the entirety of the coarse earthenware excavated up to and including the summer of 2015.

The goals of this project are two-fold. First, this project included a basic analysis of all coarse earthenware objects excavated from the various areas of this site. This analysis was further examined based on bulk composition and distribution across the site in order to provide insight to the various economic, domestic, and social usages of distinct spaces within the plantation. This basic analysis was also used to determine a representative sample of artifacts in order to answer the research question and second research goal of this project: were some of the coarse earthenware ceramic artifacts excavated at Trents Plantation manufactured on island or were they all imported?

Until recently, the interpretations of the origin of coarse earthenware emphasize European production and importation of earthenware. However, previous research in Barbados provides archaeological and documentary evidence that there is a history of on-island coarse earthenware ceramic production since the late 17th century (Handler 1963; Handler and Lange 1978; Scheid 2015). Barbadian potters supplied the plantations with industrial wares necessary for the manufacture of sugar. Scheid (2015) completed archaeological research at one pot house (Codrington) and found, contrary to the belief that Barbadian potteries solely manufactured industrial wares, that as much as 10% of the annual production was for domestic wares.

To determine if some vessels excavated at Trents were locally produced, INAA and LA-ICP-MS were two analytical techniques selected to compare the chemical composition of a representative sample of the artifacts excavated, Barbadian clay samples, and known British ceramic samples. Using the information from basic analysis, a representative sample of 119 artifacts and clay samples was selected for further analysis. This representative sample included industrial and domestic artifacts from all three loci, and included all form and glaze types. The INAA analysis will give whole body quantitative data of approximately 35 different elements, so the major chemical composition of the earthenware paste can be determined. The LA-ICP-MS will provide quantitative information of over 120 different potential isotopes within each sample at specific points, which allows us to target glaze and inclusion composition. These two analyses in conjunction will provide the information to group the artifacts based on similar chemical compositions, which can then be compared to the Barbadian clay composition and known imported samples. The third analytical system, XRF, will be performed on a subset (27 sherds) of the representative sample in order to gather chemical information on the various glazes found within the assemblage. Upon the return of the data from these external analyses, potential relationships and groupings of the samples will indicate if the vessels were imported or locally produced.

1.4 Organization of Chapters

Just as the goals of this project are two-fold, the organization of this thesis can be broadly divided into two parts. The first section focuses on background information and academic base on which the project is situated, and the second section is an analysis of the coarse earthenware artifacts excavated from Trents. Chapter 2 discussing the history associated with this project. A general history of Barbados leads into a more specific description of the changes that Trents Plantation has experienced over time. I conclude Chapter 2 with a description of the archaeological research that has been conducted at Trents including a breakdown of the three separate areas of excavation within the plantation complex. Chapter 3 focuses specifically on defining coarse earthenware ceramics and the manipulation of clay in the manufacturing process in both Britain and Barbados. Chapter 3 also includes a brief description of the distribution of earthenware across Trents Plantation, but a more in-depth analysis is provided in Chapter 6. The discussion of earthenware manufacture and clay manipulation prefaces the significance of

Chapter 4, which is a discussion of the geological characteristics of Britain and Barbados and how these evolutionary histories impact the clay and earthenware compositions.

Chapter 5 is a transition between the two broad sections of this thesis. First I discuss the Provenance Postulate as the theoretical basis for provenance research and the archaeometric analyses selected. I then describe common archaeometric analytical methods and explain the selection and methodology of this project's chosen analyses and how a test sample was selected. Chapter 6 discusses the analytical results of this project and what this tells us about the social and economic history of Barbados. First, the characteristics of the coarse earthenware artifacts are examined in depth. This analysis is completed in terms of the entire assemblage and by each individual locus in order to differentiate the various purposes of each area of the plantation. Then, the total assemblage characteristics are compared to the samples that were sent for each analytical method in order to explain the reasoning for the sample selection. Chapter 7 summarizes the conclusions and significance of this project. This chapter also outlines the future research associated with the coarse earthenware especially with respect to the results from the various external analyses and the potential conclusions that may result.

Chapter 2:

A Historical Overview of Barbados, From Broad to Local

The Caribbean islands and the plantation systems within these islands were major factors in the development of the economic and social systems worldwide in the second millennium of the Common Era. Colonization of the New World was established largely by Spain and Portugal, but their control began to be challenged in the 16th century with other European nations employing privateering methods and using Caribbean islands as strategic bases (Sheridan 1970a). Dutch colonization of South America began in the late 16th century and more formally expanded in the early 17th century along with the increased colonization of the Caribbean. Widespread colonization of the Caribbean island by the French, English, and Dutch started in the 1620s reflecting the power shift in the area. Plantations were established in Caribbean as a result of this wave of colonization, providing an important economic role to the European nations. As a result, the Caribbean islands were "[v]ariously described as 'treasure islands' or 'precious gems in the crown of trade,' [and] plantation colonies were widely regarded in the age of mercantilism as valuable adjuncts to European nations" especially with respect to sugar-producing islands (Sheridan 1970a: 9). In fact, sugar was the most lucrative British import from 1670 to 1820 (Morgan 2007). Prior to the introduction of sugar in the Caribbean, plantations produced other commodities like tobacco, cotton, and indigo, but it was sugar that made the Caribbean islands extremely valuable colonial properties.

The colonization of the New World resulted in widespread international trade, and the restriction and control of this trade introduced the economic system of mercantilism. Colonies provided raw materials and luxury food to their mother nations as well as a new market for manufactured goods. Protectionist policies were a common feature of mercantilism. For example, the British Navigation Acts of 1650, 1651, and 1660 established that trade within and between their colonial possessions and Europe could only be done legally through British shipping (Handler et al., 1978). The goal of these acts was to restrict direct trade between Dutch merchants and their colonial planters in order to ensure British profit from trade. Despite these laws, it is important to remember that illicit trade inevitably occurred. Nevertheless, mercantilist policies largely affected life on the Caribbean islands and the greater world.

Within the mercantilist system, plantations flourished. In the Caribbean, sugar plantations were dominant and produced incredible wealth for landowners, but it had a dramatic cost in terms of reliance on enslaved laborers from Africa. This sugar plantocracy created a social hierarchy the dramatically impacted world history. This plantation system drastically increased the wealth and power of colonial nations. The plantocracy controlled the economic, political, social, and religious viewpoints of the various Caribbean islands (Scheid 2015). Furthermore, large plantations were dependent on free labor achieved through the forced enslavement of Africans, the social and economic repercussions of which continue to impact the world today. Barbados, a 166 square mile island, was a major colonial possession of England, that was situated within this larger mercantile and plantation system, provides insight into colonialism in the Caribbean.

Barbados was perhaps England's least problematic colony since there was no armed resistance from indigenous people or war with a rival nation concerning ownership of the island

(Beckles 2006). In fact, from 1625 to 1966 (the year of its independence) Barbados was a colony of Great Britain, and no other nations. Barbados's location at the intersection of trade winds and ocean currents placed it along majoring shipping lines navigating the Western Hemisphere, which made it a valuable island for the British (Scheid 2015). As both a significant shipping location for trade and valuable landscape for plantations, by the 1660s, Barbados was commonly considered the "richest spot in the English New World Empire" (Beckles 2006:xvi).

Within this rich colony were various plantations as is shown in the map (Figure 2.1a) "A Topographicall Description and Admeasurement of the YLand of Barbados in the West Indyaes." In 1657, Richard Ligon published this map, a recreation of an earlier map, in a period account of Barbados (British Library 2009). This map indicates the major landholders and 285 plantations, which are mainly coastally located, found on Barbados in the mid 17th century. The archaeological examination of a plantation from this period provides insight into various aspects

Figure 2.1a This map is one of the earliest known maps that is exclusively of Barbados and is believed to have been redrawn by Ligon from the original—and now lost—map by John Swan. This Figure was retrieved from the British Library's online gallery.

of the Caribbean colonial venture. For example, the archaeological research at Trents Plantation—performed in a series of area/locus excavations—provides an opportunity to examine the shift to sugar (Locus 1) in Barbados as a part of the larger system of British colonialism in the Caribbean. The archaeological excavations at Trents Plantation can also look beyond planter economics and provide insight into the living conditions of enslaved laborers (Locus 2) and their cultural practices (Locus 3).

2.1 A Brief History of Barbados to Emancipation

Captain James Powell initially claimed Barbados in 1625 on behalf of King James I of England. English colonists led by Henry Powell, the younger brother of James Powell, and financed by Sir Peter and Sir William Courteen arrived in 1627. The constitutionality of this settlement is not fully clear since the group may not have had a royal patent for settlement (Beckles 2006). Thus early control of this island was largely impacted by court maneuvers in England. The Courteen group sought support from the Earl of Pembroke, who claimed Barbados and other islands on the basis of a promise from James I (Harlow 1926; Beckles 2006). However, Charles I granted a royal patent to Barbados and other lands to James Hay, the Earl of Carlisle. Following political maneuvering, a second patent supporting Carlisle's claim and revoking Pembroke's to Barbados was issued in 1628 (Beckles 2006). Thus agents of Carlisle usurped the Courteen group and gained political control of the island.

Directly prior to European settlement, Barbados was uninhabited, so the British settlers did not have to compete with indigenous people for land. Early Barbadian settlers learned the basics of successful agricultural practices in the Caribbean from indigenous people from other islands. This allowed settlers to grow foodstuff and cash crops successfully. Within the first two decades following initial settlement, Barbados became the most populous colony in the West

Indies (Sheridan 1970a). Land in the early history of the settlement was mostly divided into small farms of 5 to 30 acres each, and in 1645, 11,200 of the 18,300 white settler adult males on the island owned land (Sheridan 1970a). However an agricultural and economic shift occurred that resulted in the consolidation of these small farms into large plantations.

Tobacco was the initial investment crop in Barbados, but a glut on the market in London and the low quality of Barbadian tobacco compared to Virginian tobacco, led to a poor return on investment (Alleyne and Fraser 1988; Beckles 2006; Scheid 2015). By the early 1630s Barbadian planters had shifted to cotton cultivation, which resulted in a period of prosperity that was interrupted by another glut on the market in the late 1630s (Beckles 2006; Scheid 2015). Some planters turned to indigo as a cash crop, but the island did not experience long-lasting prosperity until the introduction of sugar to the island in the mid-1640s (Beckles 2006).

The introduction of sugar to the island resulted in a shift to large-scale agroindustry and the establishment of a plantocracy, which drastically altered the physical and social landscape of the region. This shift in Barbados began in 1643 at plantations like Drax Hall and Drax Hope (Armstrong 2015a). Sugar plantations required a large initial investment, but they offered tremendous financial rewards to planters. These large investments were necessary in order to fund the construction of associated sugar works like mills and boiling houses and to support a larger labor force (Alleyne and Fraser 1988; Armstrong 2015a). These sugar works altered the physical landscape, as did the clearing of expansive acreage on which cane was planted. Plantations accrued massive acreage through the amalgamation of small farms, which resulted in the migration of small farmers from the islands since they could not compete with larger plantations. In 1643 there were 8,300 landholders, but in 1666 there were 760 proprietors with larger landholdings (Sheridan 1970a; Beckles 2006).

In the two decades following the island's widespread and quick shift to sugar, Barbadian planters experienced a period of prosperity and consolidation. High sugar prices and beneficial trade policies fostered this prosperity and bolstered the social power of the plantocracy. After these two early decades of the sugar industry, land consolidation and plantation slowed, and plantations focused on increasing efficiency (Sheridan 1970a). After fifty years of being the most valuable colony, Jamaica and the Leeward Islands became more significant contributors to sugar exports by 1720 (Beckles 2006). Nevertheless, Barbados was one of the top ten sugar producing colonies in the mid-18th century (Sheridan 1970a). Table 2.1 displays the amount and value of sugar exported from Barbados in a one-hundred-year stretch starting in 1673. Though there were fluctuations, sugar planters were largely prosperous until the mid-18th century, when the sugar industry faced a decline. Fluctuations in sugar prices as a result of wars and trade policies along with poor harvest from environmental issues and land exhaustion precipitated this decline (Beckles 2006; Scheid 2015).

Table 2.1 Barbadian Sugar Exports*

Year	Tons	Value (£)	Value per Ton (£)
1673	6950	250,000	35.97
1710	7630	267,000	34.99
1731	6118	122,000	19.94
1748	6442	219,000	34.00
1757	6899	264,000	38.27
1768	7819	287,000	36.71
1773	5624	200,000	35.56

*Adapted from Sheridan 1970a

The largest social change that resulted from the introduction to sugar was the change in the labor force. Large sugar plantations relied on slave labor from Africa while previously

Barbadian laborers were largely indentured servants. Table 2.2 displays the massive increase in enslaved laborers in Barbados following the shift to a sugar monoculture. The dramatic increase in the slave trade in Barbados also reflects the increased demand for enslaved labor following the introduction of sugar. From the start of the colony to 1650 an estimate 20,000 slaves were brought to the island (Handler et al. 1978). From 1651 to 1834, 350,000 enslaved laborers were brought to Barbados, which amounts to three to four thousand per year (Handler et al. 1978). After the 1770s, following the sugar decline, under 300 slaves per year were brought to Barbados due to a lesser demand (Handler et al. 1978). In 1807, Britain abolished the slave trade, and Barbados was the only West Indian colony to eliminate the need for imported slaves through an emphasis on natural growth of the enslaved labor force through 'breeding' (Beckles 2006).

In 1834, Britain abolished slavery through the Emancipation Act, which implemented an apprentice system to help the laborers adjust to freedom and give time for the restructuring of the economy (Beckles 2006). The British government also compensated slave owners for their loss of property. During the apprentice period, field laborers continued to work in slave-like conditions (Beckles 2006; Scheid 2015). Complete emancipation came in 1838 when Barbados ended the apprentice system early.

2.2 A Brief History of Trents Plantation

What is today known as Trents Plantation has been called by various names over its almost four centuries of existence as a plantation, including Fort Charles, Fletchers, Gibbs and Afflick, Ovens Mouth, and Innes (Armstrong 2015a). The plantation was founded and christened (Charles) Fort Plantation in 1627 by John Powell, the original governor of Barbados for the initial settlement of the island that was financed by Sir William Courteen and the Earl of Pembroke (Armstrong et al. 2012 and Armstrong 2015a). The plantation was one of five original plantations established as part of the first European settlement in the Holetown area of Barbados (Armstrong 2015a). The Powell group lost control of this estate when the Carlisle group gained control of Barbados through political and social maneuvers to gain the formal charter of King Charles I (Armstrong et al. 2012). At this point, Captain Daniel Fletcher gained possession of the plantation with Edward Seede and Jonathan Hawley co-writing the mortgages (Armstrong et al. 2012). The current name of the plantation, Trent's Plantation (now the apostrophe is commonly dropped), is derived from Lawrence Trent who acquired the property in 1743 (Armstrong et al. 2012).

Table 2.2 Estimated Slave Population of Barbados*

Year	Population
1629	50
1643	6,000
1655	20,000
1666	30,000
1673	33,183
1683	46,602
1710	41,970
1731	65,000
1748	68,000
1757	63,645
1768	76,275
1773	74,206
1834**	83,150

*Data from Sheridan 1970a
** Data from Beckles 2006

The estate began as a series of small, 10-20 acre plots that were cleared using slash and burn techniques (Armstrong 2015a). Prior to the shift to sugar, the plantation cultivated cotton, potatoes, tobacco, and provisions, and it utilized a small labor force composed mainly of indentured servants and some enslaved laborers (Armstrong 2015a). In the early 1640s, the plantation shifted to cultivate cotton as its primary cash crop (Armstrong 2015a). The scale and scope of the plantation did not shift much. The laborers and planters continued to work in close quarters with the labor force remaining relatively small. In 1641, the labor force of Trents was composed of fourteen indentured servants, and in 1643, it included five indentured servants and eight enslaved laborers (Armstrong 2013). Although 1643 marked the beginning of sugar production in Barbados, Trents did not shift to sugar until later in the decade (Armstrong 2013).

The Hapcott map (see Figure 2.2) is a survey of Trents (then Fort) Plantation that was completed in 1646 on behalf of the London financiers who held the mortgage to fund the plantation's shift to sugar (Armstrong 2015a). Thus, the Hapcott map is significant in that it provides a glimpse of the landscape prior to its major alteration as part of the sugar manufacturing industry. This map displays a Great House that dominates in terms of size and land holding, but there are still some tenant farmers that were operating quasi-independently prior to the sugar mono-culture (Armstrong et al. 2012). The Great House structure displayed on the Hapcott map matches the current location of Trents Great House, an 18th century structure that appears to have been rebuilt on a 17th century foundation (Armstrong et al. 2012). The Great House is positioned at a high point on the property that overlooks the plantation lands and coastal Holetown. This positioning allows a wide-angle view that is ideal for defense and control of the property (Armstrong et al. 2012). According to this map, the plantation was long and narrow, with the narrow side fronting the sea. This shape was typical of plantations because there was a mutual need for access to the sea for transportation (Sheridan 1970a).

Figure 2.2 Map of Trents Plantation with the 1646 Hapcott Map overlaying a 1986 ordinance survey map. Figure courtesy of Doug Armstrong.

The Hapcott map does not display any of the large-scale industrial structures that are associated with the sugar mono-crop; thus we can infer that sugar cane was not yet cultivated at Trents by 1646, but was close to shifting over to a sugar mono-crop. In 1669, the estate was sold to William Dyer for £6900 pounds as a well-established sugar estate (Armstrong 2013). With this record of sale, we know that Trents shifted into a successful sugar estate after 1646, and this shift is evident in the material culture and archaeological contexts of excavations at Trents Plantation. With this shift in sugar came a change in the labor force both in terms of size and population make-up. After utilizing a small force of indentured servants and some enslaved laborers, the enslaved laborer population of the estate increased dramatically after the transition to sugar. Table 2.3 provides a summary of plantation size in Barbados based on the amount of enslaved laborers. Deeds show that in 1722 there were 50 enslaved laborers on the estate, and in 1793 there were 160 enslaved laborers (Armstrong 2013, 2015a). In 1834, at the point of emancipation, there were 167 enslaved laborers on the estate (Armstrong 2013, 2105a; UCL 2016). The estate owner, John Trent, was compensated £3596 9S 5D from the British government for the loss of this "property" (UCL 2016). These totals of enslaved laborers show the increase in estate manufacture size following the shift in sugar. To counteract the erasure of these laborers as individuals, lists of the recorded names of laborers at the point of the property's transfer to the Trent family and at the time of emancipation can be found in Appendix A.

Table 2.3 Barbadian Plantation Size by Slave Population 1650-1834*

Slave Population	**Plantations***	
	Count	**%**
≥50	27	13.7
51-100	39	19.8
101-150	54	27.4
151-200	43	21.8
201-250	23	11.8
251-300	8	4.1
310-350	3	1.5

Trents Plantation was an average sized plantation according to the chart, with a range of 50 to 167 enslaved laborers from 1722 to 1834 (Armstrong 2013 and 2015a.

*Table adapted from Handler et al. (1978).

**Information on 167 separate plantations.

2.3 A Summary of Excavations at Trents Plantation

Archaeological excavation at Trents Plantation has been underway since 2012. This site is registered with the Barbados Museum and Historical society with the assigned site identifier

IBS3. A variety of archaeological techniques including walking surveys, shovel test pits (0.5m x 0.5m square pits), and full unit (1m x 1m square units) excavation has been applied to this project. Excavation has been focused on three separate loci: a midden pit adjacent to the Main House (Locus 1), house-sites within the enslaved laborer settlement (Locus 2) and a cave site (Locus 3).

After correlating the modern location of Trents Plantation to the Fort Plantation on the Hapcott map, the archaeological investigation originally aimed to focus on early contexts of pre and early sugar in order to better examine the shift to the large scale mono-culture of sugar cultivation by Barbadian plantations (Armstrong 2013). This examination is centered largely on Locus 1. Further fieldwork revealed a greater wealth of potential archaeological excavation at Trents Plantation, which resulted in an expanded focus. The rediscovery of the enslaved laborer settlement site occurred late in the first year of archaeological research (Armstrong 2013). This area provided a unique opportunity for archaeological excavation because it is the sole unplowed enslaved laborer settlement site that has been identified in Barbados, though further investigation of the island will likely result in more being identified (Armstrong 2015a). Locus 2 allows for greater investigation into the daily lives and living situation of enslaved laborers at an average sugar plantation in Barbados. The third area of excavation, a cave site with caches of iron blades and animal bones, was rediscovered at the end of the 2015 field season.

The planned excavations for have largely been completed, though additional units may be excavated for targeted sampling purposes. For example, extra units may be excavated in Locus 1 in order to collect more data from the early pre-sugar contexts. Further excavation will also likely be undergone at Locus 3 for a better understanding of the possible significance of the site and for a more statistically significant artifact assemblage. Since the excavations are largely complete, the artifact assemblage already excavated can be considered representative of the site as a whole. All of the coarse earthenware excavated from Trents at this point has been qualitatively analyzed and cataloged, and a representative sample of this coarse earthenware from the three separate loci was selected for external chemical analysis.

2.3.1 Locus 1: Main House Midden

Locus 1 is adjacent to Trents Main House, on a hill to the south of the house. This location was selected based on the results of a series of STPs (shovel test pits) dug following a five-meter gridded interval that uncovered material that indicated potential early 17th century contexts (Armstrong 2013). This midden pit is composed of well-stratified deposits of over 2 meters in depth, and the bottom 20-40 cm were early 17th century deposits from the 1620s to the 1640s (Armstrong 2013). This dates the earliest contexts from this locus to the pre-sugar period, which is a period when there was a smaller labor force that was composed of both indentured servants and enslaved laborers. The material derived from these contexts that aid in the dating include delftware, a Bellarmine stoneware jug, and pipe stems with large bore diameters (Armstrong 2013). In these early contexts, there is not the same wealth of material that characterized the overlying deposits that indicate the shift to sugar.

The shift to sugar at Trents Plantation occurred in the late 1640s, and this shift is evident in the Locus 1 units. The early sugar period contexts (1640s to circa 1700) include both a great variety and volume of artifacts, which indicates an increase in planter wealth and access to expensive goods (Armstrong 2013, 2015a). These materials include onion bottles, window glass and lead casing, and the earliest appearance of thick earthenware sherds characteristic of industrial sugar wares (Armstrong 2013). The presence of these sugar wares is primary evidence of the industrial shift at Trents to a sugar plantation during this period. With the shift to sugar during this period, there was a change in the cultural landscape and the labor force. The labor force increased drastically and was composed of more enslaved laborers. During this period, it is also likely that the labor settlement shifted away from the main building (Armstrong 2015a).

2.3.2 Locus 2: Enslaved Laborer Settlement

The enslaved laborer settlement is located on a wooded hillside to the east (inland) of the main house. This settlement, with its visible housing platforms and abundant surface artifacts, was rediscovered in 2013 from a walking survey of the site (Armstrong 2013 and 2015a). The house sites are along an old roadbed that was the nexus of cart paths for transporting goods and crops, especially sugar cane. To the west of this settlement is a gully with steep cliffs, and to the east and southeast of the village are limestone outcrops and stone quarries. The location of this village is fortuitous because it prevented the area from being plowed over for agricultural purposes. As a result, this is the only pre-emancipation laborer settlement area that has not been plowed and converted to other uses that has been identified in Barbados to this point (Armstrong 2015a). This area was occupied from the mid 17th century to emancipation when it was abandoned circa 1838 when laborer housing moved to Trents Tenantry (Armstrong 2015a). This means that the area was largely undisturbed—though there are some modern artifacts on the surface of the area—for roughly 175 years.

The excavation of Locus 2 was largely done during the 2014 and 2015 field seasons. Fifteen distinct house sites and yard areas were identified in this settlement. 122 STPs were dug in a 60m x 140m area following a 10m x 10m grid with a North-South baseline that the old roadbed aligns with before curving west (Armstrong 2015a). These STPs both defined the village boundaries and helped us determine where to excavate. Four house areas with high concentrations of ceramics in the STPs were selected for full unit excavation. All house areas were rich in domestic material and notable paucity of industrial earthenware on the north-end of the site to a large presence on the south end (Armstrong 2015a).

House Area 1 and 2 are located on a hillside near an intersection of two old roadbeds. Both of these areas were evident on the landscape with visible limestone foundations and abundant surface artifacts. House Area 1 (HA1) consists of two structures that are no longer present and their associated middens. One structure was built on a limestone outcrop. The surface artifacts include late 18th to early 19th century materials and the excavation revealed well-stratified layers with ceramics dating to the late 17th and early 18th centuries (Armstrong 2015a). House Area 2 (HA2) is also a pair of structures and their surrounding yard area and is located uphill to the southeast of HA1. One structure was built on a limestone outcrop and the clustering of limestone pebbles and marl representing the washed away mortar of a once existing structure evidences the second structure (Armstrong 2015a). The artifacts from HA2 have a similar date range to those of HA1. The two house areas were largely excavated in the 2014 field season, with some additional units completed during the 2015 field season.

House Areas 3 and 4 (HA3 and HA4, respectively) were excavated during the 2015 field season. HA3 was identified by a large concentration of artifacts in the STPs rather than visual surface elements. This area was located further from the road bed than all other excavated house areas and was situated near the gully to the west of the village. Excavation of HA3 concentrated on multiple potential house sites and a well-stratified midden associated with these houses. This midden was extremely rich in domestic material, but it also featured a significant amount of industrial earthenware, some with evidence of alterations and repurposing for domestic use. HA4 was located alongside an old roadbed, and the material from this area dates mostly to the mid-18th and early 19th centuries (Armstrong 2015a). Rocks found in this area likely acted as foundation stones with a structure built on top, as was the case in HA1 and HA2. These four house areas provide insight to the living conditions and material possessions of laborers prior to emancipation during a period of large-scale sugar manufacturing.

2.3.3 Locus 3: Cave Site

In July 2015, a cave site in the gully between the main house and the enslaved laborers settlement area was identified and carefully excavated (Armstrong 2015a and 2015b). While there is visibility across the gully from the main house to the laborer settlement, the cave was not directly visible looking down into the gully especially with vegetation concealing the area (Armstrong 2015b). Due to the site's fragile nature, 3-D LiDAR mapping and scanning was completed—thanks to a grant from the National Geographic Society—prior to excavation (Armstrong 2015b). Careful removal of artifacts and bones from the cave along with ample soil sampling and the excavation of two units were also completed in the final weeks of the 2015 field season.

This cave site includes two chambers, with the larger chamber splitting into several micro-chambers, an overhang area, and surface crevices where objects were placed. Within the chambers were metal fragments and wrought iron blades and organic matter including animal (prominently lamb) bone, seeds, and charred wood (Armstrong 2015b). Within exterior crevices of the cave's surface various artifacts were placed including metal fragments and a modified base of a crystal tumbler. The two units excavated were located under the overhang in the sheltered area. This sheltered area is likely the location where the most social activity occurred since the chambers are too small for comfortable interactions. Soil samples from within the chambers and of various levels of the units were taken with the goal of better sampling and identifying the organic materials.

While this locus has not been fully analyzed a preliminary examination indicates that the cave may have been the space of ritual practices and/or cultural resistance by the enslaved laborers (Armstrong 2015b). These possibilities are supported by the abundance of iron weapons, the remains of butchered animals and ash from cave fires, and the notable scarcity of domestic artifacts like bottle glass and ceramics. It is important to note that the evaluation of this locus and its archaeological evidence is incomplete, so this interpretation is tentative. Future research, including expanded excavation of the overhang area is necessary before a more encompassing analysis of this significant area is completed. Due to the limited amount of earthenware excavated from this locus and the incompleteness of its excavation, this area is the least represented in the samples selected for external analysis (see Chapter 5).

Chapter 3:

Coarse Earthenware Ceramics

Coarse earthenware ceramics are ubiquitous in the archaeology of plantation and enslaved laborer sites throughout the Caribbean, the United States, and South America. Coarse earthenware is porous due to a low firing temperature and often includes visible inclusions within the paste body. This type of ceramic is often used archaeologically as markers of African ethnicity since it is widely acknowledged that the main producers and users of these goods were of African descent (Hauser and Armstrong 1999; Hauser and DeCorse 2003; Hauser 2008). A variety of terms have been used in the description and categorization of this type of pottery including coarse earthenware, Colono-Indian ware (colonoware), Afro-Caribbean ware, Criollo ware, and redware. One of the issues with these terms is their bias towards indicating production by a specific ethnicity. Historic Caribbean pottery has little to identify it, as it is most typically exhibits stylistic generality with a utilitarian function (Hauser 2008). Since there is a variety of techniques and decorations that developed in the earthenware across the Caribbean, it is difficult to stylistically group Afro-Caribbean ware, which is truly only unified in its presence in slave-associated archaeological contexts (Hauser and DeCorse 2003). Thus in this project, from initial excavation and analysis to the writing of this document, these artifacts have been referred to as coarse earthenware ceramics. This generic terminology prevents hasty conclusions of the origin of production of these artifacts, which is the main research question of this project.

3.1 Coarse Earthenware Typology

In the initial stages of qualitative analysis of the coarse earthenware artifacts, we divided the sherds based on vessel form and usage. These two major divisions are industrial wares and domestic wares. Industrial wares, or sugar wares, were for the economic purpose of the plantation and played a role in the processing of sugar. Domestic wares were for the use in households for tasks like cooking and food or water storage. The difference between these two types of wares is usually quite evident with the industrial wares tending to be larger (especially in terms of thickness) with untreated surfaces. Domestic wares are often less bulky, smaller, and are commonly glazed. In some cases the sherds are indeterminate or are a different form type like architectural tiles. The two major divisions of earthenware type were found across the various loci excavated at Trents Plantation.

Coarse earthenware from a plantation based site can be further divided based on who manufactured it, in economic rather that ethnic terms. Dwayne Scheid (2015) devised a typology with three divisions based on production and applied it to the coarse earthenware from some archaeological excavations in Barbados. Type I earthenware are those that were produced in a plantation centered site by enslaved laborers trained in British manufacturing techniques. This type of earthenware is mainly industrial and architectural. Type II is transitional made by free individuals (black or white) for monetary gain, manufacturing industrial, architectural, and domestic wares to fulfill the needs of the market. Type III is domestic ware to be used for non-industrial purposes that were produced by individuals of African descent. While I do not specifically apply this typology in the analysis of the coarse earthenware of Trents Plantation, it is a useful system to consider. This typology indicates that earthenware was produced on island in Barbados at a variety of different scales for a variety of different purposes. Furthermore, Scheid’s (2015) research of pottery manufacture sites in Barbados supports the claim that on-island production of earthenware occurred, which supports the possibility that at least a subset of the coarse earthenware artifacts excavated at Trents could have been manufactured locally.

3.2 Clay for Earthenware Manufacture

In order to manufacture earthenware, the proper raw materials including clay and temper must be procured. The term clay is a geological term that can have a variety of different meanings from particle size to chemical and mineralogical characteristics. Clay particles are the fine-grained portions of sediment or sedimentary rocks with dimensions of less that 0.0002mm, which means that they cannot be identified through conventional optical means (Nesse 2012). Clay sediment is usually comprised of clay minerals that are fine-grained sheet silicates that naturally arrange themselves in repeating layers held together electrostatically (Nesse 2012). These characteristics allow clay to be shaped and fired to transform into relatively impervious ceramic vessels. Clays are not one single mineral, but instead a suite of weathered silicate minerals, with different chemical compositions, that are unified by their small grain size and platy structure (Nesse 2012; Bloch 2015). Thus, clay sources for earthenware can vary greatly depending on their geologic origin.

Clay used for earthenware manufacture can also vary due to human manipulation of raw materials. To differentiate between the geologic usages of the term clay, the term clay body is used to refer to a material that is usable in a ceramic context (Colbeck 1988). Potters often create mixes to make the clay body more workable since naturally occurring clay is rarely suitable for ceramic manufacturing purposes without manipulation (Frakenburg 2000). As a general guideline, naturally occurring clays can be used to make coarse earthenware, but refined earthenware requires clay body mixes (Colbeck 1988). In order for a clay body to be useful for manufacturing purposes, it must have a balance of plasticity and stiffness, which allows molding into various shapes with enough strength to maintain the shape and resist deformation or cracking (Sandeman 1860; Frakenburg 2000; Bloch 2015).

3.2.1 Characteristics of Clay

Clay can be divided into two broad groups based on the weathering and deposition of the clay sediments. Primary or residual clays are those that are derived directly from underlying rocks, which means that they were weathered in situ (Orton and Hughes 2013; Bloch 2015). Secondary clays, also known as sedimentary or alluvial clays, are those that have been transported, often via water systems (Orton and Hughes 2013; Bloch 2015). These secondary clays are more fine-grained than primary grains and are more often used for pottery (Orton and Hughes 2013).

Clay can be further divided into four categories that are useful in discussing the manufacture of earthenware. China clay is pure, white clay that lacks plasticity; this clay is the basis of porcelaneous mixes (Colbeck 1988). Fire clays, which are characterized by their sandy texture and a greyish color, are often the weathered product of crushed shale (Colbeck 1988). Ball clays are group of clays that are characterized by their extreme plasticity (Colbeck 1988). This type of clay is often used in mixes to increase the clay body's malleability. Common clays are the most prevalent, but not all are suitable for use in clay bodies. Common clays that are suitable for clay bodies typically fire brown to red and are used in the manufacture of coarse earthenware and industrial wares (Colbeck 1988).

3.2.2 Manipulation of Clay

Since few native types of clay are immediately suitable for the manufacture of pottery, the clays must be modified to create a clay body that balance plasticity and strength. An extensive process is required to prepare clays for use. The raw clays must be purified, which means that extraneous materials from rock pieces to organic matter are removed (Frakenburg 2000; Orton and Hughes 2013; Bloch 2015). This material can be removed through sieving and grinding methods. Adding materials alters the clay mixture to achieve the desired balance of characteristics. These additives include various raw clays and tempers. Tempers like crushed rock, bone, and shell reduce the plasticity but increase the strength of the clay mixture (Orton and Hughes 2013; Bloch 2015). The specific mixtures or clay body recipes vary depending on the manufacturer (Sandeman 1860). Different mixture recipes result in different whole body chemical compositions from the original raw materials mixed.

3.2.3 Analytical Basis for Sourcing Earthenware

The major component of earthenware is clay, which is a geologic material. This clay is a heterogeneous material composed of a variety of minerals. A compositional analysis of ceramics relies on the basic concept that clay sources have elemental differences that can be measured from raw materials and the altered ceramic paste (Leute 1987; Orton and Hughes 2013; Bloch 2015). Provenance studies are based on the concept that the elemental signature of a clay body is linked to the specific parent material from which the sediments weathered. In order to source these compositional differences, the paste body must be linked to clay source. These compositional differences can be measured by a variety of archaeometric methods, which are further discussed in Chapter 5.

Sourcing based on geologic properties of a region can be successful because the expense and difficulty of mass transportation of clay long distances does not make economic sense, so ceramics are usually manufactured from local clays (Bishop et.al. 1982; Bloch 2015). The economic sense of the use of local sources is illustrated by the fact that the notable pottery manufacturer Wedgewood attempted in the mid-18th century to economically and effectively ship high quality white clay from North Carolina to his manufacturing base in Staffordshire, but the logistical difficulties and high expense ended the scheme after shipping only five tons of the clay (Frakenburg 2000). Since local clay is more likely to be used in manufacturing earthenware, it is important to have an understanding of the geologic variation within the region from which the clay originates. The geologic origins of the clay will give insight to its composition. (See Chapter 4 for a comparison of the geologic origins of clay from Britain and Barbados, two likely sources for the coarse earthenware ceramics excavated.)

Sourcing earthenware faces further complication because the chemical composition of a sherd does not solely depend on a single clay source. The chemical composition of a sherd is impacted by the characteristics of all ingredients in the clay body, which may include a variety of clays and tempering agents, and the human actions that turn the raw material into the finished product. Just as clay is a heterogeneous material, the clay body is a mix of various materials. While the clay is likely to come from a source near to the area of manufacture, the temper ingredients are not necessary from the same area and may be transported a greater distance (Bishop et al. 1982). Nevertheless, chemical characterization of a group of artifacts can create groups of similarity that can then be compared to artifacts of known origin and/or raw clay sources to indicate likely origins based on compositional overlap.

3.3 British Ceramic Manufacture

Singly fired earthenware with a basic glaze was the basis of pottery made in the Great Britain until the late 18th century when more refined styles of ceramics became more common (Cooper 1988). From the 17th century to the mid 18th century, unglazed and lead glazed earthenware in simple and practical forms were produced for local markets with local materials, and following the advent of industrial manufacture, this local manufacture of red earthenware goods by regional potteries continued throughout the 18th and 19th centuries (Cooper 1988). In the 18th century, technological innovations allowed for an industrialized production of more refined wares. Staffordshire was the largest and most important center for pottery manufacture in Great Britain, and was the region in which notable potteries like Wedgewood opened factories and developed new ceramic types (Cooper 1988). These new ceramic types, including creamware and pearlware, are more refined than the coarse earthenware ceramics that are the focus of this project, but they are useful archaeologically as a dating tool for different contexts.

3.3.1 Clay Sources

The regional production of earthenware in Britain meant that a variety of local clay sources were used. Chapter 4 covers the geologic origins of a variety of clays found in Great Britain that may have been used to manufacture earthenware. The Staffordshire potteries are notably located in an area known as the coal measures, where ample amounts of clay, coal, and lead sulfide are exposed along fault lines (Bloch 2015). The clays found there are suitable for potting, and the lead sulfide provides the lead necessary for glazing (Cooper 1988; Bloch 2015). The Staffordshire potteries also used clay from the southern area of Britain, especially Devon (Chamber’s Edinburgh Journal 1839; Cooper 1988).

3.4 Barbadian Coarse Earthenware

Both documentary and archaeological evidence supports the production of coarse earthenware on the island during the height of the plantation economic system. Tax records indicate that from 1710 to 1760 the number of potteries in operation ranged from 15 to 27 (Handler and Lange 1978; Scheid 2015). Most of these potteries operated in the parishes of St. Andrew, St. Philip, St. Joseph, and St. John, all of which are along the east coast of the island

and are either in or near the Scotland District. The Scotland District is the only geological region in Barbados with a significant source of clay.

While the beginning of island ceramic production cannot be dated with accuracy, the earliest archaeological evidence of Barbadian redware was found at Charles Towne Landing site in North Carolina, a colony that existed from 1664-1667 (Loftfield 2001). This means that earthenware production on island had been established by the mid-1660s. While it may seem odd that the earliest earthenware from Barbados was not found on island but in Carolina, Barbados and Carolina share a linked history and overlapping settlers. Alleyne and Fraser (1988) outlined various levels of connection between Barbados and Carolina, and this red earthenware adds yet another link between the two.

The pottery industry of Barbados was rooted in the plantation system especially with the production of sugar wares (Hauser 2008 and Scheid 2015). While there is little documentary evidence to support the manufacture of domestic earthenwares, archaeological evidence indicates that they were produced during the 17th and 18th centuries, though at a smaller scale than industrial earthenware production (Scheid 2015).

3.4.1 Manufacture of Industrial and Domestic Earthenware

The earthenware manufacturing on the island of Barbados primarily supported the plantation economy, which was largely based on sugar production. The industrial manufacture of earthenware based on British techniques dominated production in Barbados, preventing the widespread continuation of African ceramic forms and techniques (Loftfield 2001).

The research of Dwayne Scheid (2015) examined two pottery production sites within the parish of St. John in Barbados, Colleton Pothouse and Codrington Plantation, which expanded upon the work by Loftfield (2001). Colleton operated throughout the 17th and 18th century and

Colleton operated into the mid 19th century (Loftfield 2001 and Scheid 2015). Both of these sites mainly produced industrial wares that were used in the processing of sugar and architectural

Figure 3.1 (left): Sugar cones or sugar molds were used in processing sugar with the narrow opening placed over a jar to allow excess molasses drip out of the sugar crystals. This object shows the typical form of a sugar cone. The object dates between 1680 and 1720 and was collected from Goldsmith Street, Exeter, Devon, United Kingdom. This object is part of the collection at the Royal Albert Memorial Museum & Art Gallery, and the Figure originates from their website (<http://rammcollections.org.uk/content/catalogs/ramm/antiquities/exeter-archaeology/mould-300-1988-2572.ashx>).

Figure 3.2 (right): Drip jars come in a variety of forms, but they all served the purpose of collecting the molasses that dripped from the sugar placed in the sugar cones. This Figure, courtesy of the Royal Albert Memorial Museum & Art Gallery, is an example of a drip jar excavated from Bradninch Place, University College foundation, Exeter, Devon, United Kingdom. (<http://rammcollections.org.uk/content/catalogs/ramm/antiquities/exeter-archaeology/jar-1028-1910.ashx>).

wares for construction, and domestic wares were only a small percentage of what was produced (Loftfield 2001; Scheid 2015). Individuals of African descent also produced domestic wares on a smaller in a scale cottage industry system (Scheid 2015). While this domestic ware production was largely ignored by contemporaneous historians, it is significant because it makes it plausible to believe that at least some of the domestic coarse earthenware sherds found at Trents originated from locally produced wares. These production sites, like Codrington's, could be located within a larger plantation complex, but no evidence of a kiln has been identified at Trents Plantation.

Since industrial earthenware forms were produced in greater amounts by pottery kilns on the island, it is even more probable that some of the industrial earthenware goods excavated at Trents Plantation were locally manufactured. These industrial wares include sugar cones (Figure 3.1) and drip jars (Figure 3.2) that were integral to the processing of sugar from sugar cane. Once the sugar cane was harvested, it was crushed and boiled. After being boiled, the liquid was placed in pans and began to cool and crystalize before it was placed in a mold (sugar cone) for full crystallization. The narrow end of the sugar cone was placed over a drip jar for the gravitational separation of the sugar crystals and molasses. The sugar molds and drip jars did not necessarily have to be ceramic, but, due to the lack of domestic wood on Barbados, they were more accessible (Scheid 2015). Ceramic sugar wares were also beneficial due to their durability, smooth interior surface, and porosity, which enabled evaporation of excess moisture (Scheid 2015). The sugar wares manufactured at local Barbadian potteries competed against those from London, Bristol, and Liverpool (Scheid 2015). Barbadian sugar wares tend to be of poor quality—though it likely did not impact the ware's industrial utility—since they were fired at low temperatures for an inadequate amount of time, likely because of the dearth of fuel sources on the island (Loftfield 2001). With inadequate firing, red unglazed earthenware is chalky and friable with grey cores (Loftfield 2001). The presence of a dark core in some sugar wares found at Trents may be indicative of their local manufacture.

While the Navigation Acts and the British mercantile system mostly limited Barbados to the production and exportation of unrefined sugar, planters often implemented a system of "claying" the sugar to semi-refine it (Scheid 2015). As part of the claying process, a liquid slip of clay was placed on top of the sugar mold, allowing water to drain through the sugar slowly, dissolving the molasses and washing the sugar crystals. This increased the value of the sugar and allowed it to be transported with less risk of spoiling. Some of the sugar sherds from Trents exhibit a white clay slip on the interior that greatly contrasts with the red body (see Appendix B sample 109 for an example). It is possible that this is an indication that a claying process to semi-refine the sugar was practiced at the plantation. The gravitational methods of using sugar cones and drip jars were replaced by new technologies like the Gadsden pan and centrifuges when the Caribbean shifted to steam power in the 19th century (Scheid 2015). Steam power arrived in Barbados in 1846, but due to the expense of implementing it, the gravitational methods described continued to be used for a considerable amount of time afterwards (Scheid 2015).

3.4.2 Clay Source

The eastern portion of Barbados, known as the Scotland District, has readily available clay deposits that have been—and still are—used for the manufacture of earthenware goods. The presence of a local source of clay in Barbados was a valuable resource for its use in producing industrial goods to support the sugar industry and as an export good. The clay was exported to other Caribbean islands, some of which like the Lesser Antilles did not have local clay sources (Scheid 2015). The Barbadian Assembly restricted this exportation of the local clay resource in 1736 (Scheid 2015). This legislated restriction indicates that the local use of clay in industrial manufacture was more important to the economy than the export of the resource. Chalky Mount, located in the northeast section of the Scotland District, still has available clay resources that continue to be used to produce tourist goods. The clays in this area can be subdivided into red and white types, but they are not present in large enough quantities for commercial exploitation and only supply a sufficient amount for small-scale production (Handler 1963). Clay sources are known at sites like Codrington and Pothouse in St. John Parish, and Chalky Mr. in St. Andrew Parish (Scheid 2015). Samples of clay and pottery made from these clays have been included in studies by Dwayne Scheid (2015), and in the samples sent off for analysis for this project. In some areas of the excavation at Trents Plantation, small pockets of clay were discovered. While this clay may have been used for extremely small-scale manufacture of domestic wares, the surveys of the site have not uncovered wasters or physical structures that indicate the presence of a kiln.

Table 3.1 Coarse Earthenware STP Assemblage Summary

	Earthenware Type	Count	% of Locus Assemblage
Locus 1	Industrial	77	48.7
	Domestic/Indeterminate	81	51.3
Locus 2	Industrial	48	9.5
	Domestic	447	88.5
	Indeterminate	10	2

3.5 Coarse Earthenware of Trents Plantation

During excavations at Trents Plantation, a significant amount of coarse earthenware, both domestic and industrial, was uncovered. A sharp contrast between Locus 1 and Locus 2 was immediately evident in the coarse earthenware artifact assemblage collected from STPs prior to the more expansive excavation. In the STPs of Locus 1, there was a relatively even amount of industrial and domestic sherds, but this balance shifted in favor of industrial wares during the examination of the entire assemblage. Domestic sherds dominated the assemblage from STPs in Locus 2, and this dominance remained in the entire Locus 2 earthenware assemblage. (See Table 3.1 for a summary of the coarse earthenware sherds excavated from the STPs.) This distribution reflects the different purposes and land use of the two loci. Locus 1 was located within a center for sugar production on the plantation complex, and Locus 2 was an area of domestic habitation by the enslaved laborers. This basic difference between the two loci was further reflected in the entire assemblage of material from the full excavation and will be further analyzed in Chapter 6.

Chapter 4:

Geologic History

As discussed in the previous section, the process of making earthenware ceramics (both coarse and refined) required clay to form the body of the objects. Since the clay itself often came from areas near the manufacturer, objects made in Barbados would likely have different clay sources than objects made in the United Kingdom. Since Barbados and the United Kingdom have different geological histories in terms of age and process of formation, it is logical to conclude that the clays, and therefore the ceramic vessels, from these two areas would have different characteristics. These clay characteristics can be systematically examined from the paste of the earthenware objects, which is the basis of this project. The following section provides an overview of the geologic formation of Barbados and the United Kingdom to outline the general chemical and mineralogical differences one can expect from the clays found on each island.

4.1 Geologic History of Barbados

4.1.1 Location and Major Formations

Barbados is the easternmost Caribbean island, located outside of the Lesser Antilles Chain. It is the most isolated of the Caribbean islands, projecting out into the Atlantic Ocean and has a geologic structure that differs from other Caribbean islands (Matley 1932). Geographically, Barbados is the closest Caribbean Island to Africa. The island itself is small, only 166 square miles, 21 miles wide from north to south and 14 miles at its widest east to west (Scheid 2015). Barbados's location, through the combination of trade winds and ocean currents, placed it along the major shipping lanes navigating the Western Hemisphere, and made it a valuable colony to Britain (Scheid 2015).

In general, Barbados is composed of middle to late Cenozoic Era sediments that were uplifted throughout the Neogene Period and capped by Pleistocene Epoch marine sediments (Allan and Matthews 1977). Barbados is part of the accretionary wedge (also known as an accretionary prism) formed from the Atlantic Ocean crust under thrusting the Caribbean plate (see Figure 4.1) (Baldwin et al. 1986; Kasper and Larue 1986; Takizawa and Ogawa 1999). An accretionary wedge is formed from accumulated sediments on the non-subducting plate at a convergent plate boundary. These sediments often have marine origin, which is the case for Barbados, since the sediments are scraped from the subducting oceanic crust.

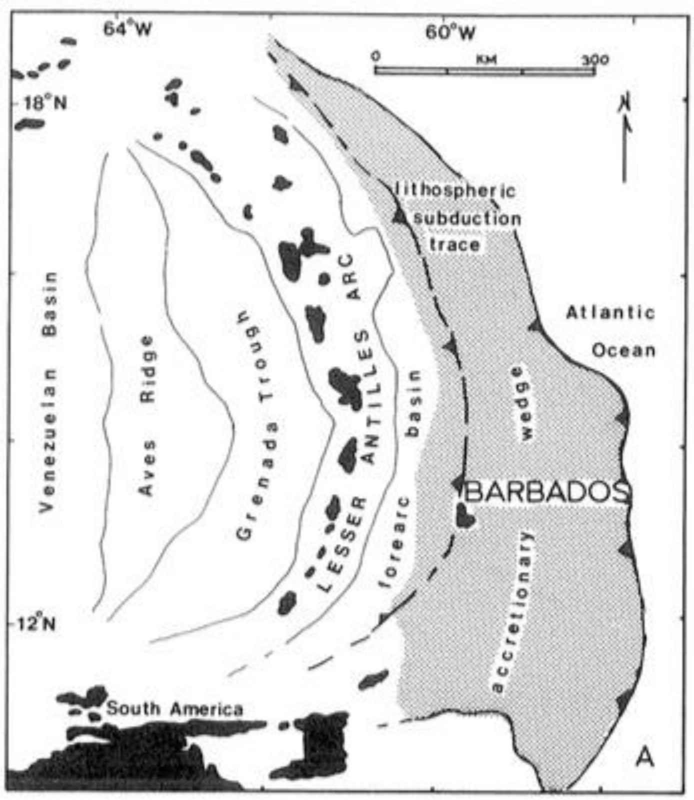


Figure 4.1 This schematic from Baldwin et al. (1986) displays how Barbados is part of the accretionary wedge that formed as a result of the subduction of the Atlantic crust under the Caribbean Plate. Furthermore this map shows how geographically separated Barbados is from the Lesser Antilles and other Caribbean islands.

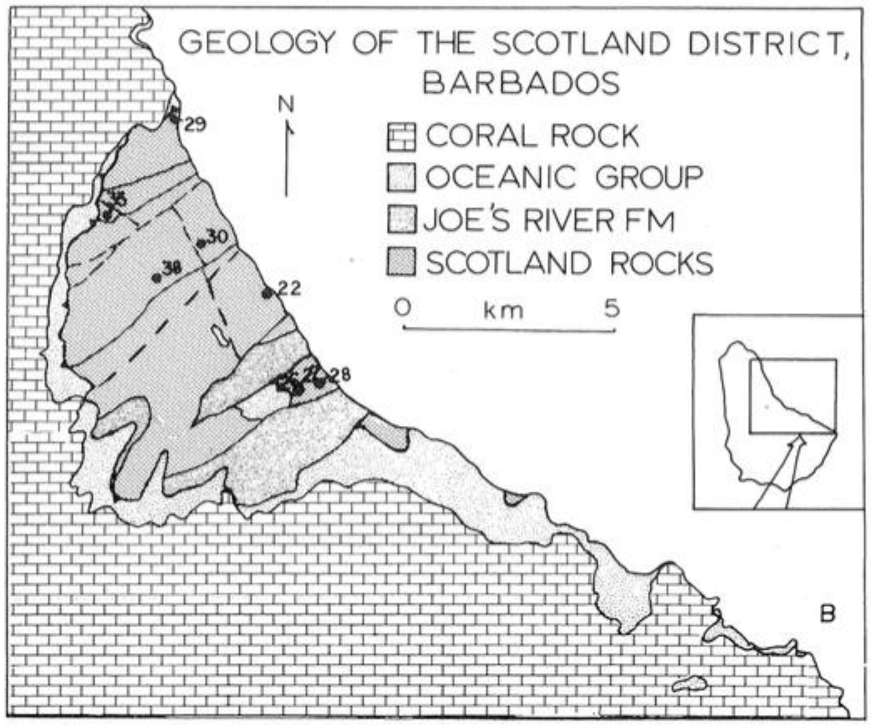


Figure 4.2 This map from Baldwin et al. (1986) is a simplified representation of the rock formations in the Scotland District of Barbados, which is the main region where clay is found in Barbados. The geologic formation of the rest of Barbados that is not depicted in this map is the Coral Rock formation.

The island of Barbados is comprised of three major units all separated by unconformities, which are non-continuous contacts between sedimentary layers that indicate a gap in time. These three units in descending order are the Coral Rock series, the Oceanic Series, and the Scotland Beds (Jukes-Brown and Harrison 1892; Trechmann 1925; Matley 1932; Kasper and Larue 1986) (see Figure 4.2). A fourth formation, named the Joe's River Clay, can be found in an isolated area lying unconformably between the Oceanic Series and the Scotland Beds on the eastern coast of the island (Matley 1932).

The majority of the exposed rock of Barbados is the Coral Cap, which covers roughly 85% of the island (Trechmann 1925). The coral limestone is thin and weakly deformed and was dated to the Pleistocene Epoch, roughly 2 million years ago, using fossils (Jukes-Browne and

Harrison 1892; Trechmann 1925; Allan and Matthews 1977; Kasper and Larue 1986). The coral limestone was deposited in a series of reef terraces, with each terrace representing a separate sea-level stand (Allan and Matthews 1977). As one moves inland in Barbados, the age and elevation of the coral limestone increases (Allan and Matthews 1977).

The middle formation of Barbados is the Oceanic Series, which is composed of marls, chalks, siliceous earths, and interstratified volcanic ash (Jukes-Browne and Harrison 1892; Matley 1932). These sediments, which include radiolarians and diatoms, indicate deep ocean deposits in a semi-volcanic region that were later elevated to above sea level (Jukes-Browne and Harrison 1892; Matley 1932; Kasper and Larue 1982). This series is generally calculated to be 300 feet thick (Jukes-Browne and Harrison 1892; Matley 1932). Due to faulting, the series is not unified or continuous with sections dropping between blocks of the Scotland beds (Jukes-Browne and Harrison 1892). The Joe's River Clay, which is sometimes found between the Oceanic and Scotland Series, is an oil-soaked clay that includes angular sandstone fragments and debris from submarine mud volcanoes (Matley 1932; Baldwin et al. 1986).

4.1.2 Mineralogy and Origins of the Scotland Beds of Barbados

The Scotland Beds are the basement rock of the island, underlying the Coral and Oceanic series everywhere. While the Scotland Beds are the oldest rock of the island, they are still relatively young, dating to the Eocene Epoch 50 to 30 million years ago (Matley 1932 and Baldwin et al. 1986). The only exposed outcrop of the Scotland beds is 50km^2 in the Northeast portion of the island, which is called the Scotland District (Baldwin et al. 1986 and Kasper and Larue 1986). The Scotland District is named after Scotland, not because of similar rocks, but because the rugged landscape visually reminded settlers of Scotland, the northern portion of the island of Great Britain. The Scotland Series, with thickness estimates ranging from 500 to 2000 feet, is strongly folded and faulted and composed of sandstones, grits, conglomerates, and interbedded clays (Jukes-Brown and Harrison 1892, Trechmann 1925, Matley 1932, and Kasper and Larue 1986). This Scotland District is an exposed portion of the accretionary wedge of the Lesser Antilles arc (Baldwin et al. 1986).

The parent rock of the Scotland Beds is pre to early Cenozoic metamorphosed sandstone (Matley 1932; Baldwin et al. 1986; and Kasper and Larue 1986). The mineralogy of the sandstones from the Scotland district is quartz rich, but not volcanic quartz despite the island’s location in a perivolcanic accretionary prism (Kasper and Larue 1986). The mineralogy, light framework grain composition, and dating of these Barbadian sandstones are similar to rocks found in the northern area of South America, which suggests a genetic tie (Baldwin et al. 1986; Kasper and Larue 1986). The sediments for the Barbadian sandstones likely accumulated from deep-sea turbidites of eroded sediments from the continent of South America (Baldwin et al. 1986; Kasper and Larue 1986). Thus the Scotland District of Barbados is—in mineralogical and geological terms—more related to northern South American than Scotland in the United Kingdom.

4.2 Geologic History of Great Britain

In contrast to Barbados, the geologic history of the Great Britain is much longer, more varied, and more complex. This island developed over hundreds of millions of years and features various types of igneous, sedimentary, and metamorphic rocks. In the following section, I will summarize the geologic history of the island of Great Britain. I will specifically highlight clay formations found on the island, especially the clay areas where earthenware manufacture was prevalent, as was discussed in the previous chapter.

4.2.1 Location of Great Britain

Currently Great Britain is located in the northern hemisphere at roughly 50° North latitude. However, the landmass that would later become this island was not always at this location due to large-scale continental movement (plate tectonics). In fact, Scotland was a separate landmass from England and Wales, and these two pieces were later joined through orogenic processes into one landmass. During the Precambrian Era, the landmass that would become England and Wales was likely thousands of kilometers south of Scotland (Toghill 2002). This southern location meant that England and Wales was a sedimentary basin in the tropics for millions of years and collected marine sandstones and shales along with some volcanic rocks from island arcs (Toghill 2002). During the Mesozoic Era, specifically the Silurian Period roughly 430 million years ago, the Iapetus Ocean that separated Scotland from England and Wales closed bringing together the two landmasses in the Caledonian orogeny (Toghill 2002). This orogeny caused metamorphism and folding of the earliest sedimentary formations of the island. A second orogenic event occurred at the end of the Carboniferous roughly 300 million years ago that led to the formation of Pangea, a single supercontinent (Toghill 2002). At this time, the landmasses that would become Great Britain and North America were joined and a considerable amount of metamorphism and folding occurred. In the following Permian and Triassic periods, Pangaea broke up into the current continental configuration, and it was during the Mesozoic Era that Great Britain approached at its current latitude (Toghill 2002).

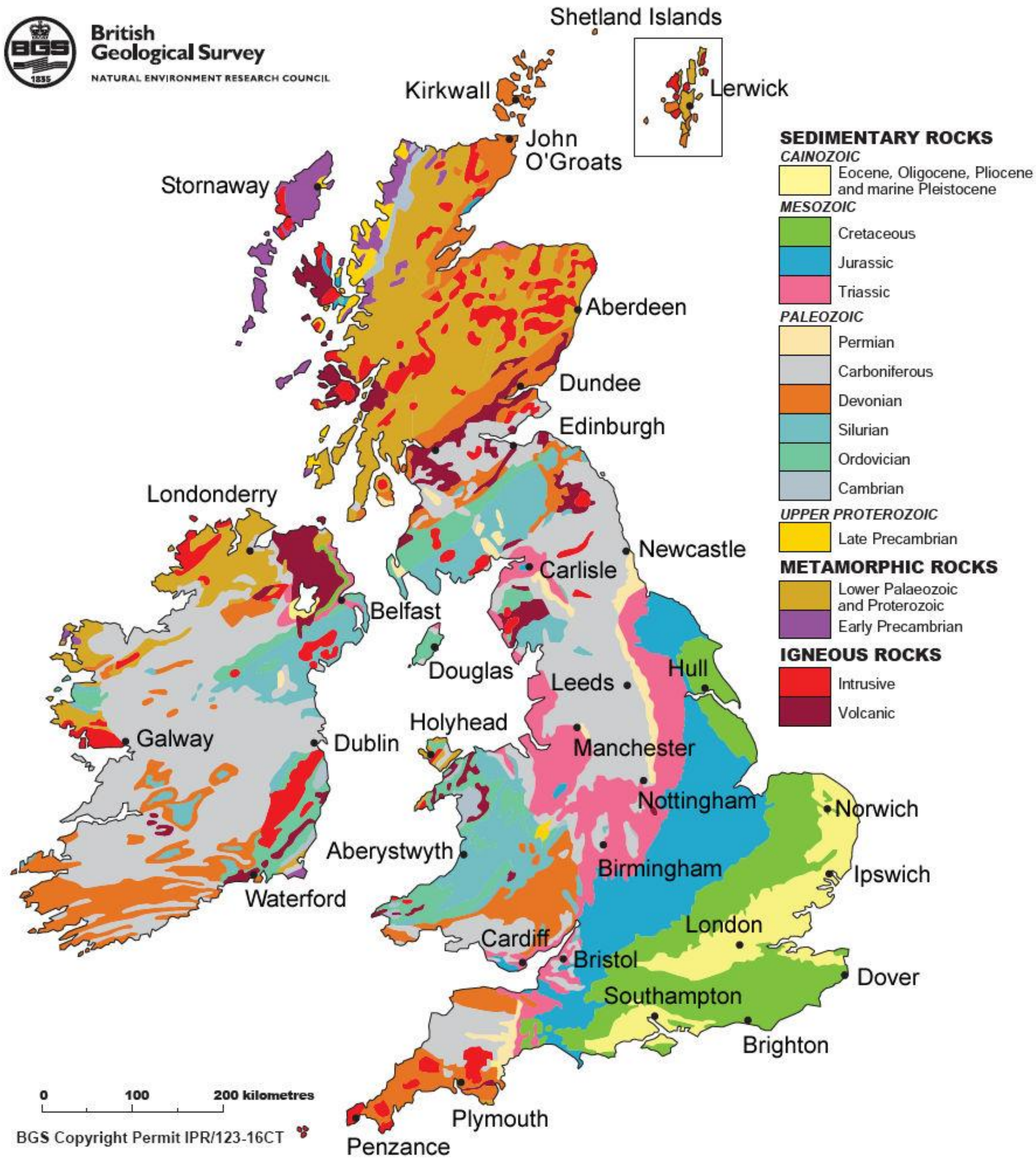


Figure 4.3 This geologic map by the British Geologic Survey (2016) indicates the rock formations and their ages of the United Kingdom. The areas of interest to this project are southern and central England with Cenozoic (spelled Cainozoic here) and Carboniferous formations, respectively. These formations provide the source material for much of the earthenware manufactured in England.

4.2.2 Scotland, the Oldest Rocks of Great Britain

The oldest rocks of Great Britain are intensely metamorphosed gneisses in northwest Scotland that date to 3000 million years ago (Toghill 2002). Overlying these gneisses are 1000 million year old Precambrian sandstones and shales that were metamorphosed and form the mountains of Scotland (Toghill 2002). On the geologic map by the British Geological Survey (2016) (Figure 4.3), outcrops of these gneisses are represented by the color purple and the dark yellow represents outcrops of the Precambrian sandstones. These outcrops only occur on Northwest coast of Scotland and nearby islands. This area of Scotland was once attached to the Eastern Seaboard of North America, so the rocks of these two areas are similar (Toghill 2002).

The highlands of Scotland are characterized by complex metamorphism with thrusting and folding from three different episodes, mostly during the Paleozoic and Mesozoic Eras (Toghill 2002). Thus, the geology of Scotland is highly deformed and complex. As the geologic map (Figure 4.3) shows, the majority of surface outcrops in Scotland are metamorphic rocks with some intrusive igneous rocks, which indicates high-grade metamorphism in the area (British Geological Survey 2016). This geologic history is vastly different from the history of the Scotland District of Barbados despite their shared name. Though both feature metamorphosed rocks and sandstones, the Scotland District in Barbados is much younger and less intensely metamorphosed.

The Grampian Highlands (central section) of Scotland includes a sequence of beds called the Argyll Group, which dates to the late Precambrian. The Argyll Group is significant because the base of the bedding is a glacial sequence the evidences approximately forty glacial advances during a time when the landmass was within 10-15° of the equator (Toghill 2002). The main portion of this glacial bedding is boulder clay (Toghill 2002). Boulder clays are finely ground rocks, commonly called rock flour, alongside boulders that are produced through the grinding action associated with glacial movement. While these glacial deposits are relatively thick—750 meters at their thickest—they are overlain by 20 kilometers of metamorphosed rock (Toghill 2002). Because of the depth at which these clays are, it is unlikely that they are a significant source of raw material for earthenware production.

4.2.3 The Clays of Central and Southern England

As was discussed in Chapter 3, Staffordshire was a key earthenware manufacturing area in Great Britain. Major sources for clay came from that region—central England between Manchester and Birmingham—and southern England (Chamber's Edinburgh Journal 1839). As the geologic map (Figure 4.3) shows, these two areas have significantly different surface rock outcrops. The Staffordshire area is part of the Coal Measures region of Great Britain (Bloch 2015). This area includes rock outcrops of both Carboniferous (late Paleozoic) and Triassic (early Mesozoic) age (British Geological Survey 2016). In contrast, late Mesozoic and Cenozoic sediments characterize Southern England (British Geological Survey 2016).

The Coal Measures were deposited during the Carboniferous Period 350 to 300 million years ago when the British landmass was near the equator experiences repeated cycles of marine transgression (Toghill 2002). This marine transgression means that both shallow water tropical carbonates and humid swamp organic materials (coal deposits) were deposited (Toghill 2002). Interbedded with these coal deposits are marine and glacial sediments with fault lines exposing clays sources suitable for use in pottery manufacturing (see Chapter 3) (Bloch 2015). Furthermore, these fault lines exposed lead sulfide, which is a useful ore to obtain the lead necessary for glazing pottery (Bloch 2015).

The Southern Coast of England, which includes London, is largely covered by Cenozoic sediments that date from the Eocene Epoch (roughly 55 million years ago) to the Pleistocene Epoch, which ended roughly 12,000 years ago with the start of the modern day Holocene Epoch (British Geological Survey 2016). Surrounding these Cenozoic sediments are Cretaceous and Jurassic rock (British Geological Survey 2016). Each of these geologic periods produced different clays that can be found in the region. The Jurassic aged clays (Oxford Clay and Kimmeridge Clay) are organic rich were deposited during a period when there were marine conditions over Britain (Toghill 2002). The Cretaceous clays, known as Gault Clays were deposited in a series of marine transgressions (Toghill 2002). The Gault Clays range from pale to dark and include phosphatic, pyrite, and calcareous nodules (Toghill 2002).

The Cenozoic Clays of Southern England accumulated in a series of basins of partially consolidated marine sediments. During the early Cenozoic, the British landmass experienced erosion after a long period of marine deposition (Toghill 2002). Erosional materials were able to accumulate in basins. The London Basin accumulated a variety of sediments including Paleocene aged clays of estuarine and lagoon origin and Eocene aged clays that include marine fauna and land flora (Toghill 2002). The Eocene London Clay is a North Sea-type clay the cover a great deal of Southern England (Toghill 2002). A second major basin in this region is the Hampshire Basin, which received sediments from Devon, Cornwall, and other western areas (Toghill). A third basin, the Bovey Tracey Basin is located in Devon, and the sediments accumulated in this basin include pottery clay, sands, gravels, and lignite (impure coals) (Toghill 2002). These pottery clays are comprised of kaolinite derived from the weathering of feldspar from the Dartmoor granite (Toghill 2002). These clays were significant sources for pottery manufacturers in England (Chamber’s Edinburgh Journal 1839).

4.3 Clay Comparison of Barbados and the United Kingdom

The previous discussion shows the difference in geological origins of Britain and Barbados. Barbados is much younger with a less complex geological history and fewer rock formations than Great Britain. There are a variety of clays with different origins in Great Britain from boulder clay as a result of glacial erosion to the basin clays of southern England. Barbados, on the other hand, has less clay variation with the Scotland district as the sole major source of Barbadian clay. Since the Scotland district is the only region in Barbados that does not feature a coral cap, it allowed access to clay and became the center of island ceramic production (Scheid 2015). The Scotland District includes most of the parishes of St. Andrew as St. Joseph and a small portion of St. John (Scheid 2015). Within the Scotland District is the area known as Chalky Mount where small-scale pottery manufacture continues today. Chalky Mount is not a chalk formation, but steeply dipping white sandstone that includes sequences of sandstones, shales, conglomerates, and clay (Trechmann 1925). Interestingly, there are some isolated instances of clay in other areas of Barbados. The excavation at Trents plantation uncovered small accumulations of clay. While this accumulation is not enough for large-scale manufacture, it may have been sufficient and suitable for local manufacture of coarse earthenware.

The clays from Devon, which is a major source of pottery clay in Britain, are largely composed of the mineral kaolinite. Kaolinite, $Al_2SiO_2O_5(OH)_4$, is one of the most common types of clay minerals, which are fine-grained (<0.002mm) sheet silicate minerals (Nesse 2012). In an x-ray diffraction and differential thermal analysis study of clay from Barbados, El Wakeel (1963) determined that kaolinite was rare to absent. The kaolinite in the Devon clays originated from the weathering of feldspar in the Moorland granites (Toghill 2002). Feldspars are rare in the in the quartz rich sandstones of Barbados (Kasper and Larue 1986). Quartz and illite minerals were far more predominant in Barbadian siliceous earth (El Wakeel 1963). Illite, ~$K_{0.8}Al_2(Al_{0.8}Si_{3.2})(OH)_2$, is another common type of clay mineral, and it is structurally and compositionally similar to muscovite (Nesse 2012). Chemically kaolinite and illite differ in that illite includes potassium while kaolinite does not. Thus, it is to be expected that earthenware made from British clay would have different chemical and mineralogical characteristics than earthenware made from Barbadian clay.

While I focused on the clays of Barbados and Britain, these are not the sole possibilities for the source of clay and earthenware objects found at Trents. International trade of pottery existed in this period including Chinese porcelain and Dutch delftware, but these examples are not coarse earthenware. It is even possible that inter-Caribbean island trade occurred, so there are numerous possibilities for the clay sources used to produce the earthenware uncovered at Trents. There is a tendency in archaeology to believe that coarse earthenware was not traded or transported as widely as refined ceramics (Orton and Hughes 2013). While this is not necessarily true, this concept reinforces the lack of necessity—and overall irrelevancy—of an exhaustive outline of the geology of all of the potential clay sources. Therefore, the geological focus on just Barbados and Britain illustrates the concept that chemical characteristics of earthenware differ based on the geologic origins of the clays used in manufacture along with the mix recipes used by the potter (see Chapter 3). Thus, a chemical characterization of earthenware from Trents will not give definitive proof of clay origins and area of manufacture, but instead will provide data that show if the paste body of the earthenware is similar to the clay found in Barbados, which would support the claim that coarse earthenware could have been locally manufactured.

Chapter 5:

Archaeometric Methods

Archaeometry is a field of archaeology the focuses on applying scientific methodology and analytical techniques to quantify archaeological finds. Technological advances in the 20th and 21st centuries allow for the intensive scientific analysis of archaeological material with quantifiable and reproducible results. Archaeometric technologies vary from acid extraction to x-ray diffraction, but they are united in the fact that they allow different research questions to be asked and answered than what could previously be studied. One common goal of archaeometric research is the chemical characterization of artifacts to trace their places of origins and the human trade routes that brought the artifacts to the site of excavation. Three principal techniques for compositional analysis of archaeological materials are X-Ray Fluorescence (XRF), Instrumental Neutron Activation Analysis (INAA), and Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Each of these methods has strengths and weaknesses, but by combining these methods like we did in this research, one can compare results to ensure reliability.

While coarse earthenware ceramics may not be the most exciting artifacts to uncover in the field, their omnipresence at sites in African Diaspora sites of the New World make them a useful research tool. Because clay is a heterogeneous material with a wide variety of geologic origins, multi-element analytical techniques are most applicable. Of the 92 naturally occurring elements, 80 are detectable, but eliminating the extremely rare elements, gases, and volatile elements that do not survive the ceramic firing process, one is left with roughly 40 elements to quantify in ceramic studies (Orton and Hughes 2013). Archaeometric analysis techniques have been applied to the coarse earthenware ceramics from African Diaspora sites in the Western Hemisphere, including the Caribbean and Eastern United States, to answer research questions on trade routes and manufacturing origins. Hauser and Armstrong (1999) examined the networks of social relationships through coarse earthenware trade in St. John using petrography and x-ray fluorescence spectrometry to identify provenance and trace trade routes. Hauser (2008) examined the local trade and manufacture of domestic coarse earthenware in Jamaica by enslaved laborers using petrography and neutron activation analysis. Bloch (2015) utilized laser ablation inductively coupled plasma mass spectrometry to create coarse earthenware (redware) type groups to exhibit various manufacture centers in Chesapeake region. In Barbados, several scholars have undertaken the critical analysis of coarse earthenware. Handler (1963, 1978) researched the historical and contemporary impact of ceramic manufacture on the Chalky Mount Community. Scheid (2015) examined the varying levels of manufacture and trade of coarse earthenware during 18th century Barbados using historical and archaeological research. Neutron activation analysis of earthenware from various sites in Barbados was performed by Ferguson and Glasscock (2011) and examined by Kevin Farmer. This preceding research exemplifies the plethora of research questions and insight compositional analysis of coarse earthenware can provide to archaeologists studying the African Diaspora.

Orton and Hughes (2013) outline three general ways to format compositional analysis studies of earthenware. The first is clay sourcing to link the geologic material with the artifacts recovered, which can be difficult due to the wide array of potential raw materials. The second method is to compare the unknown artifacts recovered with objects of known origin. The third method allows for a comparison of sherds of unknown origin by defining cluster of like composition that may reflect a shared source. This project includes components of all three methods, but the analytical methodology largely focuses on clustering the artifacts.

5.1 The Provenance Postulate

Provenance studies of earthenware analyze the physical and/or chemical properties of the paste and temper to determine the pottery's source. The theoretical basis to provenance studies was defined by Weigand (et al. 1977) as the provenance postulate. Provenance studies can only be effective if "there exist differences in chemical composition between different natural sources that exceed, in some recognizable way, the differences within a given source" (Weigand et al. 1977). In other words, it is only feasible to identify the raw material source for an artifact if the differences in chemical or physical properties between potential sources exceed the variation within a given source.

When sourcing earthenware vessels, one must consider the components that influence their chemical compositions. The chemical composition of ceramic vessels depends on the geologic characteristics of the clays and tempering agents used along with the human actions that transform the raw material into the finished product like the firing process (Burton and Simon 1996; Bloch 2015). When souring clay, it is assumed on the principal of least cost that the raw materials used in manufacturing pottery were more likely to be obtained from local sources than transported great distances (Bishop et al. 1982). Since clay is heavy and bulky, it would have been both expensive and logistically challenging to ship it great distances, so it is more economical to use local sources. Therefore, it is important to know the geological characteristics and variation of local clays when attempting to source earthenware vessels.

While the geological properties of the raw materials largely impacts the chemical composition of vessels, it is important not to overemphasize the geological and chemical composition while forgetting the human role in creating and using these vessels (Burton and Simon 1996). Human behavior created ceramics, which can influence a vessel's composition, as in the case of the various clay body mixes that master potters make. Human behavior following manufacture, like cooking or repurposing material is also significant and may be overlooked with a sole focus on the quantitative results that can be obtained from archaeometric techniques. Therefore, it is important to thoroughly examine various aspects of coarse earthenware ceramics both qualitatively and quantitatively while performing provenance studies.

5.2 Determining Analytical Methods

Analytical methods for characterization of artifacts can generally be categorized based on the information the data shows. Some techniques inform the researcher of the mineralogical composition of an artifact while others show the elemental composition of an object. The second major difference in compositional analysis techniques is whether they are whole body (bulk) or point measurements. In bulk measurements, the average of all components of an artifact is measured. In point techniques, only the composition of a specific area is measured, so one can

Table 5.1 Comparison of Ceramic Characterization Techniques [t]

	INAA	ICP-MS	XRF	XRD	Petrography
Mineralogical analysis				X	X
Elemental analysis		X	X		
Bulk technique	X		X*	X	
Point technique		X	X*		X
Destructive analysis	X	X	X*	X	X
Powdered sample	X		X*	X	
Sectioned or whole sample		X	X*		X
Can analyze raw materials	X	X	X	X	X

[t] Table 5.1 was adapted from Table 4.1 in Bloch (2015).
* XRF can be performed on powdered samples or on whole samples, so it can be either destructive or non-destructive and bulk or point.

isolate specific components. Table 5.1 provides a basic overview of the analytical characteristic of commonly used archaeometric techniques.

Mineralogical techniques include petrography and X-ray diffraction. Petrography applies the geological technique of optical mineralogy using a polarizing light microscope to identify minerals present. The use of petrography in archaeological provenance studies of pottery became popular in the 1930s and continues to be used in current research (Orton and Hughes 2013). Petrography can quantify data by performing point counts of minerals present, but the process typically provides a qualitative assessment of samples (Bishop et al. 1982). This process is labor intensive and destructive because it requires the creation of thin slides of the pottery. Furthermore, petrography is best used for the identification of accessory minerals and temper since the small size of clay particles makes optical identification of specific clay minerals impossible (Nesse 2013; Bloch 2015). Hauser (2008) petrographically examined coarse earthenware ceramics from Jamaica, and his division of artifacts into like groups largely coincided with the instrumental neutron activation analysis performed on a subset of the same artifacts. Hauser and Armstrong (1999) also combined petrographic analysis of Caribbean earthenware with X-ray fluorescence for provenance research, combining qualitative and quantitative methods.

X-ray diffraction (XRD) is a bulk technique that identifies the minerals present based on the properties of their crystalline lattice. When X-rays bombard the powdered sample, the rays are diffracted at measureable angles, which indicate the characteristics of the crystalline lattice, and allows for mineral identification (Luete 1987; Bloch 2015). XRD also has the potential to determine the firing temperature of ceramics by assessing the mineral transformations that occurred (Bloch 2015).

Spectrometry can precisely characterize the elemental composition of samples. This style of analysis is based on the concept that electrons of a given element occupy discrete energy levels and can be excited to a higher energy state. When an excited electron falls to a lower energy level, the excess energy is emitted as electromagnetic radiation that can be measured. These energy measurements provide precise information of the elemental characteristics of a sample (Luete 1987). Mass spectrometry has a different analytical basis though it shares the term. In mass spectrometry elements are determined through their atomic mass rather than through their energy emissions. A mass spectrometer separates charged particles (ions) using electric or magnetic fields and sorts them on their mass to charge ratio to identify elements (Luete 1987; Speakman and Neff 2008; Bloch 2015). Mass spectrometry is accurate and precise, and it can detect a wide range of elements.

This project combines three different analytical techniques: instrumental neutron activation analysis (INAA), Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS), and X-ray fluorescence (XRF), all of which are discussed further below. Samples from the same subset of artifacts were used for the different analyses in order to provide comparable datasets. INAA and LA-ICP-MS provide data on the elemental composition of the paste. XRF and LA-ICP-MS analysis of the surface of artifacts provide information on the glazes and surface treatments of the samples.

5.2.1 Instrumental Neutron Activation Analysis

Neutron activation analysis (NAA) and its uses in provenance research was first conceptualized in the mid-1930s, and the 1950s and '60s nuclear reactors with enough sensitive to be useful were constructed, which allowed for this technique's application in archaeological research (Glascock and Neff 2003). Instrumental neutron activation analysis (INAA) was an advance in NAA technology because it allows for a more streamlined analytical method by removing the necessity of extra pre- or post-irradiation steps like chemical separation (Glascock and Neff 2003). INAA has been a standard in bulk elemental analysis for decades because of its accurate and comparable results for a wide range of elements (Glascock and Neff 2003 and Bloch 2015).

INAA involves irradiating a powdered sample in a nuclear reactor, which means that the sample is bombarded with neutrons to prompt nuclide decay (Glascock and Neff 2003; Bloch 2015). During this decay, gamma rays are released that are element specific. These gamma rays are measured to determine the amounts of different elements present. Typically there are three different groups of measurement performed as part of this analysis (see Table 5.2). The short measurement features a 5 second irradiation, 25 minutes of decay, and a 12 minute count that measures 9 short lived elements: Al, Ba, Ca, Dy, K, Mn, Na, Ti, and V (Glascock and Neff 2003). For the medium and long count, the pottery samples are irradiated for a further 24 hours (Glascock and Neff 2003). The medium count is performed after 7 days of decay to measure another group of elements: As, La, Lu, Nd, Sm, U, and Yb (Glascock and Neff 2003). The long count is performed after three to four weeks of decays and measures the 17 remaining detectable elements: Ce, Co, Cr, Cs, Eu, Fe, Hf, Ni, Rb, Sb, Sc, Sr, Ta, Tb, Th, Zn, and Zr (Glascock and Neff 2003). With these three counts, INAA has the ability to accurately measure the 33 elements that may be present in a sample.

Because of its ability to measure so many elements, INNA analysis returns a large quantity of raw data. As a result, it is necessary to apply multivariate statistical methods to create compositional groups. Glascock and Neff (2003) define these compositional groups as “centers of mass in the compositional hyperspace described by the data.” In other words, each group is defined by a centroid representing a specific element concentration, and the compositional groups are composed of samples sharing similar elemental compositions clustered around that centroid. Therefore cluster analysis, principal component analysis, and plotting the data in multiple dimensions is necessary to best understand the results of INAA.

Table 5.2 The Three Counts of INAA

	Time irradiated	**Time decayed**	**Time Counted**	**Elements Measured**
Short count	5 seconds	25 minutes	12 minutes	**9** (Al, Ba, Ca, Dy, K, Mn, Na, Ti, and V)
Middle count	24 or 70 hours*	7 days	2000 seconds	**7** (As, La, Lu, Nd, Sm, U, and Yb)
Long count	24 or 70 hours*	3 to 4 weeks	10000 seconds	**17** (Ce, Co, Cr, Cs, Eu, Fe, Hf, Ni, Rb, Sb, Sc, Sr, Ta, Tb, Th, Zn, and Zr)

In INAA, a series of two irradiations and three counts are performed to measure 33 different elements. The characteristics of each count as described by Glascock and Neff (2003) are shown in this table.
*The middle and long count are the same irradiation with the count performed after a different amount of decay time. For this count the sample can be irradiated for 24 hours, as is the case for ceramic artifacts or for 70 hours as is the case for lithic material.

Though INAA is a proven analytical method, there are several drawbacks to using this method. Due to the need of a nuclear reactor, there are few labs with the necessary capabilities. In the 1980s and 19990s, there was widespread decommissioning of nuclear reactors which further reduced the availability of this analytical method (Glascock and Neff 2003). However existing reactors have increased their capacity so INAA is still readily available (Glascock and Neff 2003). INAA may also be cost prohibitive for many research projects, and is not feasible without considerable external funding. The use of INAA for this project was possible through the

generous funding of the National Science Foundation, subsidization of sample costs by the Archaeometry Laboratory at the University of Missouri Research Reactor (MURR), and the Crown Award from Syracuse University's Renée Crown Honors Program.

5.2.2 Laser Ablation Inductively Coupled Plasma Mass Spectrometry

Inductively coupled plasma mass spectrometry (ICP-MS) is a technique that is growing in popularity in provenance research of a variety of archaeological materials (Speakman and Higgins 2015). This growth is due to the fact that it provides accurate and precise results with lower detection limits—parts per million and parts per trillion—than INAA (Speakman and Neff 2005; Speakman and Higgins 2015; Bloch 2015). ICP-MS quickly and easily generates bulk, elemental compositional data that is comparable to the data resulting from other bulk techniques. Furthermore, this technique uses sensitive microprobes that are capable of detecting a wider variety of elements and isotopes than INAA (Speakman and Higgins 2015).

The LA-ICP-MS technique was developed in the mid-1980s (Speakman and Neff 2005; Speakman and Higgins 2015). The laser ablation technology has replaced the need for heat or acid digestion of the sample, so LA-ICP-MS can analyze a large amount of solid samples with relative ease (Speakman and Neff 2005 and Bloch 2015). A high heat plasma torch is used to atomize (ablate) samples that are then transported to the mass spectrometer via argon gas (Speakman and Higgins 2015). In the mass spectrometer the vaporized samples are excited into ions and separated according to their mass to charge ratio to determine the elements present (Speakman and Higgins 2015).

The laser ablation method allows for a specific area on a sample to be targeted, which can allow for the matrix or inclusion analysis, which makes it a point technique of mass spectrometry (Bloch 2015). Therefore, LA-ICP-MS can be used to distinguish temper composition from paste composition if these two components are originally quite distinct (Larson et al. 2005). If the inclusions are too small, they may be ablated to quickly, which would result in matrix composition to be included in the reading. LA-ICP-MS can also be used for a surface analysis of glazed and slipped ceramics as it can measure significant isotope ratios like lead (Speakman and Neff 2005; Ferguson et al. 2015). When analyzing glaze using this method, one faces the possible source of error of ablating beyond the glaze and including paste material in the compositional analysis. Nevertheless, this surface analysis can be a useful supplement to bulk paste characterization data.

Some of the benefits of LA-ICP-MS are that it is microdestructive, has a quick analysis time, which allows for the input of a large amount of samples, and it has low detection limits of a large range of elements. There are two primary drawbacks of this method. First is the issue of elemental fractionalization, or nonresponsive sampling during ablation (Speakman and Neff 2005). This issue can largely be corrected by programming the laser to ablate along a defined linear path rather than at one point. Line ablation provides better results with higher count rates and reduced error (Speakman and Neff 2005). It can also be challenging to quantify the data from LA-ICP-MS because there is a need to normalize (Speakman and Neff 2005). Oxygen cannot be detected, so its elemental presence is calculated using oxides, which is based on a large assumption that all other elements present in the sample were detected and measured (Speakman and Neff 2005). Different mathematical processes can be applied to quantify the data and LA-ICP-MS has been shown to have results that are reliable and comparable to INAA (Speakman and Neff 2005; Speakman and Higgins 2015; Bloch 2015).

5.2.3 X-Ray Fluorescence

X-ray fluorescence spectrometry (XRF) uses x-rays to excite atoms so they produce a secondary electromagnetic beam when the excess energy is emitted. That energy is measured to identify minerals present based on the principals of spectrometry (Luete 1987; Bloch 2015). XRF is a non-destructive analysis technique, but it has poor detection of the lighter elements (sodium and below) (Bloch 2015). XRF tends to provide a surface measurement, so it can provide better information about the glaze than the paste. XRF analysis of 29 samples was performed for this project, and sampling methodology will be further discussed in the following section.

5.3 Sampling Methods

All coarse earthenware samples for this project were tested using both INAA and LA-ICP-MS. These two analytical methods are well suited for their use together due to their comparability (Larson et al. 2005). The two methods are the most sensitive analytical methods that can measure major, minor, and trace elements of both fired and raw samples (Glascock and Neff 2003; Bloch 2015). They are similar in that they provide quantitative elemental data yet differ in that INAA is a bulk technique of compositional analysis while LA-ICP-MS can be a point technique. The compositional groups based on the paste that was established in these two methods should be comparable. In analyzing all samples with both techniques, one is ensuring that the results, if similar, are reliable.

Further LA-ICP-MS and XRF analysis was done on a subset of the sampled artifacts. This subset was comprised of glazed artifacts, and both methods analyzed the same subset, with XRF sampling two additional manjack samples. These two methods provide information about the surface and glazes of the earthenware, which is supporting information to supplement the paste compositional analysis performed on all samples. Table 5.3 provides a summary of the samples sent for each analytical method.

Table 5.3 Summary of Sample Selection

	INAA	**LA-ICP-MS** (Body)	**LA-ICP-MS** (Surface Treatment)	**XRF**
Coarse Earthenware, Industrial	29	29	3	3
Coarse Earthenware, Domestic	81	81	23	23
Coarse Earthenware, Indeterminate	3	3	0	0
Chalky Mount Samples*	3	3	0	0
Staffordshire Slipware	1	1	1	1
Manjack**	0	2	0	2
Total	117	119	27	29

*The Chalky Mount Samples include raw clay, prepared clay, and an unfired ceramic from the contemporary potter John Springer, who lives and works on Chalky Mount, Barbados.
**Manjack is a solid black hydrocarbon found in certain veins in the Scotland District of Barbados. The two samples of Manjack come from the Springvale Eco Heritage Museum in Barbados.

Samples were selected based on characteristics observed in the qualitative analysis done on all coarse earthenware excavated (n=6891). Domestic earthenware was selected to ensure a distribution of form type, glaze, and temper characteristics across the different loci and house areas. There were three separate glaze characteristics qualitatively described: green, clear/brown, and chalky/yellow (likely decomposed). The aim was to ensure at least one of each these glaze samples from each house site in Locus 2. The domestic samples from Locus 1 also followed the aforementioned goals, but there was an additional focus on coarse earthenware from the deepest/oldest context at depths greater than one meter. Artifacts from these contexts dated from the 17^{th} century to earlier. We included a significant amount of extremely coarse highly tempered cooking pots found in some of the earliest contexts of Locus 1. The majority (60.5%) of the domestic earthenware samples were selected from the Locus 2 house sites. Only four samples, fewer than 4% of the excavated coarse earthenware samples selected for analysis, were from the Locus 3 cave site, and these were all domestic wares.

Table 5.4 Sample Distribution Across Loci

	Locus 1	**Locus 2**				**Locus 3**	**Total**
		HA 1	HA 2	HA 3	HA 4		
Industrial	24	2	1	2	0	0	**29**
Domestic	28	11	6	19	13	4	**81**
Indeterminate	0	0	1	2	0	0	**3**
Total	**52**	13	8	23	13	**4**	**113**
		57					

The industrial earthenware samples were largely selected from Locus 1, with only 17% (n=5) of them selected from the house areas. The sampling was done in this way because Locus 1 was an outbuilding of the manor house and was possibly a storage area for processing sugar. The industrial earthenware found at the enslaved laborer house sites were likely repurposed for domestic use, so they originated from the same manufactures as the industrial wares found at Locus 1. The industrial wares selected for sampling were distributed across a variety of contexts and represented both sugar cones and drip jars. We were also sure to select several samples of sugar cones that had either a black tarry substance or white clay on their surfaces. These surface treatments may reflect a process of semi-refining the sugar that was completed on the plantation prior to exportation to England. Table 5.4 provides a summary of the domestic and industrial samples selected based on locus.

For provenance research there was also a subset of samples that were not coarse earthenware excavated from Trents (see Table 5.3). Three samples from a contemporary pottery (obtained courtesy of local potter, John Springer) from Chalky Mount were tested. These samples included raw clay, prepared clay, and an unfired pot. A sherd of Staffordshire slipware excavated from a house site was tested to provide comparative data. Two samples of manjack were also tested in order to determine if they matched the black tarry substance found on some of the industrial earthenware samples. Manjack is a solid, black hydrocarbon that can be found in veins in the Scotland District of Barbados (Greenridge and Ménard-Greenridge 2002). Manjack was first used as a fuel for boiling sugar and in plantation furnaces before being used for various construction and transportation purposes (Greenridge and Ménard-Greenridge 2002). These six samples supplement the 113 coarse earthenware samples for a total of 119 unique samples. Various subsets of these unique samples were analyzed via INAA, LA-ICP-MS, and XRF as is shown in Table 5.3.

Chapter 6:

Coarse Earthenware Analysis Results

The analysis of course earthenware from Trents plantation began as excavation proceeded. A preliminary sample of earthenware was used to test and refine our typology and analysis system. The standard typology developed for the project was designed to include a wide range of variables from form to external and internal surface treatment for each earthenware sherd. This analytical system was developed in consultation with other archaeologists working in the region. The system was designed utilizing prior research in Barbados and the Caribbean (Armstrong 1990; Farmer 2013; Scheid 2015) and data from other islands of the Caribbean islands including Jamaica (Armstrong 1990, 2011; Hauser 2008), Dominica (Hauser 2013), and Guadeloupe and Martinique (Kelly et al. 2009) (Armstrong 2016, personal communication). This system was created to describe the assemblage at Trents with the additional goal of facilitating comparisons with data from other archaeological research in Barbados and the Caribbean.

The analytical system developed codes to describe the various aspects of coarse earthenware to allow for a breakdown of the assemblage by characteristics. Each sherd is linked to the context from which it was excavated, and the dimensions including size and mass of the sherd are recorded. The form type, vessels description, and sherd type (area of the vessel that the sherd is from, i.e. rim, base, or body) are also identified. Paste characteristics including color, inclusion size, inclusion sorting, and firing core presence are described within this system. The various decorations and surface treatments are also examined and recorded. This sherd-by-sherd analysis was then entered into a digital database from which the following analysis is based. (See Appendix C for a summary of the full earthenware typology used in the project.)

6.1 Whole Assemblage Summary

The entire earthenware assemblage of this project includes 6891 individual coarse earthenware sherds across the three loci. Table 6.1 provides a summary of the count of sherds and form type across the three loci. Overall the assemblage was 50.7% domestic and 33.9% industrial, but this balance differs between the loci. The Locus 1 assemblage was more dominantly industrial at 64.5% and under 6% domestic with the majority of industrial sherds coming from the post-sugar contexts at this locality. The rest of the Locus 1 assemblage of coarse earthenware was identified as indeterminate. The dominance of industrial wares at Locus 1 reinforces the use of this area of the plantation as a part of the sugar manufacturing and refining process beginning in the mid-17th century.

Within the domestic wares of Locus 1 there was a group of very coarse cooking pots found in the earliest contexts of the locus, many of which were samples sent for external analysis (see Table 6.2). It is expected that these cooking pots will cluster together in the chemical composition studies, and they are likely to be linked with Barbadian clay samples. It is also possible that these were manufactured on another Caribbean Island, and if this is the case, then it provides information about trade relationships during the early history of the Barbadian settlement.

The Locus 2 assemblage was 78.3% domestic, which shows a sharp contrast from Locus 1 sugar era contexts of the same period where industrial sugar wares predominate. The dominance of domestic wares at Locus 2 reinforces the fact that this area was residential. The presence of industrial wares (15.2% of the Locus 2 assemblage) here also provides evidence that enslaved laborers made use of, reworked, and reused ceramics that were produced as sugar wares for their own domestic purposes, including use as storage vessels to store food and water. One industrial sherd was even modified to create a spindle whorl. Within each house area, the balance between industrial and domestic earthenware varied from 7.8% to 20.8%. The low end of this range was HA1, and the high end was HA3, which was the most abundant assemblage of Locus 2. At this site, a concentration of industrial ware included a drip jar base that had apparently been modified to create a low bowl or basin.

The Locus 3 earthenware assemblage only accounts for 1.6% of the total assemblage. Since this locus has not been as fully excavated and is in the preliminary stages of analysis, this project did not extensively focus on this assemblage. However, four domestic earthenware sherds from this locus were sent for external analysis.

Just as the assemblage form composition of the Locus 1 and 2 varies, the date distribution two assemblages also differs. The contexts can be divided into five date periods from the earliest settlement of the plantation to the time of emancipation. Locus 1 was an area of the plantation that was used earlier than Locus 2 since the enslaved laborer village was not created until after the large-scale shift to sugar and slave labor. Figure 6.1 displays the different date distributions of Locus 1 and Locus 2. For Locus 1, the majority of the assemblage dates to the early 18^{th} century and before, but for Locus 2, the majority of the assemblage dates to the mid 18^{th} century or later. The samples selected for external chemical analysis span all date ranges relatively evenly (see Table 6.2).

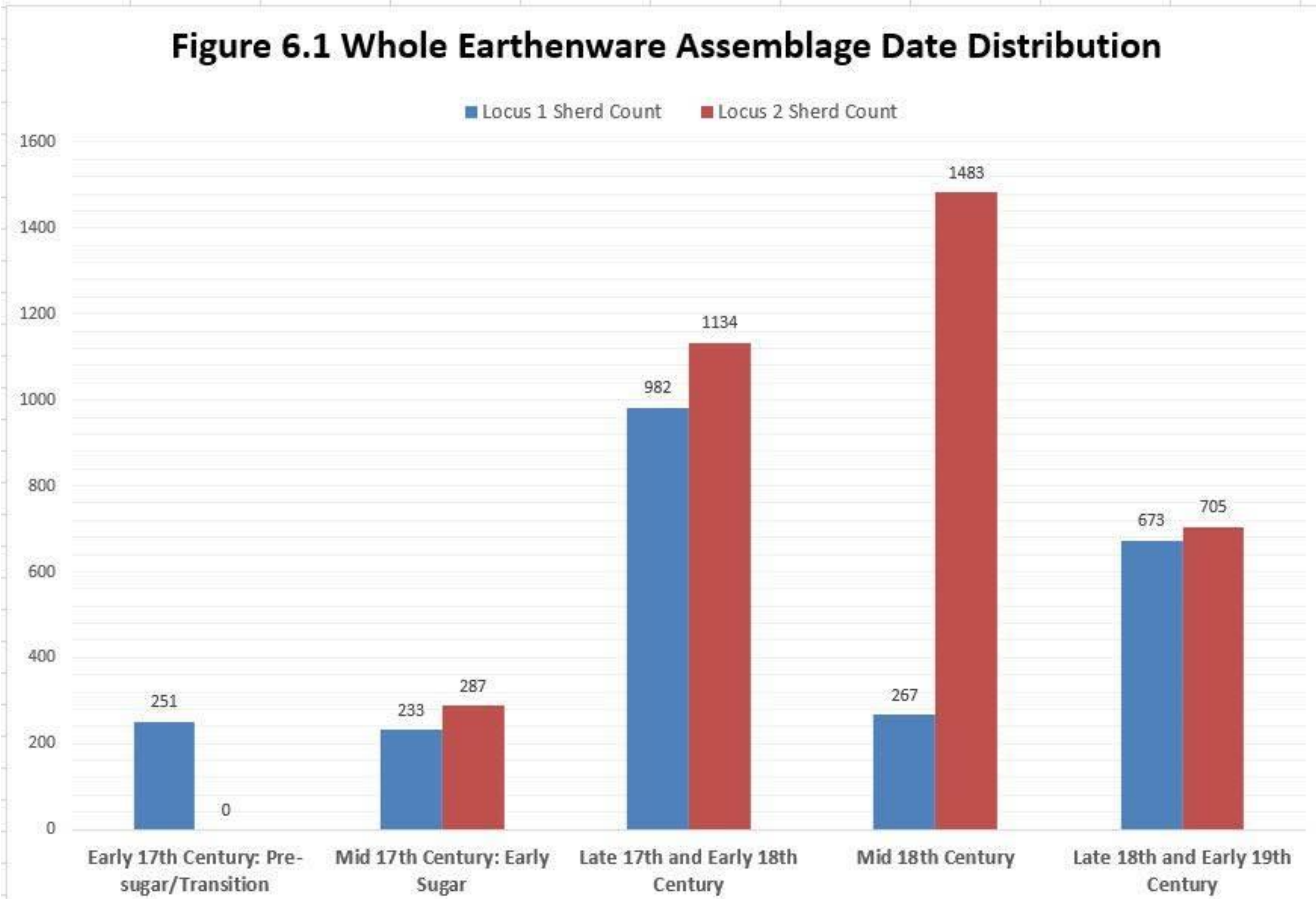


Figure 6.1 Whole Earthenware Assemblage Date Distribution
Locus 1 Sherd Count
Locus 2 Sherd Count
1600
1400
1200
1000
800
600
400
200
0
251
0
233
287
982
1134
267
1483
673
705
Early 17th Century: Pre-sugar/Transition
Mid 17th Century: Early Sugar
Late 17th and Early 18th Century
Mid 18th Century
Late 18th and Early 19th Century

Table 6.1 Coarse Earthenware Whole Assemblage Summary

		Domestic	Industrial	Indeterminate	Total		% of Assemblage
Locus 1		149	1679	774	2602		**37.8**
Locus 2	**HA1**	783	68	13	864	4178	**60.6**
	HA2	258	48	8	314		
	HA3	1346	398	162	1906		
	HA4	436	60	29	525		
	STPs	447	60	62	569		
Locus 3		75	21	15	111		**1.6**
Total		3494	2334	1063	**6891**		100
Percent of Assemblage		**50.7%**	**33.9%**	**15.4%**	100		

Table 6.2 Coarse Earthenware Context of Samples for Chemical Analysis

<table>
<tr><th rowspan="2">Date</th><th colspan="2">Locus 1</th><th colspan="4">Locus 2</th><th rowspan="2">Locus 3**</th><th rowspan="2">Total***</th></tr>
<tr><th>Domestic</th><th>Industrial</th><th>HA1</th><th>HA2</th><th>HA3</th><th>HA4</th></tr>
<tr><td rowspan="2">Early 17th Century: Presugar/Transition</td><td>12</td><td>3</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">15</td></tr>
<tr><td colspan="2">15</td></tr>
<tr><td rowspan="2">Mid 17th Century: Early Sugar</td><td>5</td><td>5</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">4</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">14</td></tr>
<tr><td colspan="2">10</td></tr>
<tr><td rowspan="2">Late 17th and Early 18th Century</td><td>5</td><td>7</td><td rowspan="2">4</td><td rowspan="2">-</td><td rowspan="2">10</td><td rowspan="2">-</td><td rowspan="6">4</td><td rowspan="2">26</td></tr>
<tr><td colspan="2">12</td></tr>
<tr><td rowspan="2">Mid 18th Century</td><td>5</td><td>5</td><td rowspan="2">5</td><td rowspan="2">3</td><td rowspan="2">2</td><td rowspan="2">4</td><td rowspan="2">24</td></tr>
<tr><td colspan="2">10</td></tr>
<tr><td rowspan="2">Late 18th and Early 19th Century*</td><td>1</td><td>4</td><td rowspan="2">4</td><td rowspan="2">5</td><td rowspan="2">7</td><td rowspan="2">9</td><td rowspan="2">30</td></tr>
<tr><td colspan="2">5</td></tr>
</table>

* This context includes the surface artifacts and the uppermost level of the units excavated.

** Do to the dearth of dateable materials at this point in the excavations at Locus 3, the contexts are not as well dated as at the other two loci. Thus this locus as a whole dates between the late 17th and early 19th centuries (Armstrong 2015b).

*** These totals do not include the four samples from Locus 3.

Figure 6.2: Locus 1 Date Distribution of Industrial Earthenware

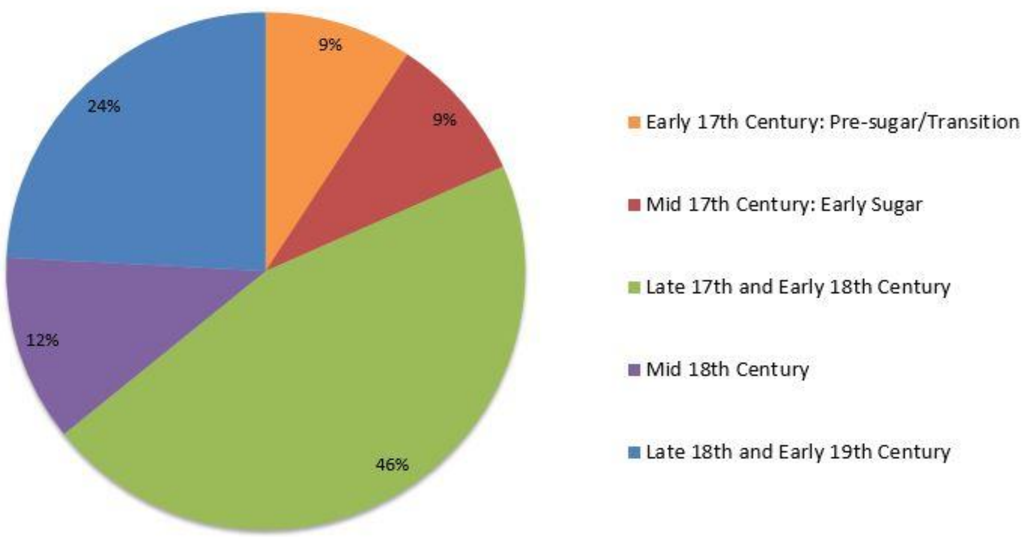


Figure 6.3: Locus 2 Date Distribution of Industrial Earthenware

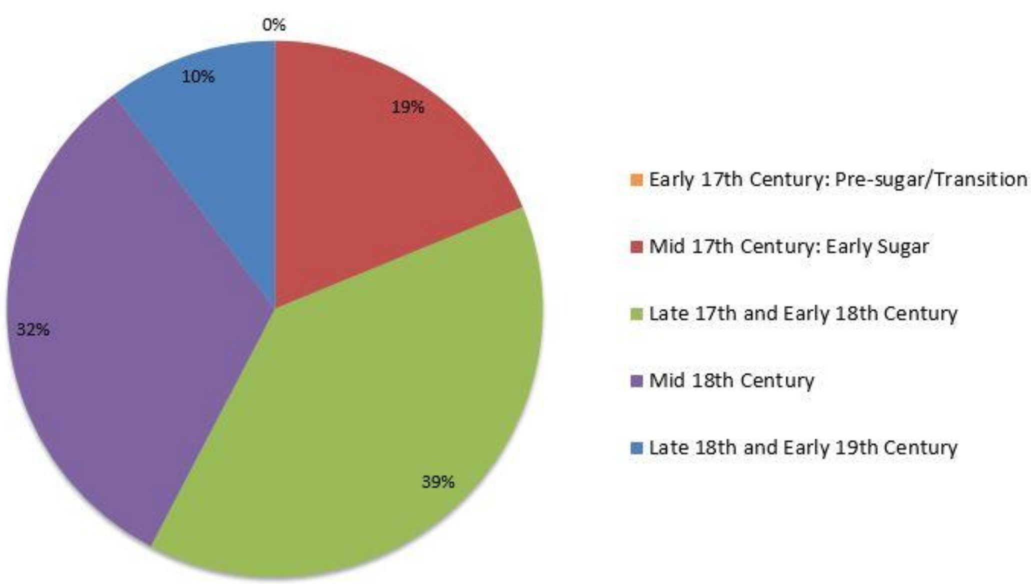


Table 6.3 Characteristics of Industrial Coarse Earthenware

		Surface Treatment			Core Present
		White Clay (interior)	Black Tar (exterior)	None	
Locus 1		124	61	1311	453
Locus 2	**HA1**	0	0	68	10
	HA2	5	0	37	2
	HA3	17	2	360	48
	HA4	4	0	56	1
	STPs	2	2	58	6
Locus 3		7	0	12	3
Total		**159**	**65**	**1902**	**523**
Percent of Industrial Assemblage		**6.8%**	**2.8%**	**81.5**	**22.4%**
Samples		2	4	23	8

6.2 Industrial Earthenware Analysis

The industrial earthenware at Trents was largely concentrated at Locus 1. This earthenware includes wares integral to the manufacture of sugar and some architectural tiles. The assemblage at Locus 1 displays a dramatic increase in sugar wares in contexts that postdate the transition to sugar, which is primary evidence of the material culture changes associated with this economic shift in plantation function (see Figure 6.2). The highest percent of the industrial ware assemblage from both Locus 1 and 2 date to the late 17th to early 18th century at the height of the sugar era in Barbados. Locus 2 also features a significant percentage of industrial ware in the mid-18th century contexts (see Figure 6.3).

Several key features reoccurred in the industrial earthenware assemblage. There were various surface treatments applied to a subset of the assemblage including a white clay slip and a black substance. Though 81.5% of the total industrial assemblage had no surface treatments, 9.6% of the assemblage features one on the two aforementioned surface treatments (see Table 6.3). Samples of both the tarred and clayed industrial wares were selected as part of the representative sample for external analysis, and will be tested using XRF to determine the composition of these surface treatments.

Another significant characteristic of the earthenware assemblage was the presence of a firing core. Over 22% of the industrial assemblage featured a firing core. An internal darkened core is the result of incomplete oxidation due to a relatively low firing temperature or inadequate firing time. Loftfield (2001) contends that Barbadian sugar wares may exhibit evidence of an internal darkened core due to the dearth of fuel sources on island. Therefore, it is possible that the presence of firing cores could indicate that those wares were produced on-island. Eight of the industrial and three of the domestic ware samples for external analysis featured a core. The results of the chemical analysis will determine if the presence of a core is significant in determining origin of manufacture for this assemblage.

6.3 Domestic Earthenware Analysis

The domestic earthenware was largely concentrated in Locus 2. Locus 1 featured some domestic earthenware, but the domestic wares only represent 5.7% of the Locus 1 assemblage (see Table 6.1). The date distribution of domestic earthenware in Locus 1 significantly differs from that of the industrial wares (see Figures 6.4 and 6.2). In the two earliest date groupings, the pre-sugar and early sugar periods, the distribution of domestic and industrial wares is similar at 8% and 9% for each period, respectively. The major difference is in the next era, which was the late 17th and early 18th century at the height of sugar when enslaved laborer reliance increased. The material culture at Locus 1 increased during this period, but only 28% of the domestic assemblage dates to this period. In contrast, 46% of the industrial assemblage from Locus 1 dates to the late 17th and early 18th century (see Figure 6.2). The late 18th century and early 19th century surface and top contexts of the Locus 1 excavations are the source of 45% of the Locus 1 domestic wares.

Locus 2 land use purpose was as a settlement area for enslaved laborers is reflected in the fact that 78% of the earthenware assemblage from this locus was domestic wares. These wares largely date to the 18th century when Barbados sugar plantations including Trents were reliant on enslaved labor (see Figure 6.5). The wares do not date to the pre-sugar era, since the plantation at that point did not utilize this area. Only 21% of the domestic assemblage from this locus dates to the late 18th and early 19th century in the era that concludes with emancipation. Following emancipation the laborer settlement area moved to Trents Tenantry, and this area was largely abandoned (Armstrong 2015a).

Each domestic earthenware sherd was identified by its form type with as specific a descriptor as was feasible. Some sherds were too indistinct to determine a form, and other could only be identified as a generic hollow ware. The form divisions include a variety of bowls, jars, plates, cooking pots, etc. The list of forms was created in consultation with and respect to the work of other archaeologists in the region. Table 6.4 summarizes prevalence of various forms across the site. Overwhelmingly the assemblage is composed of various types of bowls (n=1989). A very small subset of the assemblage is flat ware (n=45). Cooking pots, storage crocks, and jars all compose roughly 9-7% of the assemblage each. The samples selected for external analysis were selected so all of the various form types were represented.

The domestic ware assemblage was also examined in terms of the surface treatments present, and these surface treatments were a significant factor in determining the samples for external analysis. Table 6.5 summarizes the prevalence of different surface treatments across the different areas of excavation. The table also shows the count of samples that were selected for each surface treatment to ensure that the subset of artifacts sent for external analysis was representative. Only 24.1% of the domestic earthenware assemblage had no surface treatment, and the remaining 75.9% of the assemblage featured surface treatments like glazes, slip, or decorative incised lines (see Table 6.4). There were three major lead glaze colors present in the assemblage: green, clear/brown, and chalky/yellow. In some cases, multiple glaze colors were present in a single sherd or vessel. The green glaze was the most prevalent surface treatment at 37.4% of the domestic ware assemblage. The chalky glaze is believed to be a degraded glaze due to cooking processes, and this glaze was found on 11.6% of the assemblage. Another significant feature of identified in the assemblage was the presence of burned artifacts, which is typically a sign of the vessels use in cooking. A burned surface was characteristic of 2.7% of the assemblage, and 18 of the samples sent for external analysis were burned. A subset of these burned artifacts were cooking pots with coarse temper from the earliest contexts in Locus 1 which will likely cluster together as a compositional group similar to the Barbadian clay samples.

The differences in the coarse earthenware assemblages of Locus 1 and Locus 2 reflect the differences in uses at these two areas of the plantation across the various periods identified in the well-stratified excavated contexts. Both the industrial and domestic assemblages increase drastically following the plantation’s transition to sugar. At Locus 1, this increase is dominantly industrial wares. The increase in domestic wares can be attributed to the increase in enslaved laborers who settled at the Locus two village site on the plantation. The characteristics identified in the analysis of the earthenware were used to select the representative sample sent for external chemical analysis. This diverse representation of samples will allow for an examination of the correlation of characteristics with compositional groups in order to make generalized whole assemblage assessments of manufacture origin.

Table 6.4: Coarse Earthenware Domestic Form Type

	Locus 1	Locus 2	Locus 3	Total	Samples
Generic bowl	66	1838	36	1940	24
Small, shallow bowl	0	31	6	37	2
Footed bowl	0	3	2	5	4
Flat plate	1	44	0	45	5
Cooking pot*	13	287	14	314	29
Storage crock	16	242	4	262	2
Restricted orifice pot, jar	2	237	1	240	12
Other**	2	22	0	24	0
Unidentifiable	49	566	12	627	0

*The cooking pot count includes a variety of more specific forms including open cooking bowls, yabbas, and flat-bottomed cooking pots.

**This count includes miscellaneous forms including, but not limited to, lids and mugs.

Table 6.5: Surface Treatment on Domestic Coarse Earthenware

		Green Glaze	Clear Glaze	Chalky or Yellow Glaze	Slipped	Burned	Decorated Incised Line	None
Locus 1		29	9	1	4	14	5	67
Locus 2	**HA1**	404	153	62	12	18	49	118
	HA2	105	41	27	0	5	11	62
	HA3	485	247	227	7	22	51	270
	HA4	112	46	49	0	12	12	170
	STPs	165	82	36	0	9	9	118
Locus 3		8	4	4	0	14	2	39
Total		**1308**	**582**	**406**	**23**	**94**	**139**	**844**
% of Domestic Assemblage		**37.4**	**16.7**	**11.6**	**0.7**	**2.7**	**4.0**	**24.1**
Samples		20	8	13	4	18	10	20

Figure 6.4: Locus 1 Date Distribution of Domestic Earthenware

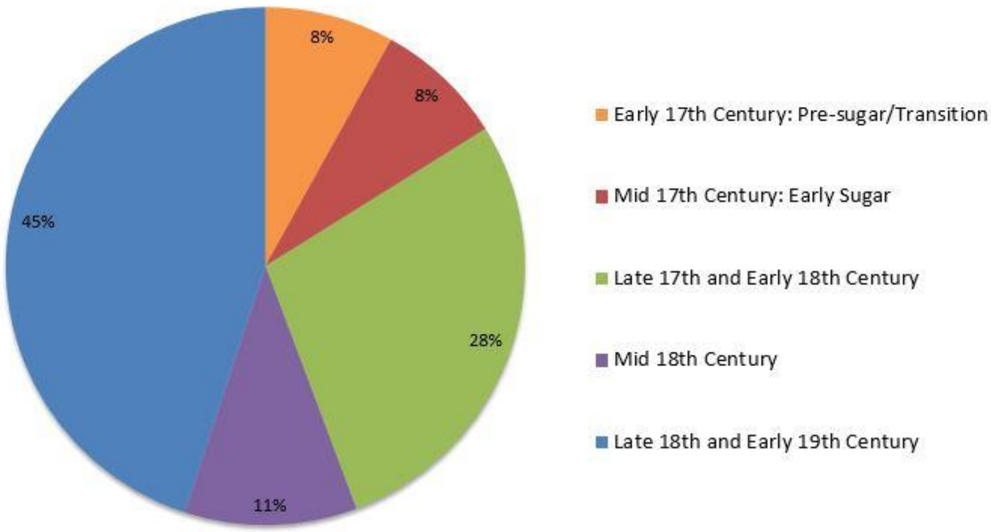
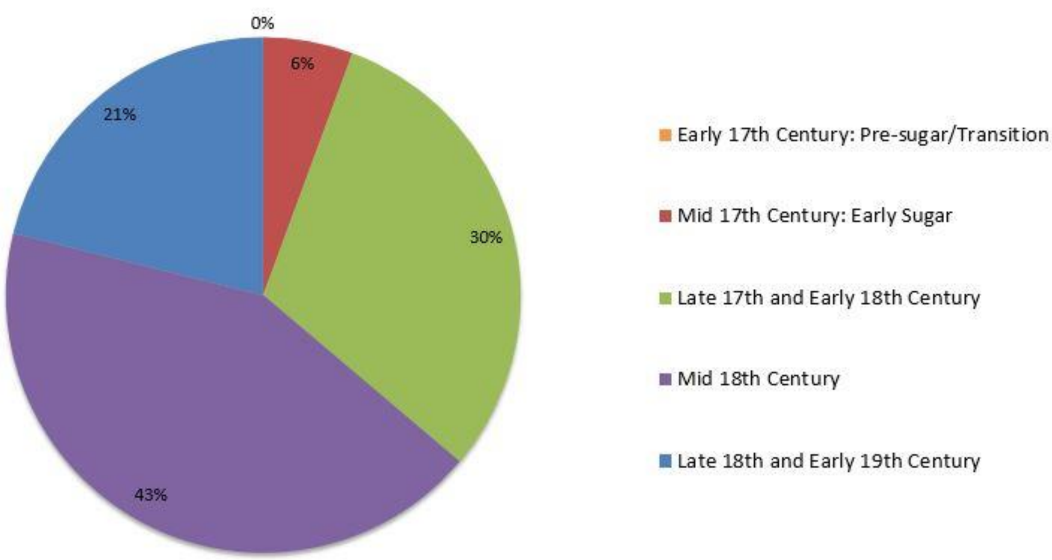


Figure 6.5: Locus 2 Date Distribution of Domestic Earthenware



Chapter 7:

Conclusion

7.1 Conclusion and Expected Results

The expansive research of Trents Plantation has an overarching goal of providing information on various aspects of plantation life in Barbados, and this project specifically focused on the coarse earthenware recovered from the archaeological excavations of the site, especially the assemblage from Locus 1 and Locus 2. The archaeology of these three loci (with a focus on Locus 1 and 2) reflects the broad economic and social changes that Barbados experienced as the region shifted from small-scale agroindustry to large-scale sugar monoculture. The well-stratified contexts of Locus 1 allow for the examination of the shift to sugar during the mid 17th century. With the arrival of sugar, Barbados's economic, physical, and cultural landscape dramatically changed, which is evident in the excavations at Trents. Industrial sugar wares that were integral to the sugar manufacturing process dominated the material culture assemblage at Locus 1 following the shift to sugar. The archaeology of Locus 2 reveals information about the plantations reliance on enslaved labor following this shift to sugar. The coarse earthenware of Locus 2 is dominantly domestic, which reflects the fact that the area's purpose was a residential area for enslaved laborers.

The specific goals of this project were two-fold. First, this project included an analysis of all coarse earthenware objects excavated from the various areas of this site using a standard system that was designed with this project and preceding Caribbean archaeological research in mind. This analysis was further examined based on bulk composition and distribution across the site in order to provide insight to the various economic, domestic, and social usages of distinct spaces within the plantation. This analysis was also used to determine a representative sample of artifacts sent for external chemical analysis in order to answer the research question and second research goal of this project: were some of the coarse earthenware ceramic artifacts excavated at Trents Plantation manufactured on island or were they all imported?

Documentary and archaeological research in Barbados show that industrial and domestic coarse earthenware was manufactured on-island (Handler and Lange 1978; Scheid 2015). Therefore, it is likely that at least some of the earthenware assemblage from Trents was locally manufactured. The success of determining the origin of manufacture of some of the earthenware from Trents is rooted in the fact that there are measurable chemical differences in ceramics manufactured in different areas with the use of different clays and clay mixes. Barbados and the United Kingdom have a drastically different geologic formation history, and the clays from these two areas would have enough chemical variation from each other to form separate compositional clusters that could be determined by the archaeometric techniques selected.

A sample of 119 coarse earthenware artifacts, clay samples, and manjack was selected to represent the variety of coarse earthenware excavated. All coarse earthenware samples for this project were tested using both INAA and LA-ICP-MS in order to determine their chemical characteristics and compositional groupings. These two analytical methods are well suited for their use together and comparability, so the use of both systems in conjunction ensuring reliability in the results. Further LA-ICP-MS and XRF analysis was done on a subset of the samples sent for external analysis, so information on the glaze and surface treatment will supplement the compositional analysis.

Though we have not yet received the results from the external analyses, based on the visible characteristics the chemical characteristic groupings established by these analysis may breakdown as follows. For industrial wares, there will likely be at least two clusters. One cluster would be the European made sugar wares, and the second cluster would be the Barbadian produced sugars. The black substance on some of the industrial wares is hypothesized to be caused by a treatment from the local manjack, which will be supported if they show a chemical similarity with the manjack samples.

The clustering of the domestic wares will likely be more complicated than that of the industrial samples. The unglazed wares are expected to cluster together, and, as they are the least refined of the samples, they will likely cluster with Barbadian clay samples, which would support on-island production of these wares. The glazed domestic wares are projected to create at least two clusters. At least one of these clusters will be distinctly non-Barbadian and non-Caribbean. This cluster will likely be associated with the Staffordshire or Buckley samples that were included as controls. An anticipated cluster that would indicate Barbadian manufacture of glazed domestic wares may feature a large range in compositions and thus would not be a tight cluster. The actual clustering may be more complicated with various micro-clusters due to different clay mixture compositions used in manufacturing in different areas. The results from INAA and LA-ICP-MS are expected to be similar to each other rather than contradictory, and this would further ensure the reliability of the results.

7.2 Future Research

There is ample research related to Trents Plantation and its coarse earthenware left to do beyond the chemical analysis of the 119 samples that were sent for this project. The excavation at Trents, though largely complete, is not yet finished. Further excavations at Locus 3 will provide more insight into this relatively unexamined area. A few units in the other two loci may be placed to specifically target the earliest contexts of pre-sugar, the transition to sugar, and the height of sugar at this plantation.

Further samples will also be sent for INAA and LA-ICP-MS analysis. The earthenware sent is representative of the assemblage, and the ceramic groups that will be established through these external analyses should also be representative. The additional samples sent will be to aid in the provenance research goal. These additional samples will include clay samples from certain excavation areas of Trents, especially in Locus 2. These clay samples may have a different chemical signature than the Scotland District clay that was sent in the first group of samples, and may better correlate with the compositional groups established. Furthermore, we are in the process of obtaining sugar ware samples that were known to be produced in the UK to provide a known compositional group from that area of manufacture. These additional samples will better allow a correlation between compositional groups established with the first group of samples and an area of manufacture. Thus while we have determined that it is likely that at least a portion of the earthenware was manufactured in Barbados, the additional samples would provide more verifiable evidence supporting this claim. The Barbados sample will also be compared with samples form Virginia and England to assist in determining if the sherds were made in Barbados, England, or perhaps some other locality.

The applicability of this research extends beyond Trents plantation. Trents is just one example of a larger colonial history in Barbados, so the archaeological research of this complex can provide greater insight into the economic and social shift that coincides with the transition to a sugar plantocracy. With its pre and post sugar contexts, Trents is ideally situated to examine the impact that the rapid shift to sugar had on the lives and labor relations of residents of

Barbados. The shift to a capitalistic sugar plantation directly resulted in the consolidation of small farms into large plantations and increased reliance on slavery with exploitation of humans from West Africa. This shift in land use not only impacted Barbados, but also had global repercussions in the broader Atlantic world that included the Caribbean, the Americas, Africa, and Europe.

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Appendix A: Enslaved Laborers of Trents Plantation

Table 1: The names of the 66 enslaved laborers on the estate in 1722, the time of the transfer of ownership from Henry Gibbs to Reverend William Trent, are listed. (Adapted from Armstrong 2015a using BDA Deeds RB 3(32): 308-9).

Men	**Women**	**Boys**	**Girls**
Tom-Cane	Dutches	Quashi	Barbary
Frank	Hagar	Cattpde	Little-Hagar
Evan	Joney	Jeremy	Maria
Old George	Ancon	Kitty	Hannah
Saul	Amembah	Peter	Bessy
Peter	Swanna	Med	Maria
Old Joe	Molley	Canterbury	
David	Maria	Mingo	
James	Betty	Cadey	
Sambo	Sampson	Sambo	
Young George	Bosanna	Jack	
Joe	Bennbah	Sampson	
John	Accobah	Harry	
Gabwell	Annie	Willy	
Mato	Billinda	Prince	
Caiser	Bulla	Cairu	
Caney	Sue	Jeromy	
Ancore	Ona	Hamford	
Ampw	Paupa-Mary	Sambo	
Ebo Sampson	Sarrah		
	Addah		
20	**21**	**19**	**6**

Table 2: During the period of emancipation, John Trent claimed financial retribution for the 167 (77 male and 90 female individuals). On May 9, 1836, the British government compensated him £3596 9S 5D for his loss of property (UCL 2016). Table 2 is a list of some of the previously enslaved individuals and their census information compiled from an 1834 register of slaves from John Trent's Ovens Mouth (Trents) Plantation. (Table Adapted from Armstrong 2015a and UCL 2016).

			Age				**Occupation**	
Male	**Female**	**Name**	**Year**	**Month**	**Colored**	**Black**	**Domestic**	**Laborer**
X		William	60		X			X
X		Sr. Jack	40			X		X
X		Ren	32			X		X
X		John Abel	31		X			X
X		William Thomas	27		X			X
X		Jack	47		X			X
X		William Johnson	47			X		X
X		George Seale	37			X		X
X		John William	22			X		X
X		Frank	49			X		X
X		Sayso	42			X		X
X		Sam	61			X		X
X		Andrew	53			X		X
X		Charles	39			X		X
X		Prince	36					X
X		James Edward	37		X			X
X		Richard	44			X		X
X		Abel	41			X	X	
X		Ned	51			X		X
X		Billy Grace	34			X		X
X		Obing	35			X		X
X		Quashay	29			X		X
X		Abelle Cobhand	34			X		X
X		Sam Prince	34			X		X
X		John Lyas	39			X		X
X		Will George	41			X		X
X		Kitt Will	37			X		X
X		Penny	37			X		X
X		Jack Ned	36			X		X
X		Ashington	30			X		X
X		Quaco Sam	27			X		X
X		Sam Richards	25			X		X
X		Sampson	23			X		X
X		Hope	31			X		X
X		Forster	22		X			X
X		Sam Able	24			X		X

			Age				Occupation	
Male	**Female**	**Name**	**Year**	**Month**	**Colored**	**Black**	**Domestic**	**Laborer**
X		James Thomas	27			X		X
X		George King	27			X		X
X		John Francis	18			X		X
X		Francis Willington	18			X		X
X		Robert King	30			X		X
X		Charles Thomas	18			X		X
X		James Thomas	24		X			X
X		Peter	15			X		X
X		Will James	18			X		X
X		Stephen	17		X			X
X		Robert Dickson	17		X		X	
X		Ben/Ben James	17			X	X	
X		Losey	12	6		X		X
X		Quanimo Rye	17			X		X
X		John Rye	14			X		X
X		William Seale	10	3		X		X
X		Sam Toney	9	8		X	X	
X		Jack William	10	3		X		X
X		Ben Henry	10			X		X
X		Philip	7	3		X		X
X		Lammy	7	5		X		
X		Casar	5	5		X		
X		William Thomas	6	8		X		
X		John Edward	5	5		X		
X		John Adam	6	7		X		
X		Jr. Jack	6	6		X		
X		Katt Taylor	7		X			
X		George Holder	4	10		X		
X		Henry Williams	4	7		X		
X		Sam Williams	4	5		X		
X		Frank	4	2		X		
X		Charles Richards	3	7		X		
X		Henry Thomas	2	5	X			
X		Robert Henry	2	3		X		
X		Scipio	2			X		
X		King	2			X		
X		Jacob	2			X		
X		John Thomas	2			X		
X		Thomas Henry	2			X		
	X	Bes Hagar	78			X		
	X	Mulatto	82			X		
	X	Phillida	67			X		

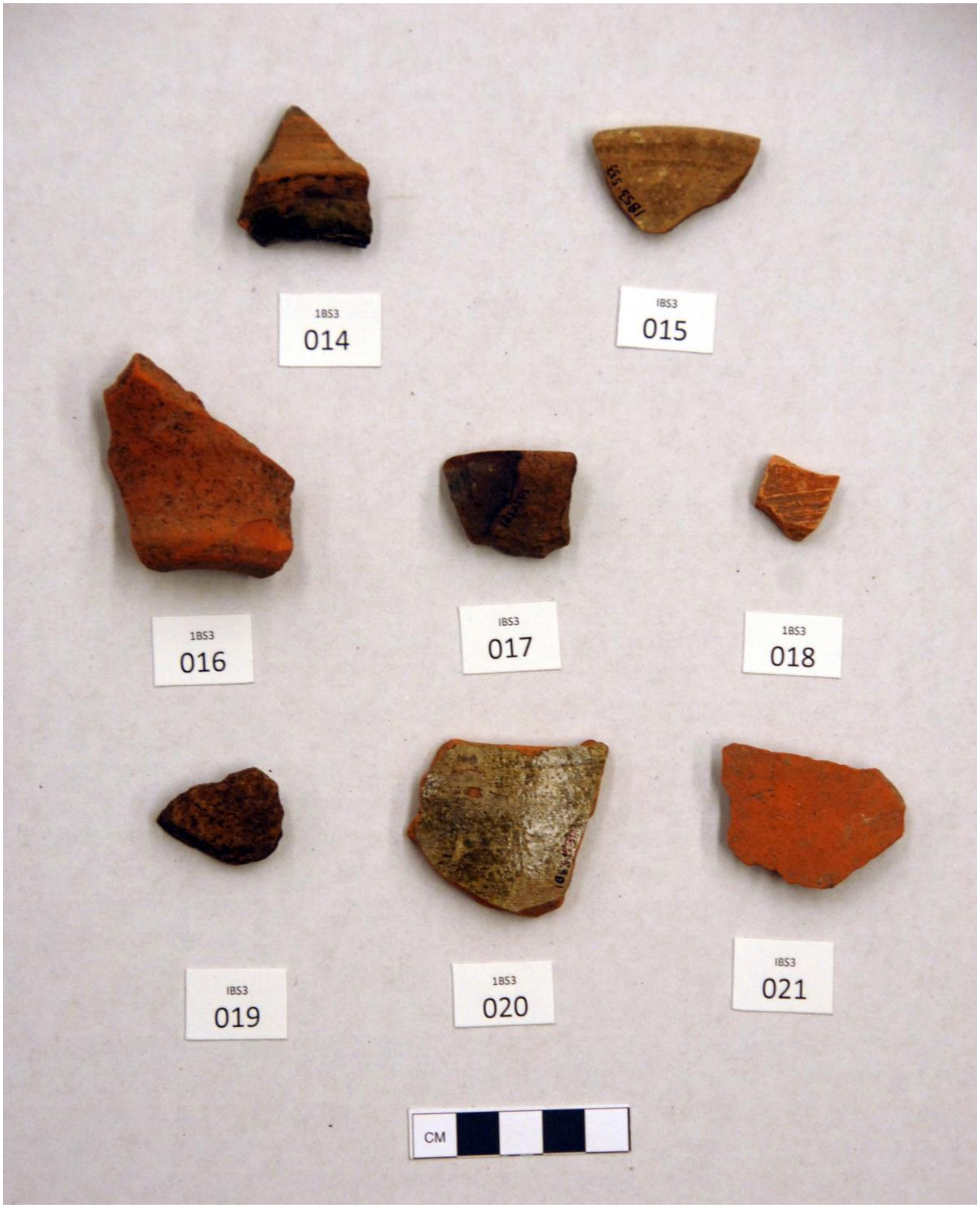
			Age				Occupation	
Male	**Female**	**Name**	**Year**	**Month**	**Colored**	**Black**	**Domestic**	**Laborer**
	X	America	61			X		X
	X	Little Sue	61			X		X
	X	Mary Frances	26			X	X	
	X	Anna Maria	30		X		X	
	X	Moll Sambo	70		X		X	
	X	Pawpaw	70			X		X
	X	Mary Mimbo	63			X		X
	X	Moll Shanty	65			X		X
	X	Nancy Bruce	67			X		X
	X	Betty Harper	57			X		X
	X	Netty	60			X		X
	X	Sabina	56			X		X
	X	Florah Jane	53			X		X
	X	Dolly	57			X		X
	X	Affey	49			X		X
	X	Eve	32			X		X
	X	Agness	53			X		X
	X	Jenny Jane	37			X		X
	X	Jenny Bruce	35			X		X
	X	Elizabeth	33			X		X
	X	Little Mimba	56			X		X
	X	Henny	36			X		X
	X	Hagar	31			X		X
	X	Christian	27			X		X
	X	Eliza Jane	36		X			X
	X	Sally Battyn	33			X		X
	X	Lilly	52			X		X
	X	Betsy Ann	25			X		X
	X	Sukey Ann	27			X		X
	X	Peggy	38			X		X
	X	Yabah	47			X		X
	X	Mana	41			X		X
	X	Phillipa	42			X		X
	X	Nanny	31			X		X
	X	Little Bess Hagar	39			X		X
	X	Myerilla	47			X		X
	X	Queen	48			X		X
	X	Flora	36			X		X
	X	Patience	48			X		X
	X	Polly Judy	28		X			X
	X	Mary Bella	23			X		X
	X	Mary Delia	23			X		X
	X	Nancy	31			X		X

			Age				Occupation	
Male	**Female**	**Name**	**Year**	**Month**	**Colored**	**Black**	**Domestic**	**Laborer**
	X	Judy	26			X		X
	X	Jenny Frances	26			X		X
	X	Nanny Will	28			X		X
	X	Nester/Violet	31			X		X
	X	Louisa	27			X		X
	X	Philly John	21			X		X
	X	Margaret Ann						
	X	Sally Kitty						

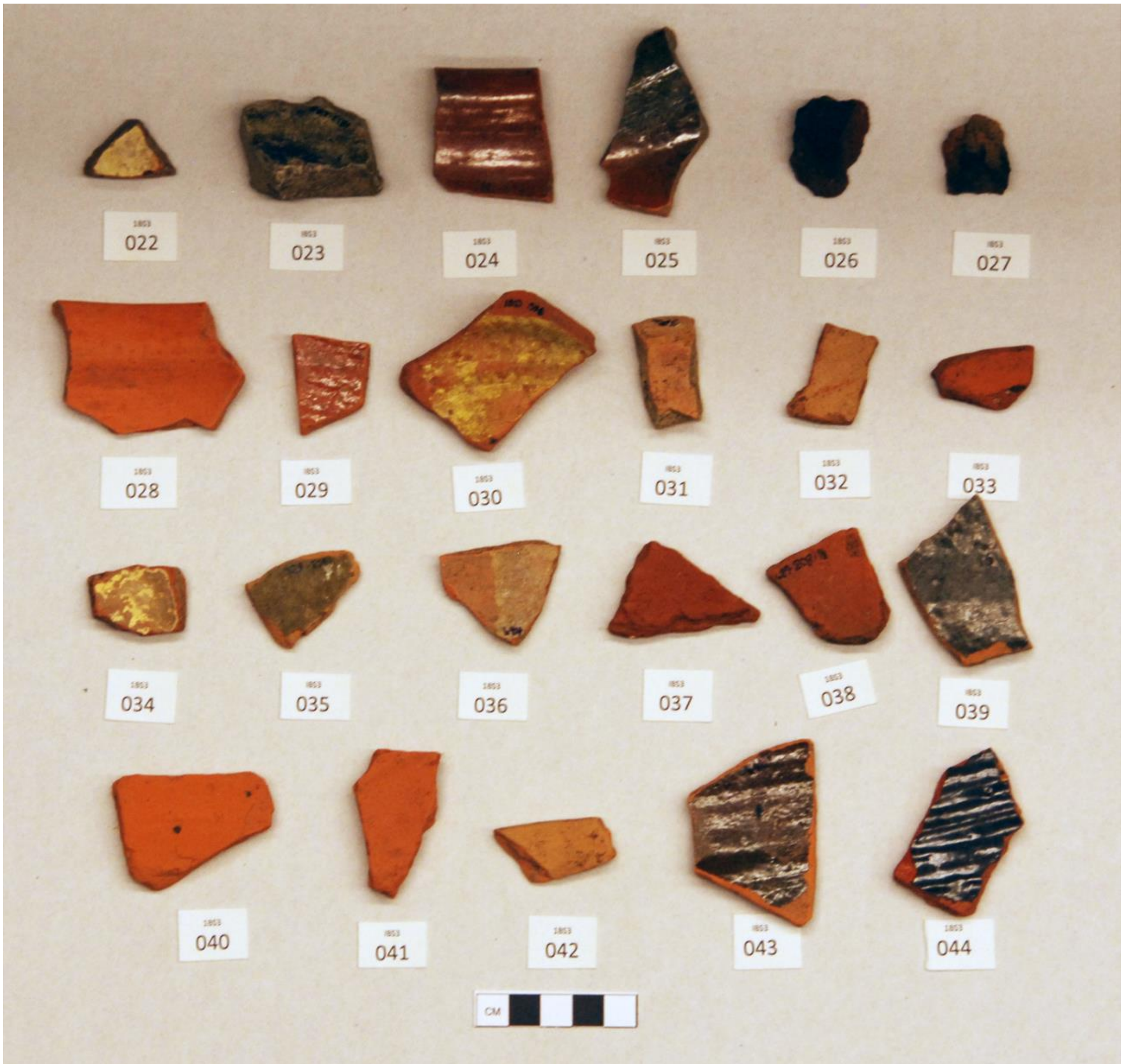
Appendix B: Images of Samples

This appendix features the images of all sherds and samples that were sent for external analysis. Each sherd is identified by the code IBS3, which represents the excavation identifier assigned to this project and a three-digit number, which is the specific identifier for each sample. Samples 114, 115, and 116 are clay and pottery samples from Chalky Mount and are not pictured here.

Samples 001-013 are from Locus 2 House Area 1. These samples are mainly domestic both glazed and unglazed. Samples 001 and 003 are industrial.



Samples 014-021 are from Locus 2 House Area 2. Sample 016 is industrial. Sample 021 is indeterminate. The rest are domestic.



Samples 022-044 are from Locus 2 House Area 3. Sample 044 is red-bodied with a black glaze and a rippled surface; this is sherd is typical of Buckley wares. The rest of the samples are coarse earthenware, and most of them are domestic.

Samples 045-057 are all domestic sherds from Locus 2 House Area 4.

Samples 058-085 (see next page) are domestic sherds from Locus 1.


IBS3
074
IBS3
075
IBS3
076
IBS3
077
IBS3
078
IBS3
079
IBS3
080
IBS3
081
IBS3
082
IBS3
083
IBS3
084
IBS3
085
CM

Samples 086-109 (see next page for sample 106-109) are industrial sherds from Locus 1.

Samples 106 and 107 were selected to test their black residue. Samples 108 and 109 were selected for to test their white clay slip.

Samples 110-113 are domestic sherds from Locus 3.

Samples 117 and 118 are manjack samples from the Springvale Eco Heritage Museum in Barbados. Sample 119 is a sherd of slipware manufactured in Staffordshire, England.

Appendix C: Earthenware Typology for Trents Plantation

Below is the analytic typology that we developed and applied to the earthenware assemblage from Trents Plantation. The metric system was used for measurements. The analytical system also included a place for notes where the specific glaze color, Muncell color of the paste, and other information was placed along with notes of potential mends and sketches made.

Earthenware Characteristic	Descriptive Codes
Weight	
Thickness (average)	
Length (maximum)	
Form Type	0- Indeterminate 1- Domestic 2- Industrial 3- Architectural, tile 4- Utilitarian, home and garden (i.e. flower pot)
Industrial/Architectural Form	0- Undefined 2- Sugar cone 3- Drip jar 4- Flower pot 5- Flat tile 6- Curved tile 7- Field tile 8- Glazed wall or patio tile
Form Type 1 (Domestic earthenware forms)	0- Unknown 100- Bowl 101- Open cooking bowl (shadle) 102- Jar (Jo) 103- Coal pot (Tesson) 104- Monkey jar (Krish) or water jug 105- Cylindrical jar 106- Cooking pot or yabba 107- Flat bottomed cooking pot 108- Pot (caneri), glazed for meat 109- Ovaloid bowl (Lo School) 110- Frying pan 111- small, shallow bowl 112- Griddle 113- Plate (flat) 114- Handled pot

	115- Storage crock 116- Footed bowl 117- Restricted orifice vessel (see also 105) 118- Flat plate or charger 120- Lid to pot 121- Restricted orifice cooking pot 122- Restricted orifice pot (no signs of cooking) 123- Mugs and tankards 124- Pot with rim ledge 125- Vase 128- Tourist ware 129- Colandar 130- Milk jar or churn
Manufacturing/Production Technique	0- Unknown 1- Wheel 2- Thrown or hand turned 3- Pulled 4- Slab 5- Mold 6- Combination
Sherd Type (part of vessel)	1- Lip 2- Rim 3- Neck 4- Shoulder 5- Handle 6- Body 7- Base 8- Foot 9- Lid 10- Spout
Interior Surface Treatment	0- Unglazed 2- Glazed, unknown type 3- Lead glaze 7- Slipped 8- Burnished 12- Iron oxide 13- White clay 14- Black stripe of patch 15- Fire cloud 16- Burned

	17- Partial glaze, drips of glaze 18- Decorative band, incised 19- Corrugated 20- Ripple 21- Rim lip banded, incised
Exterior Surface Treatment	See Interior Surface Treatment codes
Additional Interior Surface Treatment	See Interior Surface Treatment codes
Additional Exterior Surface Treatment	See Interior Surface Treatment codes
Diameter	Rim or base opening
Color of Paste (Use Muncell's Color Chart)	0- Unknown 3- Buff 4- Pink 5- Red 6- Brown 7- Grey 8- Orange 9- Beige 10- Yellow
Core Present	0- Absent 1- Present
Core Detail, color	1- Black, grey 2- Yellow
Temper Size	0- Not present 1- 0-0.5 mm, very fine 2- 0.5-1mm 3- 1-2 mm 4- 2-3mm 5- 3+ mm
Temper Variability	0- None or Unknown 1- Silt, Poorly Sorted 2- Fine Sand, Poorly Sorted 3- Course Sand, Poorly Sorted 4- Silt, Well Sorted 5- Fine Sand, Well Sorted 6- Course Sand, Well Sorted

Temper Composition	0- None or unknown 1- Volcanic 2- Limestone 3- Mica 4- Quartz 5- Shell 6- Organic 7- Other (define in notes)